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## **Wisconsin Farmers' Institutes : a hand-book of agriculture. A report of the twenty-fifth annual closing Farmers' Institute, held at Hudson, Wisconsin, March 14, 15, 16, 1911. Bulletin No. 25 1911**

Wisconsin Farmers' Institutes

Madison, Wisconsin: Democrat Ptg. Co., State Printer, 1911

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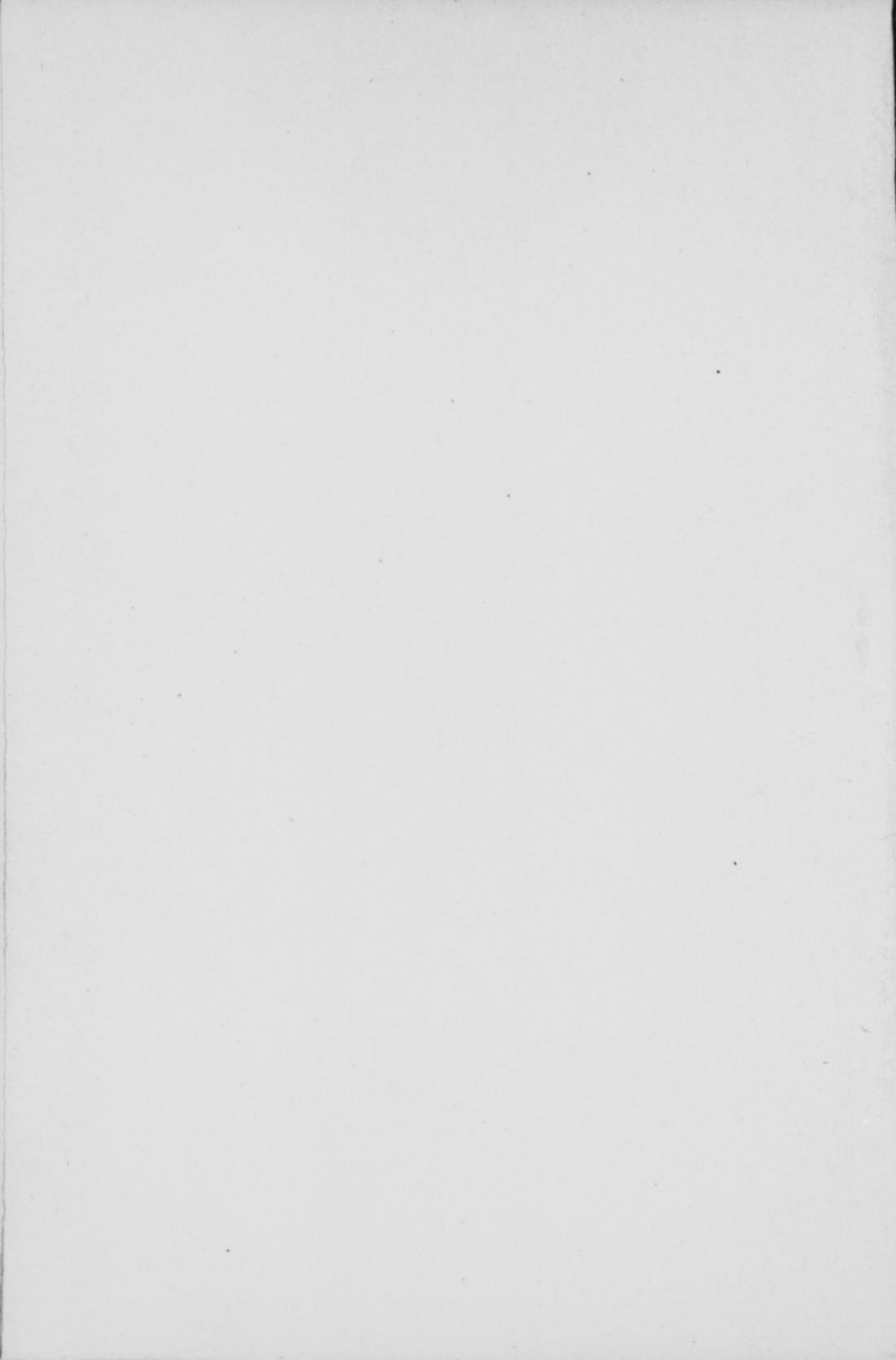
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of the  
**University of Wisconsin**





Let me live in my house by the side of the road  
Where the race of men go by—  
They are good, they are bad, they are weak, they are strong,  
Wise, foolish—so am I.  
Then why should I sit in the scorner's seat  
Or hurl the cynic's ban?—  
Let me live in my house by the side of the road  
And be a friend to man.

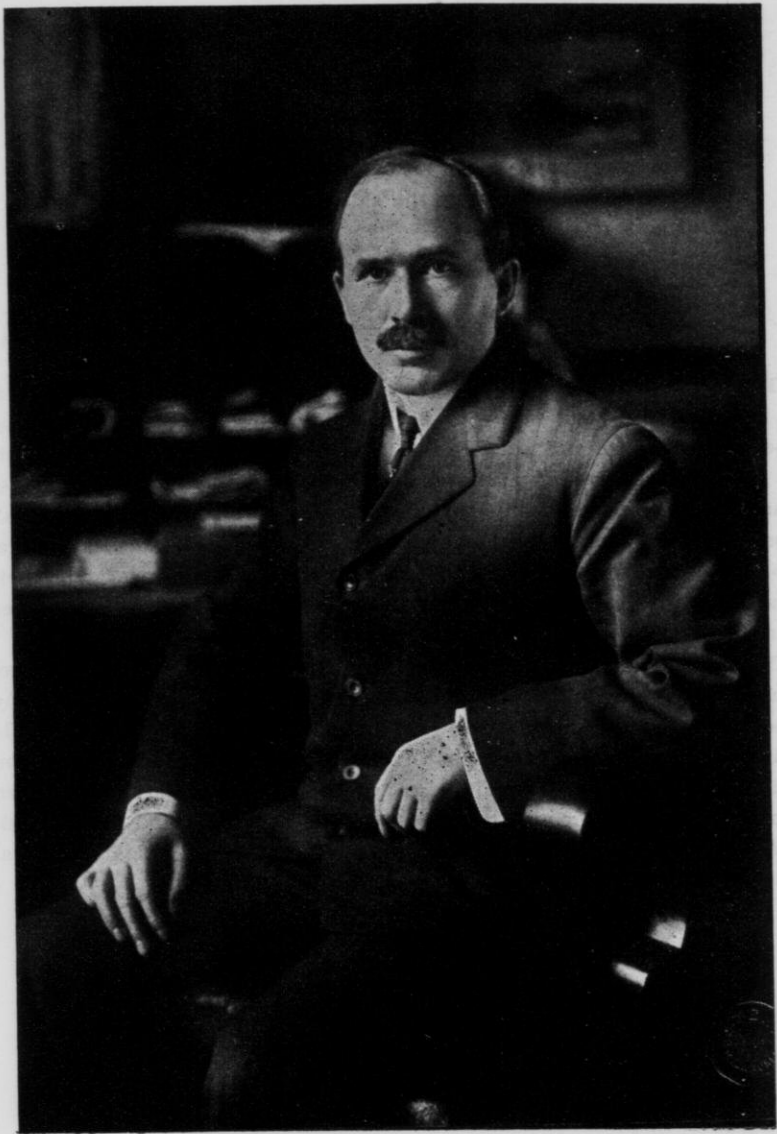
—Sam Walter Foss.

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The earth was made to be farmed and man was made and sent to farm it. Whenever and wherever he has staid close with his job he has prospered; whenever and wherever he has left it very far, he has been, by so far, less prosperous; whenever and wherever he has left it altogether he has made a dead failure. I am about ready to say, I believe, that all the powers and faculties with which men are endowed,—mental, moral and physical, have found, from Eden to this day, and will ever find their highest and most perfect adaptation to the conditions of life in the open country, tilling the ground for a living and a business. \* \* \* \* \*

Civilization is agriculture; agriculture is civilization; civilization and agriculture are one. There is nothing before, nothing higher, nothing beyond agriculture. Agriculture is the original, natural, necessary, single and universal business of mankind. Every other art, trade, profession or calling whatsoever is secondary and dependent and useful only when and in such degree as it may contribute to the one great and useful business, Agriculture. We must teach Agriculture; it is the social, political and economical salvation of the nations.

—L. H. Kerrick.



Gov. F. E. McGovern.

# WISCONSIN Farmers' Institutes

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A HAND-BOOK OF AGRICULTURE



BULLETIN No. 25  
1911

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A Report of the Twenty-Fifth Annual Closing Farmers'  
Institute, Held at Hudson, Wisconsin,  
March 14, 15, 16, 1911

*"Steadiness of national character goes with firmness of foothold  
on the soil."*—PRESIDENT DAVID STARR JORDAN.

EDITED BY  
**GEO. McKERROW**  
SUPERINTENDENT

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FIFTY THOUSAND COPIES ISSUED

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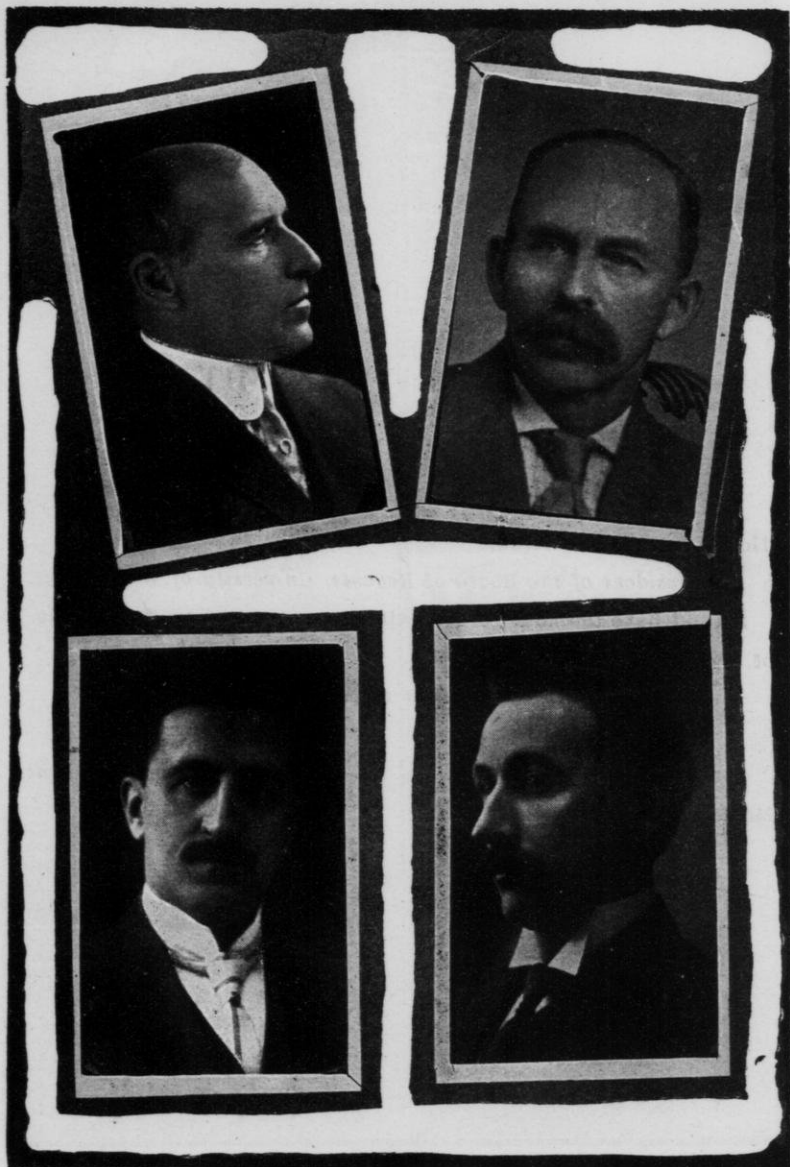


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Jas. F. Trottman.  
A. J. Horlick.

Jas. W. Martin.  
A. P. Nelson.

Four of the five members of the Committee of College of Agriculture  
of Board of Regents.

## LETTER OF TRANSMITTAL

---

HON. JAMES F. TROTTMAN,

*President of the Board of Regents, University of Wisconsin:*

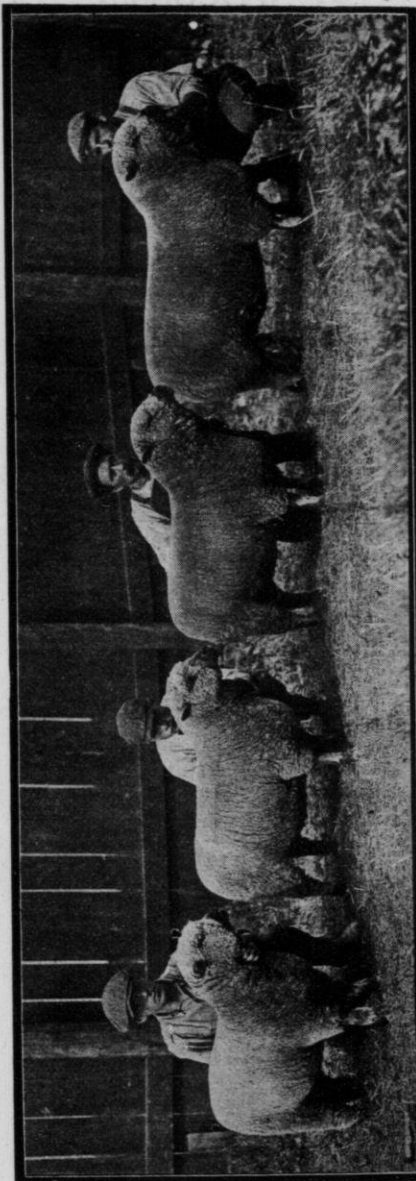
SIR:—I have the honor of herewith presenting to you Bulletin No. 25 of Wisconsin Farmers' Institutes.

Most respectfully yours,

GEORGE MCKERROW,

*Superintendent.*

Madison, W.s., November, 1911.



Champion Shropshire flock at Wisconsin State Fair, September 14, 1911.  
Champion Shropshire flock at New York State Fair, September 14, 1911, owned by Geo. McKerrrow  
& Sons, Waukesha Co., Wis.

# THE UNIVERSITY OF WISCONSIN

## Board of Regents.

Charles R. Van Hise, President of the University, *ex-officio*.

Charles P. Cary, State Supt. of Public Instruction, *ex-officio*.

State at Large, Gilbert E. Seaman.

6th District, Miss Elizabeth F. Walters.

1st District, A. J. Horlick.

7th District, Edward Evans.

2nd District, T. E. Brittingham.

8th District, Mrs. Florence G. Buckstaff.

3d District, J. W. Martin.

4th District, Theodore M. Hammond.

9th District, E. A. Edmonds.

5th District, James F. Trottman, Pres.

10th District, Granville D. Jones.

11th District, A. P. Nelson.

M. E. McCaffrey, Secretary.

## Organization.

The University embraces—

The College of Letters and Science.

The College of Engineering.

The Law School.

The College of Agriculture.

The Medical School.

The Graduate School.

The Extension Division.

The Summer Session.

The College of Letters and Science embraces—

General Courses in Liberal Arts.

Special Courses which include:

Course for Normal School Graduates.

Chemistry.

Commerce.

Journalism.

Pharmacy.

Music.

Training of Teachers.

The Summer Session embraces—

Courses in the various colleges and schools in the University.

The Medical School embraces—

The First Two Years of a Medical Course.

The Extension Division embraces—

The Department of Instruction by Lectures.

The Department of Correspondence-Study.

The Department of General Information and Welfare.

The Department of Debating and Public Discussion.

The College of Engineering embraces—

The Civil Engineering Course.

The Mechanical Engineering Course.

The Electrical Engineering Course.

The Chemical Engineering Course.

The Mining Engineering Course.

The College of Agriculture embraces—

The Experiment Station.

The Long Agricultural Course.

The Middle Agricultural Course.

The Short Agricultural Course.

The Dairy Course.

The Farmers' Institutes.

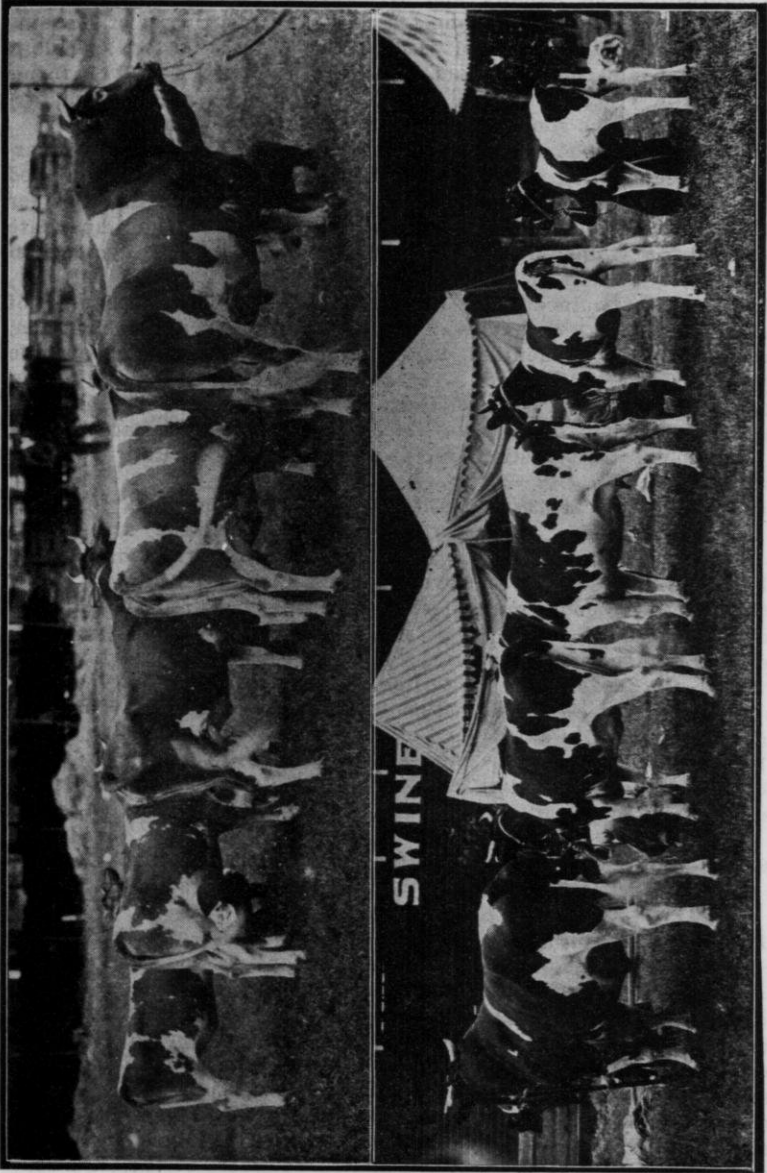
Home Economics.

The Law School embraces—

A Three Years' Course.

## Branches of Study.

The University presents a wide range of study embracing more than three hundred subjects. Something of the extent and variety of these may be indicated by the following synopsis: Twelve languages are taught, viz.: Greek, Latin, Sanscrit, Hebrew, German, Russian, Norse, French, Italian, Spanish, Anglo-Saxon and English. In Mathematics there are thirty-nine special courses. Under the Sciences there are a large number of courses in each of the following: Astronomy, Physics, Chemistry, Geology, Mineralogy, Zoology, Botany, Anatomy, Bacteriology, Phar-



Champion Guernsey herd at Wisconsin State Fair and International Dairy Show, Milwaukee, 1911,  
 owned by Fox Bros., Waukesha, Wis.  
 Champion Holstein herd at Wisconsin State Fair and International Dairy Show, Milwaukee, 1911,  
 owned by S. A. Baird & Son, Waukesha, Wis.

In history there are few courses in Political Economy, but  
 in Political Science, there are few in Moral Science, there are few  
 in Contract Psychology, Ethics, Aesthetics, Logic and  
 Education. There are numerous courses in Music, and twenty courses  
 in Physical Education.

507 volumes besides special professional and technical libraries, making  
 all more than 600 volumes, including pamphlets, fine showing very ex-  
 ceptional opportunities for teaching and special research.  
 Any person who desires information in regard to any of the colleges or  
 W. H. HERRMAN  
 Registrar

macy. In History there are fifty courses; in Political Economy, fifty-three; in Political Science, forty-five; in Mental Sciences there are fifty-five embracing Philosophy, Psychology, Ethics, Aesthetics, Logic and Education. There are nineteen courses in Music, and twenty courses in Physical Education.

**Physical Culture:**—The Armory and Gymnasium is one of the largest buildings for its purposes connected with any institution of learning in the country. It is provided with rooms for lectures on Physiology and Hygiene, and for class and individual exercise in all the forms of gymnastic practice. There are also the most abundant and approved facilities for shower, sponge and swimming baths.

Adequate accommodations are provided for the women's gymnastics by the completion of Lathrop Hall, which has been fully equipped and is now ready for occupancy. This furnishes ample facilities for systematic courses for young women, and is under the immediate direction of a trained instructor. This provides a new gymnasium for the exclusive use of women.

**In Mechanics and Engineering:**—Elementary Mechanics, Mechanics of Material, Dynamics, Mechanics of Machinery, Theory of Construction, Thermodynamics, Elementary Surveying, Railroad and Topographic Surveying, Geodesy, Sanitary, Hydraulic, Railroad, Electrical, Steam Engineering, Hydraulic Motors, Hoisting Machinery, Theory and Construction of Locomotives, Railway Locomotives, Railway Location, Railway Equipment, Construction and Maintenance of Way, Railroad Field Work.

**In Electricity:**—Electrical Testing, Electrical Plants, Electrical Construction, Electrochemistry, and various forms of drawing are given; also shop work in wood, iron, brass, both hand work and machine work, machine designing, construction and testing machines.

**In Agriculture:**—Various courses are given in agriculture, Animal Husbandry, Farm Management, Dairying, Agricultural Chemistry, Soils, Veterinary Science, Agricultural Physics, Agronomy, Horticulture and Economic Entomology, Bacteriology, etc.

**In Law:**—Courses in Equity, Jurisprudence, Real Property, Constitutional Law, wills, Contracts, Torts, Practice and Pleading, Law of Evidence, Corporations, Domestic Relations, Admiralty, Insurance, Estoppel, Partnership, Taxation, Criminal Laws, Common Carriers, Medical Jurisprudence, Probate Law, Code Practice, Agency, etc.

**In Pharmacy:**—Courses in Practical Pharmacy, Pharmaceutical Chemistry, Materia Medica, Pharmaceutical Botany and Practical Laboratory work.

**General Facilities:**—The Faculty embraces four hundred and thirty-nine instructors. The laboratories are new, extensive and well equipped; embracing the Chemical, Physical, Metallurgical, Mineralogical, Geological, Zoological, Botanical, Bacteriological, Civil, Electrical and Mechanical Engineering, Agricultural and Pharmaceutical Laboratories, Seminars are held for advanced study in History, Language, Literature, Mathematics, and other branches.

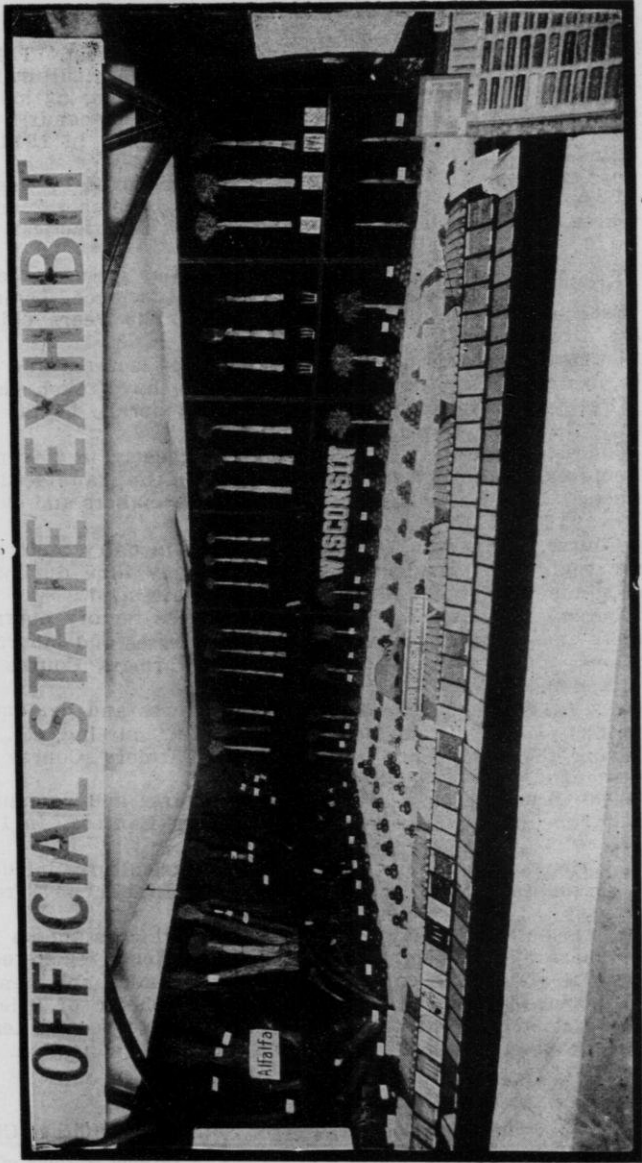
The libraries accessible to students embrace that of the University, 175,000 volumes; of the State Historical Society, 334,000 volumes, including pamphlets; of the State Law Department, 50,000 volumes; of the city, 24,000 volumes, besides special professional and technical libraries, making in all more than 600,000 volumes, including pamphlets, thus affording very exceptional opportunities for reading and special research.

Any person who desires information in regard to any of the colleges or schools, should apply to

W. D. HIESTAND,

Registrar.

COURSES IN THE COLLEGE OF AGRICULTURE  
OF THE UNIVERSITY OF WISCONSIN



Prize exhibit of Wisconsin State Board of Immigration at Illinois State Fair, 1911.



# COURSES IN THE COLLEGE OF AGRICULTURE OF THE UNIVERSITY OF WISCONSIN MADISON

- Summer Session.** Last week in June to second week in August. This session includes 11 courses in agriculture, embracing agricultural bacteriology, agricultural chemistry, agricultural education, agricultural engineering, agronomy, animal husbandry, dairy husbandry, farm management, home economics, horticulture, and soils. In 1911, 130 students attended.
- Short Course in Agriculture.** This course includes a term of 14 weeks in each of two years. Work generally begins about December 2 and includes lectures, demonstrations, and practice work for practical farmers. In 1910-11, 474 attended.
- Farmers' Course.** This is a ten days' course of popular lectures, demonstrations and exercises in practical agricultural science, beginning early in February. It is open to farmers over 25 years old. In 1911, 1,305 attended.
- Young People's Course.** This is a one week course of lectures and demonstrations in agriculture for boys and girls who have taken part in the Young People's Grain Growing Contests. It generally begins early in February. In 1911, 43 attended.
- Winter Dairy Course,** a 12 weeks' session beginning early in November, including lectures, laboratory and practice work in the manufacture of dairy products. It is designed especially for buttermakers and cheesemakers. In 1910-11, 133 attended.
- Summer Dairy Course.** This is a 10 weeks' training in dairy factory operations for beginners. Students are admitted any time during the spring and summer after March 1. In 1911, 5 attended.
- Special Dairy Course.** This is for creamery and cheese factory operators and managers and covers 10 days, including addresses and laboratory demonstrations. It is given at the time of the Farmers' Course. In 1911, 55 attended.
- Women's Course.** This is a one week course of lectures and demonstrations on various phases of home economics, cooking, nursing, etc., and is given during the first week of the 10 day Farmers' Course. In 1911, 508 attended.
- Women's One Week School.** This is a course of lectures and demonstrations given during the second week of the Farmers' Course. In 1911, 73 attended.
- Long Course in Agriculture.** A four year course in agriculture, including all phases. Students may specialize in any line. In 1911, 478 registered.
- Middle Course in Agriculture.** A two year course in which students may take up any phase of agriculture. In 1911, 94 students registered.
- Home Economics.** A four year course in home economics and general Letters and Science, leading to the degree of Bachelor of Science. This is a general culture course. If students desire to become teachers they must take 12 credits in the department of education. In 1911, 129 registered.

## Farmers' Institutes.

George McKerrow, Superintendent

Nellie E. Griffiths, Clerk

The Farmers' Institutes Department conducts 133 meetings in various sections of the state where practical lectures and conferences on subjects pertaining to farm life and operations are presented. Forty-one Cooking Schools are conducted for the women. The Farmers' Institute Bulletin is issued annually in an edition of 50,000 copies, and distributed at Institutes and by mail; also 10,000 copies of the Farmers' Institute Cookbook. Any community can secure an Institute upon proper application to the Superintendent. For further information address Supt. George McKerrow, Madison, Wis.



North slope of Winter's Hill near Sparta as re-located by the Highway Division. Note new road above the old one. Grade on new road 8%, on old one about 12%. The south slope was also re-located and graded in 1910.

WISCONSIN FARMERS' INSTITUTES FOR 1911-1912.  
ARRANGED BY COUNTIES.

| County           | County   |
|------------------|--|
| Adams.....       | Marquette.....                                       |
| Ashland.....     | Milwaukee.....                                       |
| Barron.....      | Monroe.....  |
| Bayfield.....    | Oconto.....  |
| Brown.....       | Oneida.....  |
|                  | Outagamie.....                                       |
| Buffalo.....     | Ozaukee.....   |
| Chippewa.....    | Pepin.....   |
| Clark.....       | Pierce.....  |
| Columbia.....    | Portage.....   |
| Crawford.....    | Price.....   |
| Dane.....        | Racine.....  |
| Dodge.....       | Richland.....  |
| Door.....        | Rock.....  |
| Dunn.....        | Rusk.....  |
| Fond du Lac..... | St. Croix.....                                       |
| Forest.....      | Sauk.....  |
| Grant.....       | Sawyer.....  |
|                  | Shawano.....   |
| Green.....       | Sheboygan.....                                       |
| Green Lake.....  | Taylor.....  |
| Iowa.....        | Trempealeau.....                                     |
| Jackson.....     | Vernon.....  |
| Jefferson.....   |  |
| Jeneau.....      | Walworth.....  |
| Kenosha.....     | Washburn.....  |
| Kewaunee.....    | Washington.....                                      |
| La Crosse.....   | Waukesha.....  |
| Lafayette.....   | Waupaca.....   |
| Langlade.....    | Waushara.....  |
| Lincn.....       | Winnebago.....                                       |
| Manitowoc.....   | Wood.....  |
| Marathon.....    |  |
| Marquette.....   |  |
|                  | Big Spring, Strong's Prairie.                        |
|                  | Butternut.   |
|                  | Almena, Barronett.                                   |
|                  | Cable, Washburn.                                     |
|                  | Suamico, Wayside, Wequiloc, West Hol-<br>land.       |
|                  | Cochrane, Modena.                                    |
|                  | Cadott, Jim Falls.                                   |
|                  | Owen, Unity.   |
|                  | Wycocena.  |
|                  | Eastman, Reed, Soldiers Grove.                       |
|                  | Belleville, Mt. Horeb, Rockdale.                     |
|                  | Horicon, Lomira.                                     |
|                  | Carlsville, Jacksonport.                             |
|                  | Boyceville, Knapp.                                   |
|                  | Brandon, Campbellsport, Ripon.                       |
|                  | North Crandon.                                       |
|                  | Blue River, Lancaster, Livingston, North<br>Andover. |
|                  | Juda.  |
|                  | Kingston.  |
|                  | Avoca, Cobb.   |
|                  | Alma Center, Taylor.                                 |
|                  | Johnson's Creek.                                     |
|                  | Elroy, New Lisbon.                                   |
|                  | Bristol, Somers.                                     |
|                  | Ellisville, Rio Creek, Tisch Mills.                  |
|                  | Bangor.  |
|                  | Benton, Darlington, Woodford.                        |
|                  | Antigo.  |
|                  | Heller.  |
|                  | Valders.   |
|                  | Rozellville, Wausau.                                 |
|                  | Atheistane, Harmony Corners.                         |
|                  | Oxford.  |
|                  | Oakwood.   |
|                  | Sparta, Valley Jct., Wilton.                         |
|                  | Sampson, Stiles.                                     |
|                  | Cassian.   |
|                  | Shiocton.  |
|                  | Grafton, Thiensville.                                |
|                  | Durand, Pepin.                                       |
|                  | Herbert, Maiden Rock, River Falls.                   |
|                  | Clam Falls, Clear Lake, Luck.                        |
|                  | Blaine, Buena Vista.                                 |
|                  | Ogema, Phillips.                                     |
|                  | Union Grove.   |
|                  | Bear Valley, Tavera, Yuba.                           |
|                  | Edgerton, Magnolia, Shopiere.                        |
|                  | Glen Flora, Ladysmith, Sheldon.                      |
|                  | Glenwood, Hersey, Star Prairie.                      |
|                  | Baraboo, Black Hawk.                                 |
|                  | Stone Lake.  |
|                  | Bonduel, Tigerton.                                   |
|                  | Beechwood, Franklin, Random Lake.                    |
|                  | Stetsenville.  |
|                  | Arcadia, Osseo, Strum, Trempealeau.                  |
|                  | Chaseburg, Genoa, La Farge, Ontario,<br>Viroqua.     |
|                  | Lake Geneva, Millard.                                |
|                  | Trego.   |
|                  | Rockfield.   |
|                  | Dousman, Eagle, Pewaukee, Stone Bank.                |
|                  | Clintonville, Rural, Scandinavia.                    |
|                  | Hancock.   |
|                  | Neenah (Round-up), Waukau.                           |
|                  | Pittsville, Rudolph.                                 |

INSTITUTES WITH DATES AND CONDUCTORS.

| Date.     | W. C. Bradley,<br>Conductor. | L. E. Scott,<br>Conductor. | David Imrie,<br>Conductor. | W. F. Stiles,<br>Conductor. | E. Nordman,<br>Conductor. | H. D. Griswold,<br>Conductor. |
|-----------|------------------------------|----------------------------|----------------------------|-----------------------------|---------------------------|-------------------------------|
| 1911.     |                              |                            |                            |                             |                           |                               |
| December. |                              |                            |                            |                             |                           |                               |
| 12-13     | Luck                         | Boyceville                 | Clear Lake*                | Herbert                     | Trego                     | Hersey                        |
| 14-15     | Clam Falls                   | Star Prairie               | Almena                     | River Falls                 | Barronett                 | Knapp*                        |
| 19-20     | Phillips*                    | Cable                      | North Crandon              | Stone Lake                  | Stetsonville              | Sheldon                       |
| 21-22     | Butternut*                   | Washburn                   | Cassian                    | Ladysmith                   | Ogema                     | Glen Flora                    |
| 1912.     |                              |                            |                            |                             |                           |                               |
| January.  |                              |                            |                            |                             |                           |                               |
| 2-3       | Maiden Rock                  | Unity*                     | Jim Falls                  | Rudolph                     | Glenwood†                 | Strum                         |
| 4-5       | Cochrane                     | Durand                     | Cadott*                    | Heller                      | Owen†                     | Rozellville                   |
| 9-10      | Osseo†                       | Taylor                     | Modena                     | Reed                        | Valley Jct.               | Trempealeau*                  |
| 11-12     | Alma Center†                 | Arcadia                    | Peplin*                    | Genoa                       | Pittsville                | Wilton                        |
| 16-17     | Antigo                       | Shiocton                   | Suamico                    | Sampson                     | Wausau*                   | Harm'ny Corners               |
| 18-19     | Tigerton                     | Scandinavia†               | Bondel                     | Stiles                      | Clintonville*             | Athelstane                    |
| 23-24     | Blaine*                      | Waukau†                    | Ellisville                 | Tisch Mills                 | Carlsville                | West Holland                  |
| 25-26     | Ripon*                       | Rural†                     | Rio Creek                  | Wayside                     | Jacksonport               | Wequock                       |
| 30-31     | Franklin                     | Random Lake                | Rockfield                  | Brandon*                    | Lomira                    | Campbellsport†                |
| February. |                              |                            |                            |                             |                           |                               |
| 1-2       | Valders                      | Thiensville                | Grafton†                   | Kingston                    | Horicon*                  | Beechwood                     |
| 13-14     | Eaglet                       | Millard                    | Lake Geneva*               | Somers                      | Rockdale                  | Stone Bank                    |
| 15-16     | Dousman                      | Union Grove†               | Bristol                    | Oakwood                     | Magnolia                  | Pewaukee*                     |
| 20-21     | Mt. Horeb                    | Benton                     | Lancaster                  | Edgerton*                   | Shopieret                 | Darlington                    |
| 22-23     | Johnson's Creek*             | Livingston                 | Cobb                       | Juda                        | Belleville†               | Woodford                      |
| 27-28     | Strong's Prairie             | Buena Vista                | Bangor*                    | Ontario†                    | Oxford                    | Viroqua                       |
| 29-1      | New Lisbon                   | Hancock                    | Elroy*                     | Chaseburg†                  | Big Spring                | Sparta                        |
| March.    |                              |                            |                            |                             |                           |                               |
| 5-6       | Avoca†                       | North Andover              | Yuba                       | Black Hawk                  | Soldiers Grove            | Blue River*                   |
| 7-8       | Wycocna†                     | Eastman                    | Baraboo                    | Bear Valley                 | La Farge*                 | Tavera                        |

Twenty-sixth Annual Closing Institute and Cooking School, Neenah, Winnebago Co., Wis., March 12, 13, 14, 1912. All inquiries relative to Farmers' Institutes will be answered promptly.

Cooking Schools conducted by Miss Edith L. Clift. (\*)  
Cooking Schools conducted by Miss Nellie Maxwell. (†)

GEORGE MCKERROW, Supt.,  
Madison, Wis.



Farmers' Institute workers at Twenty-fifth Annual Round-up Institute, Hudson, Wis., March 14, 15, 16, 1911.

# PROCEEDINGS

OF THE

TWENTY-FIFTH ANNUAL

## CLOSING FARMERS' INSTITUTE

HELD AT

HUDSON, WIS., MARCH 14, 15, 16, 1911

---

The opening session was called to order by Mr. Dorwin the chairman of the local committee. Prayer by Rev. John Fisher.

### ADDRESS OF WELCOME.

N. O. Varnum, City Attorney, Hudson.

The people of our city are glad to have you with us. We have for some time been talking about and planning for this Round-up Farmers' Institute. We expect to receive much good from your visit with us, and in turn we hope to be able to do you good. Our interests are one, and during your stay with us I hope we shall all learn to appreciate a little more than ever before the interdependence between the farmer and his city brother.

I regret that our mayor could not be here to extend to you a welcome on behalf of our city, but, notwithstanding his absence, he has done all he could do to make you feel that you are welcome in Hudson. Before he left, he unlocked the gates of the city, threw them wide open, and then took the keys away with him. As to our citizens, you will find the latch-string of hospitality hanging on the outside of every door. The fact is, we

all join in extending to you a hearty welcome, and in granting to you the liberties of our city.

We want you to go away from our city feeling that Hudson is something more than a black spot on the map with lines running through it indicating railroads; we want you to go away from here feeling that the people of this city of Hudson have ambitions and desires equal to those of the best of the people in the state of Wisconsin. We want you to go away from here feeling that it has done you good to come here, to learn something of our people and our city. We have our schools, adequate to accommodate our children, and we are glad to spend our money in the education of our children; we have our churches, we have not neglected the spiritual welfare of our people and those who come to our city; we have our commercial institutions, our banks, but, best of all,

ladies and gentlemen, we have a people who bid you welcome to our city.

We are not altogether without ambition. We have done things in the past of which we are not ashamed, and we expect to do things in the future of which we will be proud. We have just started a movement whereby we are going to build a bridge across Lake St. Croix—that is one of our ambitions, and when we have done that, we are going across that bridge, going to put wheels under the city of St. Paul and haul it over here; so that you see we are not altogether without ambition.

Twenty-five years ago the first Farmers' Institute of this state was held here. I imagine that there were very few in attendance at that gathering who will be here and take part in this. Since then another generation of people have become the active members of society and the bearers of the burdens of industrial, commercial and professional life. Not only have the people changed, but the methods of doing business have changed, and I believe it would be safe for me to say that the methods of farming have made as great changes as those of any other vocation. "Improvement of Methods" is the watchword of the day, and I believe that the farmers of Wisconsin are in the front rank in this march

of progress. I further believe it is the duty of every citizen, no matter what his business or situation in life may be, to aid in this movement for the betterment of agricultural conditions. With the wonderful growth of population in this country, it must necessarily follow that our farmers must produce more in order that the supply of agricultural products will meet the demand. But the question of increased production is not the only economic problem we have to face. There is also the question of the organization of a marketing system, whereby products will go as directly as possible from the producer to the consumer, which must be grappled with and worked out, in order that the producer may get a fair living price for his products and that the consumer may buy those products at prices which he can afford to pay.

These are important questions, both from the viewpoint of the producer and the consumer, and without doubt they will be ably discussed at this gathering. We therefore consider ourselves fortunate indeed in having this institute brought to the doors of our citizens and the farmers of this locality.

In the name of the city of Hudson and of St. Croix county, I again bid you welcome, and take pleasure in delivering the city into your hand.

#### RESPONSE TO ADDRESS OF WELCOME.

Supt. George McKerrow, Madison, Wis.

I was very much pleased when the representative of your city said that the mayor before leaving had opened all the gates and carried away the keys, because these farmer boys I am responsible for might possibly have climbed the fence to get in and might have got in trouble, but now, boys,

the gates are open; don't climb the fence; take everything you see that you can appropriate in Hudson.

We have been pleased to listen to these words of welcome. As the speaker has said, the first Institute under state auspices and under a state system ever held in the state of Wisconsin.

sin, and ever held in the civilized world, so far as we know, was held here in the city of Hudson some twenty-six years ago.

The Wisconsin legislature has done some things even since that time which seemed to be ahead of the times, but in 1885 it passed a bill that started out the Farmers' Institutes under state auspices by appropriating five thousand dollars for the establishment of a system of Farmers' Institutes for the state of Wisconsin; the first meeting under that appropriation was held in this city, and from that day to this the Institute work has gone on, and, I presume, because it got a good start right here, it has continued, like the boy's snowball, to roll up and become larger, until it has covered the state of Wisconsin and has brought into Institute halls all over this state millions of people; has distributed its annual Institute Bulletins by the million, books for the instruction of the farmer. And more than that; the example set by Wisconsin has been followed by every state in the union; Farmers' Institutes, more or less, are being held in every state of the United States of America, in every province in Canada, and in some foreign countries, even in far-away Russia.

Our Bulletins have been read in the farm homes of Wisconsin, in the farm homes of many other states and in the farm homes of the Canadian provinces, even in far-away Japan and Russia. Two officials in Russia have

written for Bulletins this present season.

And so we believe the little fire that started here in Hudson twenty-six years ago is now enlightening the world.

Now, let me say to those in attendance that this Round-up Institute, this twenty-fifth anniversary of the Round-ups of Wisconsin, we hope will set another record in the Farm Institute work of this state. We hope and believe that the material produced here in this meeting, when it goes into the Twenty-fifth Annual Bulletin, will represent agricultural ideas which will help on the good work of advancement, not only in Wisconsin, but throughout the civilized world. So we ask you who are in attendance here to follow every discussion closely, to note the weak points, and then by your questions and suggestions strengthen them in the discussions. I have often been told that the discussions form the best part of the Wisconsin Institute Bulletin, so make them lively and to the point.

Thanking you Mr. Varnum, as the representative of the city of Hudson, for the welcome you have given us, and you, Mr. Chairman of the Committee, for all that you have done in getting this meeting well started, and trusting we will prove worthy of the privileges that have been granted us, I will now open the business procedure of the meeting by calling Conductor H. D. Griswold, of West Salem, to the chair.



## SOIL CONSERVATION.

W. F. Stiles, Lake Mills, Wis.



Mr. Stiles.

Much has been said and written in the recent past in regard to the advisability of conserving our natural resources. The greatest resource of any country is its soil, and it is wise for any nation to consider the best methods of saving, and, if possible, increasing its natural fertility.

Many of our American farmers in the past were, and I am afraid some of the present are, soil robbers instead of soil builders. Some Wisconsin farmers are no exception in this respect, but I am pleased to believe that Wisconsin has been one of the leading states in advocating and adopting proper methods of soil conservation.

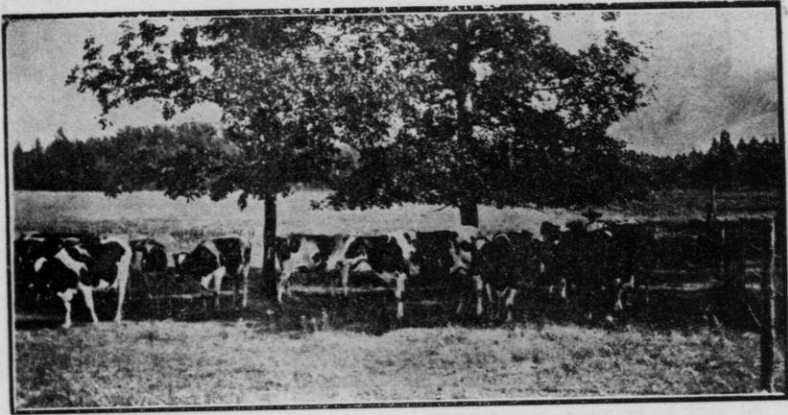
## How Fertility is Lost.

The fertility of the soil is lost in two principal ways. One we term a physical or mechanical and the other a chemical loss. By the first is meant that process by which the actual portions of the soil are lost from the farm. These occur in two ways, viz., by blowing or washing. Losses of this kind vary greatly on different soils and under varying conditions. As these are both noticeable, good farmers adopt methods of checking them as much as possible. Blowing or drifting of the soil can be prevented to quite an extent by keeping a crop of some kind growing upon it. Even winter grain in many instances is very beneficial. In the case of loss by washing, which is so destructive if permitted to go on for any length of time, the only safe method to adopt is to maintain a grass crop on those fields as much of the time as possible. An extensive root growth in the soil, even when it is plowed, prevents the water, as it flows down the hills in case of heavy rains, from carrying some of the soil with it. Not only is the soil taken from the fields, but, as is often the case, the farm is so disfigured by ditches and gullies as to make it very difficult to cultivate. When fields of this nature are plowed, the bottom of the ditch, if sodded over should be allowed to remain.

It is the losses of the chemical composition of soils, which in many cases take place unobserved, of which I wish to especially speak. All crops or plants in order to grow must have a certain number of chemical elements in the soil on which to feed. There are perhaps seven which are absolutely necessary for most crops.

The principal elements of these are nitrogen, phosphoric acid and potash and, in some localities, for certain crops, calcium or lime. The growth or yield of our crops is determined to quite an extent by the amount of these elements the soil contains in an available form. Plants take all of their food from the soil in a liquid form, thus these elements of plant growth must first be in solution

three methods must be employed. Those who first broke the sod practiced the first method only and many obtained such good results by good cultivation that they even went so far as to maintain that tillage is manure. This is not correct, except in one way. Cultivation does not add anything to the soil, it simply aids in putting the elements which are in the soil in an available form. Tillage al-



**Holsteins at Westwood, farm home of W. F. Stiles, Lake Mills.**

before the plants can use them. All, or nearly all, soils in their virgin state contained these elements of plant growth in sufficient and proper form to produce bountiful crops, but by continually removing them and rarely putting any of them back, in time the supply became limited and the farmer found as a rule his crops grew smaller from year to year.

#### **Best Methods of Maintaining Fertility.**

There are three ways which most farmers employ to maintain the fertility of their soil, viz., tillage, crop rotation and live stock farming. In order to obtain the best results, all

so fits the soil so that the plants can more readily feed. The farmer who only half prepares his soil as a rule raises but half a crop. Cultivation aids greatly in retaining moisture and since plants take all of their soil food in liquid form, it is necessary, in order that a soil may produce, that it be capable of absorbing large quantities of water and also be of such a nature that the plant roots may penetrate it freely.

#### **Crop Rotation.**

The second method mentioned was crop rotation. The advantages of a proper system of crop rotation are several. The principal ones are that

by growing some of the leguminous crops, such as clover or alfalfa, the soil can be enriched in nitrogen, as plants of this order have the power under certain conditions of taking the nitrogen of the air and using it in their growth and also of building up the nitrogen content of the soil for the use of following crops.

Another advantage of clover and similar crops is that the extensive

can be given in regard to the best rotation in all cases. From the standpoint of soil conservation, the best perhaps is a four-year rotation, keeping the fields in a hay or pasture crop half of the time.

#### Live Stock Farming.

The best practice to adopt, however, in order to maintain and if possible increase the fertility of the soil



Holsteins and young farmers at Westwood.

root growth adds a large amount of humus. A soil containing a proper quantity of humus or decaying vegetable matter is capable of absorbing water in a wet time and retaining it, under proper management, for the benefit of the crop in time of drouth.

Another advantage of crop rotation is that different crops take varying amounts of these elements of plant growth from the soil. For example, plants like cabbage, with a large growth of foliage, take a large relative quantity of nitrogen; plants such as our small grains, which usually produce a large amount of seed, draw heavily on the phosphoric acid in their growth, while plants with a large per cent of stem growth take larger quantities of potash. No fixed rule

is to follow some system of live stock farming, where a certain portion of the crops grown are fed on the farm in connection with some of the by-products of the mills which are purchased for feeding to take the place of some of the higher-priced grains or hay sold, and when the manure is properly saved and applied to the soil. This is the only safe method of carrying on a permanent system of agriculture.

It has been determined by experiment that with the various classes of live stock on the average three-fourths of the chemical elements found in the feed is voided in the manure. This, you observe, is the average.

The value of manure depends mainly upon two factors; the

kind of feed given and the class of stock fed. For example, oil meal or bran will yield a much better grade of manure than timothy hay or corn meal. The manure on a dairy farm, when the dairy product is sold either in the form of butter, cream or cheese, is more valuable than would be the case when whole milk is sold, or even on a farm where a large amount of young stock is fed and sold. This last statement is perhaps stronger than the facts warrant.

One of the advantages of dairying which is not rarely mentioned is the fact that in order to attain the greatest success the other methods of soil conservation must be carried on upon the farm in connection with dairying. I believe that it is possible with almost any class of live stock to dispose of our crops through them and make more money, and at the same time keep our farm in a much better state of fertility than where the crops are drawn and sold directly from the farm. Let us not hold the dime of immediate profit so close to our eyes that we cannot see the dollar at our feet. We have a wonderfully productive soil in much of our state. Then why not keep it such, if it is possible to do so, and at the same time make as much or even a greater profit than is possible by practicing the other method. As husbandmen of the soil, we have no moral rights to farm in such a manner as to draw as much of its natural fertility out as we can and sell it, caring nothing for the welfare of those who are to follow.

#### DISCUSSION.

Mr. Imrie—Mr. Stiles said that the four years' rotation was perhaps one of the best, having two years in pasture. Wouldn't that depend a good deal on what kind of grass you had for pasture?

Mr. Stiles—What I meant was having a leguminous crop growing, making hay one year and then one year for pasture, then plowing up for corn or some other crop.

Mr. Imrie—Clover would be a great deal better than timothy for pasture.

Mr. Stiles—Yes, although I would have a certain amount of timothy in it to insure a better pasture.

Mr. Michels—What do you consider one of the best methods of handling manure?

Mr. Stiles—I think the best method is to have the barn so arranged that you can drive right in with the manure spreader, taking the manure from the various classes of stock and putting it immediately on the land, spreading it broad-cast on a field that has grown a hay crop in the previous year, or, in case of a four-year rotation, on pasture that is to be plowed up for a crop. I feel that less loss occurs in this way than in any other. I would not by any means advise the farmer to allow his manure to accumulate too long in the yard. In the winter there is a certain amount of loss by leaching, always more or less loss in the chemical elements, a very considerable amount of ammonia escapes when heating takes place in the yard, and I feel sure that to haul it right to the fields during most of the year will be the best method of handling it. There may be a time in the spring when the frost is coming out of the ground when it is not advisable to go upon a clay field, because of the tramping of the teams and the marks of the wagon wheels which will injure the soil for that season and often for seasons to come. In that case we haul it out in the barn, leave it in a pile, and then later on spread it on the field.

Mr. Matteson—What is your idea about handling poultry manure?

Mr. Stiles—I would prefer to get it right out with the other manure. If

handled alone, it should be spread very thinly on a grass crop, or it will be almost impossible to cut the hay. It is fine manure for a garden. I think it would be better if the average farmer could mix his poultry manure with his other manure.

A Member—There is considerable loss in spreading manure on hilly lands in the winter.

Mr. Stiles—I believe there is no way of handling manure but what there will be a certain amount of loss, and of course the farmer has to select his time to a certain extent. If you spread your manure on a hillside which is covered with ice and there comes a heavy water rain, there will certainly be a certain amount of loss, but where the hillside is simply covered with snow and there has been grass the year before and the ground is filled with roots, a large per cent of the manure will get into the soil.

A Member—With what would you mix your manure in the stable?

Mr. Stiles—I mix it with all the straw I can get.

Dr. Porter—Would you use rock phosphate or land plaster?

Mr. Stiles—Being a dairy farmer, I do not believe it is advisable.

Dr. Porter—I have just ordered a carload of phosphate and intend sowing about a pound a day behind every animal in the barn and the people who sell it to me tell me I will add fifty per cent, or such a matter, to the value of the manure.

Mr. Stiles—I think that is the best way to handle that rock phosphate. I think I would rather get my fertility in the form of feeding stuffs, then I get the benefit of feeding it and also as manure. For the average farmer keeping stock upon his farm, I feel that it is better for him to get his phosphate in this manner than to buy it in commercial forms.

Mr. Scott—You see by reference to your chart that in the manure from a

ton of wheat bran there are fifteen pounds of phosphoric acid.

Mr. Stiles—Yes, that is correct. I would prefer to buy my phosphoric acid in the form of wheat bran, then I would get almost the value, perhaps more, in feeding my live stock, and I would get the manure extra.

Dr. Porter—A ton of rock phosphate that cost ten dollars contains two hundred and forty pounds of phosphorous, the principal element, as I understand it, and a great deal more phosphoric acid. Gentlemen, I believe there is a fertilizer which we have not used enough of in this state. If we can rely upon what Professor Hopkins of the Illinois Station says, I believe we have something here that is very valuable to have and that we ought to use more of it.

A Member—Some of us may have soils which have plenty of phosphoric acid in them already. In that case, will the adding of this rock phosphate bring about any improvement in our crops?

Mr. Stiles—A soil must have a certain amount of nitrogen, a certain amount of phosphoric acid and of potash in order to grow crops of any kind. Now, the size of the crop will depend to a certain extent upon the amount of these elements the soil contains in an available form. If your soil is deficient in phosphoric acid, that will determine the size of the crop, and so with the potash, and so with the nitrogen. I think that as a rule the Wisconsin farmer does not need to purchase these commercial fertilizers to build up his soil. If he purchases some of these commercial manures, they will make good crops for a few years, but I believe it will burn up the humus of the soil and it will get the soil in a condition so it cannot absorb moisture, will not cultivate as easily or retain the moisture as readily as if he practiced a right system of crop rotation and a right

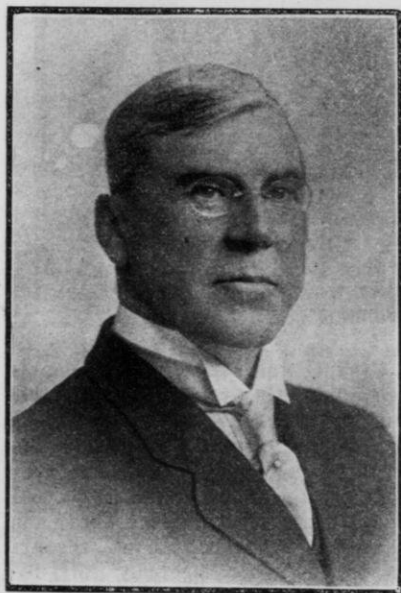
system of live stock farming. I believe it is to the best interest of the Wisconsin farmer to buy commercial feed stuffs to feed his stock and in this way get these elements into his soil rather than to sow these commercial fertilizers.

A Member—I have felt sometimes that our soils in parts of Wisconsin need something besides manure. We grow a crop of oats, they grow up rank, turn dark and go down. Now, there is something the soil needs that we do not get, even by turning under

clover or putting out on our field all the manure which we can conserve, there is something lacking. I have noticed that where there has been an old straw pile burned there the oats grow just as rank, but they stand up better and have a perfect, nice color. Probably it is lack of potash in the rest of the field, but I think it is lack of phosphoric acid, too, so I think we need some other ingredients not found in stable manure in order to bring our land to an ideal condition.

### FEEDING PLANTS.

Dellert Utter, Lake Beulah, Wis.



Mr. Utter.

The question of the conservation of soil fertility, I think, is one of the most important ones on our program

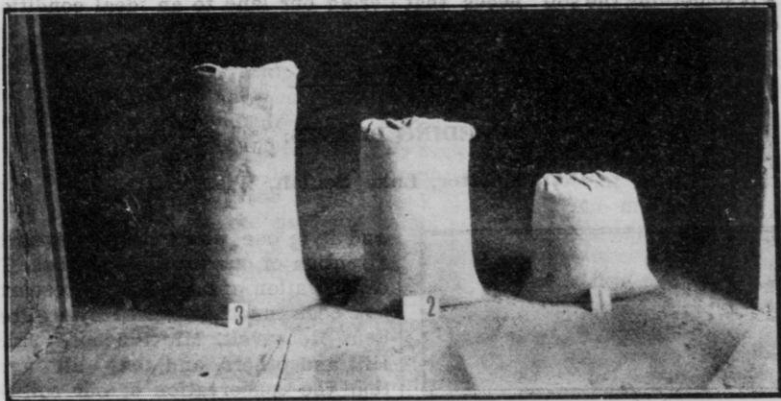
and it is one which has received the attention of our broadest minds. The conservation of our national resources has been much discussed by ex-President Roosevelt, Mr. Pinchot, James Hill and others, and they all agree that the conservation of our soil fertility is one of the most importance. While there has been a great amount of enthusiasm aroused and a great deal of interest taken in this subject, however, it is like other general matters, in that there is no great reform until the individual is interested to the point that he does something.

Now the question is, what are we to do to build up and improve the soil fertility of our farms? Until we do act as individuals there will be very little accomplished, though I will say that in my opinion the Wisconsin farmer is doing more in that direction than the farmer of any other state. I travel in other states, I notice the conditions on the farms as I attend Farmers' Institutes and conventions; I hear the kind things that are said about our Farmers' Institute work and about our Agricultural College, and I always feel proud that I am from Wisconsin and

feel that we are making good headway in our state in our system of soil conservation. From the platform of the Farmers' Institute meetings for years, the best system of crop rotation and best methods of feeding live stock have been advised and have been practiced by our farmers, but we find in going over the state many men who are growing special crops. I meet men who are renting land for growing

taken from the soil that they have gradually exhausted the soil of its fertility. Your farm is very much like a bank account; you know you keep drawing from your bank without putting back as much or more than drawn out, you will certainly exhaust your bank account, and this is just as true with your farm.

We talk about conservation and when we do so we speak as a matter



1906 Oats, W. A. Hart, Portland, Ind., black clay loam. Photograph shows yield of 1-20 acre. Fig. 1. Unfertilized, 19.5 bushels per acre; Fig 2. Blood, 33 lbs., bone meal, 300 lbs., 31.5 bushels per acre; Fig. 3. Blood, 33 lbs., bone meal, 300 lbs., sulphate of potash, 120 lbs., 41.5 bushels per acre.

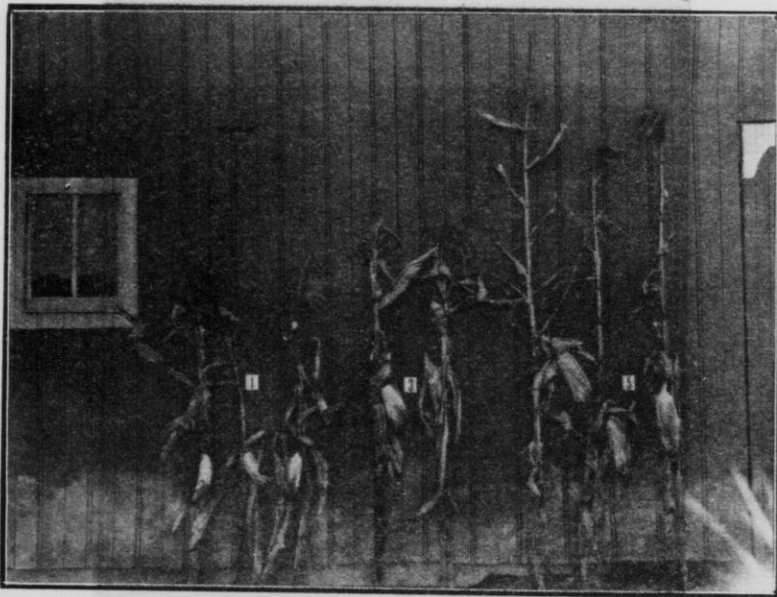
peas for canning, farmers taking contracts for the growing of sugar beets and other special crops, and these men are looking for the right kind of plant food for these crops. Some claim that our much boasted crop rotation system followed steadily will exhaust the available fertility of our soils. I know there are many of our Institute workers who will not agree with that proposition, but from experiments that have been carried on in Minnesota and very many other states, they have found that when they have practiced a rotation without putting back onto the soil as much plant food as they have

of keeping and saving. My idea of conservation is to use but not waste, and that should be the thought in the care of our farms; we should make our farms more fertile so we may grow crops better and better each year. In ten years farm values have increased in Wisconsin about seventy-five per cent, in Michigan forty-five and in some states one hundred per cent, but if your farm has increased in value in ten years one hundred per cent, you must manage it so as to make a fair interest on that increased value, and in order to do that you must grow larger crops, and the time

has come when we should pay more attention to the question of how to grow larger crops and study more about plant growth and plant food. We have become proficient as far as feeding dairy cows goes, nine-tenths of the farmers who are attending these Institutes are familiar with the terms protein and carbohydrates, they

buy the one or more elements that we find are lacking in our soil and learn how to feed our crops as we have learned to feed our cows.

We talk about making the cow comfortable to get the best results. In the same way we should make conditions congenial for the best growth of plants. To do that we want the soil



W. A. Hart, Jay Co., Indiana, 1906. Typical hill from three plats.  
 Fig. 1, Clover; Fig. 3, Clover and manure; Fig. 5, Clover, manure and 35 lbs. sulphate of potash.

know how to make a balanced ration and they also should realize that our plants need a balanced ration as much as do our dairy cows, and when we are growing certain crops year after year and using only barnyard manure, we are likely to get our soil unbalanced. There may be an excess of nitrogen or phosphoric acid, but a lack of potash, and we should all know what are the necessary elements for growing better crops, and it is surely profitable to

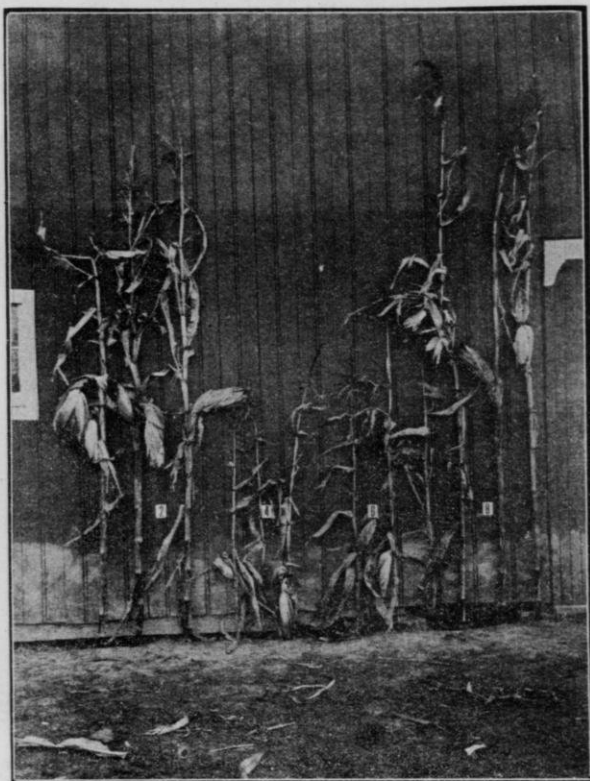
in a good physical condition, so it will conserve moisture, so the air can get into the soil and the heat from the sun can reach the roots, which are reaching out in every direction to get plant food, and this is a study of much importance, as well as being very interesting, and the sooner we take up this subject and treat it fully in our agricultural meetings and in our farm work and in our Experiment Stations, the sooner we will get results,



and that is what we are all working for.

Now, we all know that our crop is measured by that element of plant food in the soil which is most def-

In a general way we have some general knowledge in regard to what our soils need. We find that clay soils are generally deficient in phosphoric acid, while they usually contain enough pot-



W. A. Hart, Portland, Jay Co., Indiana, 1906. Poor clay soil. Typical hill from Plats 2, 4, 6, 8. Plats 2, 4 and 6, Poor clay; Plat 8, Butterwood muck; Plat 2, Clover, manure, straw and 35 lbs. sulphate of potash per acre, and bone in previous years; Plat 6, Clover, manure, straw and bone in previous years; Plat 8, Butterwood muck soil with 35 lbs. sulphate of potash per acre.

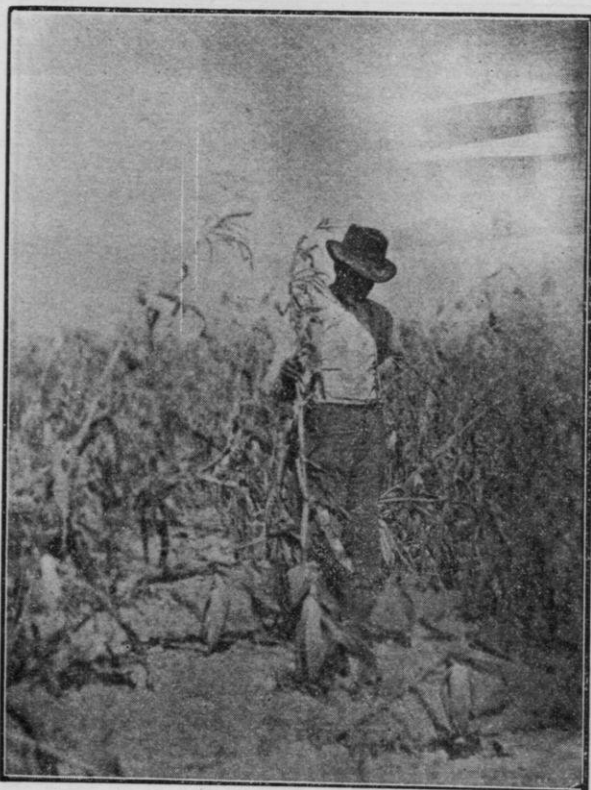
cient, just as a railroad train has to be loaded according to the highest grade on the road, or the weakest bridge on the line. From that we can get a lesson.

ash, and if we have followed the right rotation and have applied farmyard manure, we probably have sufficient nitrogen. Sandy loams are deficient in potash and nitrogen and light sandy

soils are also deficient in phosphoric acid. Muck and peaty soils are always very deficient in potash.

Soil analysis is of little value in determining what elements your soil needs; ask your crops and made some

able to use the one element, phosphoric acid; whether they shall use it in the form of rock or in the form of acid phosphate is a mooted question. Some of the very best students question the wisdom of using raw rock



W. A. Hart, Jay Co., Indiana, 1906. Clay loam, clover, straw, manure and 200 lbs. bone meal; yield 44 bushels per acre.

experiments. There is no more interesting or profitable work that you could undertake.

#### The Use of Rock Phosphate.

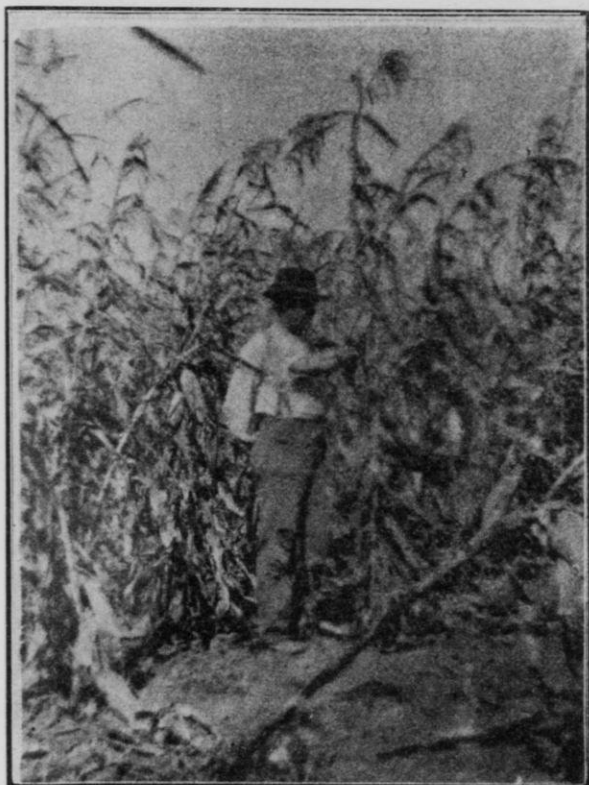
Dr. Porter asked a question in regard to phosphoric acid and I think he and many others would find it profit-

phosphate as a source of phosphoric acid.

I will say a word as to how they treat this rock to make it available; that is, to make the commercial form of acid phosphate. To a ton of raw rock they mix a ton of sulphuric acid to dissolve it to make it soluble as

plant food. If it takes that amount of sulphuric acid to dissolve a ton of rock, what effect will farmyard manure have upon the raw rock which you put in your stable or manure pile? I have been told by chemists that

food. I have heard Dr. Hopkins say that in buying rock phosphate you should be sure it is ground very fine, nearly powdered, and that you should buy it under a guaranteed analysis, because there is very much of



W. A. Hart, Jay Co., Indiana, 1906. Clay loam. Clover, straw, manure, bone meal, 200 lbs.; sulphate of potash, 35 lbs. per acre; yield 68 bushels.

there is no chemical action from manure that is at all favorable, it is only by the weathering after this fine rock is put upon the soil that you get any value from it. All fertilizers, or farmyard manure, in order to become plant food must become soluble in water before they can be taken up as plant

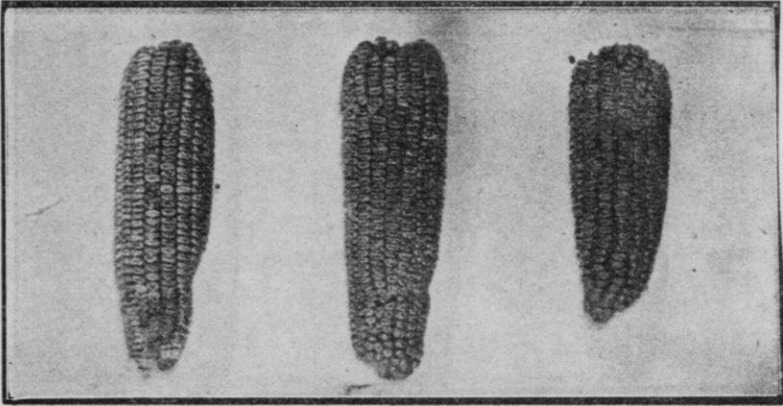
the rock phosphate which is sold that is very low grade.

#### Commercial Fertilizers.

We can only speak briefly of the materials and their sources which are used to make what is termed a commercial fertilizer. Nitrogen is the

most expensive constituent of fertilizers. Tankage from the stock yards is one source from which this can be supplied; sulphate of ammonia is a by-product of the coke and gas plants, and now they are making cyanamid, which is nitrogen taken from the air, something as the leguminous plants take it in the natural way. The process is one which has been in use in Norway, Germany and Italy for several years. They now have a plant at

phates are chief sources of phosphoric acid. Years ago when I crossed the plains, we saw immense piles of bones piled up along the railroad track and at the stations, and enormous quantities of these bones of buffalo that had been killed and cattle that had died on the plains were shipped to fertilizer factories and used as a source of phosphoric acid. Today there are only the bones that are a by-product of the slaughter houses to



W. A. Hart, Jay Co., Indiana, 1906. Clay soil. Typical ears from clover seed and manure; weight of ears, 29 ounces.

Niagara Falls. Carbide is used as a base. It is milled very fine, put in a vacuum furnace and then liquid air introduced—the air contains four-fifths nitrogen and one-fifth oxygen—and by bringing this mass up to a very high temperature the oxygen is driven off and the nitrogen remains and becomes fixed with the carbides.

Another form of nitrogen is in the form of nitrate of soda, which is found in Chili, a natural deposit. All forms of nitrogen, except nitrate of soda, have to undergo a decomposition in the soil, which changes it into nitrates and thus becomes available plant food.

The bones of animals and rock phos-

phate make up the bone phosphate. But still we have deposits of rock phosphates, which are found in Florida, the Carolinas, Tennessee, Wyoming and Montana. The rock is partly formed of bones from animals of prehistoric ages, combined with liquids, and became a part of the rock. So really, the bone is the only source of phosphoric acid.

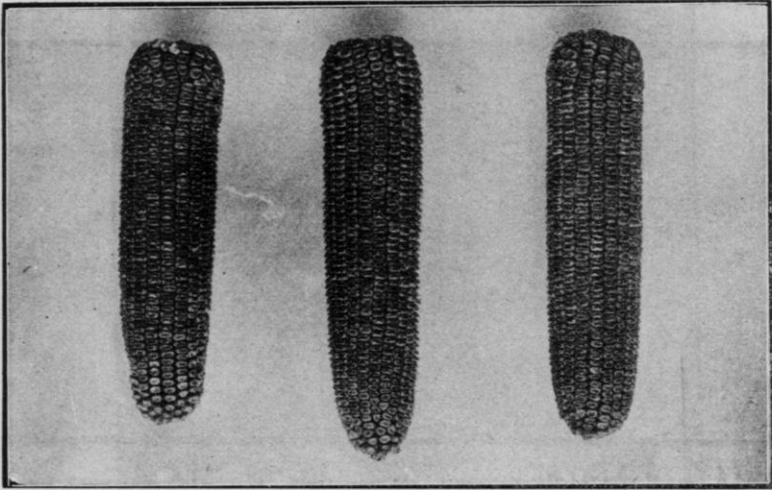
When you come to potash, there is potash in ashes which has been used as a fertilizer for years. While we were burning up those large amounts of logs in Michigan and Canada in the early days, there were plenty of ashes to supply this trade. Today that

supply is gone and the only supply of potash is the product from the German mines, which the government controls, but which is being sold all over the world.

We are using \$100,000,000.00 worth of commercial fertilizers in the United States, and using them profitably. I think it behooves our farmers to post themselves, to study the wants of our

is potash. With the application of two hundred pounds per acre, you can grow large crops.

In Indiana, where, on the one side of a field they were using ninety pounds of potash to the acre, they were growing fifty to sixty bushels of corn to the acre, while, on the other side, there was no crop, the corn would grow up three or four feet, lose strength and



W. A. Hart, Portland, Jay Co., Indiana, 1906. Typical ears from plots treated with clover, manure and 35 lbs. sulphate of potash; weight of ears, 48 ounces.

plants, and they will find in many cases we can use some of these plant foods profitably.

I want to impress upon you the value of potash applied to peat and marsh soils. We know that those soils are made up largely of vegetable matter. If you have high land, it is a waste to use farmyard manure on these soils, because your manure is more valuable on high land, because you want the humus contents of that manure, besides the phosphoric acid and the nitrogen, and that is already in those peat soils, but what you need

fall down. Potash is that element that builds up the structure of plants, makes stiff straw and a better quality of grain. I thank you.

#### DISCUSSION.

Supt. McKerrow—Where can you use your commercial fertilizers the most profitably; on a soil devoid of humus or on a soil containing a goodly amount of humus?

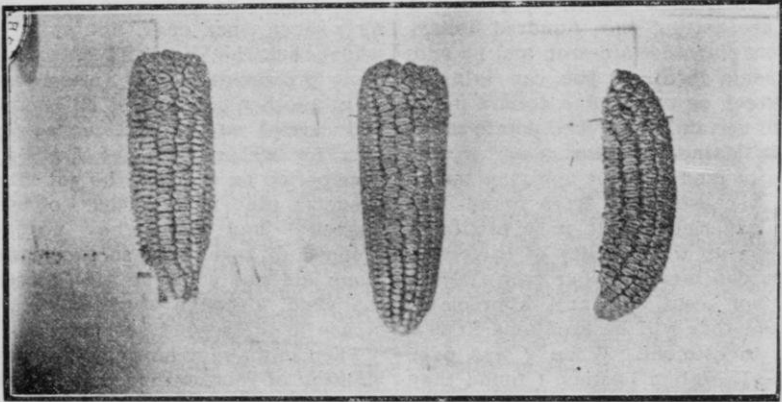
Mr. Utter—I think it is unprofitable to use very much fertilizer unless you have the land in the right physical

condition. That is the foundation of soil conservation and good farming.

Supt. McKerrow—You would not discourage rotation and the use of good manure, but you would rather encourage these and also encourage the addition of commercial fertilizer as an additional plant food?

Mr. Utter—I said I thought our methods as farmers in Wisconsin are the best followed anywhere, because they do follow just that system.

having humus in the soil. I would like to see an experiment made using these fertilizers upon soils in different conditions, very poor soil in one plot, and good soil, thoroughly worked up and filled with humus, in another. I am perfectly confident that we are going to lose our money if we put this commercial fertilizer on land that is not in proper mechanical condition, so there is enough humus in it, so it is in condition to hold air and absorb



Typical ears on clover sod; weight of 3 ears, 17½ ounces.

Mr. Imrie—Has any one in St. Croix county ever used any rock phosphate, or ground bone, or anything of that kind? I see a gentleman back there has.

A Member—There is one trouble about this matter of buying fertilizers, we are too apt to think when we get commercial fertilizers that we have got something to help our soils and that we need not be so particular about that question of having enough humus in it. If we go on that idea, we shall have poor results. I think the point Mr. Utter made about the soil being in proper physical condition is a good point, as well as the point made by Mr. McKerrow about

moisture in proper shape. I believe today that we have most of the chemical elements in our soil if we would put our soil in the proper mechanical condition and have enough humus in it.

Supt. McKerrow—I hold in my hand a little clipping from one of the agricultural papers, a sort of boiled down report of Professor Thorne's experiments in Ohio along these lines. Some of our scientists have been trying to alarm us in the last few years by making us believe there is danger of starving out the American people by following the common methods of handling our soil. These experiments have shown the benefit received by

the rotation of crops in increasing crops, rotation with the combination of manure increases the cropping ability, and then, to help Mr. Utter out, I will say that the combination of rotation, manures and commercial fertilizers has brought those crops still higher toward the top, so that the matter comes down to the simple question with reference to these commercial fertilizers, will it pay?

Mr. Utter—Yes, that is the foundation question in this whole matter, whether it is a matter of profit. If you are getting one hundred dollars an acre for a certain crop and by adding some fertilizer you can bring it up fifteen or twenty-five dollars more, it will certainly pay. The potato growers in Maine will not plow a new piece of land without applying fertilizers, because they have found out from experience that it is profitable to keep up the fertility of their soil. If you can increase your crop twenty-five per cent, or any appreciable amount that will be profitable, it is a good investment. When I was over in the Hawaiian Islands, I found they were plowing three feet deep and using fertilizers to the extent of one thousand pounds of nitrate of soda to the acre, and they told me they could not afford to break up a new piece of land and plant without the fertilizer, because they would exhaust their soil and then would have to rebuild it.

Supt. McKerrow—Professor Thorne, some fifteen or sixteen years ago, took some old, worn-out land at Worcester, which had gotten down to eight or ten bushels of wheat to the acre. He selected a period of five years, so he has had three periods to work in. He gave this wheat land the best cultivation he knew how to give it and we have heard that tillage is manure, which isn't exactly true. With continuous wheat cropping in periods of five years in the first five-year period, he got an average yield of ten bushels

of wheat to the acre; the second period he got eight bushels, and the third five-year period he got six, and that is with the very best cultivation. That was on one plot. On another plot, with rotation alone, a rotation which had clover one year, clover and timothy the next, corn the third, and then winter wheat; the first five-year period after starting out he got 9.3 bushels of wheat; the next period, 8.5; the next period it went up to 13.7. That was the rotation alone; he increased the crop forty-seven per cent, not only his wheat, but the corn and oats in the same proportion.

On another plot he put on manure and carried on the continuous cropping for wheat. For the first five-year period on that plot he got fifteen bushels; the next period, eighteen bushels, and for the next it dropped to seventeen, so the manure alone did not continue to increase the yield, although there was an increase in the second period.

Then in another plot came the combination of rotation and manure, such as we have been advising all over Wisconsin. That showed in the first five-year period twelve bushels of wheat to the acre; in the second, nineteen, and in the third, thirty, proving that a rotation and manure combination, such as we advise every good farmer in Wisconsin to follow, and such as a good many of our farmers are following, produces that wonderful increase of one hundred and forty-seven per cent with wheat, and other crops proportionately.

Then in another plot he tried the continuous cropping with commercial fertilizers; the first period of five years there were produced nineteen bushels of wheat; the second period, twenty-one; the third five-year period, seventeen bushels. The presumption is that the humus ran out and reduced the yield in the last period.

But when he combined rotation, manures and commercial fertilizers, we find the largest increase of any: for the first five-year period, 20.5 bushels; for the second, 27.5, and for the third, 33.1 bushels. The following table shows the summary of these experiments.

beg to differ from the scientists who are fearful on that score.

Mr. Utter—The question is simply whether it is profitable or not. The point has been reached among our truck farmers in the southeastern part of the state and the beet growers, where they are simply obliged to buy

| SYSTEM          | TREATMENT                   | AV. YIELD PER ACRE PER 5-YR PERIOD, BUSHELS |        |       |
|-----------------|-----------------------------|---|--------|-------|
|                 |                             | First                                       | Second | Third |
| Continuous..... | Nothing .....               | 10.1  | 8.4    | 6.2   |
| Rotation.....   | Nothing .....               | 9.3   | 8.5    | 13.7  |
| Continuous..... | Manure .....                | 15.8  | 18.5   | 17.5  |
| Rotation.....   | Manure .....                | 12.7  | 19.0   | 30.0  |
| Continuous..... | Commercial Fertilizer ..... | 19.8  | 21.9   | 17.4  |
| Rotation.....   | Commercial Fertilizer ..... | 20.5  | 27.5   | 33.1  |

Now, the only question is, Will these larger crops pay for the larger expense? Professor Thorne says that for us average farmers the extra expense would not pay, but, as Mr. Utter says, for special crops, particularly crops worth one hundred dollars an acre, one hundred and fifty, two hundred dollars, as some crops are, then there is probably enough profit to pay for commercial fertilizers.

But the main proposition is, no man ought to depend on commercial fertilizers unless he first puts his soil in the right condition with rotation and manure.

Mr. Utter—There is no question about that. If that rotation experiment had been carried right along, you would have more thoroughly exhausted the soil than in the other experiment with the commercial fertilizer added. Even if you put back all the farmyard manure that is made from the crops grown on the farm you are not returning as much as you are taking off.

Supt. McKerrow—That is true, but we do not need to fear the loss of fertility if we follow the proper kind of rotation and live stock husbandry. I

plant food in some commercial form.

A Member—Don't you think that this is one of the most important things for the Experiment Stations in the west to experiment about, these questions of commercial fertilizers?

Mr. Utter—I do, and I am disappointed in the work of our Experiment Station. The company I am representing is making demonstrations all over the world, co-operative experiments covering all these different kinds of combinations that have been discussed.

Dr. Porter—The German Kali Company sent me some fertilizers to use on plots where I was raising tobacco and about ten dollars' worth of fertilizer gave me an increase of thirty dollars' worth more of tobacco on those particular plots. On the other hand, I plowed up an old pasture which had been pastured for twenty-five years and applied the same kind of fertilizers and got a poorer crop, at least no better. I feel that showed that that land was rich enough and that there was a waste of fertilizer. Perhaps it will come out after a while on some other crop.



## REMOVING STUMPS WITH EXPLOSIVES.

J. F. Kadonsky, Marathon Co. School of Agriculture, Wausau, Wis.



Prof. Kadonsky.

When we consider that there are ten million acres of land in Wisconsin yet to be cleared, we find that the clearing of land is one of the most vital agricultural problems in Wisconsin today and one which is receiving the least attention by both the state and federal governments. There are a great many different methods used in doing this work over the state, but the use of explosives seems to be the most universal. Stump blasting is not simply the making of a hole under the stump in a haphazard way and the placing of a quantity of explosives and exploding it, but it is a problem by itself and in order to do the work best and the most economically, it necessitates a very careful study.

## A Handy Supply Box.

When one enters the field for this work, it is well to be prepared with a supply box for the materials. A supply box can be made from an ordinary box, such as an empty Dupont case, by passing a vertical partition through one end the width of an ordinary cap box. In one end make a compartment which will just receive a box of caps. This can be closed with a cover in a leather hinge, which always holds it shut and prevents foreign material from getting into them. The rest of this compartment can be separated by small strips about one-half inch wide and labelled 20, 24 and 28, where the cut fuse can be kept of corresponding lengths. When the stumps are of a uniform diameter, the fuse can be cut by placing them on a block to which a ruled strip is attached, according to which the fuse can be cut with a hand axe and the caps placed and crimped before going into the field. The rest of the box can be filled with explosives and a wooden hoop for a handle nailed over this so that it balances, which completes the supply box.

Besides this, an ordinary wood auger one and one-half to two inches in diameter with a long shank welded to it, a wooden loading rod, and a crowbar with one flat end and the other end running to a blunt point, should constitute the necessary equipment.

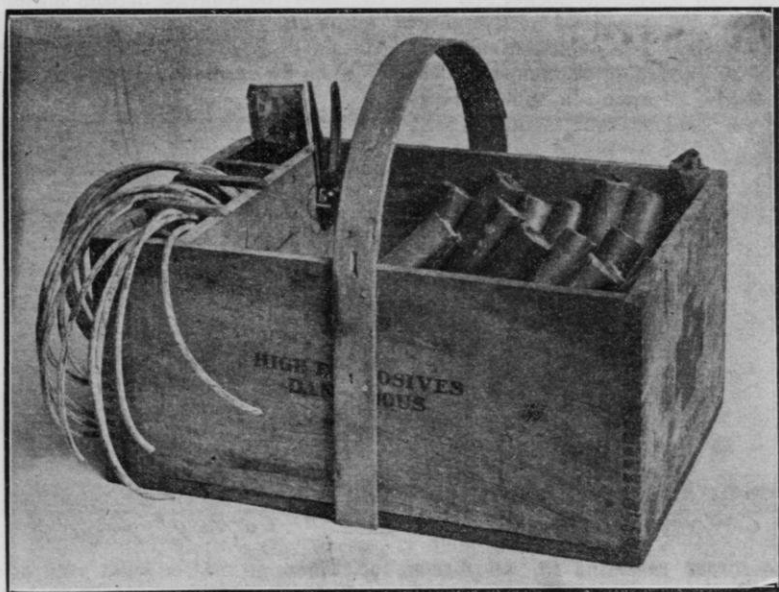
## Preparing the Stump for Blasting.

In blasting the stump, one should look it over very carefully to determine the resistance offered. The charge should always be placed under the stump in the center of resist-

ance. The depth should be regulated according to the condition of the stump. Before starting the hole, look over the root formation and start if possible between two extending roots. There are two reasons for this: First, the root distribution is such that as a rule immediately behind this there is no obstruction in

ued without any difficulty. This, which costs only about two cents, often saves one-half hour's work and at the same time the charge is placed where it is most effective.

The common error made by the Wisconsin farmers is that they generally bore to the center of the stump, at the depth of about forty-five degree



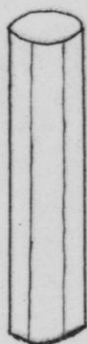
A Handy Supply Box.

the form of roots and hence easier to go down. Second, the tendency for the force of the explosion is to come back and these roots generally form a resistance which prevents this. In boring, if a small obstruction is met with in the form of a small root or a stone, it is well to cut off a piece of dynamite about an inch long and place in this a cap with a fuse about four inches long. Light and drop to the obstructing point. The explosion generally renders conditions such that the process of boring can be contin-

angle, and then place the cartridges unbroken. This brings the charge out of the center of resistance and acts pretty much like placing both horses on one side of the eveners. If the stump is solid, the depth is always too great. It is recommended that the cartridges should always be broken, but if they are not the hole should be bored past the center of resistance equal to one-half of the length of the charge. In this way it will balance and the force will take place in the center of resistance and

remove all of the stump, where in the other case it would blow out to one side, leaving the one-half of the stump and generally all of the roots behind. If a very large charge is necessary, it is well to bore a hole to the center of resistance and drop a small piece of dynamite with the short fuse and the cap down to the bottom. This explosion will spring a pocket, so the explosive can be packed at the point in bulk form. The explosive should always be packed in as compact form as possible, because in this way it produces the best results on account

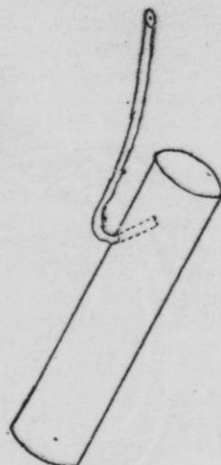
feet below the ground line, depending on the nature of the stump. Spring a pocket at the bottom of this, into which the charge is placed. Then when primed shovel this hollow full of clay and tamp well. This generally renders conditions so that the stump will blast the same as if it were solid. Remember the all-important thing is to place the charge in the center of



*Cartridge cut*



*Same Cartridge  
Compressed*



*Cartridge primed*

of the forces radiating in all directions. Remember that the force of dynamite or any other explosive takes place equally in all directions and not necessarily downward, as many farmers contend. If the stump has heavier roots on one side than on the other, the charge should be placed over toward the side of the heavy roots. When the stump is on a hillside, the resistance is greater toward the slope and the charge should be placed over that way also.

Many farmers have large hollow pine stumps to contend with and find them difficult to blast. These are best handled by boring vertically down through the hollow of the stump to the depth of eighteen inches to two

resistance, no matter what kind of an explosive you use, and if the charge is not placed in the center of resistance it will blow out to one side and the results are very poor, because the roots will be cut off above the plow line and the greater portion of the stump left behind. The explosion of dynamite is something like steam in the boiler; it tends to escape through the weakest points and must be enclosed evenly in order to get the best results.

The depth at which the charge should be placed is also very important. Most of the farmers wish to place the charge at a great depth. When placing it at a great depth, it is necessary to use more explosives,

the stump is not broken up into as many parts and it leaves larger holes to be filled. When the charge is placed as near the base of the stump as possible, the chances for the gases to escape are less, since the openings between the roots are closer than lower down. When the explosion takes place, first the stump splits and then there is a latter force which tends to peel the stump out. When this force takes place higher up as a result of placing the charge shallow, we have a

For solid clay conditions, a slow propelling force has been found to be best. This is furnished by the twenty-seven per cent nitro-glycerine or the forty per cent red cross extra, which are propelling rather than shattering forces. For loose sandy conditions a very speedy explosive is necessary, such as the sixty per cent straight. The forty per cent is the most universally used over the state, but for heavy clay conditions, it has been too fast, tending to cut the roots instead of



Before the Blast. A Tough Subject.

greater mechanical advantage than in the latter case and the stump is split into a greater number of parts, since it is not protected by a layer of soil. Place the charge just as shallow as possible, but care must be taken not to place the charge too shallow under stumps which are cut very short or whose tops are very much decayed, because then the force will blow up through the center of the stump, or blow the top of it off, leaving all the roots above the plow line.

#### The Kind of Explosives for Various Conditions.

The kind of explosive for the various conditions is an important factor.

forcing them out, as is the case with the slower explosive, and for the loose sand it is too slow. It is recommended to not use any weaker cap than the No. 5 and always use the best fuse, in order to get the best and the safest results, even if the price is a few cents higher per hundred feet.

In charging the stump, as stated before, the charge should be in a compact form and firmly packed if dynamite, and if virite should be loose with plenty of room. Dynamite cartridges can be taken out of the wrapper and the powder tamped gently but firmly, or the cartridges can be cut horizontally with a knife into three or four parts and then when pressure

is applied they will bulge and take a compact form. The powder should always be tamped with a wooden ramrod, and never place any metallic instrument down on the powder, especially when the cap is present. The last cartridge can be primed by making a hole with a pointed wooden stick somewhat smaller than the diameter of the cap at an angle of thirty degrees. This stick can be fastened to a trouser's button by means of a

remember that it is not necessary to ram the fuse clear to the bottom of the cap, since the material within is very sensitive and the fire will explode it when the fuse just enters the cap. Always crimp the cap with a pair of crimpers made for that purpose and never use the teeth for this work.

The tamping should be done very carefully until we get four or six inches away from the charge, and then



After the Blast. The result of two minutes work and two pounds of explosive.

string to prevent loosing. The cap is then inserted into this until it is buried in the powder and the fuse bent over to form a sort of hook with the cap as a point. This is done very quickly and will stand a reasonable amount of pulling during the process of tamping. The end of the fuse which is inserted into the cap should be cut squarely and not on a slant. When cut slanting, so as to form a sharp point, it may cut through the material in the bottom of the cap and cause an explosion. This slanted end may also turn over and prevent the fire from forcing into the cap, preventing it from exploding.

Always cut the fuse squarely and

the hole can be filled compactly with any material at hand.

#### Different Ways of Firing.

There are many different ways of firing. When a match is used, it is not necessary to split or cut the fuse or place a pinch of dynamite in the end, but simply light it directly by placing the burning head of the match firmly on the end of the fuse and while this chemical end of the match is burning it will always light, no matter how hard the wind is blowing. The safest, however, is firing by electricity and has advantages over the former method in that for certain

conditions it is necessary to spread the charge and fire simultaneously, which is possible only by this method.

For a large stump of a loose structure it has been found that explosives can be saved and the work done better by dividing the charge and placing the parts under the main points of resistance and firing them all at one time. When two stumps are very closely grown together and one should be blasted at a time, the first one tends to loosen the other, making it very difficult and sometimes impossible to blast, consequently here also it is necessary to blast both at one time in order to do the work most economically and obtain the best results.

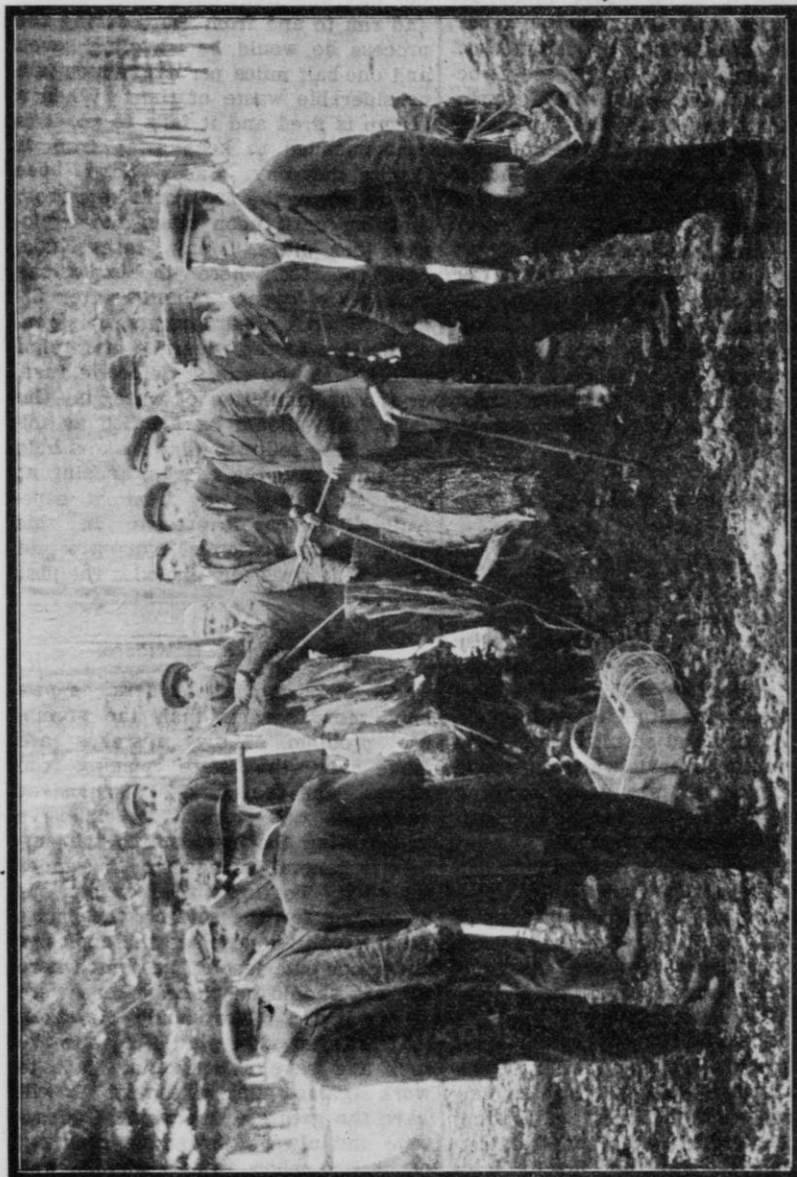
#### The Amount of Explosive For Stumping.

Many farmers find it difficult to determine just how much explosive to use for stumping. It is impossible to give any data as to the amount to use per stump of a given size, because there is a great variation with respect to kinds and condition of soil, condition of stump, and so forth. A good indication, however, is when the sound of the explosion is a dead muffling and the parts of the stump are split and just thrown out, that the amount of explosive is about right. This can be got by experience under the existing conditions. During the process of stump blasting, when the explosions are very loud reports and the parts of the stump are thrown great distances, it is an indication of waste of energy and consequently not the most economical use of the powder. When one determines the proper amount necessary, the process of loading should be carried on for one-half day before shooting and then fire by lighting with a hot rod or a live brand. It has been estimated that if one should blast a reasonable amount of stumps

per day and light each one directly and run to and from them during the process he would be traveling seven and one-half miles per day, which is a considerable waste of time. When a stump is fired and it fails to go, it is recommended to keep away from it during that day. Cases have been known where the fire would keep from morning until noon when the explosion took place. Many cases have been reported where the explosions took place twenty minutes after firing. When a misfire occurs, it is generally due to the presence of foreign material in the cap, a defective fuse, or the accumulation of water in the cap. This should be handled as follows: The following day make a hole carefully near the charge, keeping at least six inches away from it, especially if the cap is present. In this place one-half stick of dynamite and fire. This generally explodes the first charge.

#### Disposing of Boulders.

The disposing of boulders is perhaps more serious than the stumping problem. Many mistakes are made over the state placing the charge and the kind of explosives needed in this work. The explosive in throwing the bowlder to the surface is generally placed too far under the rock. To throw the bowlder out of its bed to the surface the most economically is to place the explosive under one end, just at the point where the pry should be placed if one were to pry it out. Care should be taken that the charge be placed close to the rock and have a horizontal face to work against. In this way it will have the greatest mechanical advantage and always throw the rock out of its bed when proper amount and kind of explosive is used. A slow propelling force, such as is best for stumping on a clay condition, is best



Class of students from the Marathon County School of Agriculture studying the problem of clearing land by the use of explosives.

for throwing bowlders to the surface. For breaking them up when out, place the explosive in a crevice or depression in face of the rock. If there is no crevice and cannot be easily drilled, use a very speedy explosive, sixty per cent straight. Place the charge on the surface and cover with a mushy, wet clay. This generally breaks it without any difficulty. If the bowlder is large and very hard to break, it has been found very satisfactory to explode a small charge on its face to get a depression and then use this as a seat for the larger charge and carry out the same as above.

#### The Handling of Dynamite.

Great precaution should be taken in the handling of dynamite when it is in the frozen condition, since then the particles of nitro-glycerine seem to be isolated and it is very sensitive. In thawing it, above all keep it away from the house and the kitchen stove. A good way to thaw it on a farm is to place it in a sack and open the top of the horse manure pile and place it there the evening before using it. In

the morning it will be found thawed out. Another method is to place it in a receptacle and this is placed in a larger one containing hot water.

#### DISCUSSION.

A Member—If you light about twenty stumps at the same time, how long should the fuse be cut?

Mr. Kadonsky—The fuse should never be cut any longer than it is necessary to connect the primer in the charge and extend to the surface to be conveniently lit. They can then be lit very rapidly, especially when a hot rod or a live brand is used.

A Member—Wouldn't it be best to say a prayer before you go from one to another?

Mr. Kadonsky—Well, I believe it is a good plan to say a prayer at any time if one's conscience troubles him, but I do not believe it is especially necessary while blasting stumps, because there is not any more danger in blasting than in doing any other piece of work if one knows his business and is careful.

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#### CLEARING NEW LANDS.

L. E. Scott, Stanley, Wis.

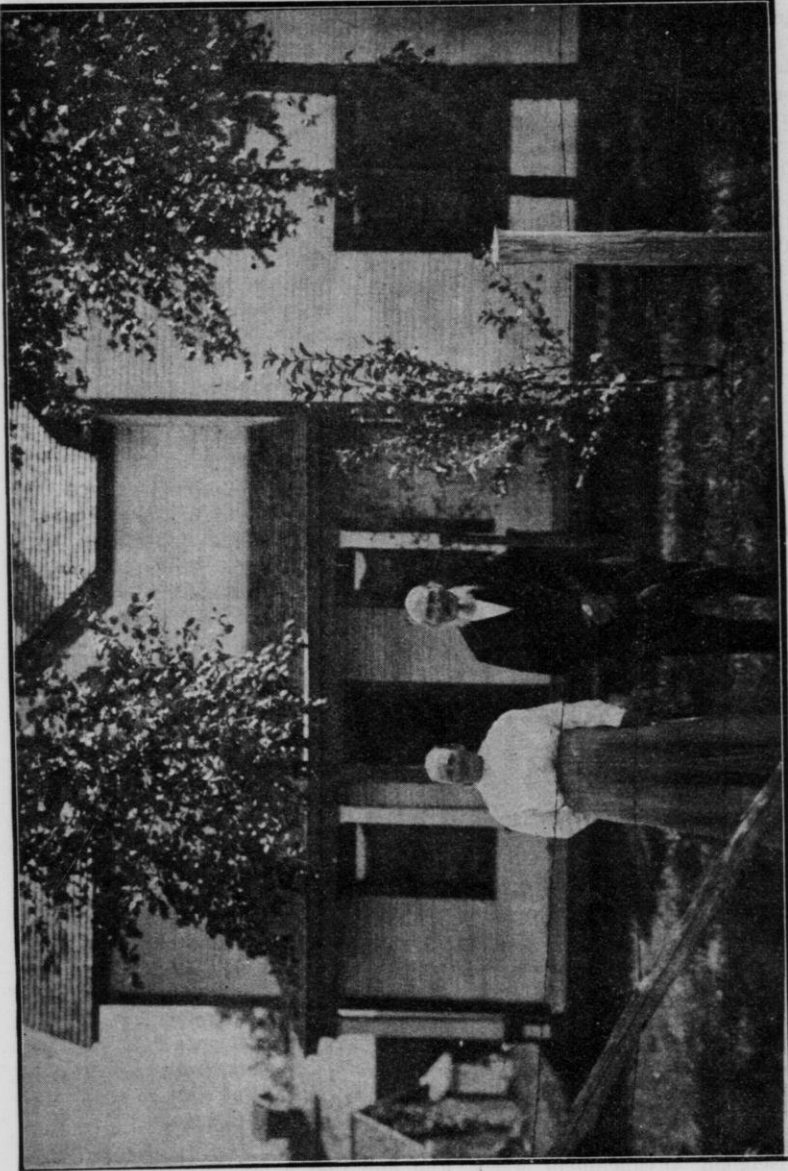
On the wall of a corridor of the Wisconsin Agricultural College hangs a sheet of brown paper, a little better than six feet square, placed there by Dean Henry. Upon the lower right hand corner is written, "This represents the amount of land, at sixty dollars per acre, that can be purchased for the price of a five-cent cigar."

The Wisconsin Advancement Association is calling for settlers to develop 5,000,000 acres in northern Wisconsin. Some of these lands of good

quality and desirable location may still be bought for fifteen dollars per acre. It requires but little figuring to show that at this price a plot a little over twelve by twelve feet, or, to be accurate, 145.2 square feet, can be purchased by this same despised nickle that the young man of today so carelessly puffs into smoke.

I have carried this a little farther and find that a young man with red blood in his veins can clear this amount of land of brush and loose rubbish in the fifteen minutes that he





Mr. and Mrs Christ Otness of Stanley, who cleared ten acres and built these buildings after Mr. Otness was sixty-nine years of age and they are still well and hearty. Mr. Otness is now seventy-eight years old, they are making a good living and are happy.

would devote to smoking the cigar. This would be at the rate of seven and a half days per acre.

I will leave it to the doctor to say which is the greater tax of vitality upon the system; the quarter of an hour spent in clearing land, or in smoking the cigar; but from my experience, I would take chances with the former.

I have used my pencil a little farther, and find that if planted three feet eight inches apart, this plat of land will raise eleven hills of corn and with four ears to the hill, we would have forty-four ears, which, at the current price of sweet corn out of the grocery, would amount to forty-four cents, or the price of nearly nine cigars. At three feet apart each way, one can raise sixteen hills of potatoes, which, with good care, should yield one bushel, the equivalent of which would feed a moderately sized family for a day.

Then again, within his lifetime the young man might expect to see this land increased in value tenfold, and all for that one innocent and thoughtless cigar and the time spent in smoking it.

#### Cutting Brush.

In clearing this land, I would first cut the brush and carefully pile, laying it straight, with tops one way, picking up what rubbish I could readily handle and pile with same.

The best tool I have found in cutting brush is the weed scythe; a blade of medium weight and length, hung on a strong grass scythe snath.

Autumn is an excellent time to brush land. If cut before the leaves fall, they will burn better, but they cut the best when the ground is frozen, before snow comes.

When I first went north, I asked a friend if he knew of any one to whom I could let a job of cutting brush. His reply was, "If you let a job of

brushing, be sure it is to some one who understands his business." I would have you infer from this that cutting brush is not the unskilled and menial service that many consider it. But on the contrary, he who takes an acre of wild and undeveloped land, clears it and starts it well on its Heaven-born mission of providing food for the human race, is just as much of a man as he who tills older and time-honored soil. In fact, he is doing better than to "make two blades of grass grow where but one grew before," he makes three grow where none grew before. All honor to the Pioneers. Theirs is a rare privilege. They fill a niche in the world's history that no other men can fill.

"Ay call it Holy ground,  
The soil where first they trod."

#### Cutting the Large Timber.

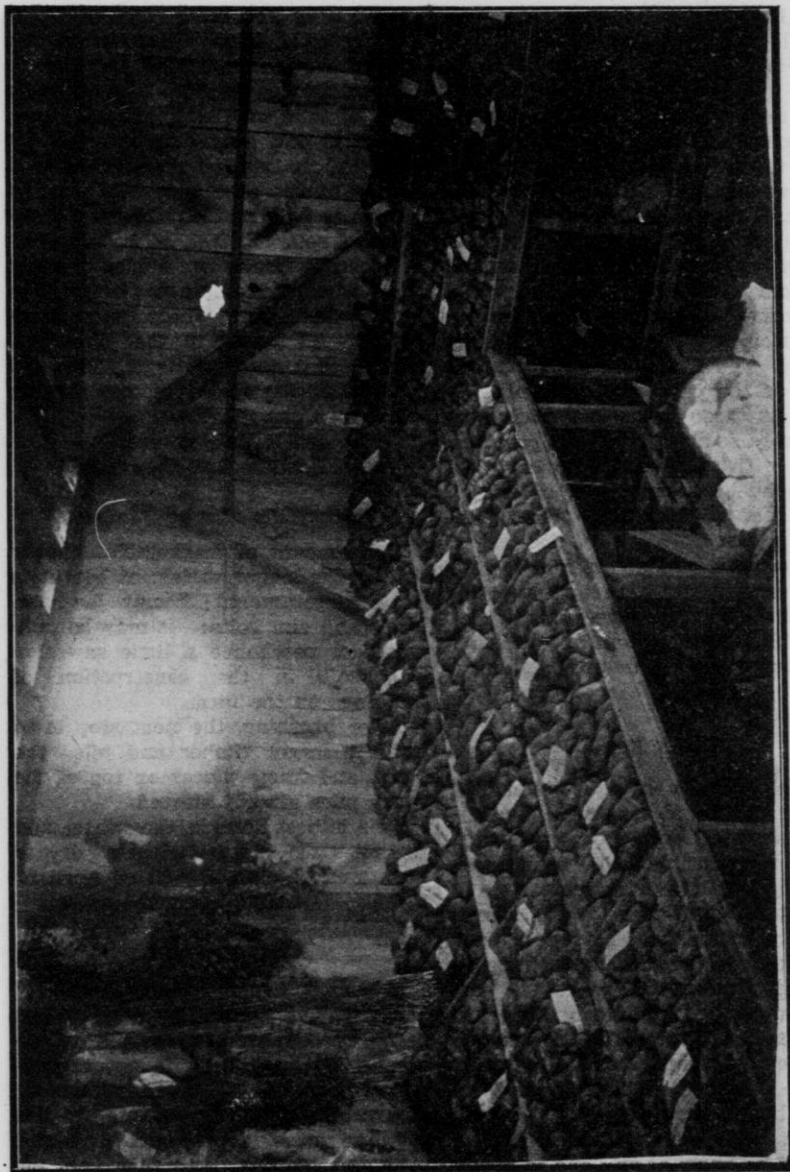
The amount of marketable timber left by the logger varies; at best it is not a large amount; it may be basswood and elm bolts; it may be pulp wood, or perchance a little saw timber, useful in the construction of buildings on the farm.

After brushing, the next step is to cut the larger timber and pile the limbs and waste pieces on top of the brush piles already started.

This is best done in the winter and the piles may be sufficiently dry to burn well the latter part of April or in May, depending upon the season.

#### Burning Brush.

In burning brush, I have tried many plans. When a boy, I was obliged to carry live coals from one pile to another. My bald head is not the result of "early piety," as many suppose, but rather from heading in on the seething mass to "snatch a brand from the burning" and then cool off by blowing it to a flame under the next pile. I have carried these brands



Potatoes and other products grown on newly leared land, exhibited at Fair at Stanley, Wis., 1911.

with shovel, with fork and with tongs; I have used torches soaked in coal tar and with kerosene; I have even used the gasoline blow-torch, but now when I go out to burn brush I fill my pockets with matches and take a can of kerosene in my hand. I pick up a dry piece of wood and if it is a little rotten and punky, so much the better. I turn on about a half a tea-cup of kerosene (just what will soak in nicely), and light it with a match. I then lay it on top of the center of the pile and pick up a little fine, dry rubbish and put on top of that and soon have a fire kindled that will burn down through the pile. A gallon of kerosene costs eight cents and will double the day's work. A fire in the roof will burn a house just as completely as one in the basement.

A bright day with a light breeze is the best time to do this work. A gale will drive the flame out of the pile, burning out the fine material and leaving the coarse limbs. A light breeze is preferable. The fire will burn out the entire center and leave but a light fringe on the outside, if any. With an old fork, this should be thrown in while the center is still alive with coals, and the burning is complete.

You are then ready for the crop; for sowed crops or for seeding down to grass. There is probably no better tool with which to stir up the vegetable mold than a spring-tooth harrow. Where a meadow is desired, I would use this tool vigorously and pick up all rubbish. If only a pasture, I have seen a good catch on clay ground by just scattering the seed without harrowing if the weather is favorable, but even then a light harrowing gives better results.

One can get on very well mowing a good stand of grass between stumps, but the settler works to better advantage if he has a little improved land upon which to grow his winter feed

and can pasture his stump lands till the stumps can be well removed.

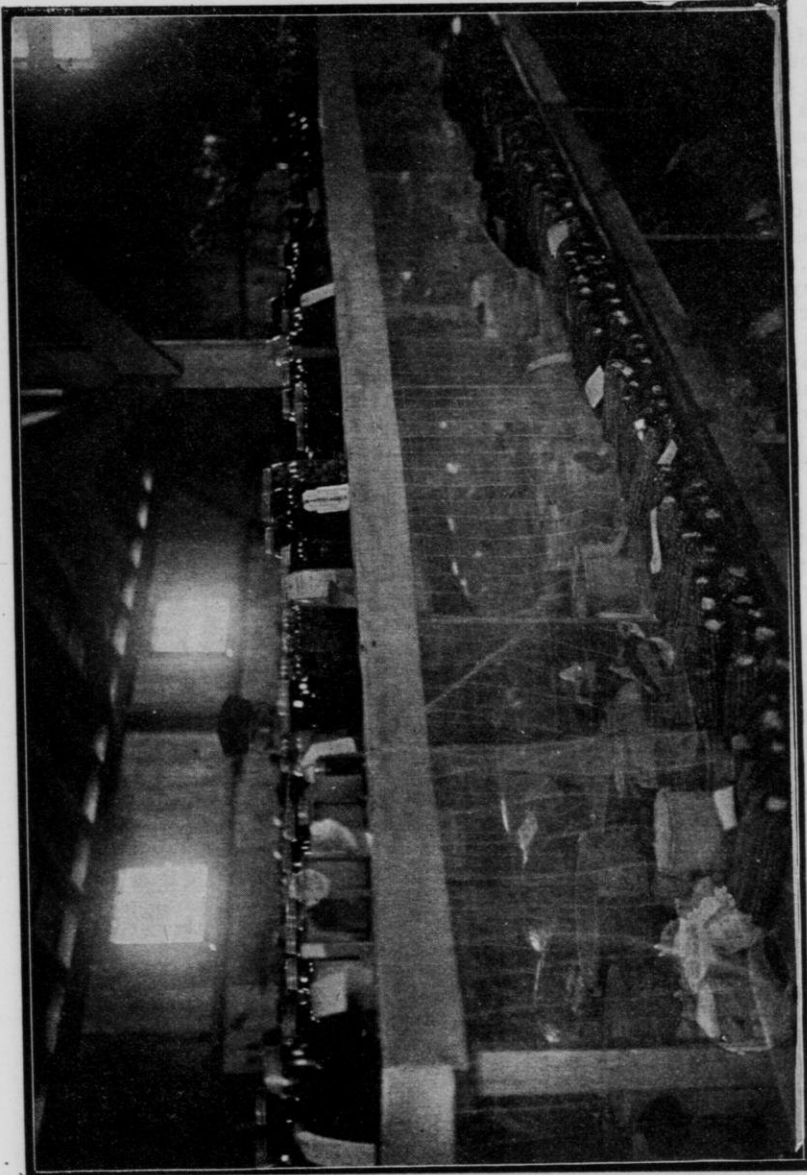
### Stumping.

The stumps can best be extracted after a few years of rotting, especially the hard-woods, and then always with explosives.

Plans are now on foot to clear lands on a large scale with powerful machines. The Soo road is now building a stump puller in Eau Claire at a cost of eight thousand dollars, which they will put in operation in the spring, but so far as this plan has been tried it has been found expensive and one serious objection is that much clay adheres to the roots and is dragged over the surface soil to its serious injury. Then much valuable top soil is taken to fill the deep holes from which the stump was removed.

Upon sandy soils where dynamite is not so effective, the moderately sized cable grubbers may be serviceable, but on clay soils I will take dynamite whenever more power than a team with a single block is needed. It is cheaper and more serviceable than any other power and the only objection to it is the headache which often accompanies its use. This does not come from the concussion and probably not so much from the smoke and fumes following the explosion as many suppose, although it is well to avoid the gases as much as possible; but it is more frequently caused by absorbing the nitro-glycerine through the skin in handling the dynamite. This causes an over-stimulation of the heart. I have experienced a severe attack of headache, nausea and vomiting from merely opening a box and picking up a couple of cartridges with the bare hands. Dynamite should be handled with gloves.

Dynamite should be used at 50° F. or above, or when it is soft enough to yield to the pressure between thumb



Corn, Dairy Products and Canned Fruits, products of the New North, exhibited at Fair at Stanley, Wis., 1911.

and finger. If hard, it should be placed in a warm room a day or so, and if the weather is cold, a few cartridges at a time taken to the field and kept covered with a cloth. If necessary to thaw it at once, this is best done by putting it in an earthen jar and setting the jar in a pail of warm water, keeping the dynamite dry. Never place it near a fire.

Just after the frost has gone out in the spring is the best time to use it. The ground then offers the least resistance to the roots and the holes can be the most easily made. We use a sharp crowbar for this purpose, making a hole large enough to admit the cartridge. We put in a half cartridge at a time, first splitting the jacket with a sharp knife, then with an old broom handle we firmly crowd this to the bottom of the hole; then another and another, if necessary. Of course the last piece put in, containing the cap and fuse, cannot be so firmly crowded home. We do not split the jacket of this, but gently tamp some soft clay over it. If water is convenient, I would pour in some of that, which excludes the air and nothing more on top is needed.

Much more force is obtained if the charge is compact in the bottom of the hole. Boring a large hole and placing cartridges side by side gives poor results and is a great waste of material.

The hole should be punched between the roots at an angle that will bring the charge under the center of the stump just as close up to the stump as possible. It is a mistake to set the charge deeply in clay ground.

In case of a hollow stump, or if the crown has been burned off, a small charge must be placed under each outlying large root, one at a time.

One advantage in the use of dynamite is that the stump is split up and clean from dirt, making it much easier to pile and burn.

The expense of stumping varies from six dollars per acre on hardwood land cut ten years to sixty dollars for removal of green hardwood, or a thick setting of large pine. I have always been in favor of pasturing till stumps are fairly well rotted, say about seven or eight years.

There is another plan which begins to appeal to me where one is in greater haste. It is to blast green stumps with light charges but not remove them. This hastens the decay so they can be easily removed in two or three years thereafter. In the meantime, many of these may be burned, and the cavities under the stumps will have become so filled and firm as not to interfere with plowing. A freshly blown stump hole, in a wet season, is sometimes pretty soft for a horse.

It is economy of labor to make small piles of stumps and logs at nearby points, rather than haul farther and pile higher. After burning, the few fragments left may be readily assembled and fired again.

Always blow the large pine stumps first and if not entirely out, pile rubbish around them and when the wind is dry, burn and the labor will be greatly reduced.

So many seem to object to going into the timbered country on the grounds that the clearing is so laborious and requires so much time. They say they prefer going on to the prairies of the west, or to Canada, where they can get results so much quicker and easier.

As an inspiration and example to young men, I would like to show you what one of my neighbors has done. He started in at the age of sixty-nine years on ten acres of absolutely wild land. Being near town, this cost him five hundred dollars (fifty dollars per acre). Being handy with tools he put up his buildings with little help other than his own hands. In nine

years he has done this and has himself cleared the land and made a good living for himself and wife. He has been offered three thousand dollars for this little home, upon which he has placed a higher value. He keeps no horses, but hires a man and team now and then as needed. He keeps cows, a few hogs and poultry and has a good garden. He is now seventy-eight years of age, hale, hearty and happy.

#### DISCUSSION.

A Member—How do you fill holes?

Mr. Scott—If they need filling at all, we fill them with the grub hoe or mattock. Many of them do not need filling.

Mr. Torkelson—I have had some experience with dynamite and we want to remember that dynamite is most dangerous when frozen, most of the accidents occur with dynamite which has once been frozen; that is, after it has been frozen and is being thawed out. The only theory I can invent to account for that is that the freezing tends to isolate the drops of nitro-glycerine.

Mr. Kadonsky—I believe you are right on that point, because when dynamite is in a frozen condition I have known of instances when during the process of breaking a cartridge it exploded with serious results.

Mr. Torkelson—I have known of instances where it would catch fire when it has been frozen.

Mr. Kadonsky—If dynamite is frozen and receives only a very slight jar, that is the time it will go off. It will burn just like a candle if you do not jar it.

Mr. Aderhold—Did you hold it in your hand like a candle while it was burning?

Mr. Kadonsky—No, I would not recommend that, although I have done it as an experiment.

Mr. Torkelson—It will be an im-

provement if you will wrap a little rag around the stick. To have a stick of dynamite loose down there is dangerous. Do you always wear gloves?

Mr. Kadonsky—Some people are more susceptible to this nitro-glycerine than others. When I get out the first two or three days it affects me, but after that it doesn't affect me at all. It is a good plan to get a pair of cheap canvas gloves in which to handle your cartridges and then have them washed, or they can be discarded when saturated with nitro-glycerine.

A Member—Dynamite is a deadly poison and where you have had dynamite about, you want to be careful about leaving cartridges around, for if the cattle get hold of them they will eat them and they will die. It has a bloating effect.

Mr. Scott—I have known men to leave their cartridges in the field and valuable cattle have been lost by eating them.

Mr. Matteson—I left some around and a lot of mice got at them, but it didn't seem to affect them.

Mr. Hirst—What would be the average cost of clearing land in this way?

Mr. Kadonsky—That question has been asked me many times, but there is such a great variation in conditions it is hard to set figures. I have set the figure from my experience—and I have covered the state of Wisconsin and part of Minnesota—at about twenty-five or thirty dollars, but I have had figures which ran up to seventy dollars, and I have had some which ran down to three dollars, so there is your range.

Mr. Hirst—What are your figures, Mr. Scott.

Mr. Scott—I think it depends much on how a man proceeds. If he is in a great hurry and wants to clear directly from the green, it might cost sixty dollars, but where you are not, in quite so much of a hurry and are

willing to wait for part of it, this cost can be much reduced. I have known lots to be cleared of brush and stumps as low as ten dollars an acre.

Mr. Hirst—What would it cost an acre to prepare it for a road machine; taking it right out of the green?

Mr. Scott—I should say fifty dollars would be a fair average.

Mr. Kadonsky—It is awfully hard to take the figures as they stand today, because a great many men are simply experimenting. You spoke about a stump machine that the Soo Line were using. They have got it down as low as ten dollars an acre on cut-over lands. This includes stumps and down logs, but not green timber.

Mr. Scott—Do not infer if you take more time to do this work that the time is really wasted. Just as soon as the brush is removed and this land is into grass, it is bringing in a revenue. The cattle will probably get just as much value out of that land as pasture as if the land were entirely clear from stumps. The old cow is bringing in a good many dollars feeding between these stumps.

A Member—How do you handle brush which is too large to be cut with a scythe?

Mr. Scott—We cut that with a good sharp axe, close to the surface of the ground; but with that weed scythe, when one gets used to cutting brush with it, he can cut brush nearly an inch in diameter.

Mr. Kadonsky—When we get into northern Wisconsin, where some of the land has been burned over in places, we will find a growth of poplar. I have had some experience with that. In the spring of the year, when everything is dry, we set fire to it

and it burns up the loose material, dead grass, and so forth around the small trees, which causes them to die the following summer. During the summer and early fall, the grass, which grows so abundantly in northern Wisconsin, grows up among these openings and furnishes some more combustible material. Then during early fall, when everything is frozen up and before the snow falls, or perhaps when there is little snow on the ground, we take a heavy roller or a big log with a team hitched to it, and this breaks down all material, including the trees. Then the snow in the winter will break them down still farther with all that grass grown up and the following spring, when it is pretty dry, we put a fire in there again and it cleans it up pretty thoroughly.

Mr. Hirst—What is the difference in cost between twenty-seven per cent dynamite and forty per cent?

Mr. Scott—I haven't the exact figures, but there is quite a difference. I think the forty per cent averages about seventeen cents.

Mr. McLeran—I think about fourteen.

Mr. Kadonsky—And the twenty-seven per cent I think is about two and a half cents or so less than the forty per cent. The twenty-seven per cent dynamite does not contain so much nitro-glycerine. It works slower, propelling rather than shattering. We use about the same amount as we do the forty per cent. The more speedy dynamite will cut our roots and leave them behind, it shoots out too fast. You want the slow, propelling force for clay conditions, or wherever you can use it.

Recess to 1:30 p. m.



## AFTERNOON SESSION.

The convention met pursuant to adjournment at 1:30 p. m., same day, Mr. Scott in the chair.

## GOOD TYPES OF HIGHWAY BRIDGES.

M. W. Torkelson, Madison, Wis.

If the presence of roads among primitive people is one of the first evidences of the appearance of civilization, then the presence of bridges on these roads indicates a great advance. As long as a road serves merely to allow to communicate, that is, to pass back and forth, bridges can be dispensed with, but when a road becomes the means for the transportation of any considerable quantity of goods, bridges are a necessity, so then, we can expect to find the best bridges in the most advanced communities and the poorest bridges in the most backward communities. It is noteworthy that in the mountainous parts of the southeastern states, which were settled very early in our history but are by far the most backward part of the country today, bridges are very scarce.

Here in Wisconsin the streams have been bridged since the first roads crossed them. The early structures were crude, but well suited to the conditions existing at the time they were built. Since that time, there have been many changes. Lumber, a temporary material which was cheap then, is now dear; Portland cement, a material for permanent work which was then prohibitively expensive, is now cheap. Just at present many of these old structures are being replaced, and many new bridges at new sites are being built. Vast sums

of money are being spent for bridges, in fact, practically all of the money tax paid out for roads and bridges has gone for the bridges.

A large number of towns have gone on for so many years patching old bridges and repairing decrepit culverts that they believe this condition must always continue. This is not the case. The number of culverts and bridges which any town must maintain is perfectly definite and easily learned. The chairmen should determine this number, the location of each and set about replacing the old, temporary structures with permanent work. If a few are built in this way each year, it is a matter of only a few years until the work is completed and the money which has been absorbed in this profitless way can be omitted from the tax roll or used to further the work on the highways proper.

#### Safety and Economy Requisites in Bridge Building.

People very often ask me this question: "What kind of bridge do you advocate?" It cannot be answered, because each bridge is a problem by itself and requires special plans. People also ask about the strength of different types of bridges, if a steel plate girder bridge is not stronger than a steel truss bridge of the same span, or if a reinforced concrete arch bridge is not stronger than a rein-

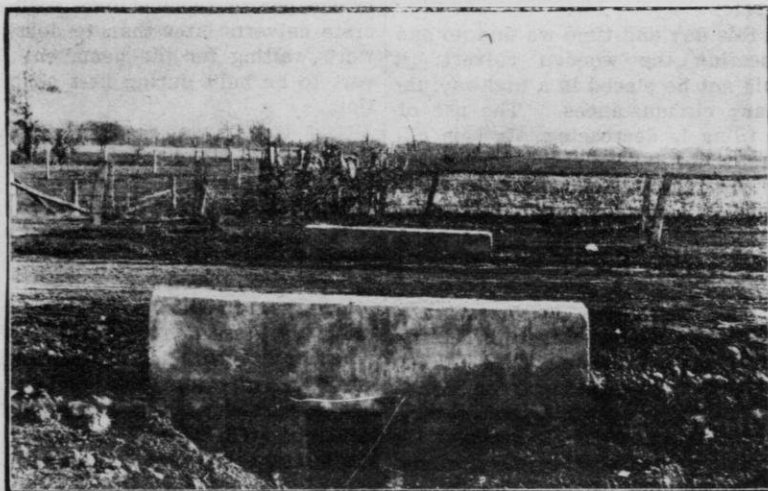
forced concrete bridge of the girder type. This question can be given a more satisfactory answer, which is, that being economically designed to carry the same load, they should be of equal strength. The task of the engineer is not to design the strongest possible bridge, but to prepare the most economical design to safely carry certain loads.

It will be noted that there are two

low cost of maintenance, and the most economical structure is one in which the cost of maintenance, not only general repairs, but depreciation, also shall be a minimum.

#### The Merits of Different Materials for Construction.

The tailor must cut according to his cloth, and the engineer must be governed by the amount of money avail-



Square 18" concrete culvert on Sauk Co. road. Built by town chairman with day labor. Such culverts, 24 feet long with end walls, can be built at from \$30 to \$60 each—and they stay built. Plans furnished by Highway Division, Wisconsin Geological Survey.

requirements, which are safety and economy. Safety is the first and it is always possible to make a bridge safe, but if it is good engineering to leave nothing undone that should be done, it is equally good engineering to do nothing needlessly, so the problem is to evolve a design which shall be safe yet economical. The whole question, in fact, is one of economy, which should not be confused with cheapness. Cheapness indicates merely a low first cost; economy indicates a

able for his purpose. Very often he is forced to design in a manner he does not favor, because he cannot command the funds necessary to carry out his purpose. But in the smaller structures, such as culverts, there is not under any ordinary circumstances, any excuse for other than permanent work.

For all culverts and short bridges up to ten or twelve feet span, concrete is by all odds the best material. Its valuable qualities are so well

known that it is not necessary to dwell on them. It is sufficient to say that it is composed of materials easily obtained, requires no great skill in the making and can be moulded in to any form and designed to withstand any strain.

For the smaller openings, we usually find either wooden culverts, vitrified clay pipes, corrugated metal culverts, cast iron culverts, either plain round, or some patented form, or concrete.

In this day and time we find no one advocating the wooden culvert; it should not be placed in a highway under any circumstances. The use of clay tiling is decreasing. In this climate its life is very short, frost being very destructive. If used with well drained foundations, carefully laid and sufficiently covered, it is a good material.

Corrugated metal as a culvert material has not been in general use long enough for experience to demonstrate its actual value. While it has some advocates outside of the manufacturers, they are few, and people who buy it generally do so secretly apologizing, and thinking they cannot afford something better. Its advantages are that it can be cheaply and easily installed. It can be subjected to considerable abuse in handling without injury, and if washed out corrugated metal culverts can be put back into place uninjured. Its use in the smaller sizes is advisable where there is not enough head room for a concrete culvert, or where foundations are such as to make it unduly difficult to build concrete safely, but in the larger sizes its cost is at least equal to the cost of a concrete culvert of the same capacity, and as now manufactured, these larger culverts are not as strong proportionately as the smaller sizes. The advocates of this material, in order to create the impression that it is permanent, frequently call attention

to the fact that corrugated metal culverts are sometimes used in railway construction work. It is true that these culverts are often so used, but not because they are permanent. In work of this character, it often happens that vexatious and costly delays in grading occur because of uncompleted culverts. In such cases, corrugated metal solves the problem. These culverts can be bought and installed in the shortest of time, and it is cheaper to replace them with concrete culverts later than to delay the work waiting for the permanent culvert to be built during first construction.

Cast iron is an excellent material for culverts, being much more enduring in the ground than steel. The only thing against it is its first high cost. It should be bought in the plain circular form, rather than in any of the patented forms.

Whenever a culvert is being built, using any form of manufactured pipe, whether it be vitrified clay, corrugated metal or cast iron, the culvert cannot be considered complete until it is equipped with suitable end and wing walls, either of stone or concrete masonry. The end walls should be carried down to a depth which will insure against undermining, and the walls extended sufficiently to protect the filling over the culvert. In estimating the cost of a culvert of this kind, the cost of these end walls should always be included.

Concrete may be considered as coming closer to filling all the requirements than any other material we have. It can be built in any form, round, arched or flat. Placed in the ground, it does not rot like timber or rust like metal; reinforced with steel, it will resist tension as well as compression, thus withstanding the frost which destroys vitrified piping.

In the smaller sizes, that is, up to about forty-eight inches, it is probably

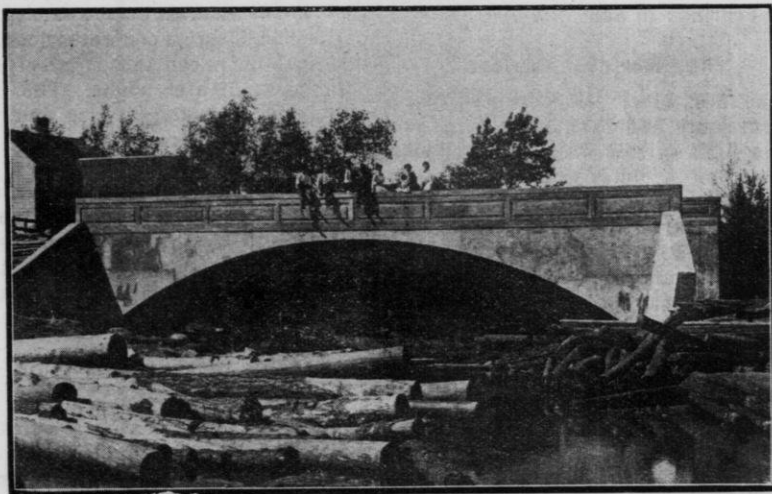
best to build concrete culverts circular in shape, using a collapsible metal form. There is a large number of these on the market, some crude and inexpensive, some elaborate and high-priced. They are all good, some better than others. A town with a large number of culverts to build should buy one of the better kinds.

Larger than forty-eight inches and up to about twenty feet, concrete cul-

the site happens to be in a low place, this rise will be enough to make an ugly hump in the road. If built flat, the height of the floor can be made anything desired and the grade of the road remain unbroken.

Above twenty feet, reinforced concrete bridges should be built arched, or with girders.

The cost of these two types is about the same for spans up to about forty



**Reinforced Concrete Arch Bridge, Town of Medford, Taylor County, built by Stein Constructing Co. of Medford. Designed by Highway Division, Wisconsin Geological and Natural History Survey.**

verts and bridges can best be built flat. The advantages of the flat type of bridge are that it can usually be built cheaper than the arch type and that it can be built to fit any grade. Building the forms for an arch requires considerable cutting of timber; building the forms for a slab bridge requires very little. An arch to stand up must be built with its proper rise. If we should build an arch of, say, twelve-foot span it should rise from three to six feet. If

feet, when the advantage is with the arch. In Wisconsin very few reinforced concrete bridges of long spans have been built, but the number is fast increasing.

#### The Steel Bridge.

For spans longer than forty feet, it is cheaper to build of steel. Steel as a bridge material has only one drawback; it will rust and requires frequent paintings, but with ordinary care, a steel bridge, substantially de-

signed and well built, should endure for fifty years at least. Rust generally does the greatest damage at the end bearings, where dirt is allowed to gather in and around the shoes, holding moisture against them, so that we frequently find bridges with the end posts completely rusted through near the floor, while the other portions of the structure are in no way affected. This condition can be remedied by placing a concrete curb around the end bearings to keep the dirt away.

#### The Floor of the Bridge.

The first steel bridges built had plank floors and even now many are being built in this way. Plank floors should be avoided wherever at all practicable and a permanent floor used. So far reinforced concrete has given better satisfaction than any other type of permanent floor. Its only drawback is its great weight, which makes it dangerous, except in rare instances, to use it on structures originally designed for wooden floors.

Various kinds of wooden block floors, all lighter than reinforced concrete have been tried, but with indifferent success, so far as country highway bridges are concerned. There is always so much vibration to these bridges that the blocks composing the floors are very hard to hold in place, besides these floors are much more expensive than the reinforced concrete.

The weight of a reinforced concrete floor five inches thick is about seventy-two pounds per square foot. The earth covering, which should always be on a concrete floor, will vary in thickness, but will generally weigh about thirty pounds per square foot. Under ordinary conditions, to estimate the weight of such a floor with its covering, at one hundred pounds per square foot, which is sixteen hundred pounds, or four-fifths of a ton per linear foot of bridge, is very near correct. On long bridges this weight

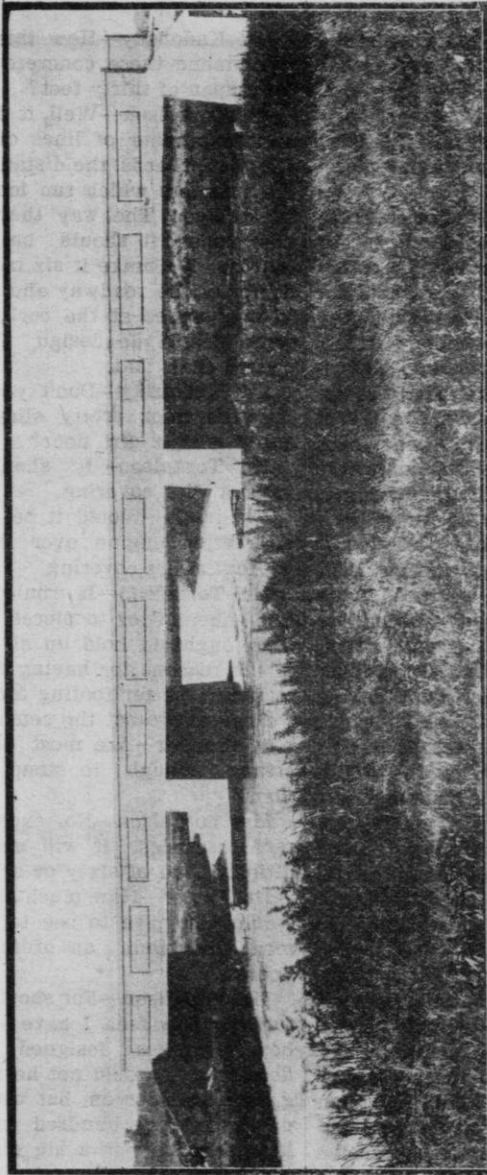
becomes very great and requires very much stronger truss work for its support than would be the case if the floor were planked. This, of course, costs extra money and the cost increases very much more rapidly than the span.

Under ordinary conditions of wear and at the present price of lumber, for spans greater than one hundred and twenty-five feet, it costs less money to replace the planks when worn out than to pay interest on the excess cost of the bridge with a concrete floor, but this does not mean that it is better to build these lighter spans. The price of lumber is bound to rise and with a plank floor there is always a danger that some single weak plank may cause an expensive accident. Usually, however, where a long bridge is needed and the concrete floor is desired, it is more economical to build it in a greater number of short spans.

#### The Substructure.

In building reinforced concrete bridges, it is not possible to use anything but a solid masonry substructure, but with steel bridges many different kinds are in use. The commonest are solid abutments of stone or concrete masonry, steel tubes filled with concrete and supported by piles, and driven steel piling, usually I-beams, encased in concrete. The latter type is good for I-beam bridges and where the materials for concrete are high-priced. The steel piles have very little supporting strength. They serve more as anchors to keep the abutments in place should they be undermined. For this reason they should be long enough to reach far below any danger of wash. This type of substructure should not be used for very long or very heavy spans.

Tubular piers do very well where they are used to support vertical loads only, but should not be used to hold an embankment, as they are easi-



Reinforced Concrete Girder bridge—three forty-foot spans. Town of Vernon, Waukesha County.  
Built by W. L. Shaw of Freeport, Ill. Designed by Highway Division, Wisconsin Geological and  
Natural History Survey. Contract price, \$4,480.

ly pushed out of plumb. They are easier to set in water than any other type of foundation and easier to make secure against wash than any other type. Because of their low first cost, they have been used in a great many places where they are not the best, but their use, except for center piers, is decreasing.

Solid abutments of stone or concrete are far superior to any other type of substructure and concrete is better than stone. The only disadvantage of these heavy abutments is that they sometimes cost more money than some other type. They should always be designed not only to carry the superstructure, but to resist the thrust of an embankment by their own weight. If built on soft soil, or where there is a possibility of undermining, they should be supported on piling.

The subject of highway bridges is so broad that volumes can be written about it. As now designed, the appearance of a bridge, which is really a very important consideration, receives no attention, and the greater part of the bridges now built are as ugly as the proverbial "home-made sin." The foregoing has served merely to call brief attention to the different types of bridges in ordinary use, with the advantages and disadvantages of each. The end sought should always be to secure permanent work, designed to fit special conditions, and with an eye to the appearance of the work when completed. To secure this the plans should be prepared by some engineer, a specialist in this line and disinterested, one who will not stand to gain or lose by advocating any particular kind of structure. By employing a man of this kind, any town board building a bridge may be certain that such advice as they receive will be given them with a view of protecting their own interests and not to in any way advance the interests of the designer.

## DISCUSSION.

Mr. Kadonsky—How thick do you recommend these concrete floors, say for a span of thirty feet?

Mr. Torkelson—Well, it depends upon the number of lines of joists in the floor; that is, the distance between the stringers which run lengthwise of the bridge. The way they are usually placed, it should be about six inches. We make it six inches in the center of the roadway and taper it off to five inches at the curb, although some people do design it an inch lighter than that.

Mr. Kadonsky—Don't you find this concrete floor pretty slippery compared with a dirt floor?

Mr. Torkelson—It should always have a dirt covering.

Mr. Imrie—Would it be safe to run a traction engine over that cement without a dirt covering?

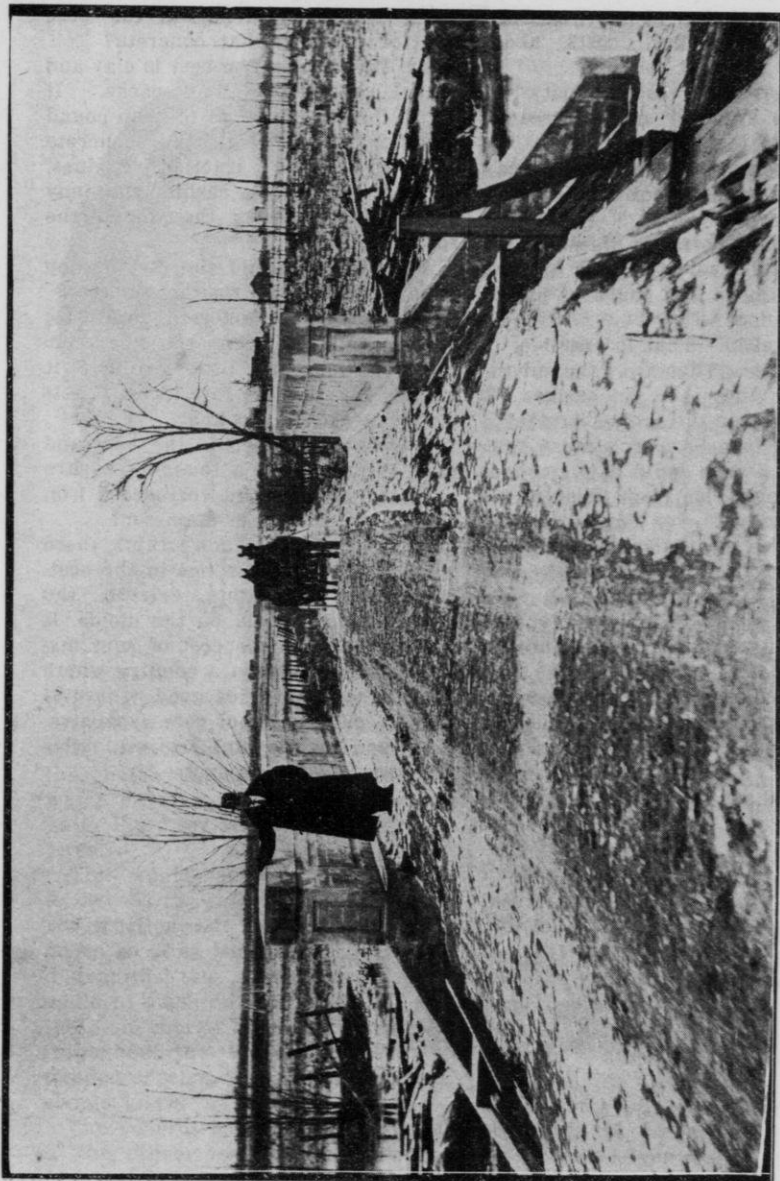
Mr. Torkelson—It would simply cut the cement floor to pieces faster. The floor ought to hold up all right. One of the reasons for having dirt on it is to secure better footing for horses, as well as to protect the cement floor.

A Member—Are most old bridges strong enough to stand a cement floor?

Mr. Torkelson—No, except in very rare instances. It will make the additional load of sixty or seventy tons.

Dr. Porter—How much heavier steel would you have to use to carry a cement floor than an ordinary plank floor?

Mr. Torkelson—For short spans, like forty or fifty feet, I have seen a number of bridges designed for plank floors that I would not hesitate to put a concrete floor on, but when you get up around one hundred and twenty-five feet, there is a big difference. I couldn't say just the percentage in the weight of the steel, but as far as cost in money is concerned, the following example will illustrate. A one hun-



Reinforced Concrete Girder Bridge, Town of Lena, Oconto County, built by Smith & Co. of Oconto. Designed by Highway Division, Wisconsin Geological and Natural History Survey. Contract price, \$1,345.



dred and twenty-six span with plank floor costs about \$2,200.00. Under like conditions, a similar span, with reinforced concrete floor, costs about \$3,000.00.

Dr. Porter—The vast majority of our bridges are over small streams, thirty-five to forty feet.

Mr. Torkelson—There it would pay to have an engineer look each particular bridge over.

Mr. Bradley—In many places where there are old steel stringers, by the addition of more iron could we put on a concrete floor?

Mr. Torkelson—That is possible.

Mr. Stiles—What are the advantages of having the flat bridges in marsh land over the arched bridge?

Mr. Torkelson—An arch must have some rise; if you build a twelve-foot arch, it should rise from three to six feet, and to get over that you often have to have an ugly hump in the road, while with the flat bridge you don't need to grade up at all. We have built spans up to twenty feet, built them flat; that is, with reinforcement, without I-beams. We build reinforced concrete bridges with spans up to thirty-six feet, but in those cases we use a high girder on the side. With a thirty-three-foot span, we make a set of girders six feet

high, and those are of reinforced concrete.

Mr. Kadonsky—What is the best soil for covering that concrete?

Mr. Torkelson—The best is clay and gravel, something that packs. It should be thick enough to keep bound together and protect the concrete from horseshoes, traction engines, etc. It is more of a cushion than any thing else to take up the wear of the road.

A Member—Would the dirt on top have a tendency to rot the concrete?

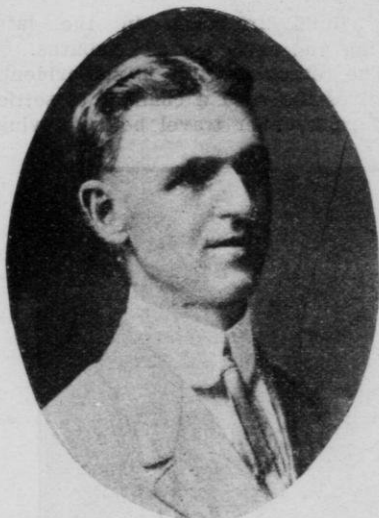
Mr. Torkelson—Concrete won't rot; in fact, if you can set the concrete and keep it a little bit damp, it is all the better for it. If it sets slowly it will be stronger.

A Member—Which is the best and most inexpensive, a ten-inch square concrete culvert, or a corrugated iron culvert ten inches in diameter?

Mr. Torkelson—I don't think there would be much difference in the cost. In building a concrete culvert, the most expense would be the molds. It also depends on the cost of your material. If you are in a country where you have plenty of good natural gravel, concrete is not very expensive, but if you have to haul it several miles it becomes very expensive.

## FIRST PRINCIPLES OF ROAD CONSTRUCTION.

A. R. Hirst, Madison, Wis.



Mr. Hirst.

I want it to be understood that this paper simply covers the broad foundations of the subject and makes no effort whatever to touch on some of the engineering or structural details, which might possibly be best brought up in the discussion, if any one is interested.

This would seem to be a late day to discuss the first principles of road construction, but we find these principles so often seemingly unknown or disregarded that it was thought worth while to touch on them again, so that those in charge of road construction throughout the state might be reminded of what they already know or should know.

The general principles which apply to the proper location, construction and maintenance of roads are as old as highways themselves and as simple

as the alphabet, yet we find them more honored in the breach than in the observance. We can think of no better way to consider the subject than to enumerate a few of the principles applying to each great class of road and give with each broad rule a few words of explanation, which may perhaps give you an idea of the basic laws which are the foundation of all successful road work.

**Location.**

1. Never climb a big hill if a way around it can be found.

This is often neglected and in common practice it has been replaced by this rule: "Never go around a hill if it is possible to go up over it and down again." The wishes and whims of adjacent property owners are too often put ahead of the welfare of the whole people in road location near hills. A steep hill, long or short, is a big tax on the community traveling it, and the first step toward betterment of roads is to cut down or to go around such hills.

2. Never climb a hill in a short distance if you can find a long way to the top.

The thing that makes a bad hill is more often a steep pitch or pitches, rather than the height that has to be climbed. If the top of a hill is one hundred feet higher than the bottom and the road up it is only one thousand feet long, the grade of ten per cent is hard to get up, especially in "soft weather." But if a road two thousand feet long climbs gradually up the same hill, giving a grade of five per cent, the hill almost disappears for practical purposes of hauling. Make it a general rule to start to climb a hill before you get to it, and

the sooner you start the better the road will be.

Another important point is to never allow the road to start down hill after you once start to climb. It makes travel climb part of the hill twice and steepens all the grades. When you start up, stick to it!

3. Don't stick slavishly to section and land lines in laying out roads.

Remember the Lord fixed the best

very little difference in the distance between two points, but a few big hills make bad traveling and expensive hauling.

#### Construction.

1. Build dirt roads in the late spring and early summer months.

The reason for this is self-evident. It gives the road a chance to settle and pack under travel before having



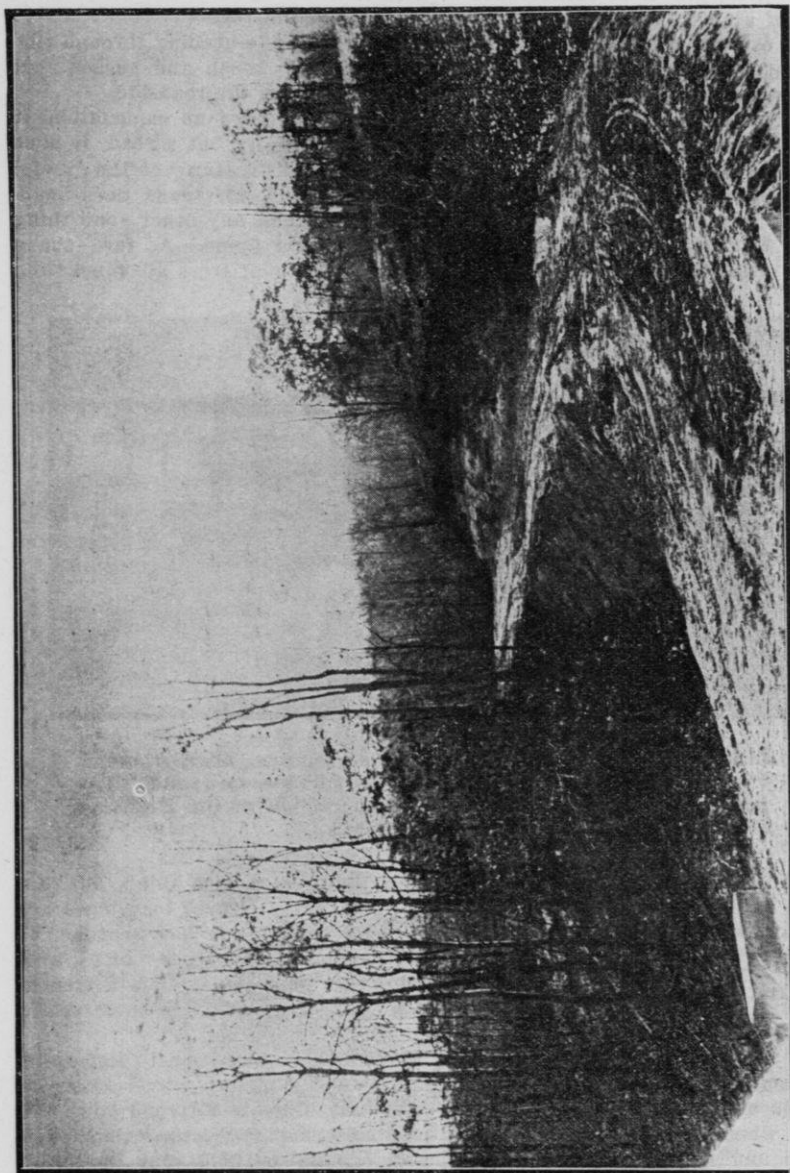
Macadam road in Dane Co. near Madison. Cost (contract), 52 cents per linear foot nine feet wide. Planned by Highway Division, Wisconsin Geological Survey.

places for roads to go long before man learned to run the compass or transit. Straight roads and section line roads in rough country are usually examples of poor judgment in those who first laid them out, and of just as poor judgment in those who keep them there. All things being equal, or even nearly so, by all means build the roads straight and keep them on section lines if you will, but in rough country, where Nature made nothing straight, make the roads winding also, and get good grades. A few twists and turns and curves make

to stand the rigors of winter and the next spring's break up. If your present road system doesn't allow road building to be done in the early months, the best thing to do is to change it to one that does.

2. Make the center of the road higher than the ditches and keep it so.

"Foolish," you say, "everybody knows that." Perhaps they do, but if a large proportion of the roads in your vicinity are not kept the other way around, you are living in a good neighborhood.



Rough grading on relocated Reedsburg Hill, Sank County. 7% grade in place of an old 18%. To be macadamized under state aid in 1912. Located and planned by Highway Division, Wisconsin Geological Survey.

Give earth, gravel or stone roads a crown of at least an inch to the foot for the center sixteen or eighteen feet, and make it even steeper as you get toward the ditches. Have the center of the road at least fifteen inches higher than each ditch and give water a chance to get to either ditch at every foot of the whole length of the road. A distance of from twenty to twenty-five feet between ditches is usually ample. Don't build

ter from the up hill side across and away from the road.

4. Cut a wide opening through timber and keep brush and bushes cut well away from the roadside.

This should need no explanation. If the sun is to dry out a road, it must first get to it. Many of the "awful bad" places in our roads need sunlight more than any other one thing to make them good. A few shade trees or a row of trees at or near the



Granite road bound with limestone screenings, near Almond, Portage County. Nine foot stone surface on sand. Experimental road built under the supervision of the Highway Division, Wisconsin Geological Survey.

more width than you are going to be able or willing to keep smooth and free from weeds and brush.

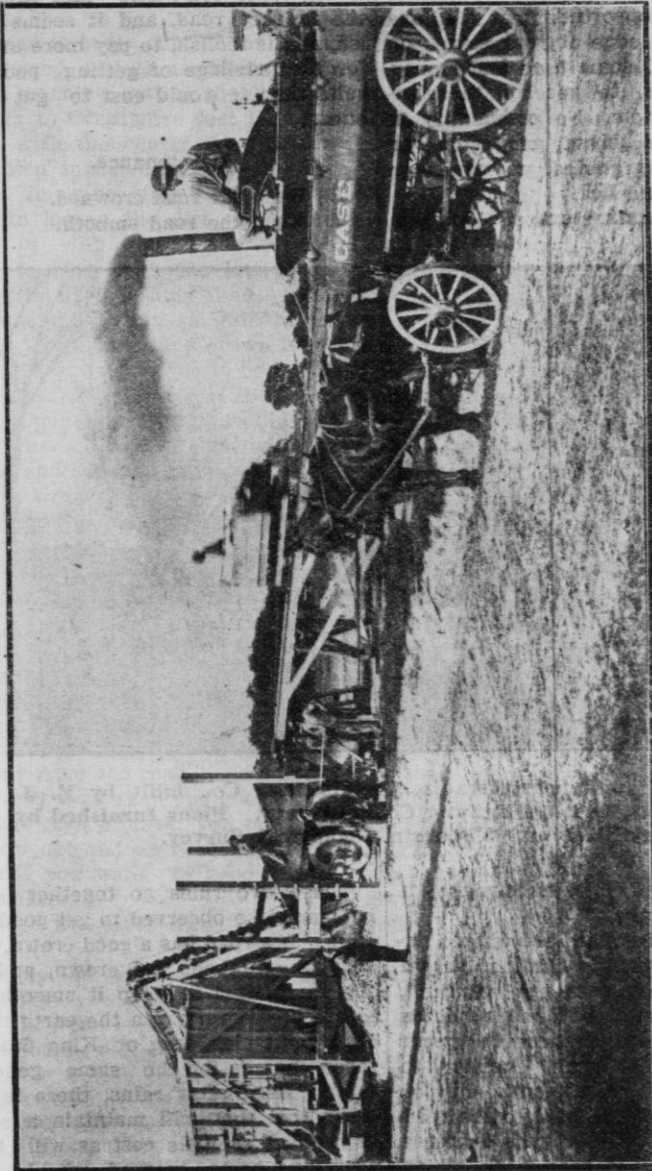
3. Carry water across the road under the road and not above it.

In other words, build culverts. The water break and "thank-you-marm" may be sometimes necessary on very steep, long hills, but the places for their use are very few and far between, when a road is properly crowned and maintained and proper culverts are in. In building culverts, small or large, it pays to build the best—concrete. In side hill work, put in culverts often and throw the wa-

fence line are a nice thing, but lots of trees near a clay or loam road are certainly harmful in wet seasons.

5. When laying stone or gravel roads, put your material in a trench. Don't pile it up in a hog-back on the grade.

This is the one most important thing about stone or gravel road construction. Cut out a trench down the center of your road wide enough and deep enough to hold your material. This keeps it from spreading as it is packed, gives you all the material you put on the road in the place where it will do you the most good, and when



Typical Sauk Co. portable crushing plant. Field stone are hauled in the winter and piled centrally on the road to be built. When building the crusher is set up at the pile and stone is thrown into cars on an industrial track and dumped directly on the crusher platform. Note car of stone being drawn up to crusher.

the road is finished if you want to turn out, the dirt edges or shoulders offer an easy opportunity, as they are flush with the edge of your stone or gravel. Spend some time and money in fitting roads to receive these expensive materials. No community is rich enough to throw good stone or gravel on an ungraded, undrained or untrenched road bed.

6. Before hauling gravel long dis-

binding clay. Excessive clay or sand or big stone don't help—they injure—the finished road, and it seems foolish, and is foolish, to pay more money for the privilege of getting poor results than it would cost to get good ones.

#### Maintenance.

1. Keep the road crowned.
2. Keep the road smooth.



Macadam road near Arcadia, Trempealeau Co., built by E. J. Matchett, County Highway Commissioner. Plans furnished by Highway Division, Wisconsin Geological Survey.

tances to a road, it pays to make it right for road use.

Thousands of dollars are wasted annually in the state in hauling gravel with too large percentage of sand, clay or big stone and dumping it on the road just as it happened to occur in the pit. It is much cheaper to screen out the excess sand, clay or stone at the pit, and haul to the road only that part of the pit's contents which are useful in road work, which is a mixture consisting of sixty-five per cent stone up to three inches in size and thirty-five per cent of good

These two rules go together and both must be observed to get good results. If a road has a good crown, the best way to keep the crown, and at the same time to keep it smooth, is to use after every rain the earth road drag, split log drag or King drag—three names for the same general thing. Used after rains, there is no other tool that will maintain a road as well at as little cost as will this drag, and some method should be taken in every town to insure their universal and persistent use on all clay or loam roads. This is the only

practicable way to give dirt roads the proverbial stitch in time that saves nine.

If a road is badly out of shape or deeply rutted, or both, re-grade it with the road machine, getting the distance of twenty to twenty-five feet between ditches, with the center from fifteen to eighteen inches higher than the ditches. In doing this work, use a plough to loosen the dirt with and pull it in with the grader. Don't expect to plow with the latter and move earth at the same time. Keep ploughing and pulling in alternately until the right shape and crown is secured. A traction engine is both better and cheaper than horses for heavy road machine work and should be used oftener. Do this work early in the year and see that the road is subsequently dragged after every rain.

3. Keep the ditches and culverts open.

The best made ditches and best built culverts sometimes clog and hold water. Whenever you see water standing after a rain, fix that place so water won't stand at that place after the next rain. Remember that the very foundation of all road building is "Get the water off the road and away from the road." The battle is only half won when you get the water to the road ditches; you must get it to flow out and away from these ditches if you want to keep a good road surface.

4. Read the other three principles over.

They include all the primary requisites for successful road maintenance. You can build a beautiful dirt road; smooth, well crowned and well shaped, but unless you observe more or less faithfully those three rules your work will be lost in a few months. There is no easy way to get good roads of any kind except by the use of money and hard work, but even these do not assure good dirt roads

unless there is added to them the constant attention of the road drag or some other smoothing tool.

The foregoing covers briefly most of the first essentials of good road work and the reader is probably tempted to exclaim, "Why, I knew all of those rules before; anybody knows them who knows anything about roads!" True, and yet how many of these very A. B. C's. of road building are neglected in your town, not once, but a hundred times; not one rule broken on one road, but probably five or six or all of them on twenty roads?

You know how roads should be built, your neighbor knows, your whole town knows, but yet year after year you do the same wrong things in the same old ways and let it go at that. Everywhere there is the same lack of intelligent interest in one of the greatest problems of our time, the problem of bringing our roads up to the same high standard that other of man's activities have reached. There can be no doubt that in methods of road management and road building we are far behind the times.

To bring ourselves up to date, we must first get up a real live interest in the subject and create a demand for road improvement. The Almighty won't give us good roads until we want them and work for them. As long as the farmer hangs on to the small district labor tax system of our grandfathers and does his road work under his next door neighbor's kindly and considerate direction, or misdirection, we cannot get good results.

#### DISCUSSION.

Mr. Imrie—You said that in order to get up a hill you should commence climbing before you got to the hill. I suppose you meant when you saw the hill you should commence to step high?

Mr. Hirst—No; the idea of climbing



the hill and getting at it early is to fill at the bottom, and in that way you commence to climb before you get to it. The easiest and cheapest way is to seek higher ground where you would naturally make a fill at the bottom of the hill. It is sometimes a matter of putting a greater distance into the hill to be climbed.

Mr. Matteson—The men in our part of the country claim that using the road grader is not good for the road, because it throws the sod into the road.

Mr. Hirst—Throw it out altogether, or plow it the year before. The probability is the road superintendent will plow it the year before, intending to bring it in, and the next superintendent forgets to do it.

Mr. Matteson—In some places, if the road is a little bit wet, you cannot use a traction engine to haul the grader.

Mr. Hirst—Yes, you have got to have a good footing under your engine, and you have to have a reasonably long distance to grade and it should be reasonably free from stones and sods.

Mr. Scott—If you are putting sods into your road at all, you should put the other subsoil over it.

A Member—Would you have a dirt road twenty-six feet from ditch to ditch?

Mr. Hirst—Not always. As a matter of general observation, the narrower a dirt road is, that affords room for traveling, the better it is I think you will find that where the footing is good the best dirt roads are the narrowest dirt roads; in other words, the roads are around twenty feet between ditches. The distance between ditches depends on how far above the surrounding country you want the center of your road to be. If it is marshy, you want more width.

Mr. Bradley—What sort of a scheme do you use for screening gravel at the pit?

Mr. Hirst—In some cases we take an ordinary screen having poultry wire, an inch and a half or two-inch screen. If you are going to build much road, the cheapest way is to have an elevating arrangement, just as you would do to carry crushed stone from the crusher up to the bins, and send it to a revolving cylindrical drum.

Mr. Toole—I wish to emphasize what Mr. Hirst says as to the value of paying cash instead of working out the road tax. We have followed that plan for several years and we feel that it would be a very poor farmer who could not very well occupy his time in looking after his own business rather than to be subjected to the call of the pathmaster. There is another point not mentioned in Mr. Hirst's paper which is of importance to those intending to establish a side track on a macadam road. It is of great value to us to have a side track and it costs almost nothing, because people do not get into it when it is muddy.

Mr. Hirst—You mean simply where the ordinary ditch widens out into a flat space of six or eight feet?

A Member—Wouldn't it be cheaper to have each farmer work his own piece of road instead of having the state do it, as it is talking about doing?

Mr. Hirst—I think you misunderstand the subject of State Aid. There is no movement on hand in this state to take the management and the expenditure of the road funds on the general roads of the town out of the hands of the town. The idea is simply to have State Aid in the construction of stone and gravel roads, in the construction of bridges and the cutting down of hills on a few selected highways. The idea of State Aid does not disturb the present system of working out your taxes in labor as it is now.

A Member—Those away from the

road like that wouldn't get any benefit of it and have to pay the benefit for others.

Chairman Scott—In that case it would be better for the town to get into the game.

A Member—If the town should build nice roads, gravel them and everything, there would be no nice roads for the farmers, there would be so many automobiles they would spoil them for the rest of us.

Mr. Toole—I haven't an auto as many farmers have, and they are very hard on macadam roads, I admit. In our town of Baraboo, the roads branch out from the city like the spokes of a wheel, and people who never thought of owning a horse enjoy the fun of owning an automobile and go back and forth on our roads just for the fun of pushing against the wind, and they certainly are hard on our roads. On the other hand, I will say we have found the automobilists very considerate to farmers, they take their share of the road and no more, and we take our share and no more. They are certainly harder on the roads than our wagons are.

Mr. Hirst—We take the view that the road that is good enough for the automobile is none too good for the farmer.

Mr. Chambers—For that very reason, that the automobiles are harder on roads than wagons, it is certainly only fair to ask the people of the city and the country at large to help support those roads as well as the farmer.

Mr. Toole—The city people have tried to argue that that was not fair, that they should not share the expense of making permanent roads in the country. The fact, is, if you count the number of miles traveled back and forth by the city people, they are using more actual miles of road than we are, so it certainly would seem just that they should help in the expense of keeping up the roads, it is just as important to them as it is to us. On

the other hand, if we had no means of reaching the city and no means of reaching the railroads, I do not know where the farmers would be.

Dr. Porter—I believe with Mr. Hirst that we make our dirt roads too wide. Down near my home there is a strip of highway well graded up, about seventeen feet, perhaps, from the ditch on either side of the road, and that road is nearly always good. I have very pleasant recollections of a lot of little narrow highways over in Switzerland and Bavaria and Italy. I shouldn't think they were over eight feet wide, with the grass growing right up to the highways, and some of them having a little foot path on the side, so there is no waste land there. We traveled over the Appian Way for several miles and I measured it in several places, it is only sixteen to thirty feet in width, from one curbstone to the other, and the old road has been used as a military road for nearly two thousand years. I believe we are extravagant in the matter of roads.

Chairman Scott—If you will pardon the chair, I will say I believe it is largely a matter of local conditions. There is in northern Wisconsin a large area where we have down possibly one and a half feet below the surface what we call hardpan, which makes a splendid road material. Now, if we were to cut our gutters deep enough to get that material up for the surface and have a narrow road, why the banks would be altogether too precipitous. We can only do that by making our roads wider. Where we have wide roads that are flat, they are nearly always poor roads, but where they are all well crowned up, I believe the wide road is better.

A Member—On the country roads where the road is leading from one point to another, it needs a wider road than where there is very little travel. The narrower road keeps in

better condition, but it depends on the amount of travel that goes on the road.

Chairman Scott—Such narrow roads as the Doctor has spoken of here in bad weather would become impassable, they would go to pieces in a short time.

Mr. Imrie—We have an example of that near New Richmond. If that road were narrower, we would go out of sight entirely.

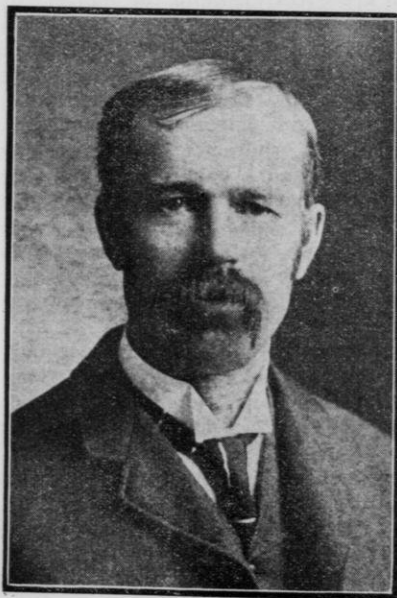
Mr. Toole—The road between Baraboo and King's Corners is a narrow road, all the way from sixteen feet to ten, and those narrow roads are growing in favor, but, of course, the question is always there, what are you going to do when teams have to turn

out. I really doubt if a sixteen-foot macadam road is necessary.

Mr. Hirst—I agree with Mr. Toole. While we do not for a moment claim that in a case of gravel and stone a twelve-or-sixteen-foot road is not better than a nine-foot road, we do claim that they are not enough better to justify the extra expense. The standard type we have adopted is now a nine-foot road, with from twenty to twenty-four feet between the ditches. Of course two loaded hay wagons, in order to pass, will have to have about twenty feet, and that is the kind most of our farmers think we should have, they want the kind of road that would allow a skittish lady driving a skittish horse to pass an automobile, which would take about a forty-foot road.

### REPAIRING THE OLD BARN.

E. C. Jacobs, Elk Mound, Wis.



Mr. Jacobs.

What shall we do with the old barn, especially the old dairy barn, is a question that is being considered by many of the farmers of Wisconsin. Barns built twenty years ago may have been good buildings for the time in which they were built, but they have not only become out of repair on account of their age, but they have become "out-lawed" on account of the advancement made in barn construction, and the better conditions demanded at the present time for housing the dairy herd. The dairy barn today must be more than a shelter from storms and a place to feed stock; it must be a suitable place for the manufacture and handling of human food.

Under the old conditions it was the custom, at it is now with some street car companies, to crowd as many animals into a given space as possible, regardless of their comfort, but the care of the dairy herd under modern sanitary conditions makes the comfort

and cleanliness of the animals and the convenience of the attendants of more importance than mere economy of space, so that the repair of the old barn usually becomes one of remodeling and rearranging, as well as repair.

I know of nothing that will better demonstrate the lack of knowledge of barn construction twenty-five years ago and the unfitness of wood as a material for floors than the removal of an old barn floor.

It is a sure thing that the old barn did not have enough light, so plenty of windows placed at the best advantage should be provided for, and then, when the work is completed, a good coat of whitewash will add to their effectiveness, as well as to the cleanliness and attractiveness of the cow home.

#### A Plan For Remodeling a Barn.

Now, for the benefit of the discussion, I propose to offer the plan used in the remodeling of my barn this summer; not because I think it is the best one that can be brought out, but simply as something to criticize and start a discussion. Although it may be too late for me to profit by what may be said here, it may be profitable for others to avoid the mistakes which will probably develop in my work.

I will briefly try to explain the problem which we have before us. The barn was fifty by ninety-six feet, built about twenty-five years ago. Of course we had to put on a new roof, and we used for that purpose shingles, which I believe is the best material at the present time for the cost. I have figured some on galvanized iron, but have concluded shingles are best.

For the floor construction there certainly is no question but that concrete is the very best material that we can use for that purpose, and for many purposes for which we have been using lumber in the past. So we

used concrete quite liberally. We found that the sills of the barn were more or less rotten, also a great many of the posts, especially near the doorways, were rotted, and I do not know of anything that will show one his previous foolishness more than taking out one of these old floors and seeing what a foolish thing it is to put lumber in the sill of the door, in the sills of the floor and the barn floor. Every sill was rotted, so we put under jack screws and put concrete piers under each post of the barn. Then we removed the sills between those posts and put concrete in place of the sills and filled the wall up between the sheeting, digging down a foot or two, so it made that part of the barn absolutely solid.

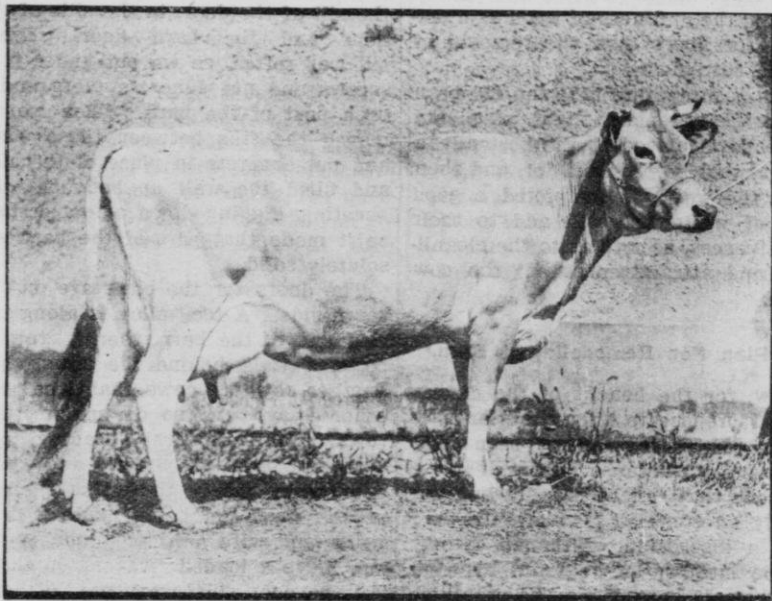
The doors for the cows are on the south side. A feed alley is along the east end of the barn, then a row of cows, a walk behind the cows, then another row of cows that face the other way, and so on, making five rows of animals, first heading one way and then the other, and doors opening in each of the walks, the one at the west end being made a little wider and with a wider door, so we can drive a loaded wagon in there. All the door sills are made of concrete reinforced with iron. The gutters behind the cows are eighteen inches wide; the platforms which the cows stand on are four feet and six inches; the mangers are two feet inclusive on the outside, with a slanting face in front, allowing the top of the manger to be about thirty inches from the stanchion, so that lets all the feed come down near the cow's nose.

The walks behind the cows are six feet between the gutters and the feeding alleys are six feet between the lower part of the manger, giving ample room for the use of a car to carry the ensilage and ample room for walking behind the cows and for

cleaning out. The depth of the gutter is eight inches on the side of the cow and four inches on the side of the walk, the platform on which the cow stands being four inches higher than the walk behind the cows.

An alley runs on the north side the whole length of the barn, making it

by sixteen, then a calf pen ten by sixteen, with an alley about six feet wide with mangers for feeding the calves. Then there is another calf pen and another pen which can be used for cows at calving time, or anything of that kind. There is a stairway going up from the end of the



Jersey cow, Miss Narcisse, Grand Champion Female, bred by exhibitor, Wisconsin State Fair, 1911; first in Test Records. Owned by W. H. Clark, Rice Lake, Wis.

convenient to feed from different alleys, and is five feet, six inches, making ample room to run a truck there. The walk behind the cows has an overhead track in which a manure carrier is run, and switches so that is all run out and dumped on the north side of the barn, where there are no cows running. A row of box stalls and calf pens extend along the west end of the barn and take up about sixteen feet. First we have a box stall nine

alley which runs along the north side of the barn.

The silos are on the north side, two of them, standing near together, and opening into the feed alley. One is twenty feet in diameter and the other sixteen feet.

That, in a short way, is the problem which we have had to work out. There are some things I already feel like criticizing. One is that we have not provided enough calf pens.

We use a swinging stanchion, which can be adjusted to the size of the cow.

## DISCUSSION.

Mr. Stiles—What provision do you make for ventilation?

Mr. Jacobs—We have a ventilator opening from the wide alley two and a half feet square. We have another ventilator that is not a very good one along on the other side of the barn, which runs up the side of the barn and up the roof, which was built quite a long time ago, but is not large enough. This other one works very well. It goes right up straight, going up the side of the purline posts, up as high as the roof of the barn; it works so well we have to be careful about driving the little calves by there, they might be carried out. Sometimes the cat is.

Mr. Imrie—Do the cows lie on the cement floor?

Mr. Jacobs—I wish you had not asked me that, but the fact is they do, otherwise than what straw we keep under them. We supply them with a great deal of straw and have never had any trouble yet in that respect. We have no trouble keeping straw under them, as we had on the wooden floor. We leave the cement a little rough, and it holds the straw quite well. Another thing, there is a partition between each cow, so that she isn't crowding and reaching for food, which pushes away the straw a good deal.

Chairman Scott—In case a man has not an abundance of straw, wouldn't you advise him to cover that cement?

Mr. Jacobs—I would advise it every time. It can be very easily done with plank or some boards put down with a band of iron under them, which makes it easy to pick them up at any time. That is what I expect to do.

Mr. Imrie—Are your ditches wide enough?

Mr. Jacobs—They do very well, but I should rather have them twenty to twenty-two inches than to have them narrower.

Dr. Porter—Does the bottom of the ditch slope backward, away from the cow?

Mr. Jacobs—No, it is flat, straight across, but it is about an inch lower at one end than the other.

Dr. Porter—Wouldn't you prefer to have the ditch slope backward, so as to keep the cow's tail clean?

Mr. Jacobs—In that case we would have to have a ditch about three or four feet wide, and I do not want one that wide.

Dr. Porter—No, my ditches are twenty inches, and I think the slope is one and a half.

Mr. Jacobs—My cows' tails are longer than that.

Mr. John Imrie—I find that the best preventive against their switching their tails and getting them dirty is to put straw in the gutter, because if the gutter is level it is easier to clean out and the liquid will run down to the lower corner if it is not level and there will be a little space there that it will be almost impossible to keep clean. By putting a little more bedding into the gutter it would be all right.

Mrs. Dynes—Is the walk behind the cows built up slanting, or is that level?

Mr. Jacobs—Slightly sloping.

Mrs. Dynes—Isn't there danger, when the cows come in with their wet feet, of their slipping?

Mr. Jacobs—No, we have not found any more difficulty than with the plank. Of course the cement floor is left rough, we just leave it rough, stripping it off with a straight edge, no trowelling down.

Mr. Kadonsky—What provision was made to bring fresh air into the barn?

Mr. Jacobs—That is another question I wish you had not asked me, because we have not made the provi-

sion that is recommended, still we have openings enough around the doors that we could not help, so we are getting very good ventilation.

Supt. McKerrow—Your barn breathes and you could not help it. He did not dare put any inlet in his barn, because he was afraid the suction would take out all his calves.

Mr. Martiny—If you were going to build a new model dairy barn, would you build it that wide, or would you build it about thirty-six feet wide and longer, and have two rows of cows running the long way of the barn?

Mr. Jacobs—Oh, I hope I have learned something in the twenty-five

years since I built that barn. We are simply trying to make the best of the barn we already have there.

Mr. Arp—Did I understand you to say that the bottom of the posts are concrete? Is the top of that wall level, is what I mean.

Mr. Jacobs—The wall was level and the posts were set in it before, but in some cases they are level. In other cases, where the posts were rotted, we cut them off, but they were built of concrete up to meet the post. The wooden post is not below the level of the wall and there is no chance of water getting down and rotting the posts of that barn.

### CONCRETE AND HOW TO MAKE IT.

C. K. Arp,

Assistant Inspecting Engineer  
Universal Portland Cement Company,  
Chicago, Pittsburg.



Mr. Arp.

Concrete is a comparatively new building material which few farmers have acquired the habit of using, probably because they do not understand it and imagine to construct all the buildings, fences, walks, floors, tanks, troughs, etc., of it is impracticable. The intelligent farmer, however, is beginning to realize that the supply of his old-time building materials is becoming scarce and expensive, and that he must study concrete and become acquainted with its adaptability to his uses. A great deal has been written on how to build a concrete water tank, a concrete barn floor, a concrete silo, etc., but very few instructions have been given on how to manufacture the concrete. The success of any concrete building or structure first depends upon the quality of the concrete which goes into its construction, and second, upon the workmanship. It will be the aim of this paper to explain just what concrete is and how it should be made.

Concrete may be defined as an artificial stone made by mixing together cement, water and inert materials, consisting of large and small particles, such as sand, gravel or crushed stone. Before going farther, it must be remembered that the user of cement is not only a builder but a manufacturer, and as such he must understand the materials he is using, must exercise judgment in their selection, and must handle them properly in order to obtain the best results economically.

#### Portland Cement.

Portland cement is a carefully manufactured compound which is sold in a condition to act immediately when mixed with water. It is usually packed in cloth or paper bags weighing ninety-five pounds each, four such bags making a barrel of three hundred and eighty pounds. Portland cement is somewhat like lime, in that it attracts moisture, and for this reason must be carefully protected when stored. If it gets damp or wet it becomes lumpy and hard. If these lumps become so hard that it is impossible to crush them easily, it has become worthless so far as a cementing material is concerned. Crushing these hard lumps to powder will not restore life to the cement, for in changing from a powder to a solid state, the same change has taken place as when cement, water and gravel or stone are mixed together, forming concrete. As this action or hardening of cement can take place but once, it can readily be seen that the cement must be properly protected until ready for use.

#### Aggregates.

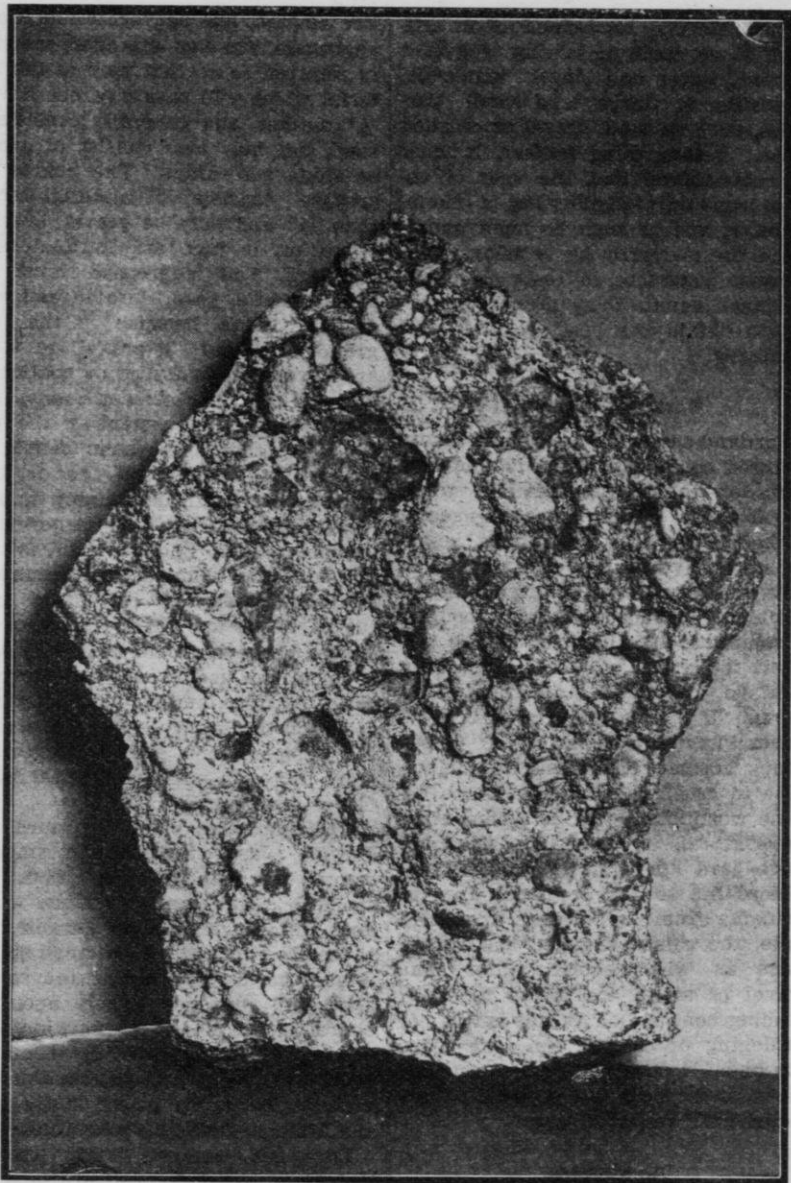
The inactive materials which are mixed with cement and water to form concrete are called aggregates. The aggregates are generally divided into

two classes, fine aggregate and coarse aggregate. The fine aggregate is usually referred to as that part of the material which will pass a screen having  $\frac{1}{4}$ " meshes, and generally consists of sand, but may also consist of gravel or stone screenings. The coarse aggregate consists of material larger than  $\frac{1}{4}$ " and may be gravel, crushed stone, or, in fact, any hard, durable material. The aggregate must be clean, coarse, hard, durable and well graded. Clean, because if the sand grains or pieces of gravel or stone are covered with a film or coating of clay or loam, the cement cannot perform its duty in cementing the particles together. The sand should be coarse and well graded, that is, consisting of particles ranging in size from coarse to fine, the larger sizes predominating. Such a sand is usually solid and compact, and requires a minimum amount of cement to coat the particles, and fill the voids or air spaces between particles. A fine sand is sometimes used by the operator who is not entirely familiar with the proper selection of aggregate, but it requires more cement for a given strength and more thorough mixing, and therefore is not economical to use.

The aggregate should be hard and durable, hard because the concrete cannot be any stronger than the strength of the sand and stone which goes into its make-up; durable because the sand, gravel or stone should remain hard. The size of the coarse aggregate depends largely upon the character of the work in which the concrete is to be used. It should always be such as will enable the concrete to be readily placed in the form and leave a reasonably smooth surface.

For plain concrete work, one-half the thickness of the wall of the structure is often given as the maximum size of the coarse aggregate, and in no case be larger than two and one-half inches.





**Figure 1. A sample of poor concrete.**

There was a very poor bond between the gravel stones and the cement sand mortar, as shown by the pockets on the surface and the projecting stones. The particles of stone in this concrete were covered with a coating of clay and this together with the fact that the materials were apparently mixed with an insufficient amount of water is responsible for its poor quality. This compared with figure 2, where each stone was fractured, shows very clearly the difference in quality.

### Proportioning.

An ideal concrete mixture is one in which all the spaces (voids) between the pieces of gravel or crushed stone are filled with sand grains, and all the spaces between the sand grains are filled with cement. As such a mixture is hard to obtain on account of the variation in amount of voids in each load of sand or gravel, it is always better to be on the safe side and use a little more cement than that required to fill the voids. From the definition of concrete we find that it is composed of water, cement, fine and coarse aggregate. Before deciding upon the relative amounts of these several materials used in making concrete, we must first consider the kind of work we intend to do. For instance, such work as tanks, silos, troughs, cisterns, etc., where solid, dense and water-tight concrete and considerable strength is required, we use about twice as much gravel or crushed stone as sand, and twice as much sand as cement. This would be called a 1:2:4 mixture, that is to say, one part cement, two parts sand and four parts gravel or crushed stone. For ordinary work, such as foundation walls, sidewalk bases, barns or feeding floor bases, a lean mixture could be used, say (1:2½:5) one part cement, two and one-half parts sand and five parts gravel or crushed stone. The materials used in making concrete should always be proportioned accurately by volume, and in sack batches. As one sack of cement is usually considered one cubic foot, it will be found convenient to proportion the aggregate in a measuring box of one cubic foot capacity.

### Natural Bank Gravel.

Sand and screened gravel or stone, as found in natural banks, are doubtless the most popular aggregate for concrete work, as they are easily ob-

tained in nearly every locality. They are, however, rarely suitable for concrete purposes as found in their natural condition, there being too great a proportion of fine aggregate. As explained above, that the most economical concrete mixture was one that contained about twice as much screened gravel or stone as sand, it is, therefore, advisable to examine or test natural gravel before using, and if the proportions of sand and stone are not approximately correct, the two materials should be separated by screening, and remixed in the proper proportion. In some cases it may be found cheaper to use a larger amount of cement with the material as it comes than to separate the sand and stone, and remix in proper proportions.

As bank gravels in different localities, and in fact the same locality, vary greatly, it is impossible to recommend a fast rule, the operator having to work out individual cases for himself. In order to produce good results, the proportions of cement and sand should be 1:1½, 1:2 or 1:2½ or 1:3, depending upon the character of the work being done. If no larger volume of concrete is wanted for the amount of cement used, the only way to obtain it without sacrificing strength and quality is by adding screened gravel or crushed stone in quantities up to and not exceeding twice the amount of sand.

### Mixing.

Mixing of materials for concrete work should always be done on a level, water-tight platform. It will be found convenient to proportion and mix the materials in equal size batches. This is usually taken in cement sack units, one bag of cement being considered as one cubic foot. The sand is first measured accurately by means of a measuring box, and spread

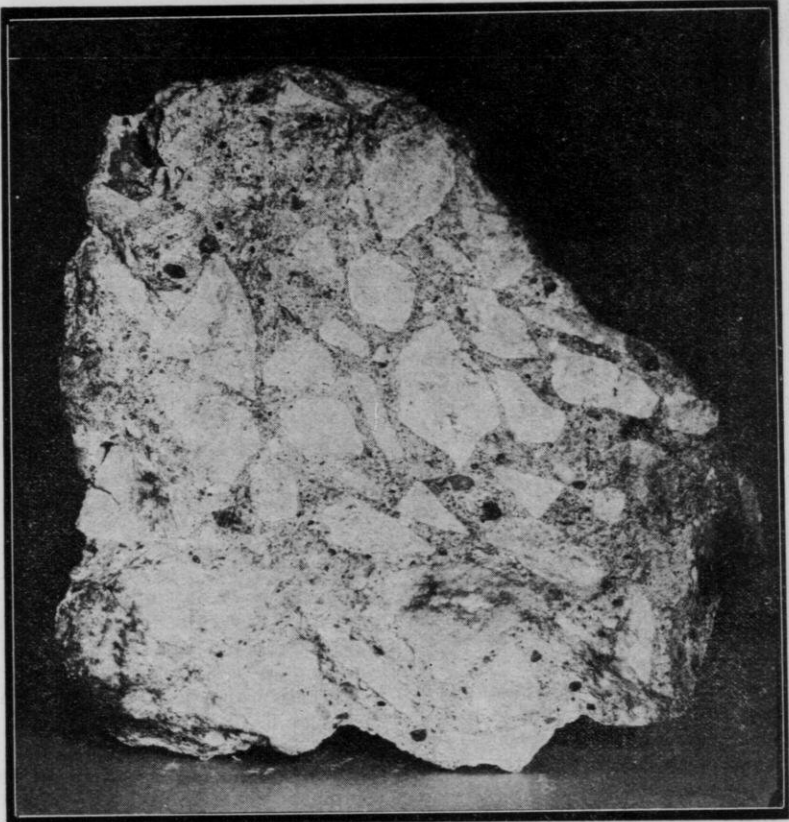


Fig. 2.

Figure 2 shows the broken surface of a sample of good concrete. The proportions of materials used were about 1 part Portland cement,  $2\frac{1}{2}$  parts clean, coarse sand and 5 parts crushed limestone, ranging from one-half inch to an inch and a half in size. The illustration shows clearly that in breaking the concrete the fracture followed in a plane, breaking each piece of stone rather than pulling the particles of stone out of the cement sand mortar.

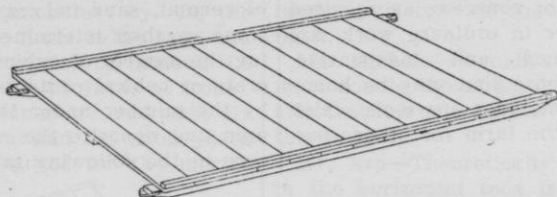
in an even thin layer over the platform. The cement is added and the two materials mixed thoroughly dry until of a uniform color, spread out again and the screened gravel or crushed stone added and again all mixed dry until of a uniform color. The mass is then shoveled up

in the form of a cone, and the top made cup shape. The water is then poured into this cup-like receptacle and allowed to settle down into the mass. If the water is applied down the sides of the pile, it is very liable to flow off, washing the cement from the particles of sand and stone. The entire mass

is then mixed thoroughly until of a uniform wetness or consistency.

Another method which is often used, but not as highly recommended, is by mixing the cement and sand

of the work being done. Whenever possible, it is advisable to mix the concrete to a medium wet consistency, or one that will permit puddling or churning with a pole, thereby working



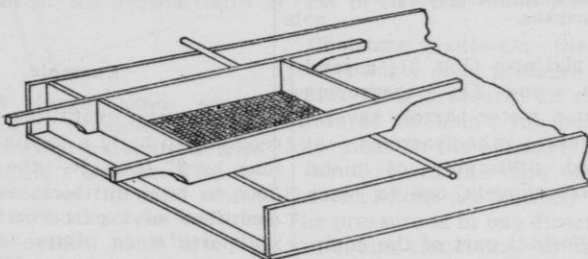
**Figure 3.** Permanent mixing platform. The platform should be about 12 feet long by 7 feet wide, and built of 2 inch plank placed on three 4x4 stringers, rounded at the ends, the outer ones projecting a short distance beyond the platform and bored for clevis pins, so that the platform may be readily drawn about the farm.

thoroughly dry, then applying the water and mixing wet, adding previous drenched stone and mixing the whole mass wet.

Concrete should be deposited in its final resting place within thirty minutes after the water is added, as at this time the action of hardening begins,

the concrete thoroughly into the forms. It is impossible to get a satisfactory concrete if it is mixed so dry that excessive tamping is required in order to fill the forms properly.

Concrete should not be mixed with so much water that when it is deposited in the forms the stone and gravel



**Figure 4.** A small sand screen used in horizontal position consisting of a wooden frame to which is attached by cleats or strips, galvanized wire cloth with  $\frac{1}{4}$ " meshes.

and if the concrete is disturbed serious results are very liable to occur.

**Consistency.**

The wetness or consistency of the concrete when deposited in the forms will depend largely on the character

have a tendency to settle to the bottom, as the water will have a tendency to rise to the top and carry with it a large amount of the cement and fine particles of sand. This causes a separation of materials and if the forms are not watertight, the water will flush out and carry with it the

cement, and the result is a weak, lean concrete.

#### Tools and Equipment.

The tools and equipment used in the manufacture of concrete, as required by the farmer in ordinary work, are easily obtained and inexpensive. Aside from those that may be home-made, the remainder are tools which are used on the farm for other purposes.

#### How to Determine Quantities of Material.

First figure the quantity of concrete required for the work in question in terms of cubic yards. The quantities of cement, sand and gravel or crushed stone are then determined by multiplying the number of cubic yards of concrete or cubical contents of the work by the number under the proper column and opposite the required mixture in the following table:

QUANTITIES OF MATERIALS IN ONE CUBIC YARD OF CONCRETE

| PROPORTIONS OF |      |        | QUANTITIES OF MATERIALS |                |                          |
|----------------|------|--------|-------------------------|----------------|--------------------------|
| Cement         | Sand | Gravel | Cement, Barrels         | Sand, Cu. Yds. | Gravel or Stone Cu. Yds. |
| 1              | 1.5  | .....  | 3.87                    | .86            | .....                    |
| 1              | 2.0  | .....  | 3.21                    | .95            | .....                    |
| 1              | 2.5  | .....  | 2.74                    | 1.01           | .....                    |
| 1              | 3.0  | .....  | 2.39                    | 1.06           | .....                    |
| 1              | 2.0  | 4      | 1.51                    | .45            | .89                      |
| 1              | 2.5  | 4      | 1.39                    | .51            | .82                      |
| 1              | 2.5  | 5      | 1.24                    | .46            | .92                      |
| 1              | 3.0  | 5      | 1.16                    | .52            | .86                      |
| 1              | 3.0  | 6      | 1.06                    | .47            | .94                      |

NOTE.—These quantities may vary by 10% in either direction due to the variation in quality of aggregates.

A mixing platform (Fig. 3); a sand screen (Figs. 4 and 5); a measuring box (Fig. 6); a water barrel; several water buckets; wheelbarrows, at least two and preferably of metal bodies; square shovels, one to each man.

A very important part of the equipment is good wheelbarrow runs. Those should lead from the mixing platform to the place of depositing concrete, and are sometimes necessary between the material piles and the mixing platform. A large amount of time and expense is often lost by trying to work with poor, uneven runs. Two six or eight-inch planks fastened together with cleats serve very nicely. If the runs are some distance above the ground, they should be at least twenty inches in width.

#### Example.

To find the quantities of materials required to build a feeding floor 30 ft. long by 27 ft. wide, the base of the floor to be 4 in. thick, and concrete composed of 1 part Portland cement, 2½ parts clean, coarse sand, all of which will pass ¼" mesh screen, and 5 parts clean, screened gravel or crushed stone, the top coat or wearing course to be ¾" thick, and of mortar made of 1 part Portland cement and 2 parts coarse sand.

First find the number of cubic yards of concrete in the base,  $30 \times 27 \times 4 = 270$ , divided by 27, number of cubic feet in a cubic yard, equals 10 cubic yards. Number of cubic yards of mortar in top course,  $30 \times 27 \times \frac{3}{4} \times 12 = 50.62$ , divided by 27 equals 1.87 cubic yards.

Next, referring to the table, we find opposite the proportions  $1:2\frac{1}{2}:5$  that 1.24 barrels of cement are required per cubic yard, .46 cubic yards of sand and .92 cubic yards of gravel. Multiplying these quantities by 10, the number of cubic yards in the base, and we have 12.4 barrels of cement, 4.6 yards of sand and 9.2 yards of stone.

In a like manner we find that six barrels of cement and 1.77 cubic yards of sand are required for the mortar

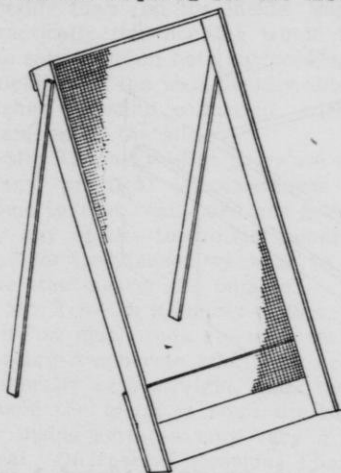


Figure 5. A large sand screen consisting of a wooden frame to which is attached galvanized wire cloth having  $\frac{3}{8}$ " meshes. The degree of fineness of the sand which will pass a vertical screen will depend on the angle at which the screen is set.

top. Adding these to the quantity required for the base, we have a total of 18.4 barrels of cement, 6.37 yards of sand and 9.2 yards of gravel required for the construction of a concrete feeding floor.

#### DISCUSSION.

A Member—Do you place your reinforcing wire just at the center of the wall?

Mr. Arp—In reinforcing a silo with solid concrete walls, I should recommend that the vertical or carrying rods be placed in the center of the wall and the horizontal rods or hoops fastened to and on the outside of them.

Mr. Michels—Wouldn't it have almost double the strength on the outside that it would have if you put it in the center?

Mr. Arp—Theoretically the tension in the horizontal rods is the same, whether placed at the center, near the outside surface, or near the inside surface of the wall. We have the same conditions with a stave water tank. Iron hoops are placed on the outside to prevent the tank from bursting, due to the pressure of the water. This pressure is equal in all directions and exerts a direct tension (or tendency to pull apart) to the hoops. Instead of placing the hoops or reinforcing rods on the outside of a concrete silo or tank, they are placed in the concrete where they will be protected from the elements and against corrosion.

Chairman Scott—On the floor of your bridge, your pressure is downward. The pressure in the silo is outward. Wouldn't you put the reinforcement on the outside?

Mr. Arp—In the case of a bridge the conditions are entirely different. The pressure is in one direction, downward, and transmits to the bridge beams or girders, two stresses, tension in the lower part and compression in the upper part. As concrete is weak in tension and strong in compression, metal which is strong in tension is combined with the concrete in such a way that both stresses are equalized. In the silo, the pressure is outward and in every direction and the concrete walls and horizontal reinforcing rods are brought into tension only.

Supt. McKerrow—Then you would

say there would be just as much strength if you placed it within an inch on the inside?

Mr. Arp—There would be just as much strength until the thickness of the concrete shell between the rods and the inside surface becomes so small that its strength is insufficient to prevent the pushing of the wall outward and away from the reinforcing metal.

of about the proportions one part cement, three parts sand and five parts screened gravel or crushed stone, is deposited and tamped with a tamper, so made that the larger stone can be forced to the bottom, allowing the cement sand mortar to flush to the top. This method would prove satisfactory where extreme care is exercised in using the right proportions and when the surface of the floor will

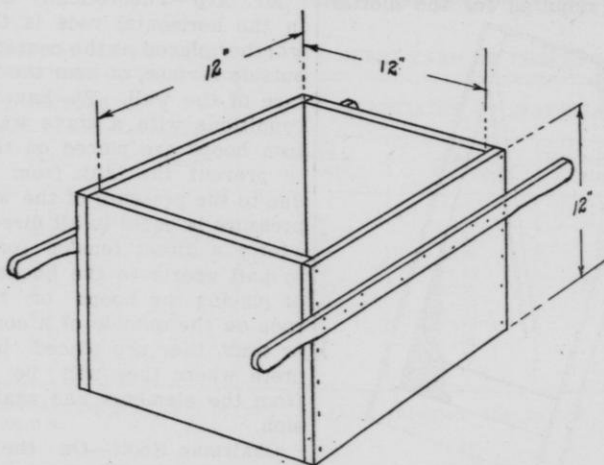


Figure 6. A measuring box of one cubic foot capacity made of 1 inch lumber. There is no bottom in the box so that it may be emptied by simply raising the box away from the materials. A measuring box of 4 ft. capacity may be made by making the inside dimensions of the box 3 ft. long x 1 ft. 4 in. wide x 1 ft. high. This large size box is more convenient for large work.

A Member—Should the sand be wet or dry in mixing?

Mr. Arp—Dry sand will mix much better with the cement, wet sand having a tendency to ball up, preventing thorough mixing of the two materials.

Mr. Stiles—Would you advise laying the lower coat of a poorer mixture and the upper coat of a better mixture?

Mr. Arp—Some contractors prefer making their walks or floors in one course or layer. A concrete composed

not be subjected to hard wear. Most authorities recommend two course work as the quality of the base and wearing course can be better regulated.

Mr. Imrie—If you have stone along in the corners of the gutters, stock stepping on them are apt to break them out.

Mr. Kadonsky—Is not a crack more liable to develop from the outside than the inside of a wall? The tendency through any section of the wall would be radial from the center.

Mr. Arp—If the concrete at all parts of the wall is of equal quality, cracks would not develop any quicker on the outside than on the inside surface. The internal pressure is equal in every direction and the tendency would be for the wall to crack in two places diametrically opposite. If, however, there are weak places in the concrete, cracks may develop on one side of the silo and theoretically the opening or crack would be wider on the outside than on the inside surface. Practically this opening would be of the same size on both surfaces, as the thickness of the wall, usually about six inches, is small compared with the diameter of the silo.

Mr. Kadonsky—But there are a good many practical circumstances that come in that really are not governed by any of the theoretical conditions, and for that reason we want to place the steel nearer the outside.

Mr. Arp—As a matter of fact, when wire or small rods are used for reinforcing a concrete silo, they are not generally very straight, and the distance the metal is from the outside or inside surfaces may vary a great deal. On several occasions I have noticed that in one case a rod came very close to the outside and within three or four feet was entirely exposed on the inside. As the walls of concrete silos are about six inches in thickness, I should recommend that the reinforcing metal be placed in the center of the wall.

A Member—Is pretty sharp sand better than the other kind?

Mr. Arp—A sand consisting of sharp grains, was at one time a very common requirement. It has been fully proven, however, that sand grains with rounded corners are more easily compacted and give equally good results as a sand composed of angular and sharp grains.

A Member—Would that apply to stone also?

Mr. Arp—This will apply equally well to the larger aggregates, such as screened gravel or crushed limestone, providing other physical characteristics, namely, being hard, durable and clean, are equal.

Mr. Nordman—Either one of them will give satisfactory results. We have worked with split pebbles and it is demonstrated that smooth pebbles are just as good.

Mr. Arp—If a dry mixture is used, or the particles are covered with a film of loam or clay, you will not get as good a bond with smooth gravel stones as with the angular surfaces of crushed stone.

A Member—What about the fineness of cement?

Mr. Arp—The fineness of Portland cement as called for by the standard specifications must meet the following requirements; not less than ninety-two per cent shall pass a screen having one hundred meshes per linear inch and not less than seventy-five per cent shall pass a screen having two hundred meshes per linear inch. If care is taken in selecting such brands of Portland cement as are guaranteed by their manufacturers to pass the requirements of the standard specification, no trouble will be encountered.

A Member—What effect does freezing and thawing have on partially set concrete?

Mr. Arp—Freezing stops the hardening action of concrete as the water necessary to carry on the hardening action is robbed from it. Alternate freezing and thawing has a very serious effect upon the final strength of the concrete. If, however, concrete freezes up once, hardening will be delayed, but on thawing will resume and under ordinary conditions the same strength will eventually be obtained.

Chairman Scott—In storing cement, is there any value in moving, rolling the sacks, so as to stir it up?



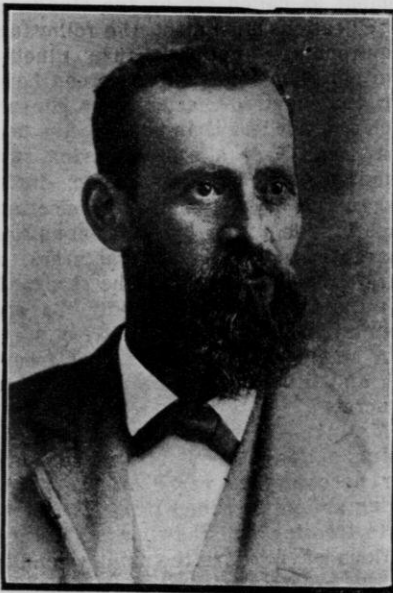
Mr. Arp—Mr. Scott doubtless refers to lumps in the cement caused by storage or getting damp. In any case if the cement becomes lumpy and so hard that it is impossible to crush easily, it becomes worthless so far as a cementing material is concerned.

In cases where sharp corners are liable to be broken off, such as on the top edges of a concrete water tank

or on the approach of a driveway, a small angle iron should be placed and anchored in the concrete at the time of construction. The edges of the gutters in the cow barn should be rounded off to prevent the animals cutting themselves, rather than be made sharp and protected with angle irons.

### ANOTHER YEAR OF THE CONCRETE SILO.

David Imrie, Roberts, Wis.



Mr. Imrie.

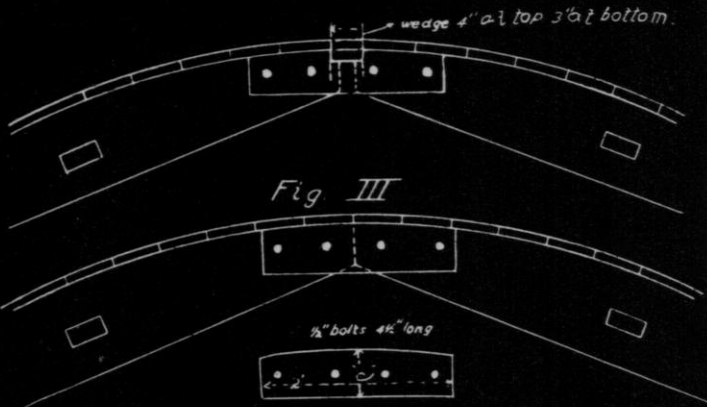
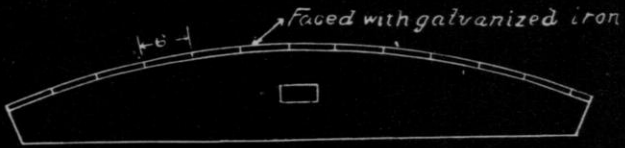
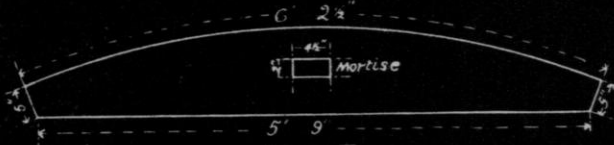
In the time allotted to me for this subject, I hardly know how to discuss it. I will be brief with my paper and give most of the time for discus-

sion, hoping in this way to benefit you more than by a lengthy paper.

#### Concrete Silos Give Universal Satisfaction.

In the last year a great many concrete silos have been built and I have yet to find the man who is not more than pleased with the results. St. Croix county is, I think, the banner concrete silo county of the state, having nearly one hundred of them, but Dunn is after us, with over thirty. Polk, Pierce, Buffalo, Fond du Lac, Sheboygan and almost every county in the state, are putting them up, and this winter the interest through the state is greater than ever before, owing, no doubt to the shortage of feed stuffs and the increased prices of lumber for stave silos, making the concrete silo by far the cheapest silo that can be built; and when properly built it gives universal satisfaction.

The concrete silo is not only cheap, but is neat in appearance, saves the silage perfectly and is everlasting, as we know of no material as lasting as good concrete.



### The Cost of Building a Concrete Silo.

As to the cost of this silo, it varies considerably in different parts of the state. Where crushed rock or gravel has to be shipped in, it can still be built cheaper than any other silo on the market. I will give you an itemized statement as to the cost of a silo we built last summer thirteen feet, two inches inside and thirty feet deep.

|  |          |
|--|----------|
| 25 loads of gravel at 75c.....         | \$ 18.75 |
| 25 bbls. of cement at \$1.60.....      | 40.00    |
| Reinforcing wire and rods for door     | 10.00    |
| Plank for door, 100 ft at \$18.00..... | 1.80     |
| 22 days labor of one man at \$2.00...  | 44.00    |
|  | <hr/>    |
|  | \$114.55 |

This silo was in the barn, so no roof was needed. Add to this the cost of a roof of boards with battons and it would cost twenty-five or thirty dollars more, making a total cost, with connections between silo and barn, of something like one hundred and fifty dollars.

#### Bill of material for forms.

|                                       |           |          |
|---------------------------------------|-----------|----------|
| 8 pieces 2"x12"—12' long              | } 224' at | \$ 4.03  |
| 2 pieces 2"x 6"—16' long              |           |          |
| \$18.00                               |           |          |
| 150 ft. No. 2 hemlock S. 1 S. at      |           | 2.40     |
| \$16.00                               |           | .11      |
| 2 wedges 2"x6"—3' long                |           | 13.00    |
| 50 ft. 3 ft. wide, 18-gauge gal. iron |           | 4.50     |
| 50 ft. 3 ft. wide, 28-gauge gal. iron |           | 1.35     |
| 64 ½x4¼ bolts and 128 washers..       |           | .25      |
| Nails                                 |           |          |
|                                       |           | \$ 25.64 |
| Making                                |           | 10.00    |

Total cost .....\$ 35.64

The cost of the forms need not be added to the silo cost as they can be sold for what they cost as soon as you are through with them (there are no less than five waiting for mine).

### Some Comparative Figures.

Stave silos of Washington fir, sixteen feet in diameter, thirty feet deep, cost from two hundred and eighty to three hundred dollars F. O. B. factory, then you have to build foundations, pay the freight, put up silo and furnish

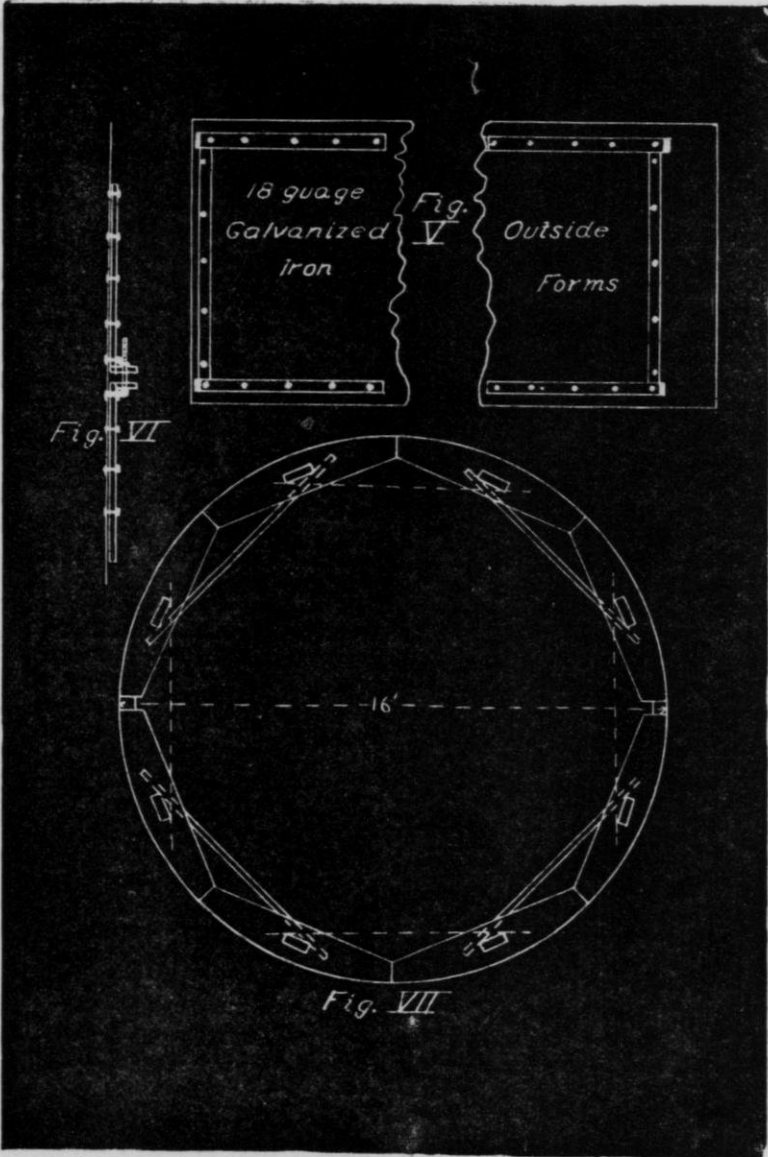
roof. A silo of the same size of Washington cedar costs three hundred and thirty dollars at factory; the panel silo the same, making the cost double that of the concrete silo, and we all know that the best of woods decay after awhile, whereas concrete gets stronger with age.

### How to Make the Forms and Build the Silo.

I will now try to describe to you how to make the forms and build the silo, so you can do the work yourselves. The description is for a silo 16 feet in diameter.

Procure 8 pieces 2x12, 12 feet long No. 2 Com., 2 pieces 2x6, 16 feet long No. 2 Com., and 150 feet ¾x6 fencing surfaced one side.

Take a narrow strip of board 1½ or 2 inches wide and 8½ feet long, bore a hole for a lead pencil near one end, measure from the center of this hole 7 feet, 11 inches and drive a nail through. This will make the circle. Then from the 2x12 plank cut 16 pieces like Fig. 1. Cut the 150 feet of fencing into 3-foot lengths, making the ends square and the pieces of even length. Next take 2 of these pieces (Fig 1), place them on their straight edge 2 feet, 8 inches apart, outside measure, and board over the circular side (Fig 2), letting the ends of the board project beyond the Fig. 1 pieces on each end. After you have boarded 4 sections cut off about 2 inches from one end of 4 pieces (of Fig. 1), cut out a piece from the outside corner of the 8 remaining pieces for wedge, as shown in Fig. 3. This wedge is 2x4 inches at the top and 2x3 inches at the bottom. Of course the board that adjoins this wedge must have the same cut, being 1 inch wider at the bottom than at the top. There are only 2 wedges directly opposite each other, dividing the form in two. Now board over the remaining sections. Next



cut out the short pieces to join the sections together (see Fig. 4). There will be 16 of these. Now you have the wood work for the inside form. Cover each section with light galvanized iron 30-gauge 3 feet wide.

For the outside form, get 2 pieces of 18-gauge galvanized iron 3 feet wide and 27 feet long. To these rivet 8 lugs made of 7-16-inch x 2-inch iron about 2 feet long, as in Fig. 5. Rivet a piece of the same sized iron between the lugs, to keep the form straight, also shown in Fig. 5. Have the lugs turned at right angles about 6 inches from the end (see Fig. 6) and a hole for a  $\frac{5}{8}$  bolt. Make the bolts 12 inches long, with a good long thread. Place the lugs on one end of each back from the end 8 inches, so this end will slip inside of the other piece and make a tight joint. You now have your forms.

Dig the hole for the silo, going down where there is no danger of water, from 4 to 8 feet below the feeding floor. Make it 17 feet in diameter. If the soil is clay, dig under the bank, commencing up about a foot and slanting it in so that at the bottom it is under the bank 8 or 10 inches to give a wider footing. Use the earth for the outside form. Place the inside form in the bottom so it is 6 inches from the bank on all sides. Be sure to get the form level.

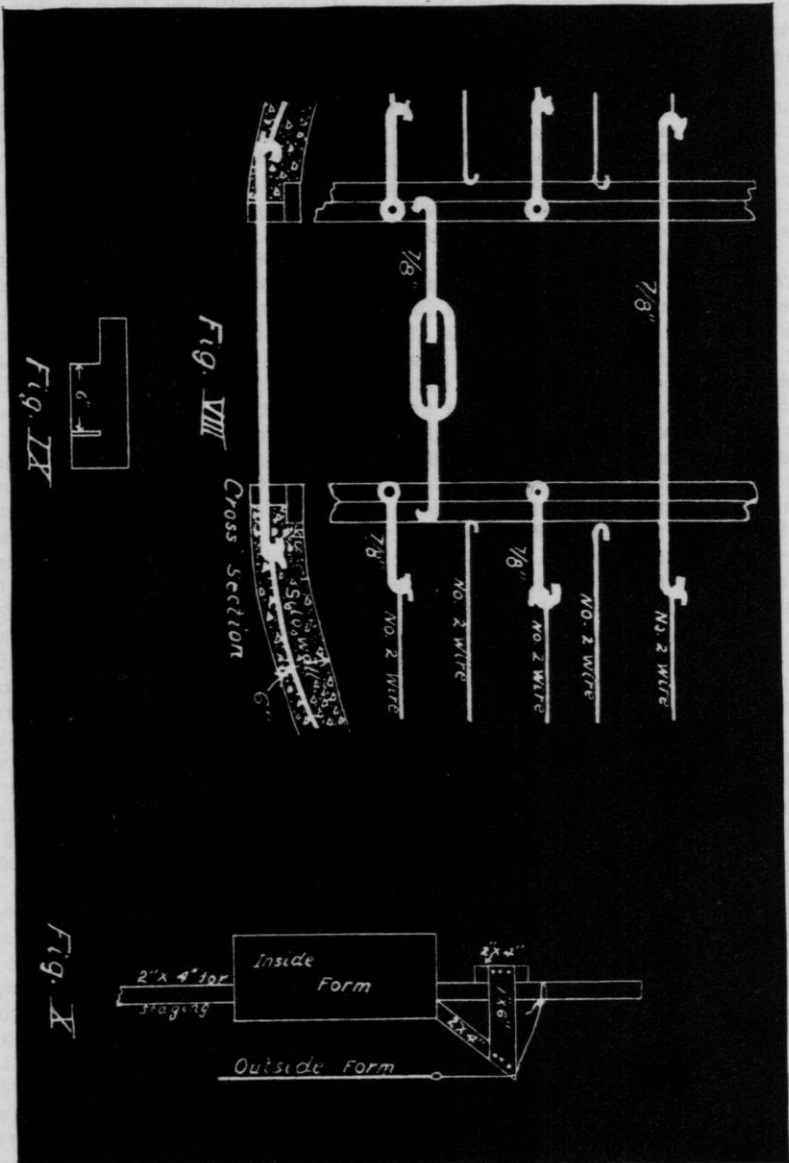
Mix the concrete, 1 part best Portland cement, 2 parts clean sand and 4 parts gravel or crushed rock. Make this quite thin and pour in 1 foot all around, then lay in a No. 2 wire, letting the ends lap about 2 feet, then another foot of concrete, then another wire, until the forms are full. Let this stand over night to set. In the morning raise the forms by knocking out the wedges, take off the pieces that join the sections together only where the wedges are, leaving the form in two pieces, 3 or 4 men can lift each half. To hold these in place

when raised, put a 2x4 through each set of mortices in the form. There will be 8 2x4's. These should be of different lengths so the splices will not all come at the same place. Put a piece of plank under the bottoms of the 2x4's, so they will not settle in the ground when the weight of the forms comes on them. Raise the forms 2 feet, 10 inches, so they will be inside of the completed wall 2 inches. Bore a hole in each 2x4 and put in a pin just under the forms. Next put in the staging. Nail 4 pieces of 8-inch boards 7 feet long to the 2x4's close under the forms to lay the plank on for the staging (see Fig. 7). Next time you raise the forms, nail boards as shown in dotted lines Fig. 7.

When level with the feeding floor, commence the door opening, which is continuous from there up. The opening should be 2 feet 6 inches wide. For the door jamb molds nail 2 pieces 2x4 together by nailing one on the edge of the other (see cross section Fig 8). Place these 2 feet 3 inches apart, see that they are plumb and cut some pieces 2 feet 2 inches long and toe nail between them to keep them in place. Cut notches in the outside edge of these 2x4's, first one 2 feet above the feeding floor and every 2 feet to the top of the silo. Make the notches 1 inch wide and 2 $\frac{1}{2}$  inches deep for the rods that cross the door. The rods are of  $\frac{3}{8}$ -inch steel extending into the wall about 8 or 10 inches each side of the door opening with a hook on each end to receive the No. 2 wire. The first two rods above the feeding floor should have turn buckles on them so they can be removed making a door 6 feet high (see Fig. 8).

For the door simply use 2x6 or 2x8 pieces cut to the right length and place a piece of tarred felt or roofing felt across the door letting it extend a foot on each side of the opening.

When you get to the surface of the



ground, put on the outside form. As the silo gets higher, make 8 brackets like that shown in Fig. 10. These brackets rest loosely on top of the inside form and slide up when the forms are raised. They should stand out over the outside form so a rope attached to this form can be brought over the point of the bracket and tied to the post to keep it in position until it is tightened up and the small pieces put on (Fig. 9).

To keep the lower edge of the outside form just 6 inches from the inside form, cut some 6-inch boards 3 feet long and place between the two forms 2 or 3 feet apart and as the concrete is put in these can be drawn up and they will not be used again. Make 20 or 24 pieces like Fig. 9 from 2x4 just 6 inches from the shoulder to where sawed in, the shoulder to rest on the inside form and where sawed to catch the outside form.

You can put 30 or 40 per cent of small stones in the silo walls if you wish. Place them in the center of the wall, tamp down into the soft concrete and pour more concrete on them. The concrete needs no tamping if made thin enough. Take a spade and churn along the sides of the forms, so as to drive the gravel stones back and let the thin concrete down beside the forms.

After raising the forms, to make a nice finish where the joints are, take a trowel and point up any holes and rub down with a brick or piece of board, using water with it.

To raise the concrete as the silo gets higher, use a mast staid to the barn and raise it with a horse, taking 4 or 5 palls at a time.

When the walls are high enough finish off level and while the concrete is still soft shove into the top of the wall some  $\frac{3}{4}$ " x 8-bolts every 3 or 4 feet, putting the head down into the concrete, leaving the thread end above the wall  $2\frac{1}{2}$  inches. This is to

fasten the plates on, and you will have a silo that will last forever.

Now take out the inside forms and lower them over the wall on the outside, also the outside form. Before taking out the staging, give the inside at least 2 good coats of wash made of cement and water of about the consistency of cream.

You can put on any kind of roof you desire.

A silo 35 feet high, 12 feet in diameter will take 30 cubic yards of gravel and 30 barrels of cement; 14 feet in diameter, 35 yards gravel, 35 barrels cement; 16 feet in diameter, 40 yards of gravel, 40 barrels cement; 18 feet in diameter, 45 yards gravel and 45 barrels cement.

The silo herein described should cost complete for work of building cement, reinforcing and a common roof, after you have the sand and gravel on the ground, a little less than \$150.00. The material for the forms in this locality (St. Croix Co.) costs about \$35.00. The forms will build a great many silos and a number of neighbors can make them in company, or if one man makes the forms he can sell to the next man wanting to build.

#### DISCUSSION.

A Member—What means do you use for raising your material?

Mr. Imrie—A platform large enough to hold four palls and a pulley and rope and horse. The staging is nailed to the posts under the form. The staging is nailed from one post to another, just a strip there. When you raise, you are standing on the staging, level with the bottom of your form where you are working. Two to four men raise it, lifting it in two pieces, we just lift it up by hand. Some have tried using blocks, but that is too cumbersome. It is not hard for four men to lift it up two

feet and ten inches and then we put the bolts through there; then raise the other half and put the bolts through that. If you want to, you can grease the inside of the outside form and the outside of the inside form every time you raise it, just smear it all over with grease with a rag that will cover a lot of surface quickly, and it helps a lot. Then in filling it, when you make the proportions of your concrete right, put it in in a sloppy condition and do not tamp it. We simply use a brick layer's trowel and work it back and forth against the outside form, and the same against the inside form, and that drives the gravel stones away from the outside form and insures a smooth surface, and also packs well. There will be no holes in the work at all. It is reinforced every foot with No. 2 wire, which is about as big around as a pencil. One of those is put in every foot all the way up. Across the door every two feet is a 7-8-inch rod with a hook on each end, the wires are simply hooked into this hook and the ends turned back.

A Member—How long do you let each form set before you raise it?

Mr. Imrie—We fill one each day. You should have a cement that sets quickly.

A Member—How do you loosen your outside form?

Mr. Imrie—It is loosened as soon as you undo it. We make ours in two pieces, we take out these three bolts and as soon as we have done that it is loose and we can take it off in one minute, letting the other half lie against the wall in the meantime.

A Member—How far do you allow the iron to go below the concrete?

Mr. Imrie—Two inches on the wall. The first time that you put this outside form on, when you come above the ground, use pieces of fencing six inches wide, shove them down to get the bottom of that six inches from the

inside frame, shove these down in every two or three feet around. That is simply the first time after it gets above the ground. Then after we get started up five or six inches, we do not need that any more.

Chairman Scott—Do you find any difficulty in the next day's filling welding to that of the previous day so as to make a tight joint?

Mr. Imrie—No, sir, we never have had any trouble of that kind.

Mr. John Imrie—If you have your first day's filling wet enough, there will be no trouble about that. We always sprinkle ours anyway.

Mr. David Imrie—Ours was in the barn and it didn't dry out with the sun as it would out of doors. If it was hot weather and it set two or three days, you couldn't work it. It is a good idea to take some clear cement and water and whitewash it on the top. We expect it to be rough, however.

A Member—Is a six-inch wall heavy enough?

Mr. Imrie—Yes, we have one in our town forty-nine feet high. If you have a good, solid clay foundation, strong enough to stand up all around, and make a smooth hole for the outside of your form, I would commence up a foot or fifteen inches from the bottom and dig under the bank, so as to give a good footing, besides the thickness of your wall. If that is not thick enough, just bank it on the inside about six inches. It will adhere nicely and make a footing two feet wide.

Chairman Scott—You can do that by raising the inside frame the first time.

Mr. Jacobs—What is the result of your experience in your county in the time that you have had these silos as regards freezing and keeping the silage, the walls cracking, etc.

Mr. Imrie—We have only had two in our county that cracked, but that was the result of poor construction. I do



not know whether any of the people who built them are here, but one of the men was at my place and I asked him about how much reinforcing he put in, and he said he wasn't there at the time, he didn't know. I asked him also what proportions he used in mixing his cement and gravel and he didn't know that, but he did say, "I noticed a good many of the rods showed inside after it was finished," and of course that was no way to do it. Those are the only ones I know of that have cracked.

Mr. Jacobs—In Dunn county the School of Agriculture took up the question of making forms for building silos and lending their aid to the farmers in this work, and we have something over thirty concrete silos in the county now. Some of the farmers made pretty poor jobs in building their silos, they are pretty rough, but we haven't one case in which the walls have cracked, and the silage has kept all right and every one is satisfied. The most that any of them froze was ten inches, and upon investigation in that case it was found they were feeding carelessly, which, of course, they should not have done. We feel that after our experience of the past two years with these silos they are an unequalled success.

A Member—How deep do you put those foundations below the top of the ground?

Mr. Imrie—In every case I would put the bottom of the silo, if there is no danger of surface water, at least four feet below the feeding floor, and

if there is no danger of water, eight feet is none too deep. That part in the ground is the best part of your silo, and it is cheaper to get material down than it is to get it up in feeding.

A Member—Wouldn't it be hard to raise the silage on the bottom of the silo up eight feet?

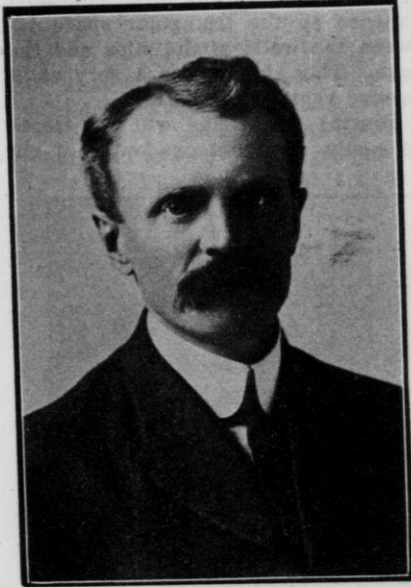
Mr. Imrie—You can work the last of it up on a slope, and, we will say, you have two feet on this side down to the bottom there; that is, it is piled up two feet on the side, so you only have six feet to raise it, so you can easily throw it out from eight feet below. Most of us would have been willing to have taken it out eighteen feet last summer if we had had any to take out.

A Member—We have a silo that cracked, for what reason, of course, we do not know. When it was built, I was away on business, but I was at home at the time the last form was put on. It cracked about ten or twelve feet on the inside. We went to work and we put on six good iron bands and fixed it up all right. It seemed to have kept the ensilage good, although it is not as good as Mr. Imrie's. I am satisfied that our silo, even as it has been, has paid for half its cost this winter, and I am fully satisfied, gentlemen, that it is one of the finest investments any farmer can make, because I know that twenty acres of corn put in a silo is worth forty acres left out on the field.

Chairman Scott—There is only one thing better than a silo, and that is two silos. Now we will hear about Mr. Michel's twin silos.

## MY TWIN SILOS.

M. Michels, Peebles, Wis.



Mr. Michels.

For the last thirty years much has been said and written regarding the value of silos and silage, but today it would be time wasted to dwell at length on the value of the silo and silage, for it is considered everywhere by farmers that the silo has come to stay. It is not a question whether the farmer can afford a silo, but the question is, can he afford to do without it. By the use of the silo, the farmer can feed his stock a palatable and a succulent food the year around. Silage has the same palatability, as well as the same laxative and corrective qualities, as green grass, which makes it nearly equal to good pasture. Silage is superior to soiling crops, as it gives better yields,

saves much valuable time in cutting and feeding, and also is likely to be fed more regularly, as it is always close at hand. Furthermore, the quality of feed remains uniform from day to day, while in the case of both pasture and soiling crops, the quality as well as quantity are dependent entirely upon weather conditions.

So far as is known, the first silo built in the United States was by a Mr. Morris, of Maryland, in 1878. About five years later the building of silos was taken up by the experiment stations, but while many silos were built soon after, it was not until of recent years that the farmers generally turned their attention to silo construction.

## Mistakes in Building and Filling Silos.

There have been two main reasons why the farmers did not turn their attention more generally to the silo question in earlier years: First, because of the mistakes made in building silos; second, because of the many mistakes made in filling.

Some twenty years ago, when the first silos were built in my home county (Fond du Lac), the round type which we see everywhere today was not known. The silos then built were square and of wood. On account of the enormous pressure of the silage on the sides of these square structures, the corners would open up, not only allowing the air to enter and spoil the silage, but also wrecking the silo within a few years.

Next came a round silo built of wood, which was quite an improvement over the square type, but not altogether satisfactory, since dry rot would set in, making it necessary to

replace poor boards and repair about every three or four years.

With the advent of the cement plastered and stave silos, all other types of wooden silos were discarded. These were followed by stone and brick silos, but of late years the concrete silo has not only proven as good as any other, but can be built for less money, and, if put up right, will last for generations to come.

The second reason why farmers did

Second: It is not necessary to build so high, saving power in filling and the trouble of climbing so high at feeding time.

Third: Only one feeding chute is required, and this is formed without expense by the triangular space between the walls of the silos and the barn. This also makes a very satisfactory ventilating shaft.

Fourth: The silage will not freeze as easily, as about one-fourth of cir-



Farm home of Math Michels, Peebles, Wis., twin concrete silos to the right.

not turn more generally to the building of silos ten or fifteen years ago, was because of the mistakes made in filling, such as cutting too green or overripe, not tramping enough, or distributing evenly while filling, and the planting of large coarse fodder corn, which is entirely unsuited for silage purposes.

#### Twin Silos.

The advantages of building twin silos, or two silos, side by side, instead of one, may be summed up as follows: First, you can have the same capacity with less silage exposed during feeding time, which means much, especially for summer feeding.

cumference of the silos is practically as warm as the barn, especially where the chute is used as a ventilator shaft.

Fifth: Both silos can be filled from one setting of the machinery at filling time.

Sixth: Each one of the silos can be completely emptied at least once in two years allowing an opportunity for cleaning and cement washing if necessary.

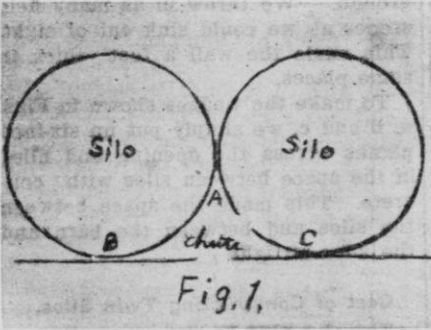
#### Location.

Wherever possible, the silo should be located in a sheltered place, as the location has a great bearing on the extent to which the silage will freeze.

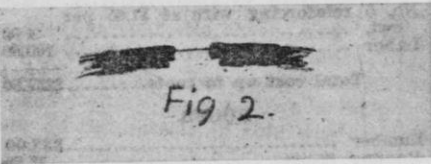
A silo that is built on the west side of the barn, where it is exposed to the coldest winds, even if it is built with dead-air spaces, will freeze more than one built of solid concrete if it is sheltered.

#### Description.

Last year we built two silos of the solid concrete type. These silos are built close together and up against the barn, as shown by the ground plan, Fig. 1. The walls are six inches

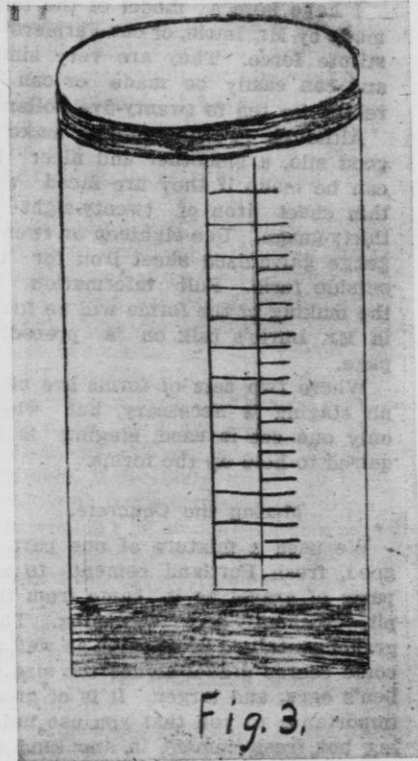


thick all the way around, with the exception of distances of about fourteen inches on each side of the continuous opening for doors, where they widen to eight inches. This is shown in Fig 2. The extra thickness at



this point is needed not only to strengthen the wall, but also to get more foot room for climbing up and down at feeding time. Figure 3 shows the continuous opening or door two feet, six inches wide. Across this opening are three-fourth-inch rods,

two feet apart. They go into the walls about six or eight inches and are hook shaken in order to hold the loops on the ends of the reinforcing wires.



We used No. 5 wire for reinforcing, connecting one to every rod running across the door and one between, to within ten feet of the top. These reinforcing wires should be laid as close to the outside as possible without danger of chipping or exposing the wire to the air. This is about one and one-half inches from the outside.

On the top, about six or eight feet apart, set bolts to hold down the roof. These bolts should be about twelve inches long by one-half inch in diameter and should be embedded in the concrete, heads down, leaving the

threaded ends sticking out long enough to hold the roof plate.

#### Silo Forms.

I have here a model of the forms made by Mr. Imrie, of our Farmers' Institute force. They are very simple and can easily be made or can be rented for ten to twenty-five dollars.

Although wooden forms make a good silo, a smoother and nicer job can be made if they are faced with thin sheet iron of twenty-eight or thirty-gauge. Use eighteen or twenty-gauge galvanized sheet iron for the outside form. Full information for the making of the forms will be found in Mr. Imrie's talk on a preceding page.

Where two sets of forms are used, no staging is necessary, but where only one set is used, staging is required to hold up the forms.

#### Mixing the Concrete.

We used a mixture of one part of good, fresh Portland cement to six parts of gravel as it came from the pit, without any screening. This gravel contained some sand, as well as some coarse gravel stones the size of hen's eggs, and larger. It is of great importance to you that you use nothing but fresh cement in any kind of concrete work.

For mixing, make a platform large enough so that you can use up a bag of cement at a time. Make a hollow frame about four feet square of six-inch boards. Lay this frame on the platform and shovel into it the required amount of gravel, and over the top distribute a bag of cement. Then lift off the frame and thoroughly mix while dry and again while the water is being added. If a continuous mixer is used (which I think is the handiest mixer yet devised for small jobs) you can shovel the gravel covered with cement directly into the mixer.

#### Construction.

It is of the utmost importance that the foundation be not only solid, but also perfectly level. If it is started level, it will be smooth sailing way up to the top. If it is only a little out of the way at the bottom, the silo will tend to lean toward one side and this can be corrected only with difficulty after the walls have been started.

In starting the foundation, we did not use the outside forms for the first five feet, but filled the entire space between the inside forms and the ground. We threw in as many field stones as we could sink out of sight. This made the wall a foot thick in some places.

To make the wedges shown in Figs. a, b and c, we simply put up six-inch planks across the opening and filled in the space between silos with concrete. This made the space between the silos and between the barn and the silos airtight.

#### Cost of Constructing Twin Silos.

The size of each of the two silos we built last summer was fourteen feet, ten inches, inside diameter, by thirty feet high. They hold one hundred tons each and the cost of the two was as follows:

|  |          |
|--|----------|
| 80 bbls. of cement at \$1.20.....              | \$ 96.00 |
| Rent of forms .....                            | 25.00    |
| Rent of mixer at 50c per day.....              | 6.00     |
| Rods and turn buckles.....                     | 6.50     |
| No. 5 reinforcing wire at \$1.65 per cwt. .... | 4.00     |
| Labor .....                                    | 100.00   |

Total cost up to roofs.....\$237.50

#### ROOFS.

|                       |         |
|-----------------------|---------|
| Lumber .....          | \$33.00 |
| Roofing (2-ply) ..... | 15.75   |
| Nails .....           | 1.25    |
| Carpenter work .....  | 30.00   |

Cost of roofs .....

Cost of silos complete .....

The above costs include floors in silos, the chute and the wedges already referred to.

It took three men twelve days to do

the concrete work and two men five and one-half days to build the roofs. The cost as given above does not include the board for the men, neither have I charged up my own labor of digging the foundation and hauling the forty loads of gravel that were required.

#### DISCUSSION.

Mr. Imrie—Mr. Michels only drew his gravel a few rods. We had to draw ours several miles, so I have added twenty-five dollars for hauling. He has charged us for the use of the forms, so it amounts to about the same thing.

Mr. Michels—I think if I built another silo, I would put on a concrete roof. It would not only be cheaper, but it would last forever.

A Member—How about freezing?

Mr. Michels—We have had no frost in our silos all winter.

A Member—My son went right out in the woods, cut timber and put up a silo himself, and the actual cost was less than one hundred dollars, but his barn is thirty or forty feet away and in cold weather his silage began to freeze. We went to work and made a second roof that he can lift and we put in a little oil lamp and stopped the freezing.

Mr. Michels—I think the location of the silo is a very important thing. If you can put your silo on the east or south side of the barn, the silage will not freeze much. You must be careful, however, to keep it down a little lower on the outside in cold weather. The frost that gets into the silage does not come through the walls as much as it comes through the roof and chute, and it is necessary to have the roof and chute good and tight. The frost does not go down very deep anyway. I was in a silo last winter where there were fourteen inches of frost on the sides and digging down two feet there was practically none at all.

Mr. Imrie—I was in a silo a few weeks ago which stood out from any other building and I noticed on the north side, about half way round, it was frozen from two to three feet, while there was none frozen on the south side, and it set me to thinking that we should build our silo where it will be sheltered. I have noticed in driving that the majority of the silos are on the north side of the barn, while I think they should be on the south side.

Mr. Michels—Your feeding alleys might be so arranged that it is more convenient to have the silo on the north side, but we use a carrier and I do not think the location means much in the matter of convenience, I wouldn't consider that a moment, so long as we can have carriers or carts to distribute the silage from.

A Member—If you put it on the south side, it is likely to be in the way of your cows going out to drink and it wouldn't be so convenient when you came to fill; also it would cut off the light from the south side.

Mr. Michels—I believe the best location is the east side of your barn, if you can possibly put it there, unless it would be the southeast, which is better still.

Where silos are placed on the southeast corner of the barn, I do not think there would be any trouble from freezing, even if there was continuous cold weather for a long time.

Chairman Scott—I believe the best location is in the barn.

Mr. John Imrie—If we are careful about not allowing any of the silage to stick to the walls on the outside, I do not think we will have any trouble, no matter where the silo is.

Mr. Kadonsky—I understand there are a good many people in the southern part of the state, in the old farming sections, who say that a good many people have abandoned the use of silos. What do you know about that?

Mr. Stiles—There are a few in our section who have not filled their silos, but when a man has sold off all but three acres of his land, he certainly does not need any silo, and that is the case in one instance with us. Another man built a sixty-foot silo, thirty-five feet deep, big enough to hold the corn from one hundred and twenty-five acres of land, and then it wouldn't be full, even of B. and W. corn, which it was built to hold. There are a few silos that have gone out of use, but they are very, very few as compared with the number of new silos which have gone into use. Then again, most of those old silos were of the old type, with corners, and a good deal of silage spoiled in the corners.

Supt. McKerrow—There are silos in Wisconsin that are not in use just now as some of our old clothes are not in use; they are simply worn out; they were not good ones to begin with, they did not fit, they were too big, but where the farmers have learned to build silos of the right kind, they are being used. I know of a good silo built in southern Wisconsin twenty-eight years ago and it is good yet.

Mr. Michels—If I were building more silos, I would not build out away from the barn and set them away where the cold can get all around them; I believe they should be close to the barn. If we build a chute and build it something in this fashion we can also use it as a ventila-

tion shaft. The warm air in the barn might as well warm up the silage, and it will do it, and keep out the frost.

Mr. Jacobs—How high is your ventilator shaft?

Mr. Michels—It goes up five feet higher than the eaves of the roof.

Mr. Jacobs—We undertook to use that same method of ventilating our barns, having it go up through the silo, and out through the cupola of the silo, and it worked very well when the wind was from the south, but when the wind got around to the north it came down there—well, the cat that had been drawn out through the other chute I told you about, came back.

Mr. Michels—I would advise anybody who was going to use the top of the roof, or have the ventilator go through the center of that roof of the silo, to put on something to protect it, so that the opening is not direct. My chute comes out here. I built the roof close up to the top, so the air must come in either from the north or the south side, have it exactly the same as a low kitchen chimney. You have to put a "T" on your chimney, or it will never work right.

The following gentlemen were named by Supt. McKerrow as a committee on resolutions: Dr. C. V. Porter, George Horsefield and H. D. Griswold.

Adjourned to 7:30 p. m.

## EVENING SESSION.

The Session Met at 7:30 p. m., March 14. Mr. W. C. Bradley in the Chair.

Mr. Bradley—In the day sessions of our Farmers' Institutes we get together to discuss the problems pertaining particularly to the farm. Today we were building silos and filling them with silage and making roads; tomorrow we will be growing the different kinds of crops, feeding the different kinds of live stock and discussing the money-making problems of the farm.

In the evening sessions of these same Institutes for a good many years it has been our habit to devote most of the time to educational features. There was a time, perhaps not so very many years ago, when an educated farmer was perhaps looked down upon by the average farmer. You can remember, all of you perhaps, in the early days of the Agricultural School at Madison, that Professor Henry first started there, that for five or six years he had only three, four, five and ten graduates each year, but in the last few years what a revolution there has been regarding the sentiment as to what the farmer should know. Today down at that Agricultural School there are hundreds of boys, and in four other Agricultural County Schools, the overflow of this great Agricultural College, they are filled to

overflowing. So there has been a wonderful change in the sentiment as to whether "any fool could farm."

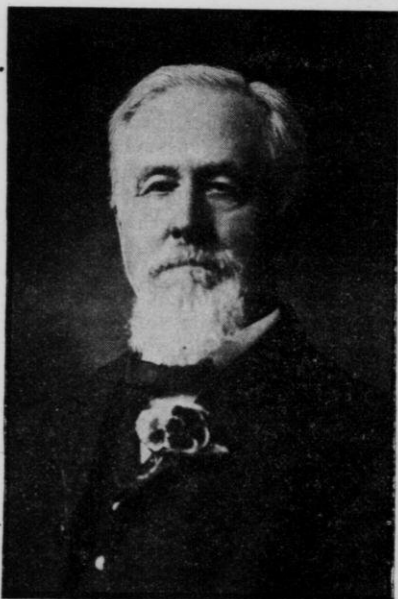
In these evening sessions of the Institutes it has come to be recognized that there is something more in a farmer's life than the habit of making money; that there ought to enter into that life something bigger and better than the thought of money-making; that the boy and girl should be educated, not only to make a living, but to live well while they are making that living.

And so we have with us tonight a man who believes not alone in money-making, but in so living on the farm that we may get that larger pleasure which comes by right living, coming into contact with the things that make good womanhood and good manhood, and this man who will speak to us first I think is the organizer of one of the most successful Farmers' Clubs in the state of Wisconsin, and in that Club the farmers of that locality get together and discuss the problems of the farm, they visit from one farm home to another, and have recitations and music and a good time all around, so they feel that the farm is a good place to live.



## BENEFITS OF A FARMERS' CLUB.

Wm. Toole, Baraboo, Wis.



Mr. Toole.

As an introduction to the subject of farmers' clubs and for comparison, it will not be out of place to make brief references to other organizations which have been intended to promote the interests of farmers in some way.

My first recollections of social and literary gatherings here, in what was known as the west forty-five or fifty years ago, were the old-fashioned donation parties and spelling schools, although these could scarcely be classed as organizations. They were useful in their way, and the spelling schools more than filled the places of some of our present day literary societies.

**The Patrons of Husbandry.**

About forty years ago the order of Patrons of Husbandry flourished here

in the middle west, and accomplished much good during the season of its popularity. The leading thought of this organization was to do away as much as possible with the middlemen and thus save money in all lines of purchase. Grange stores were established and other stores strove to secure the farmers' trade. The firm of Montgomery Ward & Company is a continuation of the results of that movement. Much good was accomplished by the granges and through their efforts the beginning was made towards putting railroad managers under control of law, instead of permitting them to be a law unto themselves.

**The Farmers' Alliance.**

In the meantime restlessness grew among the farmers because of gambling in farm products and the Farmers' Alliance was instituted as a means of checking this. Much good was accomplished in awakening thought and action among the farmers, and much more good would have resulted if the original non-partisan Farmers' Alliance had continued. The Southern Industrial Union assumed the Farmers' Alliance and absorbed the original organization. Then followed the Populist Party merger, and disruption of the Farmers' Alliance.

The Patrons of Husbandry moved eastward and in many sections are still strong and useful today, promoting through their granges the social, intellectual and financial welfare of the members.

The Alliance and other organizations which flourished at the same time gave but little attention to social uplift, although some of the local alliances conducted their meetings after the plan of farmers' clubs and were useful as long as they lasted. The

local Alliance in the Skillet Creek neighborhood made the first practical movement in the town of Baraboo towards systematic road improvement.

#### The American Society of Equity.

At the present time in Wisconsin and nearby states we have the American Society of Equity. The leading thought of this society is the elimination of unnecessary middlemen and

each other. They are helpful socially and intellectually, but their scope of influence is limited as ordinarily conducted. The ordinary plan of their meetings is to have reading of essays or selections, recitations, music and rarely a debate. Discussions of subjects are seldom considered. Ordinarily the literary society settles to the habit of looking to a few members to furnish the entertainment



Winter picnic Skillet Creek Farmers' Club, January, 1911, at home of Willis Ryan.

the securing of reasonable prices for farm products through organization. If the spirit of organization among farmers is promoted by the American Society of Equity it will not have existed in vain. Probably improved social sentiment is promoted in some localities by the local unions of this society, but no special effort was made in that direction by the local union which at one time existed in Baraboo.

#### The Country Literary Society.

Like the farmers' clubs, the country literary societies act independently of

while the balance are spectators. This need not be so, and it matters not what the name of the society, if the members fully avail themselves of their opportunities, there is no limit to the good that may be accomplished.

#### The Farmer's Club.

During all these years the farmers' clubs (oldest of our rural organizations) have kept up a steadily intermittent existence. Just as the juvenile population of school districts fluctuates, so the promoters of local activities come and go. Others do

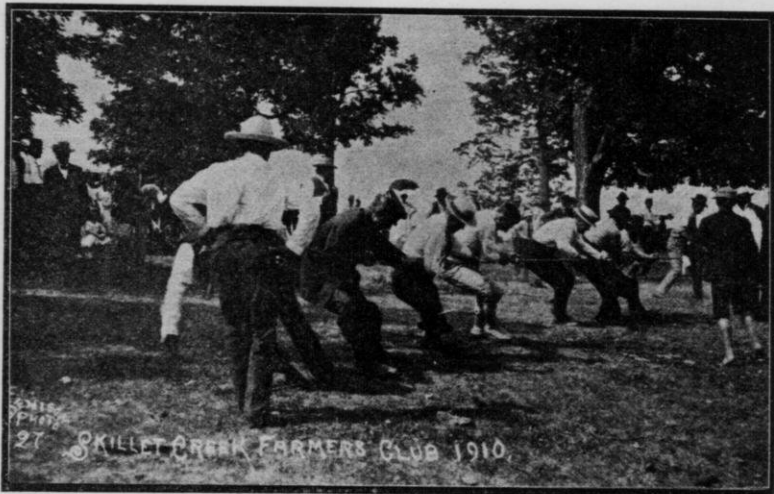
not come forward to take their place, therefore interest in the success of the club may be lost.

There were probably as many farmers' clubs in the state of Wisconsin forty years ago as today, but they have stood the test of time and their popularity will increase. Because of the flexibility of plan and wide range of usefulness made possible, the farmers' club will fit to the conditions of

#### The Skillet Creek Farmers' Club.

The Skillet Creek Farmers' club is now in the sixth year of its existence and each year has increased the interest of its members in our organization and increased the community regard for the various members.

As told in our constitution, the object of our club is to promote sociability and general prosperity among



Tug of War, Skillet Creek Farmers' Club, 1910.

any community which cares to be benefitted by an association of mutual helpfulness.

If we might have a federation of farmers' clubs, promoting interchange of thought and comparison of plans and conditions, it would be possible to bring together a summary of knowledge, experience and practice which would promote the formation of clubs and a permanency of organization which has not heretofore prevailed. In Sauk county (Wis.) we hope to soon bring about a federation of farmer's clubs and kindred organizations.

its members. Any person is eligible to membership who is old enough to be interested in or young enough to enjoy the meetings.

I will endeavor to describe one of our meetings, which are intended to and generally do commence at eight p. m. at the home of some member of the club. By that time most of the members have arrived, having come afoot or with teams or automobiles, as convenience or the weather may have determined. The ladies group themselves together while waiting, and the men like to gossip at the same time.

At the call of the president, the very orderly meeting is still more quiet, and reading minutes of the previous meeting with roll call follows. Next we have music, either vocal or instrumental, and sometimes both. Then follows a talk or an essay on some subject, generally by some member of the club, and sometimes by some one from outside. Following this is a general discussion of the subject, then

recitation by some of the young people, or perhaps another important subject is brought up for discussion. Next in order is announcements and occasionally attention is given to club business. Then comes a closing song and adjournment.

Our meetings are varied very much in character and our speakers are chosen according to the subjects to be considered. We need not go out-



Skillet Creek Farmers' Club picnic, July 4, 1909.

music and visiting intermission follows. Sociability made manifest is then the order, and never have neighbors more plainly shown the gladness of meeting and association than is shown during this social period of any one of our farmers' club meetings.

Following the call to order after visiting, there is a reajustment of seating, for visiting has brought the sexes into closer intimacy and often the most convenient place to be seated is beside the last person conversed with.

There is music again after visiting intermission, followed by reading or

side of the club for talent, but we do go outside for information that is beyond our club experience. For instance, last week we had with us Professor C. A. Ocock, of our Wisconsin College of Agriculture, who spoke about ventilating, heating and lighting our farm homes. Following this meeting in two weeks a program will be carried out which has been prepared by some of the lady members of the club. The subjects are to be: How to Train a Husband; Woman's Interest in Farming; How and Why I Learned Photography; Worries; Pickles; Music by ladies

only. The gentlemen will be allowed to join in the discussion.

At the first meeting in April we are to have County Superintendent of Schools, G. W. Davies, and City School Superintendent A. C. Kingsford, talk on educational subjects.

In addition to Professor Ocock, we have had from the university at other times, Professor R. A. Moore to talk of corn breeding and corn judging; Professor J. G. Milward to talk about spraying, and F. C. Hutchins to tell about extension work. At various times we have had with us school superintendents, business men from the city, editors, the mayor, doctors, preachers, and others.

Very rarely are refreshments served, except home-grown apples, but we have our picnics, summer and winter, and each year at least one ice cream social. Our visiting intermission proves that refreshments are not necessary to promote sociability.

In addition to our picnics, there are other meetings which we look to as annual events, as our corn and bread show, also our patriotic meeting. At the corn show trophy ribbons are awarded and addresses and discussions in keeping with the main purpose of the meeting are included. At the patriotic meeting the program is prepared by the teachers of the three districts in which the territory of the club lies. The scholars take part in recitation, music, dialogues, drills, etc. Occasionally prizes are offered for essays from the young people of the three schools. At the meeting just held, essays were read just before Professor Ocock's lecture. The subject assigned was, The Products of the Skillet Creek Neighborhood. Scholars from each school competed among themselves and the best from each of the three schools was read by the one who had written it. After the reading, the prizes were awarded by State School Inspector, W. E. Larsen,

Editor S. Hood, of Baraboo, and Geo. Hackett, Clerk of the North Freedom Board of Education.

With meetings two weeks apart in the winter and once a month in the summer, we find more things that we wish to do than we find time for. A glance over the records of the past meetings shows that we have considered a wide range of subjects, yet old as the farmer's calling is, there is ever something new to be thought of.

Our activities are not confined to the social and intellectual. We take an active interest in different movements that are of general benefit beyond our club membership. We are satisfied that our County Fair has gained from our help, along with others, in raising the standard of excellence in management and attractions, and we claim that Sauk county has one of the very best fairs in the state. For two years our club has maintained a rest and reception tent at the fair. This year we are planning to have a farmers' club exhibit at the fair such as we had last year, but more extensive. We secured from our Town the use of the Baraboo City Library. Baraboo town has now between twelve and fifteen miles of macadam roads, and our club has had a full share in promoting the construction.

There are many useful activities in which we have taken a part, but I will close the list by mentioning the latest of a week ago, when we had a very profitable Farmers' Convention and organized a county order of the Wisconsin Experimental Association.

The appointment of committees at various times for these useful activities has kept the different members busy and no one has failed to take part in some useful way. I think that being helpful keeps up the continued interest and life of our club. We hope to see more clubs in the communities about us, believing that farm-

ers' clubs, if rightly conducted, are capable of bringing out the best qualities of the members and will strengthen feelings of neighborly good will to a degree which would not exist without their influence.

Chairman Bradley—I like what Mr. Toole has said about visiting among farmers. Here in St. Croix county, I think the farmers do not get together and visit as much as they should. The poet Riley was once asked about his religion, and he answered:

“The happy smile and the grip of hand,

Is the sort of religion I understand.”

Song, Mrs. Carter.

Chairman Bradley—Within the last few years there has come into exist-

ence a study of agriculture in the common schools and the high schools in the cities and villages, as well as in the county training schools and the agricultural colleges. It has been a new work and not a great deal of progress has been made, and yet occasionally there are men who have taken up the work with a determination to show the people that there is something in agricultural education. We have an example of that in New Richmond in the high school there in the case of Mr. Brewer, and we have with us tonight a man from Dane county, the principal of the village school at Marshall, who has taken up this work in a systematic way and has had wonderfully good results.

## TEACHING AGRICULTURE IN THE HIGH SCHOOL.

Prof. C. H. Eldred, Marshall, Wis.

We are in the midst at the present time of some of the greatest movements that have ever occurred in the work of civilization, and one of those movements is the problem of social betterment of the people in the rural communities.

Back in Medieval times a man was looked upon as a man of great wisdom if he could babble away in big sounding phrases, and thus grew up the idea that education consists in knowing a lot of something, no matter whether it could be used or not, and I am sorry to say we have not fully left that idea behind us at the present time.

Another idea concerning education is that it has another purpose to fill than to store your head with knowledge simply for the sake of knowing; that the real meaning of education is that the head should be stored with useful knowledge that will help its possessor to live his life more efficiently. It gives a new meaning to the

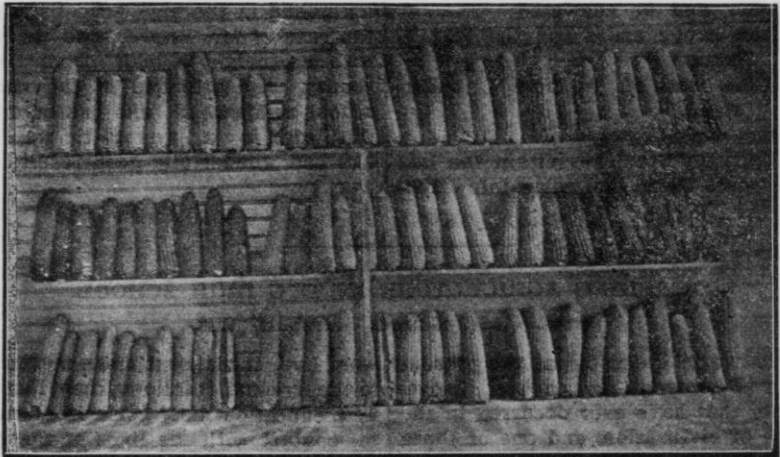
word live; it makes it mean more than to simply exist. It follows, then, that the new education must come in more vital contact with the lives of the people. A part, at least, of the urban education must deal with urban life, and a part of rural education must deal with rural life.

It was for this reason that I first became interested in the teaching of agriculture. The work began in a small school, and in a small way, by testing milk, and it awakened a good deal of interest. This was followed by a little stock judging and a little experimenting with corn. In another school, where the work could be made larger, we followed up the milk testing by establishing well organized efforts along that line to make it useful to the farmers. We started on that particular line first because the community in which that school is situated is a distinctly dairy community.

The boys and girls in that community are the sons and daughters of a

class of people who are mostly Germans. Their ancestors for many generations were peasants in Central Europe, hence they could not be expected to be shining lights in a mental way, and their parents could not be expected to look upon education of any kind in the same way as they would if they had had different ancestry. Our problem was to take those children and their parents and show

still to elevate the social condition in the community and to leave the graduate of the school on a little higher plane socially than was his father before him, but at the same time to give him enough vocational training so that should he be thrown on his own resources at an early age, as so many high school graduates are, he would be so equipped that he could go out and help himself more efficiently than



Samples of corn selected by pupils before being taught corn judging.

them that education is a vital thing by bringing it so closely in touch with their everyday lives that they could not help but see its value. We made the trial through Agriculture and having tried the scheme until we were certain it would be a success, we organized a four-year course.

#### How the Work is Carried On.

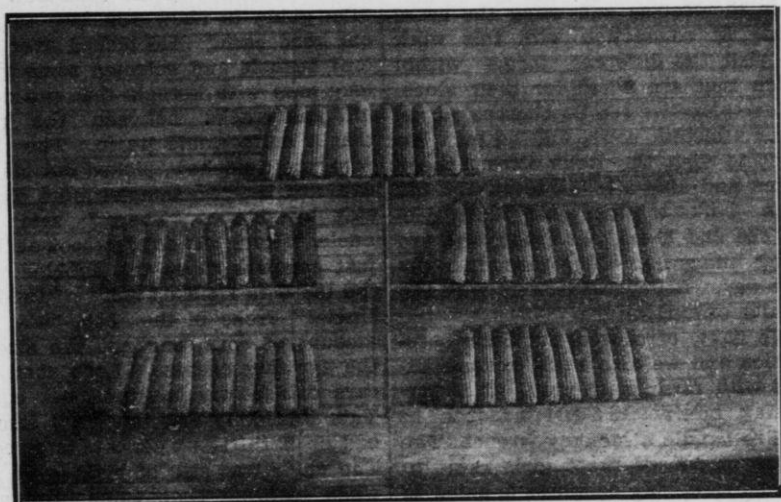
In this course we take those boys and girls and give them a high school training that is one-fourth agricultural and three-fourths cultural. You see from that statement that we are not trying in any way to make the high school a special school; its object is

his father could have done at the same age.

As a means of introduction we give over the first year of the course to teaching them how to study. This resolves itself into teaching them how to read, for reading is the real basis of all educational progress. The idea here is to teach them to understand the printed page, because during after life this will be the purpose of almost all of the reading done. At the same time we are doing this work we are giving them a start in elementary science. Here they learn about the stars, the earth, the elements, natural phenomena, and plant life, on which all agriculture is based. Another very

important branch that they are taught at this time is the life histories of bugs, beetles, butterflies and moths, and how to prevent their ravages. For instance, we were talking about squash bugs the other day, and I asked a girl, "How would you kill them?" She said, "I would put Paris Green on them." "That won't kill squash bugs," said another. "Why?" "Because bugs don't eat, they suck the juices of

natural environment. Not only must they learn the weed, but they must learn its seed as well. When they have become familiar with the weed seeds, inspection of clover seed samples is made, for it is here that many of our weeds get disseminated. As a result, I have boys and girls in my classes who can take a sample of clover seed and give a close estimate as to its value.



Samples of corn selected by students after being taught corn judging.

plants, and a surface poison won't reach them." When it comes to orchard pests, like the scales, we take them right out into the orchard and show them the scales on the trees, also how, why and when we spray to kill them.

In the first half of the second year we take up agronomy. We begin by teaching them weeds and before we are through they must know by sight about forty of the most common. To aid in getting this knowledge they gather and mount specimens of each in the agricultural laboratory, and also make field trips to see them in their

We teach them the history of the field crops, and they are often surprised, as, for instance, when they learn that soy beans and alfalfa are among the oldest of cultivated plants. It is here that we teach corn judging and grain grading.

In the last half of the year they are given a general course in horticulture. We have a greenhouse ten by twelve in which there is now some two thousand tomato plants. These are growing on the same area that has already produced radishes and lettuce. There are also about one thousand geranium slips and some other



flowers. In the spring we leave the gardening side of the work and take up practical orcharding in the orchards near by. The point that I wish you to get is that this work in the High School is very practical and useful, that it deals with the things of the pupils' experience, and that it requires no great equipment.

In the third year they study animal husbandry. Here they are taught stock judging, having work on the animals themselves and using the score card. In connection with this work we visit the different farms within reach that are noted for their stock. At one place we see Percherons, at another Holstein cows, and so on. We want to visit the Renk Bros. sheep farms and also Mr. Matteson and his hens. I like to have these young people see and meet these men who are doing things and doing them in the best way. It impresses them with the dignity of agriculture.

We have, of course, our farm economics and we also work to some extent with farm machinery. It is surprising how useful a girl finds it to be able to handle a monkey wrench. The father of one of these girls came to me and said, "My daughter is going to break her neck sure; she was away up on the windmill the other night looking for a crank, I told her to go back to the schoolhouse and she would find one."

#### Some Effects of the Work on the Community.

I have told you what we do with the children, now let me illustrate to you by a few examples how the work in the school affects the people at large. While we were working at the corn judging two or three years ago, I met an old fellow on the street who said, "They tell me you're teaching corn judging up there?" I admitted the fact. "That's all foolishness," he said. "Do you mean to tell me that you can teach those kids anything

about corn in a few days? Anyway enough so that they can come home and tell their dads anything? Why, I've raised corn for forty years and you can't tell me anything about it." I couldn't dispute the fact that he had raised corn before I was born, so I said, "Suppose you put your forty years' experience against the few days teaching and see what happens."

To my surprise he did. He said to one of the boys in the class one day, "I'm going to show you how to pick out good corn." He picked over several bushels and selected some great long ears with kernels that ran down hill and cracks between the rows that a knife would lie in. The boy, who was a nephew, picked out his ten ears and the two samples were placed side by side. "There," said the uncle, "I told you so; just look at that; just compare those ten nubbins with the ten ears I picked out." "Hold on Uncle!" broke in the boy, "it's the amount of corn, and not the size of the ear that counts. Let's shell the ears and see who has the most corn." This was done and the boy's sample had on it thirty-six per cent more corn. The uncle was still of little faith, but when planting time came the next spring he bought his seed corn of his nephew's father, with the proviso that the boy pick out the corn.

A part of the required work in dairying is to keep a complete milk sheet and test record of every cow in a herd for one month. Everything is measured so that reports can be made in class. In this class was a herd of twenty-one cows. The class kept a complete record and when it came time to figure up at the end of the month, behold, seven of the cows were boarders and were not even paying their way.

#### The Special Work for Girls.

I wouldn't have you think that because I have talked about the boys so much that we in any way neglect our

girls. We look after them also, but our work is so planned that everybody takes the same subjects for the first two years to economize in teaching force. This is a good thing in another way. Agriculture is the greatest industry in the world, and everybody should know something about it, whether he is going to follow it or not. For these reasons our girls study agriculture for two years, but at the end of that time they can choose between English, Agriculture, German or Domestic Science.

Visitors often say, "Why, how mature your pupils appear for their ages." The comment is true: School to most of them is a business proposition, a place where they are getting valuable training for future work, and their attitude is a result of the realization of that fact. Most of our girls take the Domestic Science. We have a special teacher for that work and they are taught sewing, cooking and household sanitation. As a result they are helping their mothers with the sewing and baking, and more than one mother has said to me, "I have been sewing and baking all my life, and yet I have learned from my daughter kinks in the trade that I never knew before."

In connection with the household sanitation the girls study the planning, location and equipping of houses. Perhaps you have noticed that the average house plan is arranged for city locations and not the farm. When the house plan of these country girls was perfected, among other original points I found on the ground floor a room labeled, "Men's Room." "What is that," I asked. "I will tell you," replied one of the girls. "Mother and I are sick of having the men come in to the kitchen and sit around in the way while we are getting meals. I want my kitchen so arranged that the men can't get into it, but will have to sit in a room of their own, where they

can keep their boots and rubbers and coats."

So there on the plan was the men's room and it was arranged so that it opened toward the barn, not the kitchen. "If I could have it as I want it," continued the girl, "I would have it fixed so that I could shut the doors and wash it out with the hose."

At the same time that the girls plan houses, the boys plan barns, outbuildings and gates. Indeed the father of one of the boys is going to build a barn from plans worked out in the class.

These are some of the practical results that we are getting from agricultural teaching in the High School. At the same time we are trying to help the people of the community socially; trying to get them interested in each other and in public affairs. We go out to the country school houses, get these people together and talk to them along agricultural lines, choosing such subjects as they will be interested in. In this way I have talked on "Alfalfa and How to Grow It," "The Dairy Cow and How to Know Her," and other kindred subjects. Thus we are trying to improve the social life through education and the school by working for them and with them and getting in sympathy with them, thus gradually to lift them up to a higher social strata than that on which they are now living. It is not a work that will be accomplished this year or this generation. It is a "long-time" proposition. If we cannot get the old fellows—and I do not think we will—we are going to get their sons and daughters, and when they are as old as their parents now they are going to be a different class of citizens. They will be efficient, capable, well educated, well doing citizens in every sense of the word.

I thank you.

Song, Mr. Anderson.

Adjourned to 9:00 a. m. next day,  
March 15, 1911.

## SECOND DAY.

The convention met pursuant to adjournment. Prayer by Rev. Mr. Blakesley.

Supt. McKerrow—In opening the meeting this morning, I do it with sadness on my part, for just as I was leaving the hotel a telegram was handed me from the Secretary of the State Board of Agriculture, which stated that Mr. David Wedgwood, a member of our board, with whom I parted last Monday afternoon, apparently in good health, had dropped dead in his daughter's home at Green Bay while on the way home from our meeting.

Mr. Wedgwood was one of Wisconsin's leading farmers, one of Wisconsin's large farmers, a man of large heart, as well as large interests. For fifteen years I have met him in a business way and I learned to look upon him as one of Nature's noblemen. But so it is in life; we who are here today must go on in pursuance of our duties, although one of the strong men in our life work has gone.

Mr. W. F. Stiles called to the chair.

## HANDLING AND SHIPPING DAY-OLD CHICKS.

C. E. Matteson, Pewaukee, Wis.



Mr. Matteson.

In America, no doubt, shipping day-old chicks may be looked upon as a new departure. To take a squirming mass of downy little fellows in their true innocence and start them on a journey several hundred miles may seem even cruel to some, but the venture is taking wonderful strides; in fact, is far beyond the experimental stage, and to the world as a whole it is not new. History records it being carried on in Egypt, China and to a small extent in Japan, hundreds of years ago, the hatching being done by the true natives in egg ovens. It has now spread to England, but in America it is as yet only in its infancy, however, I predict it has come to stay.

## The Object of the Practice.

The real object of the practice is to eliminate the "eggs for hatching" business. All breeders know too well the many obstacles to be met with in this work. A breeder may be ever so honest, use all methods at his disposal to

send out eggs that are fresh and fertile; use the latest models of packages and label them ever so cautiously, and at best many sad reports will result; hence the rapid evolution of the day-old chick business, as it is commonly called by poultry men. It is being brought into use by farmers as well as poultry men as a means of introducing new blood into their harem of fowls and is a Godsend in a way, because you can see just what you have got at once, not being obliged to wait three weeks and then probably be disappointed in the result. If the loss of eggs was the only loss, it would not be much, but you have lost just that much of the best part of the season, and at best, even though you have the hatch duplicated, your chicks are late just the same.

#### Distance Should be Regulated by Time in Transit.

Just how far a little chick can be shipped, will depend largely upon how direct the route is it is to travel. Distance should be limited to the amount of time it takes in transit. Where the route is direct and no delay, I would say fifteen hundred miles should be the limit, but where connecting points are to be made, allowances should be made accordingly. This should be studied by the shipper, as well as the purchaser. When shipping direct, it is easier to make a thousand miles than it is even a few miles where several changes are to be made. All this should be studied before an order is placed.

Most people probably, like myself only a few years ago, think that the older the chick, the more capable it is of standing shipment. This is certainly an erroneous idea which I have fully demonstrated in my own practice this past season. Being a little short on enough chicks to fill a certain order, I had to go to a brood of two

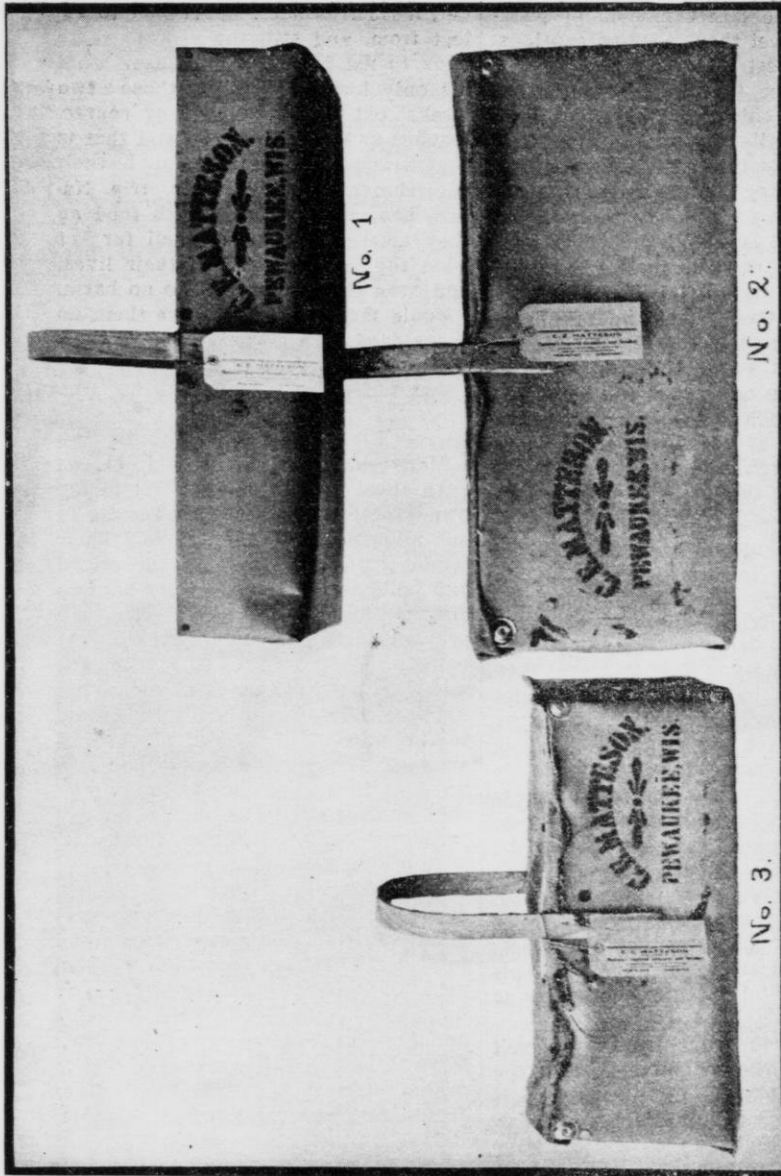
weeks' old chicks to make up the number, a thriftier lot I never had to select from, and still the report came back to me from the purchaser that his only loss was from those two weeks' old chicks. This, of course, teaches us the real secret, and that is that Nature's food only should be their nourishment during their trip. Nature has supplied them with food as they emerge from the shell for at least the first two day of their lives, and even three days will do no harm. I would much prefer to have them go three days than I would to have them fed under two days of age.

#### How to Ship.

Many shippers of day-old chicks pack them in lots of fifty, but in my own practice I have better results in not allowing over twenty-five. Their tendencies are at that age to crowd and pile up and it is pretty hard to employ shipping packages that will prevent this entirely, but where only twenty-five are allowed in a compartment, all such danger is eliminated.

The size of the package is limited to the number of the chicks to be shipped; never allow more than one hundred in a package. If more than that number are to be shipped at one time to the same customer, more packages should be used.

All packages are carefully labeled, stating the contents, with the address plainly written, and a separate placard to attract the attention of the messengers in charge, telling "how to handle; to keep out of cold draughts and that no feed or water be given." Many kind-hearted messengers are prone to share their lunches. This should be strictly placarded against. During transit they develop into a robust, hungry brood, ready for their new foster home. The body heat of the chicks should be the only means of warmth. The ventilation, therefore,



Shipping coops for day-old chicks which are used at the poultry farm of C. E. Matteson, Pewaukee, Wis. Figs. 1 and 2 accommodate 100 chicks each, No. 1 being shallow for late spring and summer shipping; No. 2 being same capacity, only deeper, which permits of packing for early or colder weather shipping. Fig. 3 accommodates 50 to 75 chicks.

must be gauged to fit the weather, to avoid chilling or smothering. This, of course, is a matter of judgment on the part of the shipper.

The loss is usually very light in shipping day-old chicks and as most shippers put in one or two extra, a full count usually reaches the purchaser.

#### Treatment at Destination.

The shipper should always notify the purchaser at least one week in advance of the date he is to ship and then it is the duty of the purchaser to be there at the train to receive them, so as to avoid all delay possible.

Upon their arrival, get them to their permanent brooding quarters at once. Too many take them to the kitchen floor, where they are spread out that the whole family may see them. They are tired from their journey and they need rest and quiet for recuperation. This is far more essential than food or water. That comes in later. Just put water where they can get it without getting wet; they will do the rest. Feed sparingly for several days and induce them to get as far away from their mother as you can consistently.

#### A Word of Caution.

Just a word to the purchaser before closing. The same chance for rascality exists in this industry as in that of selling eggs for hatching and I would advise caution, in regard to character and methods of the advertiser, before purchasing. It is a known fact that many of our day-old chick hatchers do not own a fowl and buy all their eggs from farmers and other sources. Such hatcheries no doubt would need to exercise themselves to a considerable extent if they are to secure a stock to fully satisfy their customers

#### DISCUSSION.

A Member—What would you feed those chicks the first feed?

Mr. Matteson—Most every one has his own way of feeding. I have changed mine considerably in the last five or six years. Our first feed for young chicks the last four or five years has been about forty per cent cracked corn, good quality, forty per cent cracked wheat, good quality, and about twenty per cent pinhead oatmeal, so called, steel cut oatmeal, and you should also add pulverized charcoal and pulverized oyster shell. That combination with me has proven a very good chick feed. The cracked corn and wheat must be very fine, about one-fifth of the kernel of the wheat.

A Member—How do you get that cracked?

Mr. Matteson—If you can get it cracked on rollers, that is to be preferred. It is really coarse meal. You understand ground meal, what we call meal, is not a good food for young chicks, it is too liable to pack in the crop, it should be coarser than that.

Chairman Stiles—Would the average miller be able to crack that in his mill, or do you buy a little and crack it at home?

Mr. Matteson—You can buy those cracked grains, we get them cracked at Waukesha.

A Member—How about hard boiled eggs for the first feed?

Mr. Matteson—You must use care and judgment in the preparation of those eggs. As hard boiled eggs are commonly prepared, I object to them entirely.

Mrs. Dynes—Do you leave this dry food before the chicks all the time?

Mr. Matteson—Our method is this. I do not like to take chicks from the machine and put them into the brooder before about forty-eight hours; I think the machine should be such that it will take care of the chicks better than the brooder will. Then they are put under the hover and left to their own sweet will. We scat-

ter a little bit of the feed on the outside of the hover and we feed no more until they have picked up all of that; then we know they have an appetite, and that appetite is very essential for chicks all the way through. When we see they have eaten it up, we give them a little bit more. They are about two days of age then. Then we take away the boards which have confined them and let them out into the brooder house pens, and there we scatter this feed in litter of some kind. A young chick needs exercise, and that is why we feed in a litter.

Mrs. Dynes—Is this litter alfalfa?

Mr. Matteson—We do not have alfalfa, though I would like to have it. We simply use cut straw, cut very fine through a feed cutter. We leave water where they can get it at any time. That drinking fountain must be scalded for each hatch, and not only that, I recommend that the brooder, if it has ever been used to raise chicks, be thoroughly disinfected after being used.

Mrs. Dynes—Is the floor dirt or boards?

Mr. Matteson—The floor of that brooder is boards, but all of the pens connected with the brooder in the interior of the house have earth floors, which I certainly recommend. I would not recommend a cement floor if it is to come directly in contact with the chicks. The cement floor is all right down several inches below where you want your real floor, to guard against rats, but earth is the ideal floor and should be on top of the concrete. Gravel would be all right, so far as the chicks are concerned, but I object to it because we use all that material as fertilizer on our land, and the gravel gets into it and spoils it for that purpose.

A Member—How about the hard boiled eggs again?

Mr. Matteson—When eggs are ordinarily prepared, putting the eggs im-

mediately into boiling water and leaving them there for five or six minutes, they are not fit for food for young chicks; in fact, it is almost sure death in many instances. If you are going to use hard boiled eggs for chicken feed, the way is to simply put those eggs into cold water, put the kettle on the stove and bring the water to a boil and boil them I would say, twenty minutes. Then they are tender and will not cause indigestion. At any rate, I would not recommend using them as an exclusive diet, not over twenty per cent of the amount you are going to feed should be hard boiled eggs.

Mr. Purse—When you say forty-eight hours, do you mean forty-eight hours from the time they are hatched, or from the time they begin to hatch?

Mr. Matteson—We figure the hatch is all under way. Generally they will commence hatching on about the nineteenth day and they should be all out by the twenty-first. I have no use for a chick which comes out after the twenty-first day. We leave them all there. But understand, during that time conditions should be made favorable in all respects, ventilation, heat, etc. If you happen to be using a machine that is not under your control then, I say, get your chicks out of there as soon as you can.

Mrs. Dynes—Would you prefer shipping your eggs to people who are to hatch them with hens, or people who are trying to incubate them by machine?

Mr. Matteson—That is a pretty hard question to answer. As far as I am concerned, I will take the money from either.

Mrs. Dynes—From which party would you be more apt to get favorable reports?

Mr. Matteson—I get bad reports from both and I get good reports from both, so I would hate to draw a line. I believe, generally speaking, we get

the better reports from the incubators.

Mrs. Dynes—For the practical farmer, don't you think the old-fashioned way would be better?

Mr. Matteson—No, I do not. All poultrymen realize the importance of the early hatch; that is the keynote and we all know the hen in a wholesale way is not practical in the early spring. Anybody that is going to raise chickens in June, July or August, as a large portion of our farmers are doing, then by all means I would recommend the hen.

A Member—Isn't this going out to the farmer more than to the practical poultryman?

Mr. Matteson—Yes, but I am urging on the farmer the importance of the early hatch; but people must understand the business, must take care of the chicks. Early work is not practical with the hen.

A Member—What is the best temperature for those chickens?

Mr. Matteson—The brooding temperature is ninety-three. Such weather as this (about zero), I would recommend keeping the brooder higher than that, and it should be constructed in such a way that the chicks have a chance to go to and from the heat night and day. One way that can be done, if you have hens on the nest, is to take some of those chicks when they are strong enough, forty-eight hours old, take them to the nest where the hens are, and leave a few of them over night, so as to get the hens accustomed to the chicks and the

chicks to the hens, then the chicks can be taken and given to as many hens as necessary, but all chickens taken from the machine should be gotten accustomed to their mother, otherwise they will stray from the hen and get chilled.

A Member—How large a family do you think a hen ought to have?

Mr. Matteson—In cold weather not over fifteen. In warm weather, thirty-five or forty.

A Member—What do you think of fireless brooders?

Mr. Matteson—Generally speaking, I do not believe in them. I find that most people who are using them with any degree of success bring them into use with the kitchen or other heat for early work, and that is necessary if you are doing that work in the early spring. I have yet to find a single person who has made a success without that.

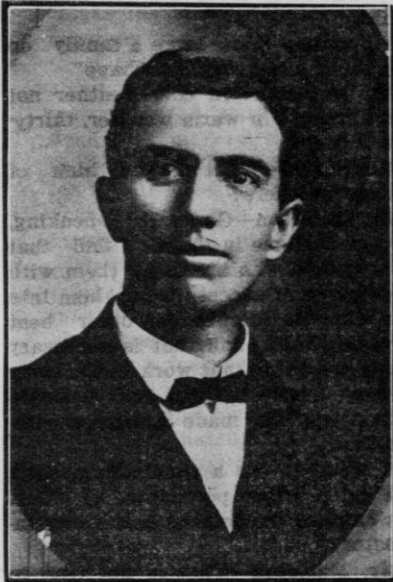
A Member—As a usual thing, don't you get a larger percentage of chickens hatched under hens than in an incubator?

Mr. Matteson—That is not true in my own practice, but I realize that, owing to inexperience and also to the poor machines which are on the market, it is many times true, too many times true. Of course, I could not think of doing business with the hen in any way, I would have to go out of business if I did. Of course I want the hen, but I just want her to lay eggs.



## THE FARMERS' POULTRY AND THE SYSTEMS.

George W. Hackett, North Freedom, Wis.



Mr. Hackett.

The farmer's poultry represents a proposition unlike any other found upon the farm. While the poultry business as a whole is scarcely exceeded by any one branch of agricultural products, and while the farmer contributes the greater part of these total poultry products, yet he regards the hen as a necessary nuisance and treats her accordingly. He would hardly be willing to do without the wholesome, fresh eggs and the choice meats so conveniently supplied by the hen, and he would greatly miss the egg basket, which does so much towards supplying the groceries, but as a moneymaking proposition he has not thought the hen of much consequence. In spite of this indifference on the farmer's part (and thanks be to

the farmer's wife), the industrious hen has forged her way into prominence as a wealth producing factor that demands the attention of the world. I am glad to note the general awakening in the poultry industry and that many of our progressive farmers are beginning to study the business and adopt improved methods in handling the poultry.

I would not expect to interest you in this subject if I could not show you where there is money in it. I am not here to tell you that there are vast fortunes in the poultry business, as you see so glowingly advertised in your journals and magazines, by the "Systems" so-called, and which I believe to be a detriment to the industry. One man tells us of a ten thousand dollar hen and how he cleaned up over eighteen thousand dollars in one year from his poultry; how he made thirty-six hundred dollars in one year from thirty hens, and for one dollar will sell you a book telling how he did it. Another made over fifteen hundred dollars on a forty by forty city lot by the use of a "system," which he explains in a book and sells to you for one dollar. There are several other systems, which I will not take time to mention, but they are all after your dollars. I do not wish to condemn the systems as having no merits, on the contrary they demonstrate the great possibilities in the poultry business, but these methods are too intensive to be of practical use to the farmer, and I believe he has too good sense to be much attracted by such advertising.

#### Selection of Good Stock First Step in Poultry Raising.

What I would ask the farmer to do is to apply the same good sense and

business management to his poultry that he does to the horse, the cow or the hog. It is just as worthy your attention to produce eggs as it is butter, both are staple articles of food. Most of you farmers know about what your cows are producing, but you couldn't make a decent guess at what your hens average in eggs per year, nor do you know what would be a fair average. If you will keep from two to three hundred laying hens on your farm and give them the same care and attention you do your dairy cow, you can make from three to six hundred dollars per year for your labor, after deducting for feed used. It would take several cows to bring you as much. These figures are very conservative and would not satisfy an exclusive poultry keeper.

To do this, you must have good stock to start with. The scrub hen is to the poultry man just what the scrub cow is to the dairyman; in fact, there is nothing to be said in favor of pure bred live stock of any kind that can not be as truly said of poultry.

If your foundation stock has been carefully bred and selected for many generations for heavy egg production, your hens would average from ten to twelve dozen eggs each per year. They will lay a goodly number of eggs in the fall and early winter, when eggs are highest in price, and if you have good pure bred stock, that looks good to your neighbor, who knows how frequently you carried eggs to the market when he was getting none, he will be wanting some of those eggs for hatching, and when he finds that you are not willing to swop them for his common eggs, will pay you many times what they will bring you on the market and at a time when they are cheapest. A little judicious advertising will dispose of a large number of eggs for hatching and also the best of the surplus cockerels for breeders.

Having selected good stock, there

are a few things particularly essential to success. They include good housing, good feeding, and disposing of the products to the best advantage.

#### Housing the Flock.

Good housing means plenty of fresh air without drafts on the fowls, especially at night. I am an ardent advocate of the open-front or curtain front house. For the stationary house, which I would use for the laying stock, I would build at least sixteen feet from front to back and twelve feet long for every fifty hens I wished to keep, using dropping boards beneath the perches, which I would place on the level and as high as convenient at rear end of pens.

I would have about one-half of the front end of pens open, with cloth covered frames to fit; would also have some glass, but not much. Remove all frames and windows in warm weather and leave some portion open, even the coldest weather.

I do not consider it necessary to build with double walls, but it is very essential that you have all parts of house very tight, except front, to avoid danger of drafts. For this purpose the prepared roofings are best, for outside and roof.

I also wish to recommend the use of the portable colony house as being indispensable for use on the farm where once used. They are very convenient for placing the brooders or hens in with little chicks and will make a very convenient house for the growing chicks until cockerels are marketed as broilers and the pullets go into the laying house. You can hitch the horse to these houses and haul them down in the corn fields, pastures, orchard or wood lot, and the youngsters will thrive and grow like weeds. They are also very convenient for housing the breeding pens and for keeping cockerels separated from the flocks.

We build these houses six by eight feet, similar to the A-shaped hog-house. I make them eight feet from front to back, with board floors laid on four by four sills for runners. The door in the front is two and one-half feet wide and contains an opening twenty by thirty inches. This is covered with netting and always left open. The perches are placed in the rear of coop over dropping boards about three feet from floor. Fowls do well in these houses all winter.

#### Feeding for Egg Production.

I will not go into detail about the feeding, but in a general way I may say that the feeds which will produce lots of milk fed to your cows, will likewise produce plenty of eggs, if fed to the hens in a manner so they can handle it.

There is one exception, and that is the necessity of some kind of animal matter to take the place of the bugs and worms secured in summer on free range. This can best be supplied in commercial beef scrap produced at the Stock Yards and for sale by all poultry supply houses and most feed dealers. Mix this with bran, shorts and ground feed and feed as a mash, preferably dry, but may be fed mixed with milk to good advantage. Feed mangels and cabbage for green food. Scatter this whole grain in deep dry litter, keep them busy, supply grit, oyster shells, charcoal and plenty of fresh water, and then gather the eggs.

#### The Incubator.

I am often asked if I can recommend the use of the incubator on the farm. The incubator is here to stay and poultry men could not get along without it. I use it myself, yet I have seen so many eggs wasted and so many scrawny chicks raised by artificial methods, that I hesitate to rec-

ommend its use on the ordinary farm. If your hens are of the American or English varieties and have laid well during the winter as they should, you will have no trouble in getting enough setting hens early in the spring and you will raise more good chicks, and it is the number of good ones we raise to maturity that counts. We have not yet succeeded in improving on the hen in this work, but in raising chicks with hens, it is very essential to keep them free from vermin.

I want to say to you farmers on whose farms the duty of caring for the poultry falls upon the ladies, as I know it does in many instances, I would ask you for them, that you see to it that the houses are arranged as conveniently as possible to care for them, as much labor can thus be saved. However, the poultry is worthy the attention of the man on the farm and in every case will pay exceedingly well for the care given.

#### DISCUSSION.

Mr. Utter—Can you describe the symptoms of this disease called chick-enitis, which seems to affect so many of our ladies in our towns?

Chairman Stiles—I think that may be foreign to the subject.

Supt. McKerrow—The cure for it is plenty of country life and air.

Mr. Hackett—Yes, and plenty of nice chickens.

Mr. Matteson—You say the incubator and brooder must be brought into practice with the Leghorns and other small breeds which are not setters. Wouldn't that stunt their growth with the small breeds, just the same as with the larger breeds?

Mr. Hackett—That is true enough, but there is no better way out of it. It is not necessary, as I said before, that your chicks be stunted because you raise them in that way; it is a fact, however, that they often are.

Mrs. Dynes—Did I understand you to say you keep from two to five hundred hens in one house?

Mr. Hackett—No, two hundred hens in a house would not be too many, but I would not keep them together in one flock. If I was keeping two hundred hens in a house, I would divide that house into four parts and keep fifty in a lot.

Mrs. Dynes—Do you mean with wire between them only, or entirely separate?

Mr. Hackett—I would divide it into four parts, making a twelve-foot division for each flock. The center partition should be solid, to avoid drafts. The other two partitions could be of wire.

Mrs. Dynes—Then it would be really four houses?

Mr. Hackett—The expense of building would be much less than four separate houses.

Mr. Matteson—Wouldn't you get better results if they were even divided into pens of fifteen or eighteen? I have tried two hundred and one hundred and fifty and twenty-five, and although my plant is located somewhat on the plan you speak of, if I was to locate a plant again on a larger scale, I certainly would locate it on the plan of having fifteen or eighteen only in a colony—I am speaking now of the poultry farm.

Mr. Hackett—For the average farmer, I think we can recommend about fifty in a flock; it would be more practical for him.

Mr. Matteson—Will they get eggs in the winter, when the prices are high?

Mrs. Dynes—No.

Mr. Hackett—That would depend upon the care and feed they got. A man down in New York who sells a book claims that he ran 1,500 hens and made \$6.40 for each hen.

Mr. Toole—Where you use beef scrap, what proportion of middlings do you mix with it, and what propor-

tion of the general feed do you use with the mixture?

Mr. Hackett—If I were feeding it all the while, I would not need to use more than five per cent in the dry mash; the balance would be bran, etc.

Mr. Toole—What is the formula of that dry mash?

Mr. Hackett—One hundred pounds of bran, one hundred pounds of middlings, about one hundred pounds of grain feed—corn and oats—and about fifty pounds of beef scrap. I also make it a little more flaky by using alfalfa meal. The beef scraps are not cocked, they are put out in a dry form, all ground up, and also have some bone in them. They will keep indefinitely, winter or summer.

Mr. Matteson—On the farm, don't you think there are other things that the farmer can get in the way of these old canners, so to speak, or green cut bone, that are much more handy to buy, and cheaper?

Mrs. Dynes—Good farmers don't have old canners, do they?

A Member—It will pay the farmers to kill a lot that they have got for canners.

Mr. Hackett—I hardly think there is anything else that is practical. Skim milk is good, and will, to a large degree, take the place of beef scrap, and that is about the only thing that will. Green cut bone would be better, but the farmer won't feed his hens much green cut bone. It is not very handy to get, and then if you keep it around too long it becomes spoiled, and therefore no good for chickens.

A Member—Our butcher charges us more for green cut bone than we can get tankage for.

A Member—We get about two bushels a day of scraps from the meat market and throw them right cut to the chickens, just the bones as they come from the waste box. We pick out the bones and burn them; the hens pick the meat off the bones.

Mr. Hackett—That is all right, if they don't get too much. It would be just as well to put them through the bone cutter. If you burn them, it takes the place of charcoal practically, but I would rather feed some charcoal.

Mr. Matteson—You mentioned sending your eggs to a commission man. Don't you think they can be handled to more profit?

Mr. Hackett—Yes, but I am speaking from a farmer's standpoint, because as a rule he will not take the pains to lock up private trade, he will dispose of them in the handiest way.

Mr. Matteson—In most all the cities there are what we call "dressers," who will make a specialty of handling fresh eggs, and you will find it much preferable to selling to commission men.

Mr. Imrie—This gentlemen spoke of tankage. Will that do in place of these beef scraps?

Mr. Hackett—I have had no experience with tankage, but have been informed that it is not good for fowls.

A Member—What kind of fowls would you recommend for the ordinary farms?

Mr. Hackett—I think the average farmer will do better with any of the American breeds and varieties.

Chairman Stiles—Name the breeds.

Mr. Hackett—Plymouth Rocks, Wyandottes and Rhode Island Reds are the most important ones. They include many varieties.

A Member—Plymouth Rocks are a little ahead of Rhode Island Reds, are they not?

Mr. Hackett—If a man thinks they are, yes.

A Member—You spoke about using trap nests. Do you find that there are many drones or non-laying hens?

Mr. Hackett—Yes, the first year I used trap nests I found a good many hens that were not paying for their keep. I found hens that did not lay

over four dozen eggs in a year, and they would lay them in the spring, when eggs were cheap. We want the kind that will run seventeen dozen and lay all the year through.

A Member—Do you find any that lay two eggs a day?

Mr. Hackett—Yes, I have in a few instances.

A Member—How long will you keep a hen that lays seventeen dozen?

Mr. Hackett—As long as she will stay with me.

A Member—Which would you prefer, pullets or hens?

Mr. Hackett—Early hatched pullets. When you have a lot of pullets, you have a lot of cockerels. Do not keep them too long; sell them when they weigh about two pounds and you will get as much as if you kept them through the whole summer.

A Member—Did I understand your colony houses are like the "A"-shaped hog-house?

Mr. Hackett—They are a good deal the same shape, only they are not built together at the top. I leave them two and a half feet wide, with a square top, six feet wide and eight feet long. I build them of ordinary hemlock lumber and cover them with roofing; they are for use both summer and winter.

A Member—Do you have a curtain around the perch platform where they roost at night?

Mr. Hackett—I have not. They are recommended and a good many use them. I was on Mr. Halback's farm recently. He has built some houses on the plan of my large house and he thinks they are all right. He has a curtain in front of the roosts which he says he has used two nights this winter and he doesn't think he needed to use it at all. Of course this winter has been an exception to the rule. Last winter we had it twenty-eight below zero and my birds never froze a comb with no curtains.

A Member—Where are the nests?

Mr. Hackett—Right under the dropping boards.

Supt. McKerrow—On the large farms in Great Britain, I have been very much interested in noting their work with poultry, and invariably, where they are following poultry to any extent, they have these movable houses and have them on wheels. After a crop is harvested in a field, you will sometimes see fifteen or twenty of these houses in different parts of the field with a little colony of chickens moving over that field. So in the summer they are hauled from one good place to another, and the farmers tell me that is one of their sources of profit. In the winter those houses are taken into the farmyard, dropped off the wheels and put on the ground and used as winter houses. Of course they move very easily on the wheels and are easily handled.

Mr. Matteson—We haven't the large farm to move them out onto. It is certainly a good plan.

Mr. Hackett—I cannot see any advantage of having wheels, because one horse will move these houses of ours without any trouble. I think we are ahead of the British.

Chairman Stiles—Some day I expect you will be putting them on a flying machine.

Mr. Purse—Stock Yards men tell me that this tankage is all right, that it has sixty per cent protein, which is even more than the scraps have.

A Member—We have fed it and didn't see any bad results.

Mr. Purse—We mix it with our mixed feed.

A Member—How early do you hatch those chickens?

Mr. Hackett—I recommend hatching American breeds in April, or the early

part of May; any time in May would be all right.

Mr. Matteson—I understood you to say you would not recommend over five per cent of this whole mash to be animal food. Don't you think that for egg purposes they could stand more than that? I have fed as high as twenty per cent.

Mr. Hackett—If you give them alfalfa or clover, I think it largely makes up for the animal food. I meant five per cent of the bulk, which would amount to more by weight.

A Member—Wouldn't you recommend keeping oyster shell and charcoal grit of some kind before them all the time?

Mr. Hackett—Yes, I would, especially the grit. If you give them plenty of alfalfa, clover and bran, it is not so essential to keep up the oyster shell.

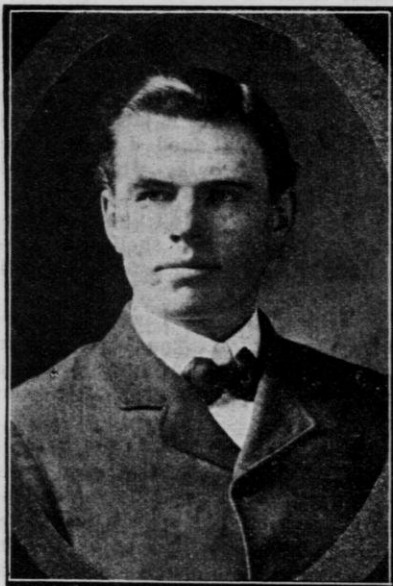
Mr. Matteson—You do not recommend any of these systems that are advertised in the papers, as I understand, but don't you think it would be well enough for a farmer to invest his money in some of these books that are advertised and read them?

Mr. Hackett—Yes, I have said many times this winter that the farmers would get full value received if they would buy one of these books. I would not buy them all, but I would buy one of them, and you will certainly get your moneys worth out of it. There is only this about it, if you take a poultry journal, you get about all there is in a book in the poultry journal.

Supt. McKerrow—A strong-minded farmer, a man who has judgment and a mind of his own, may buy a book all right, but for the average fellow, he will be safer to leave the book alone.

**FEEDING SUGAR BEET MOLASSES.**

L. P. Martiny, Chippewa Falls, Wis.



Mr. Martiny.

Beet molasses is a by-product of the beet sugar factories. In the refining process of the sugar, there is a certain amount of saccharine matter that cannot be refined into commercial sugar as we buy it for human consumption. This residue comes from the refiners in the form of a very heavy molasses, so thick that it will scarcely flow. It is dark brown in color, and while it is very sweet, there are some bitter and undesirable flavors which make it unfit, or rather, undesirable for human consumption. This molasses is used in various ways for stock feeding purposes and great results are obtained from its use.

According to Henry's "Feeds and Feeding," beet molasses contains prac-

tically eighty per cent of dry matter, nine per cent of digestible protein, sixty per cent of digestible carbohydrates, and no fat or oil, so, as far as its nutritive ratio is concerned, it is practically a balanced ration.

Beet molasses contains over fifty-six pounds of potash per ton. This large amount of potash is thrown from the system through the kidneys and heavy feeding means an overtax on those glands.

**The Value of Molasses as a Stock Food.**

Some of our best feeders of live stock have known the value of molasses as a stock food for a long time and have resorted to its use to put that nice finish, sleek coat and increased flesh on their animals, which it does as no other feed will do when it is fed very carefully, in small quantities, by the hands of an experienced feeder; in fact, until lately, the feeding of molasses to show or sale animals, to put them in the finest kind of bloom, was considered one of the "secrets" or "tricks" of the trade.

Beet molasses acts as a tonic when fed to stock. They have better appetites, their digestion seems to be better, the animals thrive, their hair gets sleek, and they show a more vigorous and better condition of health.

**The Manufactured Molasses Feeds.**

Some of our ingenious Americans, who knew the value of molasses as a stock food, have gone into the manufacture of so-called molasses feeds, which are sold to farmers under a number of different names.

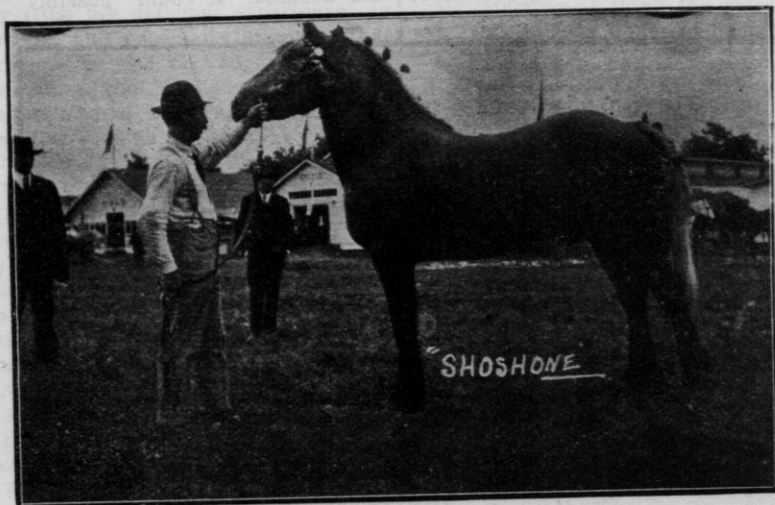
These feeds are made by grinding up most any material, such as peat,

barley beards, screenings, alfalfa, and sometimes some good feeds are used as the filler for these so-called molasses feeds.

These feeds are highly advertised, great claims being made for them, the price depending on the filler used, etc. One of the more common feeds is made by grinding alfalfa hay and mixing this with beet molasses in different proportions, usually nearly half and

### The Home-Made Product.

The thought occurred to me that I could save a great deal in cost of this feed, so I went to the Sugar Beet Factory which operates in our town and purchased the pure beet molasses at fifteen dollars per ton, the same price the Sugar Company were selling their beet molasses to these feed manufacturers. I learned that there must be



Percheron stallion colt bred and owned by L. P. Martiny.

half of molasses and alfalfa. These feeds are usually sold to Wisconsin farmers around twenty-five dollars per ton, and farmers using them report very good results, consequently there has been a large demand for them.

Hearing these ground alfalfa and molasses feeds very highly recommended, several years ago I purchased several tons at twenty-five or six dollars per ton, as I remember it now, and after experimenting with them, I learned their claims were well founded, for I could notice an increase in the milk flow of my cows, my horses sleekened up and my hogs had better appetites.

some profit in molasses feed manufacturing, when the manufacturer could purchase a half ton of molasses at seven dollars and a half, mix it with four or five dollars' worth of alfalfa and retail the mixture at twenty-five dollars, so I thought I could do my own mixing, and not only that, but I knew what I was mixing and could mix to suit myself and the needs of my various animals.

### How to Feed.

In the feeding of beet molasses, we store it in fifty gallon barrels. As it is almost impossible to dip it, we draw the molasses from the barrel through a faucet into an ordinary garden



sprinkler, the holes in the nozzle of which have been a little enlarged. We first fill the sprinkler about one-quarter full of warm water and stir the molasses as it runs in. This thins it sufficiently so it runs from the sprinkler very freely and we feed it to the stock by sprinkling it on their hay.

Good producing cows that are fed on corn silage as the basis of their ration, may be fed from three-quarters of a pound to one and one-half pounds of

since some of the sugar companies have learned the profits to be made in the molasses feed business, they also, have begun manufacturing it. One case is reported where a molasses feed manufacturer made several times more profit on the refuse beet molasses than the company did on the manufacture of sugar. If there was a demand for beet molasses among farmers, there would be some way of supplying this demand. It could possibly be



molasses per day. Cattle getting dry feed could be fed more.

One must use great precaution in feeding molasses, as it is a highly concentrated and laxative feed. It should not be fed as a substitute for any other feed, or used to balance a ration, but should be fed as a supplement to a full ration of other feeds as a tonic, more than for its food value.

Just how the average Wisconsin farmer is to obtain this molasses I am unable to say. We have several large beet sugar factories in Wisconsin, but I think their entire output of beet molasses is usually contracted for by molasses feed manufacturers, or

done through the wholesale and local grocer or some special jobber.

#### DISCUSSION.

Mr. Imrie—Is there a large amount of this molasses made at the factory?

Mr. Martiny—Yes, there is quite a large quantity. They ship it out in large oil tank cars, the same as they ship oil.

Mr. Imrie—Would it be possible for a farmer to buy it by the barrel?

Mr. Martiny—They are selling it in exceptional cases. They are accommodating some of their best growers by barreling it there and shipping it out

to them. The way I get my molasses, I borrow a threshing machine tank of one of my neighbors and back that right under the spout, fill it up from their store tank and barrel it at home.

Supt. McKerrow—I agree with Mr. Martiny as to the value of cheap molasses for feeding; from all the sources I can glean information, it is nearly a balanced ration and helps to make the animal look well. I want to say from my personal experience in feeding, and especially animals that have been fed on sugar, fed up for shows, the English and Scotch feeders have been using sugar in a skilled way, as Mr. Martiny says, for fifty years and more, I would say, be careful in feeding with molasses, feed it in a limited quantity. The owners of herds and flocks think a good deal of sugar, but I think they agree that in feeding sugar or molasses, if it is overdone, it will impair the breeding qualities of those animals.

A Member—How about beet pulp?

Mr. Martiny—I have never fed any. Mr. Comings can answer that question.

Mr. Comings—The chemists say it has little feeding value, yet my experience is that it increases the milk flow from cows very materially.

Supt. McKerrow—I hold in my hand a bulletin which I just received from Cornell University, stating that beet pulp is only ten per cent dry matter and ninety per cent water, and the ratio is 1 to 12, so it is not like molasses, it is not a balanced ration, it is wide. We have been thinking it is pretty narrow, but it is given here as 1 to 12, so it should be fed with some narrower feeds, like cotton seed meal or alfalfa.

Mr. Comings—Our cows would eat one hundred pounds, perhaps some of them more than that, of beet pulp a day. It is largely a watery feed, but we got very good results substituting

the beet pulp in place of very good corn silage, of which we usually fed from thirty-five to forty pounds. The dry matter would be about the same.

Supt. McKerrow—How much would it cost?

Mr. Comings—I do not know the original sale price. I got it through my neighbors, who had furnished beets to the factory; I think I paid my neighbor three dollars per car load.

Mr. Martiny—I think the price this year was about a dollar and a half per ton.

Supt. McKerrow—That would put silage at three dollars a ton.

Mr. Martiny—Of course it is only practical to feed beet pulp a short time during the winter.

Mr. Comings—I substituted two or three carloads of beet pulp for the sake of saving my silage for summer feeding.

Mr. Convey—Don't you think it would be a very valuable feed in addition to the dry feed if you didn't have silage?

Mr. Martiny—I think that is its great value, that it aids in the digestion and helps you to get more good out of the dry feeds that are fed.

Dr. Porter—The beet molasses seems to be a laxative feed like the beet tops. I fed about thirty loads of beet tops last fall; I fed them until the first week in January, but I found I had to feed them immediately after milking, and in very small quantities, not more than a hatful or a little more because they seemed to make the milk bitter, and my customers complained of bitter milk, but they caused quite an increase in the amount of milk and I thought they made a very good feed.

Mr. Martiny—We have noticed no bad effects from feeding the molasses at all, so far as the flavor of the milk is concerned. It is quite a laxative feed, you have to be very careful in feeding it, and the same applies to the use of beet pulp.

A Member—How do you store beet pulp, providing you buy two or three carloads at a time?

Mr. Comings—I could not answer that personally. I have neighbors who lay it in and keep it through the winter. I put it on top of the silo.

A Member—It is on the market now in dry form. How would that be in place of silage?

Mr. Martiny—When it is in dry form, it would not take the place of silage at all; it is used then more as a concentrate feed.

Chairman Stiles—It does not take the place of silage.

Supt. McKerrow—It comes nearer taking the place of corn meal, because it is a carbohydrate feed. Beet tops have been spoken of here. The tops, like your molasses, are nearly a balanced ration, while the pulp is a wide ration.

Dr. Porter—Some of my neighbors have had cattle made sick by pitching beet tops to them in too great quantities. There is some property about them that you have to look out for. When I buy these beet tops, I pile them in heaps about two feet wide at the top and two feet high, and I keep them two months that way without their injuring much. If they heat, they burn black and they are no good in a very short time.

Supt. McKerrow—In Colorado, they place stress on the value of beet tops, but they leave them right out in the field and let the cattle eat them there. They say it will not do to pile them up.

Chairman Stiles—Mr. Martiny, don't you think that for the average farmer, living a considerable distance from a sugar beet factory, that it will be cheaper for him to buy feed of other kinds and do his own mixing and do without the molasses?

Mr. Martiny—I do not recommend molasses to take the place of any other feed at all, but just to feed that

as a supplement. My cows, since we began feeding molasses, have commenced to shed their hair. They like it very much. When we come with our pail of molasses, the cattle will try to get at it like calves after a pail of milk.

A Member—Did you ever feed any of the International Sugar Feed?

Mr. Martiny—No, I never have, but I suppose the secret of that feed is the molasses that is in it. In all these molasses feeds, it is the molasses that does good, the rest is just simply filler. If you can get the pure molasses and use that with your ordinary feed, it is much cheaper and better than to buy molasses feeds at twenty-five or thirty dollars a ton.

Mr. John Imrie—There is a man down in our neighborhood who was going to buy a carload of this molasses feed and he wanted to know if I wanted some. I told him I would try it and I asked him about what kind of mixture he used. He said three hundred and fifty pounds of oil meal, three hundred and fifty pounds of ground oats, and the balance ground rye. I asked him what he charged for this mixture and he said, "We can sell it for twenty-four dollars." I said, "How can you buy oil meal, oats and barley and sell it for twenty-four dollars a ton?" Well, he said he did. I told him I was afraid he hadn't got the proportions just right. Finally I got some of it and there didn't appear to be very much rye or oats, or very much oil meal in it.

Supt. McKerrow—Mr. W. C. Bradley of this county, got me into trouble by making a statement, something like the one Mr. Imrie makes here, in a Farmers' Institute. It seems there was a certain amount of that feed being sold in that town and the sales fell off after he made that statement and the manufacturers began to write to the University about it and those letters were referred to me. They

threatened suit against the Farmers' Institutes, against Bradley and against me if I didn't stop that kind of talk. Now, I do not know how to stop Bradley, maybe you people up in this country do, I don't. But these people finally invited me to come to the factory and see these feeds made. They had stated that the basis of those feeds was oats and corn, and they wanted to prove it to me. So I went to the factory and the friendly manager took me around to see the mill running, they separated their screenings and the wheat was being ground fine in one place, weed seeds in another, and we saw these things as we went through. Finally we came to a certain hopper with a little spout and I looked at it, and occasionally a kernel of oats would drop out of that shaker, and in another spout running into the same place occasionally a kernel of corn would drop out, and while I was looking at it I counted five grains of oats and four kernels of corn. I said, "This is were you put in your oats and your corn?" And the proprietor, who was with me, rather diffidently said, "Yes, but we are just out of oats and corn now, we are waiting for a carload." I said, "They are pretty high this winter to put into this mixture and sell it at the price you are selling." And he said, "Yes, but they are coming." That is the last I heard about suing Bradley or me. I noticed that the screenings went through fast enough.

Mr. Bradley—I went into a feed store one day and I noticed a mark on a sack of this molasses feed, giving the contents of the mixture and stating, "This sack contains oats, corn, rye, etc." Well, I put my hand down into that sack and it was pretty nearly all "etc.", that is, it was pretty nearly all screenings, and it was marked that simply to mislead the farmers; that is all there is to it. The farmer who came into that store and

bought that stuff thought he was buying oats, corn and rye, when he was really buying "etc."

Mr. Martiny—I think very often the way a good many of these feeds are manufactured, the kind that is made up of a mixture, they can buy, for instance, cotton seed meal that is damaged, very cheaply, and mix that in all right. A great many of these feeds contain damaged or inferior stuff, and when they are all ground together a good many men cannot detect that there is any spoiled stuff in them, particularly where they are mixed with some molasses.

Supt. McKerrow—They can buy oat hulls very cheaply, too.

A Member—I was raised in the southern part of England, right among the feeders there for years in finishing cattle, and they use a good deal of this molasses and all such feeds. Of course their feeding is almost all stall feeding. The hay and everything is all cut for the cattle, and the cattle are never fed a pound of hay or anything of that kind, unless there is some molasses, malt sprouts, or some digestive feed mixed with it. You take those cattle and in four months' time they will put an elegant finish on a steer or cow or heifer, a finish that we do not get in our way of feeding in double the length of time, but they never feed any of these feeds, like molasses, or anything of that kind, to young, growing, animals, unless they are going into the show ring. With growing stock, they just let them rough it, you might say, more than we do, but they never think of finishing cattle there without using some of these molasses feeds.

Mr. Martiny—With our cows and feeding this molasses, we are going right along during the winter without their dropping in their flow of milk a single pound, some are even gaining since they came in last fall, and they are a good deal sleeker than

they are in the summer. I never had them quite as healthy and sleek looking as since I fed this molasses the past two years. Of course, we only feed about three-quarters to a pound per day per animal.

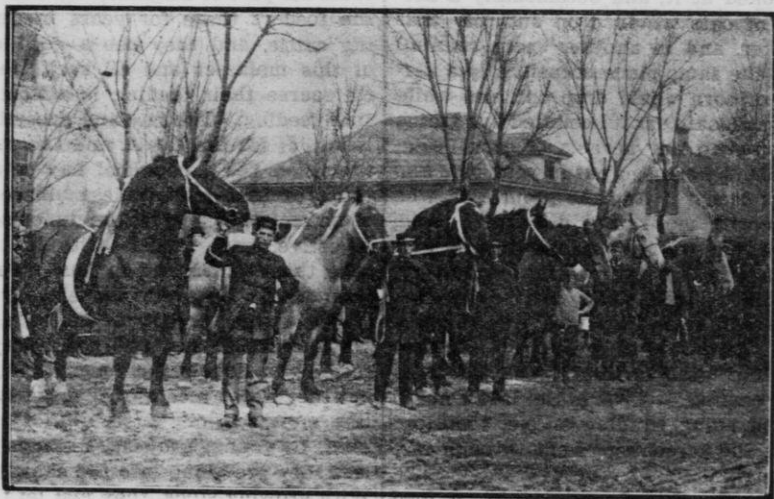
A Member—They feed it over there the same way that you are doing. It is put in a sprinkler, mixed with water, and sprinkled over the hay and rough feed.

### SILAGE FOR SHEEP AND HORSES.

W. A. McKerrow, Pewaukee, Wis.

The topic of silage has been one of long experiment and comment. Some years ago it was a common thing to hear people say that corn silage was of little value; in fact, some would even assert that it was not equal to

has proven itself a benefit to one class of live stock, it is natural that men should reach out and seek to apply it to others. The internal mechanism of the cow is not widely different from that of a sheep or horse. A feed that



Horse Fair at Farmers' Institute at Mayville, Wis., March 7-8, 1911.

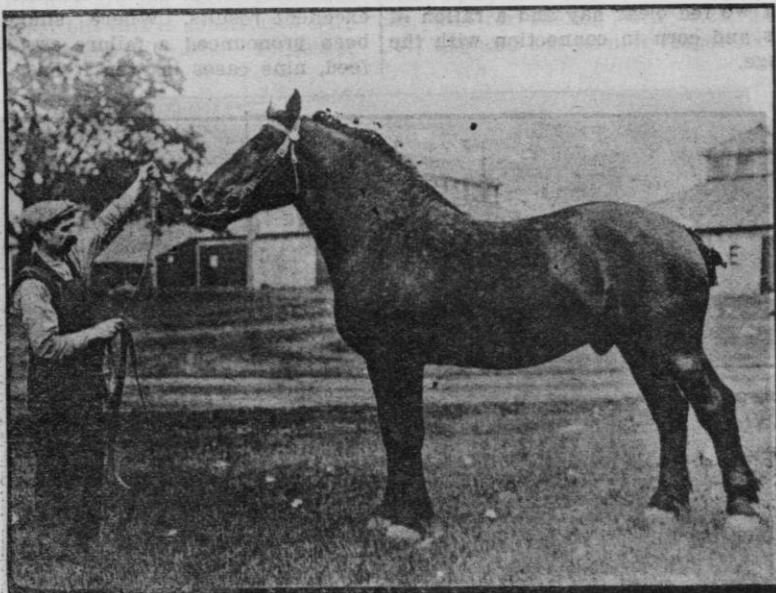
our other rough feeds. Now we find that the advent of the silo has continued, its value is fully realized by feeders in general. Dairymen understand its part as an essential in economical milk production. The majority of progressive dairymen here in Wisconsin have silos. And as silage

a cow can assimilate at a profit should be valuable as a feed for other classes of live stock.

It does not pay to maintain a silo for cattle alone if silage can be adapted to the use of our other farm animals. This has been the subject of much thought, not only to use silage

as a succulent feed, but a chief ration for sheep and horses. The results of experiments in the feeding of silage to these animals are probably not as widely known as they should be. If they were, it is my belief that farmers would derive added benefit from their silos.

I believe that the greatest fault in silage making at the present time is the putting up of too green corn, the use of corn which produces great tonnage but does not get mature enough. This causes too much acidity, which is detrimental for feeding purposes. Investigation would show that this sort



Ignace, First Prize and Champion Percheron stallion at Wisconsin State Fair, 1911, owned by J. G. Boyd, Milwaukee.

#### Some Causes of Failure With Silage.

There are always reasons why failure is pronounced on new discoveries, and we find this particularly applicable with silage. The first silos were built oblong, giving great surface but little depth. This caused moldy silage and silage which had become spoiled from contact with the air. This sort of feed proved a failure in most cases and the silo was not a success. But when the deep, air-tight silo was brought into use, the prospect became much brighter.

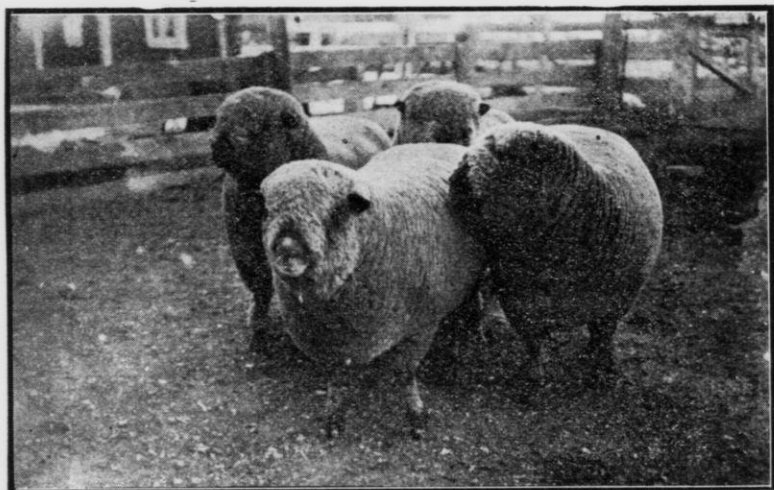
of corn has been used in nearly every instance where failure has been pronounced. I might give a brief outline of our experience with corn silage the past twelve years in feeding sheep and horses.

#### Experience.

The first year we filled the silo with whole corn, which was planted thick in the rows and harvested when just beginning to glaze. The leaves and stalks were filled with sap, being grown on rich loamy soil. Although it

gave us a very heavy yield, the results were not the best. We started feeding it cautiously to all of our sheep, but when over one and one-half pounds were fed it had a laxative tendency and in some cases the younger growing lambs would appear sickly, showing papery colored skins and an unthrifty appearance generally. I might state that we fed clear hay and a ration of oats and corn in connection with the silage.

for husking and is a fairly early maturing variety with leaves partially dried. Pregnant ewes and young stock receive two pounds per head daily and ewes suckling lambs from two and one-half to three pounds, with the best results. I believe we could profitably feed all of this well matured silage our sheep would consume with excellent results. Where silage has been pronounced a failure as sheep feed, nine cases in ten it has been



A group of Shropshire rams fed on ensilage on the McKerrow farms.

The following year a more mature crop was harvested, and as a result the apparent bad effects of the previous year were eliminated, and a two-pound ration was fed, showing good gains and thrift in the entire flock.

Since the first two seasons our corn has been run through the cutter, not because we thought it made better feed, but we could handle the crop at feeding much easier with practically no more expense.

We are now feeding sheep of all ages corn which has ripened enough

caused by filling the silo with immature corn.

#### Experiments by Experiment Stations.

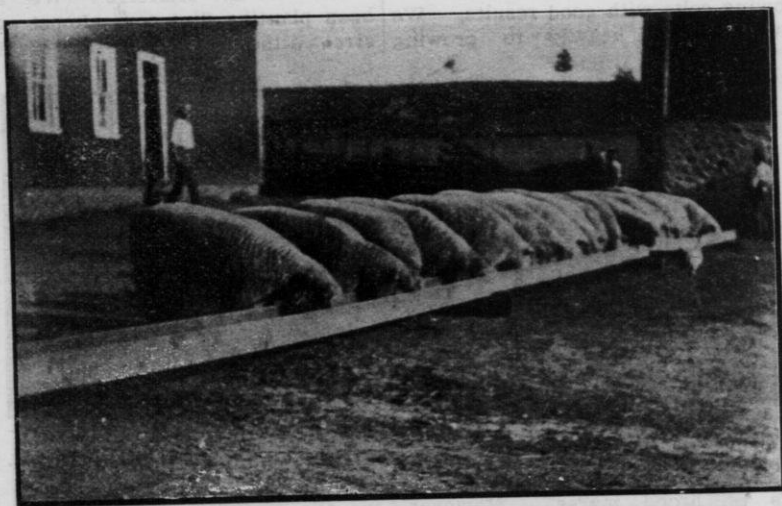
The experiment stations have been doing excellent work in carrying on experiments with the feeding of corn silage in connection with other feeds to sheep. Among the most valuable are those carried on at Illinois, Indiana, Michigan, and Iowa, in most cases demonstrating that good silage was the most economical mutton producing

feed when fed in connection with other feeds.

The Illinois station is now conducting a second experiment with corn silage for fattening lambs along the same lines as one completed two years ago, when silage was substituted for corn and clover hay, with the addition that two lots are fed entirely without clover hay, but this is substituted with other nitrogenous foods. Professor

this experiment which is very important. That is the gradual increase made in feeding; a sudden increase in feeding has been detrimental in many instances. I would like to illustrate this by using the data from that college.

A fourteen-day preliminary period, followed by four twenty-eight-day periods, was for shelled corn 0.29, 0.80, 1.07, 1.36 and 1.61 pounds respectively.



A flock of Oxfords eating ensilage.

Coffey states these lambs are as healthy and making as good growth as the others, although the experiment is not completed.

In the test two years ago at Illinois, five lots of sixteen wether lambs each were selected and silage fed in different quantities to each lot. Another lot was fed entirely on clover hay and corn. In every case the lambs having silage in their ration made greater and more economical gains than those fed on corn and clover, and in every case also the lambs fed the greatest amount of silage made the best gains.

There is one noticeable factor in

Corn silage, 0.56, 1.19, 2.03, 2.58 and 2.62 pounds. Clover hay, 1.33, 1.04, 0.80, 0.63 and 0.38 pounds.

The gains were greatest where the most corn silage was fed.

Similar work has been carried on at Michigan, Ohio and Indiana.

These efforts are particularly valuable, because they have been long periods, demonstrating fully that there are no ill effects on the system of the lamb and mature sheep, which we find claimed many times by people who are not feeding silage mature.

The Indiana station, LaFayette, Ind., recently stated that silage was an ex-



cellent feed for sheep being fattened for slaughter, also for pregnant ewes and ewes after lambing. This statement corroborates the experience of many a practical sheep breeder.

Our experience in feeding silage to horses has been similar to that with sheep. The poor results from feeding sour, immature silage was apparent. Since the first year or two we have been feeding a liberal quantity to our work horses, brood mares and growing colts with good results. We have never fed heavily to growing

Our conclusion is that silage is one of the most economical and successful feeds for sheep and horses, when it is made from well matured and properly siloed corn, and may be fed in almost unlimited quantities.

#### DISCUSSION.

Mr. Nordman—What variety of corn do you plant for the silo?

Mr. W. A. McKerrow—We have been planting flint corn almost exclusively, although two years ago we filled



Group of Oxford rams that eat ensilage on the McKerrow farms.

colts or brood mares. However, some of our most progressive farmers have been feeding as high as thirty pounds per day to mares suckling colts, and others have fed silage and oats as an entire ration.

#### Moldy Silage Dangerous.

It has been fully proven that moldy silage is dangerous. Pearson, of Pennsylvania, in investigating an outbreak where five horses had died, found moldy silage had been fed, causing the deaths. Wing also reports the death of eight horses feeding on moldy silage. We see that, in view of such troubles, silage should be fed to horses only where sound intelligence is used.

our silo partially with some of the dent varieties, but it is more difficult to get dent varieties fully matured in all seasons.

Mr. Nordman—Don't you think the flint corn makes a richer silage than dent?

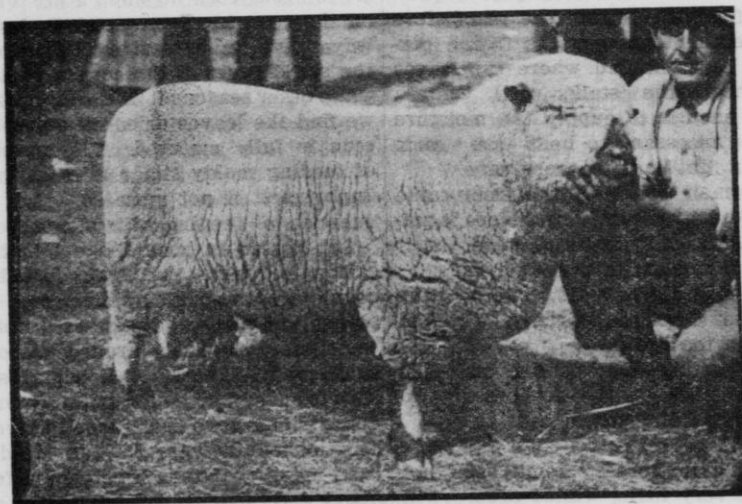
Mr. W. A. McKerrow—That has been proven by experiments carried on in the east. It makes a richer silage, it is higher in protein.

Mr. Nordman—Mr. Delwiche has figured out from Henry's "Feeds and Feeding" that the ratio of protein and carbohydrates in ordinary flint corn is 1 to 11, while that of dent corn is 1 to 15. That accounts for a good deal that we have not been able to figure out heretofore. The leaves and stalks are finer for one thing; then here is

another thing; the farther north you go, the larger percentage of protein is found in almost any kind of corn, and that is of a good deal of importance, because it shows you although you cannot grow the quantity in the northern part of the state that you can farther south, you make it up in quality.

Chairman Stiles—Let us confine ourselves to the subject of feeding silage to sheep and horses.

Mr. W. A. McKerrow—Yes, as a succulent feed I would say it was fully as good. Of course it was not as rich as corn feed, but the results were excellent from feeding pea silage as a succulent feed. We ran ours through the cutter as it came right out of the viner, and turned it into the silo. Of course the only benefit in cutting it would be that it is more easily handled, and is packed into the silo a little more easily.



Champion Shropshire ram at Wisconsin State Fair and Kansas City Royal, 1911, owned by Geo. McKerrow & Sons, Pewaukee, Wis

Mr. Nordman—We raise sheep and horses in the northern part of the state.

A Member—In your case, your corn becomes frosted before it gets into the silo. Wouldn't it be well to let it dry a little?

Mr. W. A. McKerrow—Yes, that is a good idea. It won't come out as sour as if you put it in real green.

Mr. Bradley—I think you put up pea silage a year ago. Did you find that as good as corn silage?

Mr. Bradley—Did you raise the peas for silage?

Mr. W. A. McKerrow—We raised the peas for the canning factory and siloed the vines.

A Member—Is silage affected any if the corn is nipped by frost?

Mr. W. A. McKerrow—If the corn is matured, no. Of course, if the corn is not matured, it makes some difference, but it is not detrimental particularly to the silage.

Mr. Imrie—You would rather have it

put in as soon after that frost as possible?

Mr. W. A. McKerrow—Yes, before the leaves have become dry.

Mr. Nordman—We have at different times put silage into the silo after a frost struck it, and we never could notice any difference in it whatever; that is, we have put into the same silo some before it was frosted and then the same lot after it was frosted, but the quality of the silage in both cases was just the same. It is just a question of getting it into the silo before the weather damages the frozen portion. You will find where the leaves are frozen the stalks still contain juices enough to supply the moisture that is necessary to heat the corn. That is flint corn in every case.

Chairman Stiles—If the frost came along and struck the corn before it matured, it would not be as good as if the corn had not fully developed?

Supt. McKerrow—It would have been just the same as though you had put it in too green.

Mr. Martiny—Do you find any difficulty in feeding silage to horses as to the amount they would eat?

Mr. W. A. McKerrow—We find a big difference in horses; some will not eat but very little, while others will eat a great deal. Of course you have to watch, as with some horses it has a very laxative effect.

Mr. Nordman—I think that depends a good deal upon whether the silage is as mature and as well put up as it should be. In our case this year, we were a little short on hay and I bought a couple of tons, that they wouldn't eat, by the way, so that in the meantime our horses have been just getting silage and oats and they have never looked better in their lives.

Mr. Convey—In regard to this matter of mature silage, we want to take into consideration that many people are building silos and many more have been operating them a long time,

and I think the most experienced of them will agree that you must not let it get too mature. If it is immature, it will develop an excessive amount of heat, will become discolored, and in that case you will not have good silage, so I would suggest that you let your corn get sufficiently mature and that you get it in as fast as you can, and if necessary add extra moisture.

Mr. W. A. McKerrow—That is my opinion. Of course the moisture that is in the corn depends a great deal on the season. Some seasons we always have an excessive moisture in the stalks, even if the corn is mature, while other seasons it is the other way, we find the leaves dried off before the corn is fully matured. The question of feeding moldy silage is of as great importance, if not more so, than the question of feeding sour silage.

Dr. Porter—A month ago I had occasion to realize that fact. I had a couple of cows which commenced to scour, had severe diarrhoea, and I commenced to hunt around for the cause of it. Years ago I had lost a cow from eating moldy oats. I could not attribute it to that cause this year, so I looked farther. I was feeding from my silo, sixteen by eighteen feet, about forty-five bushels a day, and when I came to examine carefully. I found mold spots here and there. Then more cows commenced scouring, one or two at a time, and finally a valuable young Jersey had severe diarrhoea, and the same day it developed into dysentery, and the next day she was dead. Now, I am sure this all came from feeding those patches of moldy silage in the center of the mass, not around the edges, where we generally look for mold. I pitched that silage myself, and I am always careful to scatter it very carefully. After I had thrown out all those little moldy places, I had no further trouble, but in the meantime I had lost that cow. I believe there are a lot of farmers that

are taking great risks in feeding moldy silage. A neighbor told me of a farmer in another county that had lost seven horses worth a thousand dollars from feeding moldy silage.

Mr. Convey—How do you account for the silage becoming moldy in the center of the mass?

Dr. Porter—I think the trouble was I was not feeding sufficient silage to keep the top fed off. We simply cut off less depth, feeding off about six inches a day; also I think that the man in the pit had not spread the corn as carefully as might have been done.

Chairman Stiles—Don't you think, Mr. McKerrow, that it is more dangerous to feed sheep and horses exclusively on silage than it would be either dairy or beef cattle?

Mr. W. A. McKerrow—That seems to be not only our experience but that of others, and also the experience of the experiment stations that have carried on this work, namely, that there is more danger in feeding exclusively to sheep and to horses than to cattle, or in feeding poor silage.

Mr. Jacobs—Along this line of feeding moldy silage, I would like to state my experience several years ago in feeding horses upon some of the top of the silage that was moldy and had been thrown out. It was where the horses could get at it and they seemed to have a craving for it. I was away from home at the time and when I got home I found two already dead and five or six very sick, caused by allowing them to run in this lot where this stuff had been thrown out. I think farmers should be very careful to protect their animals from that kind of silage.

Mr. Imrie—Except pigs. I want to know how much silage Mr. Nordman fed when that was the only roughage?

Mr. Nordman—All they would eat: I should judge about thirty pounds per day in two feeds. The boy goes down with a bushel basketful and gives it to two horses, and he does that twice a day. They have marsh hay there that they pick at, but they eat very little of it.

## FEEDS OF QUALITY.

Supt. George McKerrow, Madison, Wis.

You seem to have discussed the quality of silage pretty thoroughly and thereby have stolen that much of my thunder. However, there is plenty of room left.

The quality of our food stuffs is one of the things that we have considered altogether too little. The good feeder has considered that matter in this way: when he has been feeding roughage of very poor quality, he has said to himself, what can we feed to balance up this poor quality of roughage. If the roughage has been straw, timothy and corn fodder,

he not only has thought of balancing the carbohydrates in those feed stuffs, but he has thought of feeding a concentrate of least coarseness, as a rule, and you will find this man, if he is a good feeder, feeding such feeds as oil meal, gluten and cottonseed meal, containing a highly concentrated and digestible amount of protein, and therefore balancing the whole ration. But too many of our farmers and feeders have not given this question of bringing the whole ration into balance, both as relates to the protein and carbohydrates and the amount of bulk,

as careful thought as it should have, and it is along this line that I propose to talk very briefly this morning.

#### A Standard for Feeding.

Professor Wolf, a German experimenter, made up a standard first, a balanced ration he said, should contain one part digestible protein to 5.4 of the carbohydrates, that an animal might have sufficient protein to build

Then he also figured out a standard for a thousand-pound animal in the bulk that was to be given, and he said that a thousand-pound dairy cow, which is the average dairy cow, should have as the amount for her large stomach and her large work, about twenty-four pounds of dry matter, and of this dry matter about two and a half pounds should be this digestible protein, about thirteen and a half



Champion Shorthorn bull and cow at Wisconsin State Fair, 1911, owned by F. W. Harding, Waukesha, Wis.

up the working machinery, the muscles, the tendons, the animal matter in the bones, the nerve centers, the brain, spinal cord, nerve tissues, the outside covering, the skin, the hoof, the hair and horns of the animal; the dairy cow to put the protein and the casein into her milk.

But, on the other hand, as most of the food elements were used up in the making of the heat and the energy of the animal, they should have the carbohydrates which do that work, in that larger proportion, five and a half times as much.

pounds should be carbohydrates, including the fat after it had been multiplied by two and a quarter, making a total of about 15.9 pounds. The balance of the twenty-four pounds would be crude fiber that was not digestible, but needed there to supply the bulk for the proper distension of the stomach.

In Wisconsin about fifteen years ago, Professor Woll, of our Experiment Station, sent out a list of questions to one hundred of the best dairymen in the state at that time, so far as we knew—I don't suppose he got all the

best ones, I helped him to make up that list. When the returns came back and were polished up, he found that these men were not exactly feeding according to the German standard set up by Dr. Wolf, they had widened it a little, which made it cheaper, but they were not very far from it either. Instead of twenty-four pounds of dry matter, they were feeding twenty-four and a half pounds, only a trifle more. Instead of two and a half pounds of protein, they were feeding 2.2, a trifle less. Instead of the 13.4 pounds of carbohydrates, they were feeding 14.9, a little more, and a total digestible dry matter feed of 17.1, a little more than the German standard, making a ration of 1 of protein to 6.8 of the carbohydrates, a wider ration than the German standard.

This little book I hold in my hand is the latest bulletin from the Cornell University in the state of New York bearing upon feeding tables and computing rations for animals. I do not wish to throw any reflection upon the state of New York and the work of Cornell university, because the work of Cornell University stands up well beside the work in any part of the world, but I am sorry to see that in this little book there is no analysis of corn ensilage—though there is an analysis of pea ensilage—and no corn ensilage figured into any of the rations outlined here, and therefore, without any criticism, I want to say that the state of Wisconsin scores one over New York again because in Wisconsin we consider ensilage today as the basis of the best rations.

Now, to get back to the question of quality in feed stuffs. This present winter the man who has had to buy feed has been paying very high prices for feed stuffs of quality. For instance, oil meal, one of the feed stuffs of the very best quality, not only in the amount of protein it contains, but in the hygienic, healthful effect it has

upon the digestive tract of the animal, indeed upon the whole system of the animal, oil meal has been from thirty-five to forty dollars a ton. Bran, another feed of quality, is twenty-four dollars a ton; gluten feed, twenty-four dollars a ton, and all other feeds of quality have been selling at very high prices.

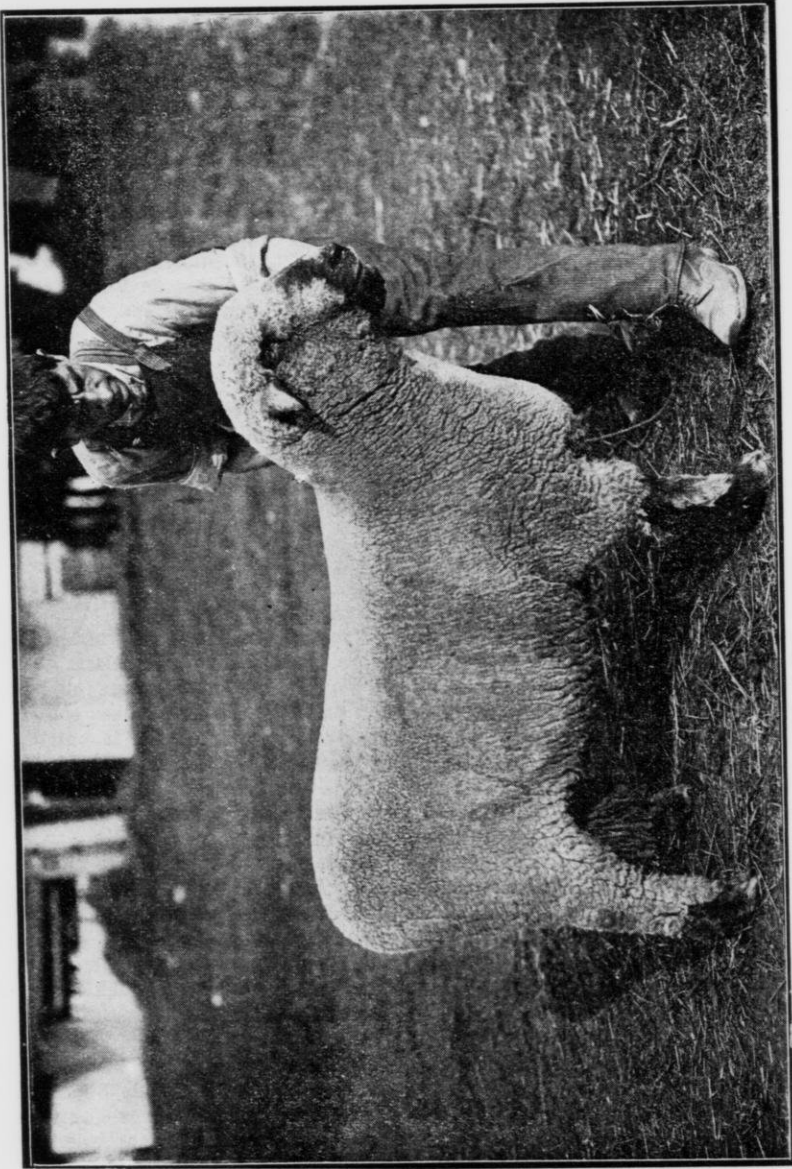
Now, I believe that the main question for the Wisconsin farmer to study is to produce the bulk of the feed that he needs on his own farm and to produce it of such quality that he can come the nearest to balancing up the ration in its food elements and also in its bulk, so that I wish to include in the term quality the two things, a balanced ration as between protein and carbohydrates, and a balanced ration in bulk.

#### Ensilage a Feed of Quality.

Right here I am going to say—I am not a prophet—but I predict that in twenty years no man will stand up in a Farmers' Institute anywhere in the state of Wisconsin and claim that he is a good dairyman unless he has a silo on his farm, and unless that is a good silo and unless he is putting into that silo good, mature corn. Ensilage is going to be, and with many of our best farmers today is the basis of good feeding.

Now, as to the quality of that ensilage, that has been pretty well discussed in the preceding discussion, and yet I am going to say a word or two on that subject, though what I have to say will bear much along the lines of the discussion already had here.

By Professor Henry's book, "Feeds and Feeding," which has been mentioned here, and by other analyses of corn, I have learned what was an impression with me for forty years, that the finer quality of corn, we will say flint corn as compared with dent, and the finer varieties of dent as compared



Champion Hampshire ram Iowa State Fair, 1910, owned by W. F. Renk, Sun Prairie, Wis.

with the coarser varieties of dent, the dent corns that we find adapted to Wisconsin conditions as compared with the dent corns found in Illinois, Kansas and Nebraska,—in such comparisons we find these corns richer in protein here in the north, as we find them finer in their growth and development. You all know that the tendency of this dent corn, when brought from the south to the north, is to become flinty, and some of our people object to that, particularly the people who come from corn districts south of us. I have said, and I want to say again, that, in my opinion, that tendency to flintiness is not a fault, but a benefit. As those corns become more flinty, they become more leafy, and the leaf is the protein part of the plant, and the grain at the same time shows a higher percentage of protein, not so great a difference in the grain as in the leaf and the stalk as a rule, and yet there is a difference in the grain.

Now, if we put into our silos, the big, coarse, southern corn that we used to, the B. and W., that some of our people called "Big and Watery," we are putting in a lack of quality; we are putting in too much water in the first place in proportion to the dry matter, and in the second place, we are putting in too much of the carbohydrates in proportion to the protein. We get not only a sour ensilage from that watery corn, but we get a poor quality in the proportions of the feeding elements, so that the thinking farmers of Wisconsin have stopped raising that big, coarse corn and have gone down to finer qualities of dent, such as we advocate in Wisconsin and some of them even to the flint, and I am here to say that the finer quality of corn will carry along the line of leafiness and flintiness and less bulk of stalk and better ensilage when you get it into your silo. It has the advantage of maturity; if the frost does catch

this small, finer type of corn, it is nearer maturity than the other type would be and is in better shape for ensilage, there will be less water in the silage than in the big corn.

The only argument ever offered for the big, coarse corn was the amount of tonnage per acre, but if that tonnage is largely water and woody fiber, it doesn't amount to anything, and especially when that water turns to acid; in that case it amounts to something that is absolutely detrimental and there is a lack of quality. So much for ensilage.

#### The Merits of Alfalfa.

Then I believe, in growing the other crops on our farm, we are going to pay attention to quality.

Alfalfa is being grown all over this state. We are going to have an alfalfa discussion a little later, but I am here to say that I believe in the future, in connection with the silo, the next important forage crop that our farmers are going to grow to get quality in their feed and results from their feeding, will be alfalfa. We have one farmer of whom I know in this state with one hundred and forty-five acres down in the great Swiss cheese producing county of Green, and we have many farmers in other places who are growing from ten to fifty acres of alfalfa in this state, and what one Wisconsin farmer can do, others can do, if they go at it in the right way. It is not every acre of Wisconsin soil that will produce alfalfa; you cannot produce it on swamp lands, but you can produce it on good lands that will produce corn, wheat, oats and barley throughout the state; it is only a question of going at it right, and we will try to solve that question before we get through with this meeting.

Alfalfa is rich in protein and alfalfa is a feed of quality. It has been actually proven in experiments that alfalfa



will produce as much milk and as much growth as bran, ton for ton, and bran is certainly one of the feeds of quality. The alfalfa leaf is exceptionally rich in protein.

Now, if we put the right kind of corn into the silo, having as much quality as possible in that corn, and have alfalfa to feed with it as a dry feed, we come pretty near having a balanced ration if fed in the right proportions, because alfalfa is narrow, and we have pretty near the right amount of bulk. We have reduced the bulk of the ensilage from the course corn to the fine; we have reduced the bulk as compared with clover, which is a very good feed, in our alfalfa. Then we do not need the concentrates, which cost us such large prices, the same as we need them if we are feeding straw, coarse, immature ensilage, timothy hay and feeds of that kind. In that case we must have fine concentrates to balance, but alfalfa will balance that high quality of corn ensilage. Even good clover, if you haven't got to growing alfalfa, good, fine clover, cured at the right stage, is very rich in protein also, and if grown fine in quality—which means that you should mix the finer clovers with the coarser, the alsike with the medium red, sowing a large amount of seed and getting it thick on the ground—that will give you a finer quality of hay, and if you cut and cure it right, it will nearly take the place of alfalfa. Then, with the addition of a very small amount of the concentrates, such as bran, oil meal, cotton seed meal, etc., you can have your feed of extra quality.

That is all I am going to say, unless you make me say more.

#### DISCUSSION.

A Member—What variety of flint corn would you recommend for this section of Wisconsin?

Supt. McKerrow—There are several

good varieties of flint corn, but we have not been paying so much attention to them of late years in Wisconsin as we have to the dent corns. The King Philip, for the north, if you can get the seed, the white flint corn, early yellow flint corn, the Longfellow, if you are growing it on some of the sandy loam soils, but it is not quite so early a maturer as some others; the Michigan Smut Nose, or what the Experiment Station calls "Wisconsin No. 15"; any of those should mature up here.

Mr. Jacobs—Don't you think in picking out our corn for the far north country, where Nature is inclined to flintiness, that we should follow the line of least resistance? In other words, grow dent corn where it is adapted and flint where it is adapted?

Supt. McKerrow—Yes, adapt the corn you grow to the place where you grow it, but do not be misled with old notions, old theories; get the Experiment Station to work to compare and test these things. They have made some tests through the extreme north. I have been prejudiced in favor of dent corn, we will say in the corn-growing districts of the state, and yet I had a little of that conceit taken out of me by the New England Corn Show. Those old Yankees gave us fellows in the west a little lesson. We have been putting up our prizes here for the best ten ears. Down at that show they said they would not put up their best prizes for the best show for one or ten ears, but they put up the biggest prizes for the best feeding value to be gotten out of a whole acre. They sent their men out to measure the acres and to husk the corn, and they offered five hundred dollar prizes. They found an acre of dent corn down in Rhode Island that at husking time showed 133 bushels of shelled corn to the acre; they found an acre of flint corn up in Massachusetts that showed a yield of 127 bushels of shelled corn to the acre.

"Pretty good for New England, where the soil is all worn out," we are in the habit of saying. But they didn't make an award on that even; they said "Hold on, there may be a difference in the amount of water carried in these different kinds of corn; you must reduce these bushels down to twelve per cent moisture, figure the dry matter ready to grind into meal to make Johnny cake of, and then we will get nearer to its value." So they went to work and reduced it to the twelve per cent moisture basis. Then the acre of dent corn that showed 133 bushels husked, went down to 83 bushels to the acre, the flint corn that showed 127 bushels at the husking only went down to 103 bushels, because it had less moisture when it was husked. That is one of the points I tried to make, that it has less moisture in it than the other kind. So the dent corn which was way up at husking time, when they reduced it to its intrinsic value, they found it was beaten about twenty bushels to the acre. But they didn't stop there. They put their chemists to work on these two acres they were comparing and asked them to find out how much feeding value there was in those two acres, and they got their analysis. In milk, the acre of flint corn represented over 13,000 pounds of milk, while the acre of dent corn only represented 11,000 pounds of milk. In beef, the acre of flint corn beat the acre of dent corn 871 pounds. It is this kind of propositions that we farmers want to get at. It is not the big ear of corn that means the most feeding value, it is not the acre that looks big in our baskets when we husk it that means the most feeding value, so to get down to the quality side of the question, we must not be too sure that we are going to get the most value, even in the districts adapted to grow dent corn, always, but on general principles I would say, grow dent corn where it does the best and grow

flint corn where it does the best, but the tendency of Wisconsin soils and climate as a rule is to make dent corn over into flint, and while we may improve on some of these things as they develop, yet we ought to watch the laws of Nature and not work counter to them.

Mr. Jacobs—Now, take this experiment in New England: that is a flint corn country, and while it has done its best there, we want to be careful not to try to grow flint corn in a dent corn country, or vice versa, except as a matter of experiment.

Supt. McKerrow—Yes, we should experiment and find out for ourselves.

Mr. Delwiche—Four or five weeks ago I spent three weeks at Columbus, Ohio, and I had the pleasure of meeting experiment station men from all parts of the country, some New England men, a man from Ohio, and I will tell you what the Ohio Experiment Station men said. They said: "In the early days of the corn studying question, we were doing certain things"—they were recommending a rather small variety of corn, a corn that is not much larger than our Wisconsin No. 7, it is a dent corn, rather a shallow dent corn. They say that deep dent corn does not yield as much per acre as the shallower kind, and they say that at the present time the Ohio corn does not test more than thirty per cent germination, that is, the seed, and I also heard corn men say that their corn carries more than thirty per cent of moisture. The trend of opinion today between those men who came from different sections of the country, from Nebraska and Illinois and Ohio and Indiana, still sticks to the very large corn; but all the other states are working toward the idea of getting the farmers to grow corn every year—not an exceptional year—corn that does not carry in it too much moisture. I wish to state that I saw some corn that was taken

from Rhode Island, some flint corn. You can grow corn everywhere if you will grow the corn that will mature. They got the corn the ears of which weighed less than four-tenths of a pound, but they got immense yields to the acre, so it is not so much the size of the ear which you grow as it is the number of stalks you grow and the number of ears you mature.

Mr. Nordman—Nothing has been said in the discussion so far as to the influence that land has on the quality of the feed produced in corn, and I think that is very important. The balance of you people may not agree with me, but I maintain that if I can grow fourteen or fifteen tons of silage from flint corn on an acre of land, that I have got silage of a good deal better quality than if I only grow six or seven

tons on that acre of land; I think I have proved it on our own place. In our case we can take silage from corn grown that way, heavy crops, because the land is fertile, and by feeding a little oat straw with that silage for dry feed, giving them all the silage they will eat, they will do just as well as they will on good pasture grass.

A Member—Is there any difference in the feeding value between the yellow and the white varieties of dent corn?

Supt. McKerrow—No, sir, an analysis doesn't show any difference between the value in the yellow and white varieties. Some of us would rather eat yellow butter than white, but I think one will make just as much fat and heat in our bodies as the other.

### C.-OPERATIVE EXPERIMENTAL WORK IN NORTHERN WISCONSIN.

E. J. Delwiche, Ashland, Wis.



Mr. Delwiche.

The value of any experimental or research work in agriculture is almost in direct proportion to the interest the farmers as a whole take in such work. It avails little to carry on research on feeding problems, to breed up new varieties and strains of grains and forage crops, or determine the fertilizer requirements of different soils, if such investigations, researches or discoveries are not brought directly to the attention of the farmer. It is true that the results of experimental work are published in bulletin form, which bulletins are distributed to such persons as are on the mailing list or apply for them. Much valuable information is disseminated in this way, but the most effective lessons are such as can be demonstrated visually, by means of co-operative experiments with farmers themselves.

Again, then are many classes of agricultural experimental work which can be best worked out through well

planned experiments carried on with farmers who are vitally interested in the results sought for. A good deal of work done by the experiment stations in the past has been relatively small in value to practical agriculture because no attempt was made to co-relate the results obtained with actual farming operations. In the acclimatization of grains and forage crops in a state like Wisconsin, where such vari-

every year. The plan followed is to furnish enough seed to plant one acre to such farmers as agree to comply with conditions as follows: The grain sent is to be grown for seed and if possible compared as to yield and other qualities with other varieties grown on the farms and a report is sent to the Sub-station office on a blank form furnished to the co-operator. In this manner valuable



**Mangels on E. Nordman's farm, October 10, 1910. Yielded 32 tons per acre for tops and roots.**

ations of climate and soil conditions are found, it is evident that a good deal must be done through co-operation with farmers in typical localities.

Considerable work in the dissemination of grain and forage crops for northern Wisconsin has been done through co-operation between farmers and the Northern Sub-stations. About four hundred farmers have carried on tests with corn and other grains and have reported the results obtained. Much valuable information has been obtained in this way—such work furnishes a basis for further improvement

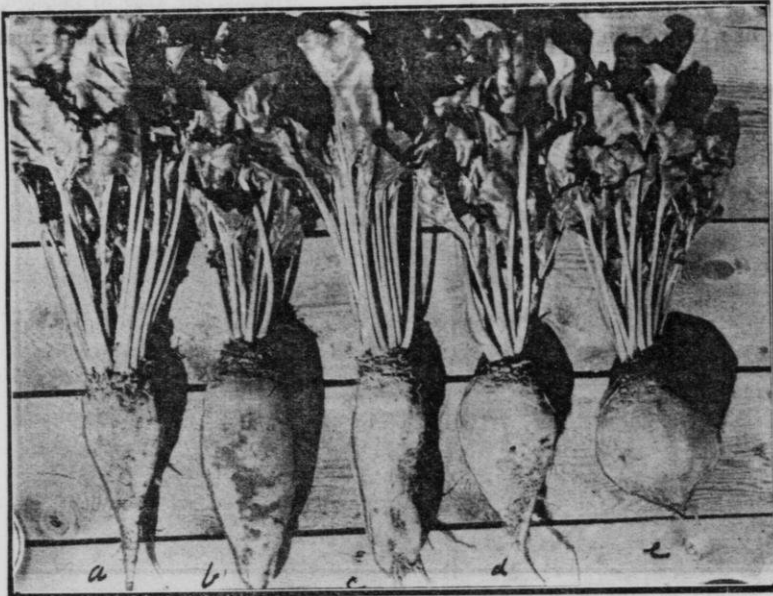
varieties and strains of barley, oats and corn, wheat and potatoes have been tested under varying conditions of soil and climate and disseminated. A limited number of fertilizer tests were also begun by the writer, and this work is now being extended by the extension service of the soils department.

Experiments in the growing of alfalfa, soy beans, field peas and other crops have been carried on, and other experiments are now planned for the coming season. Some variety tests with corn have been made in the

past, and a number have been arranged for next year. An experiment with root crops was begun during the past season with Mr. Nordman, in Langlade county, with excellent results to all parties concerned in the experiment.

It is believed that if funds were

In Ohio valuable corn breeding work has been done in the past few years through co-operative work between the experiment station and farmers' associations at different points in the state. Not only has the work helped to interest farmers in corn breeding, but it has helped in other lines as



Roots grown on farm of E. Nordman, Polar, Wis. a. Sugar beet. b. Grant Feed Sugar Mangel. c. Mammoth Long Red Mangel. d. Golden Tankard Mangel. e. Yellow Globe Mangel.

available, this work should be greatly extended and a great deal of valuable data could be gotten in co-operation with farmers in this manner. The co-operator of necessity has to provide a considerable share of the expense involved, in the shape of labor, under present conditions, but undoubtedly scientific work adapted to solving practical problems will repay him well for such an outlay. The entire neighborhood profits from such experimental work.

well. Other states are doing work of this nature. In the southern half of our state, the Experimental association has been a great help in disseminating pure bred seeds.

A co-operative experimental association in every county, working with, and receiving advice from, the experiment station, would be of great benefit in developing the agricultural resources of northern Wisconsin. Such an association might take up several lines of experimental work. Already

a nucleus for a body of this character exists in practically every northern county. Work in the improvement of farm crops, such as corn, oats, peas, potatoes, and other crops, could well be undertaken. Also the best methods of growing and handling grain and forage crops of recent introduction could be studied with profit.

Other problems, such as the testing out of the relative nutritive value of different feeds, experiments in road building, land clearing, fertilizer tests, are among the large number that could well be tried; in fact, there would be no trouble in finding field for action. The only trouble would be to make wise selections of the problems at hand.

We believe that co-operative experimental work carried on between farmers and the experiment station could not fail to be of great value to the agriculture of any state. And in the case of a comparatively newly developed section like northern Wisconsin is this particularly true. I am sincerely in sympathy with any movement that will tend to establish closer relationship between these forces. Already a good beginning has been made. Let us hope more and better co-operation between the practical farmer and the scientific experimenter be established in the near future.

#### DISCUSSION.

Mr. Nordman—Mr. Delwiche mentioned an experiment that I carried on in co-operation with his work, and I will tell you about it briefly. It occurred to me sometime ago that it would be a fine thing to have root crops to feed out in the fall of the year after the pastures began to fall and before the silos should be opened. If you open the silo too early in the fall, there is more or less of it that is sure to spoil, because the cattle do not eat

it off as rapidly at that time as they do later in the season, and a certain amount has to be fed off to regulate it so the bulk of it may keep. Mr. Delwiche sent me seed that he thought was adapted to our part of the state and I planted three-eighths of an acre of different kinds of roots. Of that three-eighths of an acre, on which I raised beets, we secured twelve tons, or, to put it another way, we fed thirty cows one month all the succulent feed they needed in connection with what pasture they were able to pick up. In other words, I would have had to open my silo a month earlier than I did if it had not been for those roots, so I was well repaid for my part of the experiment.

Chairman Stiles—What variety of roots were they and what kind of soil?

Mr. Delwiche—We have been doing this work on heavy clay land at Superior and also on sandy soil. We wanted to extend this work onto loamy clay in the central part of the state. We tried the Giant Feeding Sugar beet, the Mammoth Red, the Golden Tankard, and also the Red Globe mangels, Aberdeen turnips and Monarch rutabagas, the idea being to find which of those different roots would give the largest tonnage per acre.

Chairman Stiles—Would these be mature enough to feed at that time of the season?

Mr. Nordman—They gave good results in feeding them. I want to explain that this includes the tops and all. We simply pulled them out, roots and tops, and hauled them to the barn and fed the roots at one meal and the tops at another.

Mr. Delwiche—That would mean at the rate of thirty-two tons per acre.

Mr. Convey—You have not stated yet which varieties were the most desirable.

Mr. Nordman—I do not believe that cuts very much of a figure. I think it

is the succulence in those roots that does the business. I think any of those varieties will furnish about the same results. Of course rutabagas are a little more solid than the turnips and so you would expect to get a little more feeding value out of them. But we noticed that if we fed them along with the other feed they picked up out in the field that it did not make much difference what variety we fed.

Supt. McKerrow—Which gave you the heaviest yield per acre?

Mr. Nordman—The Giant Feeding sugar beets gave the slightly largest yield per acre and next to them came the rutabagas. We had large mangels, but they did not yield quite as heavily as the rutabagas. The sugar beets grew above the ground a good deal.

Mr. Delwiche—It is not, strictly speaking, a sugar beet, but a so-called half sugar mangel.

Mr. Toole—It would make quite a considerable difference as to variety between any of your mangels and your turnips. I do not care in what way you feed turnips, you will find your place will be contaminated if you feed in the building, you will not be satisfied with feeding turnips for dairy purposes; the whole place will be affected.

Dr. Porter—I am feeding rutabagas every morning, three or four of them, and selling milk in the city, and I have no complaint.

Mr. Toole—With me, even the droppings smell badly.

Mr. Delwiche—It might be interesting to know what we get out of it from the Experiment Station's standpoint. Mr. Nordman's experience would tend to show that the half sugar mangels are the best for his locality. In our part of the state, the Mammoth Red and the Monarch rutabaga gave the best results, so you see there is a difference for different classes of soils and under varying climatic conditions.

Mr. Convey—In regard to this question of tainting the milk: For a number of years we fed roots, we fed the German sugar beet and found that one of the nicest beets, having a nice flavor and large food value in the root, but of course the yield was light compared with the stock sugar beet, so that was more desirable in feeding. There is no trouble whatever in regard to getting a bad flavor in the milk. I have tried that system for years and know what I am talking about. We have fed on top and cut up, and fed our roots with ground feed in moderate quantities, after milking, and found no trouble. As applied to turnips, I would feed a small amount of turnips. I know we have spoiled milk, and butter too, by feeding turnips in large quantities before milking, but feeding after milking and not having the roots stored right close by where our cattle are, there is no objection whatever to feeding turnips in a moderate amount.

Mr. Delwiche—That suggests right there an experiment which might be taken up by the farmers themselves, the handling and feeding of these roots.

Mr. Convey—I took up that experiment thirty years ago and I know all about it.

Dr. Porter—Over in Wales and England they feed a lot of roots and I believe that is one source of the wealth of those people. I believe we should feed more roots here to our cows, but always in small quantities. I am feeding heavily on ensilage. I throw two or three rutabagas in the morning into the mixture uncut, the cows do their own cutting.

Mr. Matteson—Isn't it true that roots, generally speaking, are not ripe to feed during the fore part of the winter? We find that so in using roots for poultry feeding.

Mr. Delwiche—May I tell you something about the Cornell Experiment

Station findings? They have done probably more work with roots than any other single station. They advocate feeding the turnips and rutabagas early in the season and the beets and mangels later in the winter. I am inclined to think that the great trouble in feeding beets and mangels early is that the roots are not fully ripened when harvested. Such roots as require a longer growing season, like the mangels and sugar beets, were planted and given good, thorough cultivation. Under such conditions I believe these roots would be in condition to feed soon after they are harvested.

Supt. McKerrow—From my own experience, dating back forty-five years, in feeding roots, I became thoroughly convinced that in feeding roots in the fall, the first that would be ready, would be the turnips, followed by rutabagas, and then the stock sugar beets, and last, toward spring, or in the spring, the larger varieties of mangel wurzels. Now, I believe the finer grown beets can be fed to greater value than the large Mammoth. Over in Great Britain they start in with the rutabagas, but a good many mangels are grown, but never fed until later in the season. You will find them feeding them in May and June the year after they are grown, and up to July. They also argue that they are not at their best early in the season, that they are like a winter apple.

A Member—Can't you raise better roots on a loamy soil?

Mr. Delwiche—A good deal depends on the treatment you give soil. We have grown roots successfully on heavy clay soil. Last year we obtained a yield of eight hundred bushels per acre of rutabagas. Of course the land had been under good cultivation in a three-year rotation for the last five years, and at the present time is quite mellow. Such soils need a large

amount of organic matter before you can get very good results.

A Member—Has anybody experimented with soy beans in this part of the country?

Mr. Delwiche—We have. It sometimes happens that clover fails to catch, thus making the supply of leguminous feed a hard problem to solve, particularly on light soils. Soy beans can be made to fill the deficiency by planting them in drills twenty-four to thirty inches apart about the middle of June. We have had five years' experience with this crop at Iron River and last year we extended the work over to Marinette county. You know how dry it was last summer. We planted a field to sugar beets and they failed. We replanted the field to soy beans and we harvested over two tons of cured hay per acre. We planted the beans in drills, about two feet apart, gave them two or three cultivations, and let them grow. There is a requirement with soy beans for best results, as also with alfalfa, and that is inoculation. You can grow soy beans on fairly rich soil without inoculation, but they will not do your soil much good. It is much better to get that soil inoculated. I think you can grow soy beans with success in a dry, hot season, when you cannot grow anything else almost, for the reason that this plant originally came from a warm, dry climate. In seasons like the last year they keep right on growing in the hottest weather.

Mr. Michels—I would like to say one word in regard to this matter of putting bad flavor in milk by feeding roots. I have produced milk for both cheese and butter making, and I am quite certain these feeds will, none of them, flavor the milk if they are fed properly. The trouble always arises where they are fed in too large quantities.

Adjourned to 1:30 p. m. same day.



## AFTERNOON SESSION

The convention met at 1:30 p. m. Mr. Nordman in the chair.

## ALFALFA GROWING

M. Michels, Peebles, Wis.

Alfalfa, the "Queen" of all clovers and all other grass plants, yields the largest, most nutritious and most palatable of hay crops. It also furnishes an excellent soiling crop, besides being the most efficient soil enricher we have.

The first alfalfa I ever saw grown came to my notice in 1893, while in the state of Nevada. It was in the trucky meadows about Reno, where at that time thousands of tons of alfalfa hay were made annually and fed to all kinds of live stock without the addition of grain or mill feeds, with the very best results.

It was while in Nevada that I noticed that alfalfa, both as a hay and soiling crop, was relished by all kinds of stock and that four heavy crops of hay were cut during that season. In this valley people were able to grow alfalfa successfully wherever they could get water for irrigating purposes, except where the waste water would overflow. In the low places they grew timothy quite successfully.

While we have grown alfalfa quite successfully for the last seventeen or eighteen years in my home county (Fond du Lac), it was not until the last seven or eight years that the growing of alfalfa was taken up as a regular crop on most farms, and this change was mostly due to the many failures in wintering red clover. While at the present time in Fond du Lac county we are growing alfalfa without much uncertainty, I can well remember the time when it was not so certain a crop. In reviewing the many re-

ported failures of the plant, I am of the belief that if we knew the true cause of the failures, that by far the largest number could be traced to poor seed.

## Seed.

Good seed is the most important factor in the growing of alfalfa. I have tested many samples of seed in the past and almost every year have found alfalfa seed upon the markets that was very low in vitality. I have often found samples of which but sixty to seventy per cent would germinate and I have found seed testing as low as forty to fifty. It is not wise to plant seed at all that falls below ninety per cent in germination, or even below ninety-five per cent. Sowing seed that has a low germination test will not only grow less plants, but those that do grow are likely to be weak, turn yellow and die before the end of the first or second year.

Next in importance to the germination test is the purity test. This is not so easily applied, as it takes considerable experience and a good magnifying glass to distinguish the impurities that are found in alfalfa seed, particularly dodder and trefoil. Dodder is a dangerous weed that lives upon and kills the alfalfa plant. Trefoil is harmless and is mostly used as an adulterant.

## Seeding.

In the past much needless mystery has been made of alfalfa growing, and

most authorities have differed as to the best method of preparing the soil and sowing the seed. However, most authorities at this time agree that it is necessary that the soil contain lime and humus, that it must be fairly well drained, and inoculated with the bacteria that form "nodules" upon the roots to draw nitrogen from the air to supply the plant.

To get a successful catch, two methods are almost universally recommended as being the best; one is to sow from eighteen to twenty pounds of alfalfa seed with one bushel of barley per acre, cutting the barley for hay; the other is to give the ground a thorough cultivation until about the middle of June and then to sow from eighteen to twenty pounds of seed per acre. I think the method of sowing the seed in connection with one bushel of barley (beardless preferred) the better, as the barley which grows very rapidly keeps the weeds in check. I also think that in the majority of cases, a better stand of alfalfa is obtained, therefore that a nurse crop of barley does the plant good and no injury. Where the alfalfa seed is grown without a nurse crop, say in April or the first of May, the weeds are very apt to choke the alfalfa, and if they do not kill the plants will at least often weaken them to such an extent that they are unable to withstand the hot dry weather later in the season.

Sowing alfalfa seed without a nurse crop between the 15th and the last of June, in some instances has been very successful. I also know of failures on account of the severe drought and hot weather which we usually have during the month of August.

Last year, on the 20th of April, I began working a field of thirty acres on which I wished to grow alfalfa, mainly for the purpose of destroying Canada thistles and wild mustard which was growing so thickly on certain parts of

this field that whole shocks were left and burned. Previous experiences had proven to me that no matter how thickly the Canada thistles were growing before sowing a field with alfalfa, practically all would disappear by this method at the end of the first year's cutting.

I worked this thirty-acre lot, which was fall plowed (which I think is the best in all cases), with the spring tooth harrow and again went over the piece of ground with a fine tooth harrow. We followed the harrow with the disc drill, set so as to sow four pecks of beardless barley and sixteen pounds of alfalfa seed to the acre. The grass seeding attachment on my disc drill is so arranged that the seed may be dropped either in front or back of the discs, or may be run down the same tubes with the barley. I always prefer dropping the seed in front of the discs. The field was then left without any further harrowing.

Although the season was so dry that most of the red clover seedings were killed, our alfalfa came up fine and we allowed the barley to ripen and cut it with the binder. Part of this field was so low that on about one and one-half acres the barley was killed by excessive moisture, but apparently the alfalfa did not suffer at all.

About September 1st, the alfalfa, thistle and other weeds had grown quite high again, so we cut the entire field with the mower, tilting the cutting bar as high as possible. This cutting we left on the field, and by the time cold weather set in the ground was well covered with alfalfa and but few weeds could be seen, and I expect a bumper hay crop from this field next year.

In conclusion I wish to say a word regarding alfalfa as a regular crop in a five-year rotation. Alfalfa being such an excellent soil builder and such a wonderful weed destroyer, but being so very hard to plow when left six or

eight years, I have come to the conclusion that hereafter I shall plow my alfalfa fields at the end of three years, for by this time all weeds are pretty well destroyed and the soil is in fit condition to grow a most luxuriant crop of corn or grain.

#### DISCUSSION.

A Member—Where can you get seed so you are sure it is free from dodder?

Mr. Michels—Up in our section of the country, we have clubbed together, put it into the hands of somebody who bought for a number of us. I used to be in the creamery business, and in most cases it has gone through my hands. One year I bought seventy eight bushels, fifty and sixty other years, and in this way, buying large quantities and getting samples from different parts of the state, and with the help of the Experiment Station, we were always able to get good seed, and in no case were we troubled with weed seeds, which you are pretty sure to be if you buy them from nearby towns. In our section we do not want anything but northern grown seed.

Mr. Bradley—How much does it cost a bushel?

Mr. Michels—I paid twelve dollars a bushel last year. At the present time you will find good alfalfa running all the way from nine to fifteen dollars a bushel, and if you buy cheap seeds they are apt to be very low in germinating quality, as well as adulterated with weed seeds. I would certainly get samples from different seed houses before buying and tell them you will want ten or twenty bushels, whatever it may be, and get samples, of course. I have been in correspondence with a number of different firms this year, and I find it pretty hard to get seed with a high germination test, even the best will only run about 85, 86 or 87 per cent. Last year we had the same trouble at first, but we waited a little

longer and got some that germinated 94 per cent.

A Member—How do you inoculate your ground?

Mr. Michels—Up in our section of the country we do not need any inoculation; that is east of Fond du Lac. We can sow it anywhere and everywhere; it is as easy a crop as we grow.

A Member—Do you find new seed preferable to old?

Mr. Michels—Why, no. We have occasionally had some left. I have some old seed now from last year and I have tested it under those circumstances and found that that which is left over will test higher the second year than the first year; in other words, it seems to improve it. Usually the fresh seed is smaller in germination.

Mr. Imrie—I noticed in an article of Joe Wing's that he said he was of the opinion that a good heavy coating of manure was more essential than inoculation.

Mr. Michels—I think there is a good deal of truth in that; I know the richer the soil, the better the crop of alfalfa.

Mr. Imrie—In talking with Mr. Baker, of New Richmond, he told me that his father-in-law, John Glover, got a ton of soil from an alfalfa field and inoculated some land before he sowed his alfalfa seed. I asked him if it showed any benefit. He said they thought it did a little; they could hardly have told the difference.

A Member—I have had a little experience with alfalfa myself. I tried it on a small scale first; I started on an acre and a half; there was a strip of about eight or ten rods that had been in potatoes and vegetables quite a few years, and then the next acre and a half had been cropped, but had been seeded to alfalfa once before, but the alfalfa had been a failure. I seeded the whole thing down to alfalfa. The piece that was not inoculated hadn't

more than a half or a third of a stand, though the ground was just as rich. I think our soil would have to be inoculated, unless it is very rich.

Mr. Michels—I think it is possible that that condition was due to the previous crop. I do not believe it is a good thing to sow alfalfa on potato land.

The Member—The first I had anything to do with alfalfa was on what had been a garden patch. I changed my garden, then I ran the alfalfa a little farther than where the garden had been, on what had been a regular field crop. We worked it all up in the spring; I began to cultivate the ground in the spring and cultivated it until the first of June, then the whole strip was worked the same way and seeded down. On this south piece, where there had not been any garden, the plants came up just about as thick, but very delicate and sickly, while the other cut five tons to the acre. The garden was rich and where the garden was there we had a fine stand. I believe that if the soil is rich enough there is no need of inoculation.

Mr. Imrie—Wouldn't it be cheaper to manure than to inoculate? I sowed three acres this year, it was at the end of the field, and I cultivated up to the fence, dragging it down in June grass. Last year was a poor year to make any kind of seed, it simply dried up. I worked it every few days to the middle of August, when our first rain came. After that there was very thick grass. I do not suppose the soil got very much benefit from that alfalfa. Where I sowed the alfalfa, the plant was a great deal better in that June grass than in the field; you could see a distinct mark on the part that was comparatively new land.

Mr. Stuble—My experience is something like that of the gentleman who spoke before. I do not think we need a great deal of inoculation to get started, but we find it does a great deal

better on a piece of ground to sow alfalfa with other seed, and I think a cheap way to inoculate our ground is to sow a little alfalfa seed in our red clover seed wherever we sow it, and in that way inoculation is slowly taking place.

A Member—What guaranty do you get that your alfalfa seed will grow?

Mr. Michels—We haven't any guaranty, except what the seedsmen tell us.

A Member—It is a well-known fact that nine-tenths of all the seed grown in the northwest is grown in California, and I do not think there is enough grown to supply this country with one-tenth of the demand.

Supt. McKerrow—I understand a good deal of it comes from Montana.

Mr. Michels—Much of the seed on the market now is Grimm's alfalfa.

Mr. Delwiche—I really believe that for our extreme northern part of the state, we must resort to inoculation if we want to get a crop the second season after seeding. Our experience has been that we did not get the stand of alfalfa, even with plenty of manure, without inoculation. Where we tried seeding on light soil, the wind settled that; we found on heavy clay soils that where we inoculated we were able to get a crop of alfalfa the first season. We got a ton of home-cured alfalfa hay the first season we sowed. We sowed the latter part of May and cut the alfalfa the latter part of August, but we inoculated, and I think it pays to do so.

A Member—I sowed alfalfa on an eighty-acre field. It was a partial failure and I plowed it up and planted corn. The next year I seeded it down, inoculated a sixteen-acre field, and last year was the first year's cutting on the eighty acres. The sixteen acres were inoculated and you could distinguish the difference right away between the two sides, one

where it was inoculated and one where it was not. My method of inoculation was simply sowing a little seed the previous year.

Mr. Michels—If you had planted corn on the same field, you would have noticed the same difference. Growing alfalfa helps the soil, and after it we can grow a better crop of any kind, whether it is alfalfa again, or oats or corn or barley, or anything else; with the deeper rooting it carries the fertility to the surface.

Mr. Convey—We always seed down with alfalfa when we sow clover. It didn't do very well at first, although we noticed that on the part of the farm where timber had grown it did better than on the rest of it. We top-dressed with manure and now it grows nicely everywhere. We found to our astonishment that we not only made good hay, but very much better hay than we had before. We aim to sow it everywhere, even in our rotation we sow it every year.

Supt. McKerrow—For about ten or twelve years we have been sowing alfalfa with clover on our land, that land not being especially suited to alfalfa growing, and alfalfa grows almost anywhere on our farm, except on the very low lands. I am very sure it can be sown with our clover and that it improves the quality of the clover hay. I wouldn't sow very heavily to begin with, about two or three pounds of alfalfa with the clover. That will make the clover a little richer.

A Member—Would this soil around here contain enough limestone to make it adaptable to grow alfalfa?

Mr. Convey—I think your soil is similar to ours, and that is the very best for growing alfalfa that I know anywhere in the state. I read a long article in the "Outlook" last summer by Professor Hansen. He was sent out by the United States government to collect alfalfa seed. He divides al-

falfa into two classes; the yellow blossom and the blue blossom. The seed that is uniformly used in the states of Wisconsin and Minnesota, and all over the United States, is the blue blossom. Professor Hansen went into Siberia and Mongolia and all over, and he found that the alfalfa which withstands the rigors of the northern winters best is the yellow blossom. Now, some of the yellow blossom seed has been raised here in the northwest, up west of Minneapolis somebody raised one hundred bushels, and he sells it at fifty cents a pound, thirty dollars a bushel. I understand that he has harvested from forty-five acres something over five thousand dollars' worth. Now, if we are going into alfalfa, shouldn't we try to get the seed that is best adapted to the northern climate?

Mr. Michels—I, for one, believe we should come to growing our own seed and I believe it is the same with alfalfa as it is with corn, it has got to be acclimated. As to the distinction the gentleman spoke of, I never yet saw an alfalfa plant with a yellow blossom.

A Member—Professor Hansen was in the employ of the United States government for upwards of ten years, and the result of his investigation was that the alfalfa seed adapted to northern winters is the kind that has the yellow blossoms. That article published in the July number of the "Outlook" was well worth reading.

Mr. Imrie—Grimm's alfalfa originated in Excelsior, Minn. I went out there and he was growing both kinds, but the Grimm's was a year older and it hadn't got the large growth in the fall of the new seed he had cut only this year. I asked him which was the best, and he said he could tell no difference; it was perfect in both cases.

A Member—Which would you prefer, that which would grow 78 or 98 per cent?

Mr. Michels—Oh, I wouldn't buy anything but the higher germination test. I believe there have been too many different theories advanced. The farmers are afraid to try it, and then, again, in too many cases they cultivate their soil too deep. It seems as though alfalfa does best by just ordi-

nary working, as for any ordinary crop.

Mr. Convey—Don't you think too much importance is attached to winter-killing? With me I have not found it winter-killed.

Mr. Michels—We do not know anything about winter-killing.

### CURING ALFALFA HAY

Fred Stubley, Black Earth, Wis.



Mr. Stubley.

The time has come for Wisconsin farmers to pay a little more attention to providing feeds for winter, that is, to the palatability and digestibility of those feeds; we might say, as to the quality, have the conditions as near like summer as possible. We see how well our stock do under these conditions and we know we do not have to grain them. Now, if we will only ap-

ply a little thought in preparing our feeds for winter feeding, so as to bring nearly the same conditions, we shall hope for the best results, particularly among our stock and dairy animals, and that we can do by supplying the proper method in cutting and curing our clover and alfalfa.

#### When to Cut Clover and Alfalfa.

As a rule, we generally allow our clovers to grow a little too old. We cannot allow clover to stand and hold the natural juices if it becomes over-ripe. For instance, a good deal of the alfalfa hay shipped in this winter is very dry and brittle, showing that it was cut too late.

There are different ways of curing alfalfa, and we should adopt that method by which we can best conserve the protein element, and that is the leaf part. The alfalfa leaf will test about twenty-two to twenty-six per cent protein, while the stalk is only about six, so we must employ the method of curing under which we will not lose the leaves.

My plan has been to cut it a little on the green side, if anything, just coming into blossom. A better way, however, to judge as to the proper time of cutting is to watch the root growth. When your alfalfa is ready to cut, your next growth has made a start, the growing crop should be re-

moved, because if it is not and you wait too long, the second crop will get started and you will cut off the top of the second cutting in harvesting the first and injure the growth of it very much, so as soon as the growing crop has reached a stage of maturity and the next one starts growing, that is the proper time to cut, regardless of the blossom. Last year, for instance, our alfalfa did not blossom at all, and naturally we went entirely by the root growth.

#### Curing the Hay.

In cutting it, the one thing to look out for is to keep the green leaves green. We know that the leaf of the growing plant is the outlet for the moisture in the stalk. If we keep the leaves green, it doesn't take a great while to rid those stalks of the moisture contained in them; if, on the other hand, we let the leaves dry up quickly, we shut off the escape of moisture from those stalks, so you see it is important to adopt the method of curing which keeps the leaves green.

My habit has been to cut it in the morning providing there is no moisture or dew on it, then rake it up the next morning and put it up before dinner. You can cure it with or without caps. I was in a barn a few weeks ago where they cured just in the windrow, fifty acres of it. It had been raked from both ways into heavy windrows, and it made a very good quality of hay, but any method will do by which we can cure it and retain the greenness in the leaf. You can put it up in a cock about twelve hours and the sweating begins, inside of thirty-six or forty hours it is sweated out.

It can be put in the barn remarkably green; in fact, we do not want it sun-dried, we just want that moisture out of it, and when you have once got that out of it you can put it into the barn and it will keep all right. We have very little difficulty with it burn-

ing in the barn. We turn it out about one hour before hauling in, leave it exposed to the air and sun, just dry it out, and haul it right in the barn green. Last year we cured quite a lot in the windrow. Of course the weather conditions have got to regulate that.

If we follow those methods and have plenty of green silage and study the quality of our feeds and the best ways of curing our hay, we will have no necessity to buy the high-priced feeds that we as dairymen otherwise have to buy.

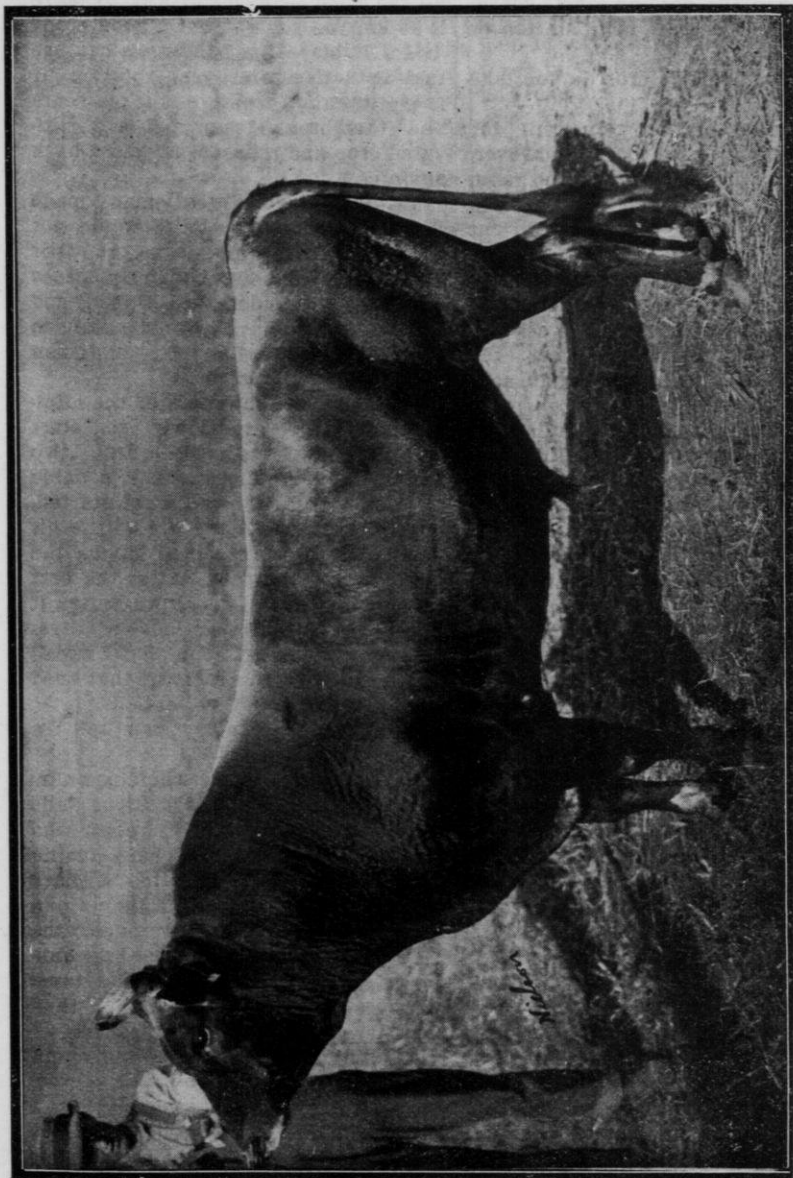
#### DISCUSSION.

A Member—With all my study on this subject, I find that different writers do not agree on the proper time to cut alfalfa. Some will advocate the time when it is nicely in the blow, others say, never mind the blow, but watch the root growth.

Mr. Stubbley—I find that if I wait until it gets well blown my second crop is a little high on me. I have read several articles the past year, and some say that the biggest analysis of protein is secured if we wait for a medium blossom, or a little on the fullest side of blooming, but my experience is that if you wait for that stage your stalks get too woody.

Mr. Michels—I believe Mr. Stubbley is right. I am quite sure that in my neighborhood most of the alfalfa hay is cut too late rather than too early, they are looking for the blossom, and in most cases these new growths will get started too far before the blossom appears; with us it will make it a little bit too late and the consequence will be a weak growth on the next crop.

Supt. McKerrow—From our dozen years of experience and all I can learn from other people, I think you ought to watch both. When the first blossoms come out, cut it, whether the



One of Fred Stubble's herd bulls, Blue Bell's Eminent 74774, Half brother to Noble of Oaklands, who sold for \$15,000.00.



sprouts have started or not, and vice versa, when the sprouts start, cut it, whether the blossoms have started or not.

A Member—Which crop do you take for seed?

Mr. Stubley—Either crop will do; we prefer the second crop, however, because the first crop grows too rank.

Chairman Nordman—Would you think it would pay you to try to cut seed?

Mr. Stubley—Yes, I intended to this last year, but the dry weather came on and we needed the feed. They tell us about two or three times the amount of seed will grow on an acre as of red clover.

A Member—How does that affect your next year's crop? Wouldn't it be better to plow it up and start fresh?

Mr. Stubley—I do not think so. We left a little strip on the outside for seed last year and it started right up.

Mr. Michels—Not far from my place is a field that grew alfalfa seed three years ago, and it had just as nice a crop the following year as ever.

Chairman Nordman—Do you know anything about the yield of that field?

Mr. Michels—Yes, they got between six and seven bushels to the acre and it was very good seed.

Mr. Imrie—I was down in Mr. Michel's territory this winter and they had a little seed there, but it seemed to be very uneven, as to the stage of ripeness. There was shrunken seed, quite a variety of conditions.

A Member—How many times have you top-dressed that piece which has been in twelve years?

Mr. Stubley—Twice.

A Member—And does the crop hold up?

Mr. Stubley—Last year we took off the best and heaviest cutting that we have for twelve years. However, the June grass has begun to come into it and we are going to plow it up in the spring.

A Member—Do you think it would be the most economical way to leave it so long as you can get a good crop?

Mr. Stubley—No, I think we can use that in a five-or six-year rotation. It is my intention to leave it three years and then break it up, put on a cultivated crop and repeat it and seed back again.

Mr. Purse—This gentleman made the statement that alfalfa would not grow as well after potatoes. At River Falls we raise a great many potatoes and we plow under the clover sod heavily manured. I would like to know the reason for the gentleman making that statement.

Mr. Michels—The roots of the alfalfa plant grow very slowly to start with, especially for the first two months, and the dry weather is liable to kill it before the roots get started, and for that reason we are a little bit more certain by reason of having the ground more compact. After the first two months it will get down where it has plenty of chance. I have a gravel pit under one of my fields that I sowed last spring and the roots of that seed went down four or five feet.

Mr. Bradley—Stubley can tell a bigger story than that.

Mr. Stubley—We were holding an Institute down here at Black River Falls and we ran across an Irish farmer who said he had been out west and coming through Colorado he visited a place where they were digging a tunnel and something came down through the roof of that tunnel from two hundred feet above where he was standing. He asked what it was and they said it was alfalfa.

A Member—Will alfalfa land stand pasturing?

Mr. Stubley—Why, we think not. I have never had any experience except as a hog pasture. It helps them to get a fairly good growth before winter.

A Member—I have had lots of experience in growing red clover, and I am

sure the gentleman is right in saying we must cut our clover late enough to get it properly cured. I have been in the habit of cutting my clover about eleven o'clock, when there isn't much moisture, and I can cure it nicely in that way. I am sure too many make the mistake of trying to cure it too early in the forenoon.

Mr. Stublely—We do not want to cut it when the dew is on it, or it is wet, but we find common red clovers are a little harder to cure than alfalfa.

Mr. Michels—Speaking of alfalfa as pasture, we know it will stand pasturing without any trouble, but the cattle do not seem to stand it very well,

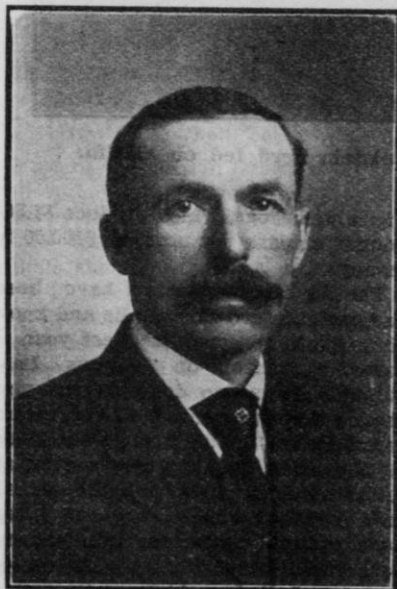
they are apt to bloat, especially in the fore part of the season. It doesn't seem to affect them so much in the latter part of the season. I have a field of eight acres that has been pastured in the latter part of the season, and pastured very closely, and the crop was all right.

Mr. Stublely—I think it would be preferable to use it for green forage food. I was talking with an old German farmer the other day and he said where he was raised they use it in that way, they begin on one side of the field, cut it and feed it, and keep going along that way, and I think that would be preferable to pasturing.

### SOME EXPERIENCE WITH ALFALFA IN GREEN COUNTY, WISCONSIN.

John Waelti, Monroe, Wis.

(In the absence of Mr. Waelti, the paper was read by Supt. McKerrow.)



Mr. Waelti.

Alfalfa has been known of for centuries as the best forage crop. It was but a few years ago that it was brought to Wisconsin and to many farmers it is yet an unknown plant. Six years ago many farmers in the vicinity of Monroe claimed "it would not grow on their land." Several farmers started with a small patch and soon found it to be a fine feed. Year by year they continued growing it in larger fields; last year they raised such an amount that by heating in the mow it caught fire and destroyed lots of feed and many buildings, but that can all be overcome. If alfalfa is properly cured, there is no more danger of its self-heating than in timothy hay.

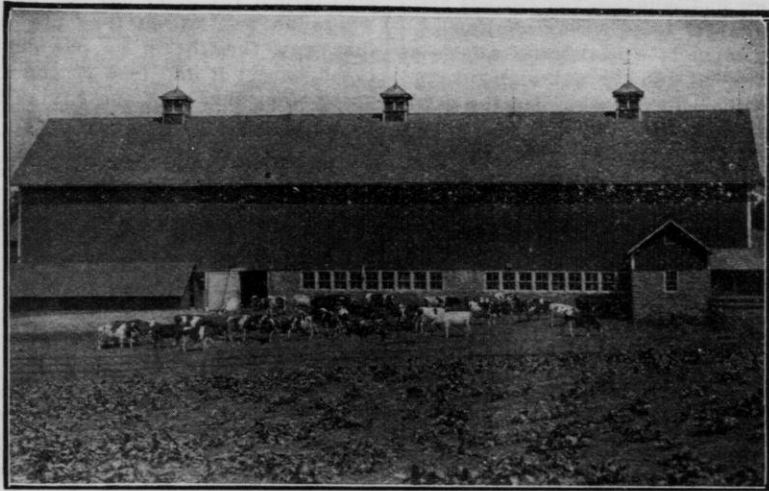
Alfalfa is a plant of its own. The farmers of Wisconsin know (or at least ought to know) that by sowing winter wheat in May, oats in September, or by planting corn in March or August they cannot expect a good crop. They cannot expect a

good crop of oats if they cut it as soon as headed out. To have good success, the farmer must know how and when to sow, when to cut, how to cure, and how to feed it.

Three years ago alfalfa was sold at Monroe for \$12.00 per ton. Since then they have found out that a ton of good alfalfa is worth as much as a ton of grain.

I once read an article in a farm paper telling how a farm proprietor in Texas sowed five acres of alfalfa and soon discovered its value. Six years later he owned 1,300 acres of alfalfa. Besides feeding his stock, he shipped hay and made a net profit of \$109,000.00 in one year.

A farmer in Minnesota writes that he makes use of his alfalfa by pastur-



Barn of John Waelti, with Holstein herd fed on alfalfa.

Here are a few figures well worth studying.

| Yield per acre.                      | Present price per ton. | Value per acre. |
|--------------------------------------|------------------------|-----------------|
| Alfalfa, 3 to 5 tons.....            | \$20 to \$25           | \$60 to \$125   |
| Corn at 50 bu. per A., 1½ tons ..... | 18                     | 27              |
| Oats at 31 bu. per A., ½ ton .....   | 22                     | 11              |

Now, if we figure interest, taxes, seed, twine, threshing and \$3.00 per day for labor, we will find a ton of straw will cost more than it will cost to raise a ton of alfalfa. Many farmers consider straw a cheap feed, but I call it a very high-priced feed. If we figure the expenses for alfalfa at the same rate, it will not cost \$6.00 a ton until it is ready to feed.

ing it with hogs, which produce \$1,500 pounds of pork per acre, or \$100.00 in money.

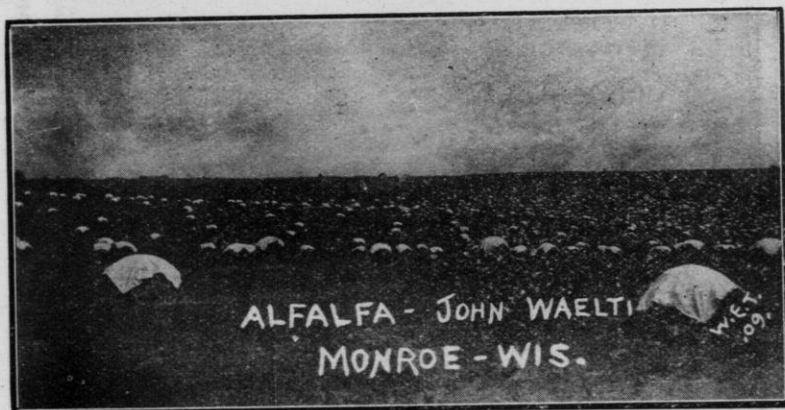
For the last six years I have been successful in growing alfalfa and know of no grain to equal it. Last year I sowed 24 bushels on 70 acres. Last summer it was so dry that the new seeded timothy and red clover, also a great deal of the old clover, was killed. At the same time the new seeded alfalfa remained alive, and the old alfalfa kept growing slowly and made good pasture. After the rain it grew very rapidly and from the 70 acres (new seeded) I could have harvested at least 35 tons, but I left it for winter protection. That proves that it

will stand drouth better than any other plant. I now have 145 acres of alfalfa, from which I expect to cut 75 acres for hay, 50 acres for pasture and 20 acres seeded six years ago I expect to break up and plant in corn.

I would not recommend you to sow only one acre at a time, but first find out how to grow it and then seed down on a larger scale. The sooner you get your farm in alfalfa the more profit it will prove to you.

#### Time for Cutting.

As soon as you note small new sprouts on the lower part of the stem, at the crown of the root, as though the plant was to make a new growth, it should be cut as promptly as possible. Under favorable weather conditions, the first crop is usually ready for cutting about the first week in June; after that it can be cut every four weeks, but should not be cut after the first week in September.



#### How and When To Sow.

Most of the land in Green county is well suited for alfalfa, only on level, swampy land or sand stone rock it cannot thrive. Corn, oats or barley stubble should be plowed in fall or early in the spring and dragged once a week until after corn planting. Seed should test germination of at least 85 per cent, of which 20 pounds of seed will be sufficient for one acre.

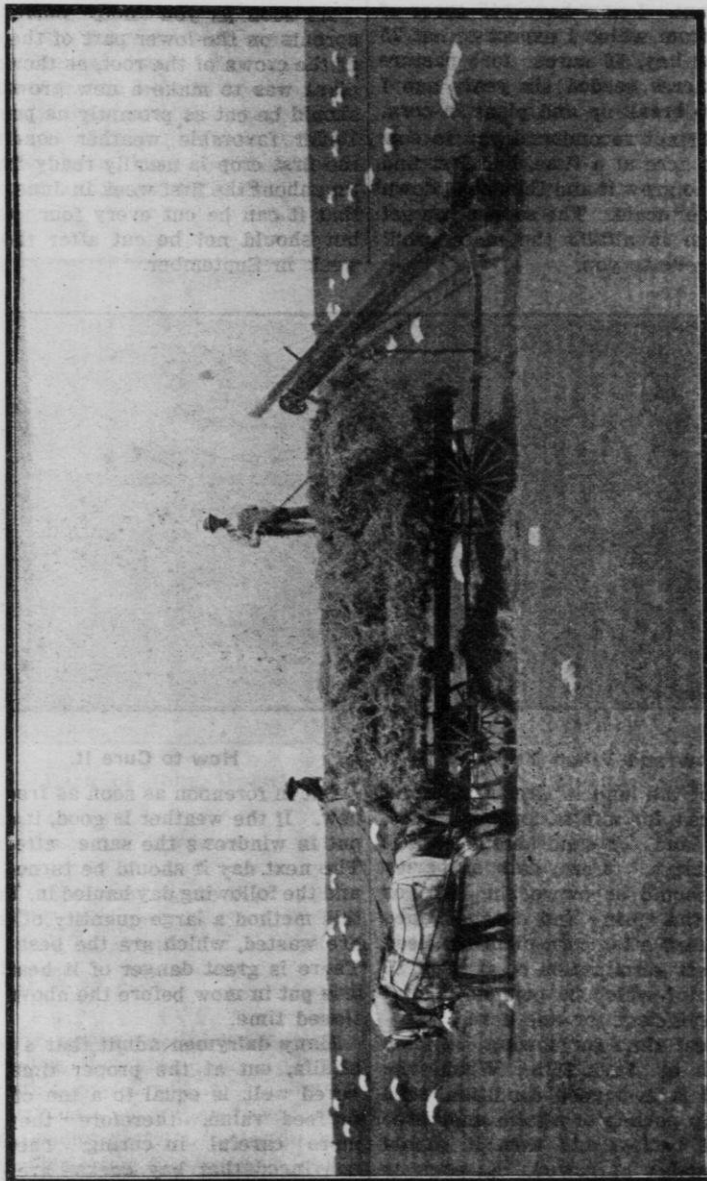
The best time for sowing is from May 15th to June 15th. When the seed bed is in a good condition, seed it with 20 pounds of alfalfa and three pecks of barley, and then it should be thoroughly harrowed. As soon as barley has headed out it should be cut for hay and the field remain untouched until the following year.

#### How to Cure It.

Cut in forenoon as soon as free from dew. If the weather is good, it can be put in windrows the same afternoon. The next day it should be turned over and the following day hauled in, but by this method a large quantity of leaves are wasted, which are the best feed. There is great danger of it heating if it is put in mow before the above mentioned time.

Many dairymen admit that a ton of alfalfa, cut at the proper time and cured well, is equal to a ton of grain in feed value, therefore they are more careful in curing. They are convinced that hay cocks are very beneficial in curing alfalfa, these being used more and more every year.

Rake before the hay is dry enough



Loading cocks with hay loader, on farm of John Waelti, Monroe, Wis.

to lose its leaves, then put in cocks, which should not weigh over 100 pounds each. Cocks then should be covered promptly to shelter from rain or dew. After three or four days it can be put in mow, but the cocks must be removed the fourth day, or else it would damage the plant.

At the present time I have almost 2,000 hay caps and by next summer expect to improve in handling the caps and making cocks, so it will not cost me any more labor and expense to cure the hay under caps than by any other method. Some people say, it is too much work to make those cocks and handle those caps. Any one interested in curing alfalfa in this manner is welcome to come and see us handling the hay and caps and they will find that there is not the work so many expect.

#### Feeding Alfalfa.

I will not say much about feeding, as the majority are very likely to say, "no one need to teach me how to feed a cow," but I know there are a great many farmers who do not know how to feed a dairy cow a balanced ration.

The cow, as I would describe her, is a living separator, which separates the milk out of the feed; therefore the feed must first contain the milk. Every dairyman should know what substances the milk contains, also what substances the different feeds contain, then he can easily figure out how much it requires of each food to produce a certain quantity of milk. Many farmers are feeding their cows corn fodder and timothy hay, which are rich in carbohydrates and fat, but very low in protein, then wonder why their cows do not produce more milk. Most all forage plants are not rich enough in protein, therefore alfalfa is so valuable in making up a balanced ration. One acre of alfalfa produces as much protein as nine acres of timothy.

In winter I feed my cows 10 pounds of alfalfa, 10 pounds shredded corn fodder and 9 pounds corn chop (29 pounds per day.) This is nearly a balanced ration and I receive from 25 to 28 pounds of milk per day per cow. During the last year I received from the factory and veal calves \$115.41 per cow.

We should improve our barns, improve our dairy cows, so they will sell for at least \$150.00 per head; we should learn to feed a balanced ration, so that every cow returns over one hundred dollars a year. We can raise feed enough to keep more than twice as many cows. By doing this, we will soon increase the value of our land at least one hundred per cent.

Supt. McKerrow—You will note, progressive as this farmer is, student as he is, that he is not feeding any ensilage, he has only dry corn fodder, and the reason for that is this, the Borden Milk factory, until lately, has refused to take any milk from ensilage fed cows. Within a short time, they have come down enough and they now say they will take milk from ensilage fed cows, providing the silo is a good one and the ensilage is good, and that is a proviso that everybody will want to have anyway, and Mr. Waelti is going to build a silo soon.

#### DISCUSSION.

(At Farmers' Institute at Monticello, Wis., February 24, 1911.)

Mr. Morgan—What size do you make the hay caps?

Mr. Waelti—Forty inches square.

Mr. Morgan—What kind of material do you use?

Mr. Waelti—I buy eleven-ounce ducking forty inches wide and cut them forty inches long.

Mr. Patton—What kind of weights do you use?

Mr. Waelti—I tie a "small cement block onto each corner.

Mr. Imrie—How do you make those blocks?

Mr. Waelti—I take one part cement to two sand, mix that into a stiff mortar. Had a little tin cup made, which holds about one-half of a pound, fill this packed full with this mortar, tip it out on a board and stick a fence staple in the top. After two days it is hard enough to fasted to the caps. The string should be eight inches long. One person can make about a thousand of those blocks in one day.

Mr. Holcombe—Can a poor stand be improved by sowing on more seed?

Mr. Waelti—A number of my neighbors have tried it without success, but I believe they sowed the seed too early in the spring. Professors and alfalfa growers claim a poor stand must be plowed up and reseeded. I would recommend to sow the field the last week in May, rake it off clean, disc it well and then drag it, sow the seed and harrow again.

Mr. Pierce—I did it in this way with good results.

A Member—I sowed in April and got a good stand.

Mr. Waelti—A year ago last summer I decided to find out which was the most successful way to grow alfalfa, so I went from one farmer to another through our vicinity, until I had a full description of seventy-four fields. I found thirty-four sowed in April, from which seventeen had no stand and had to be plowed up again. Twenty-nine were sown in May, from which only one had a poor stand, and that was sown the first week in May with barley for nurse crop and that was cut for grain. Ten fields were sown in June, of which all were a good stand. One sown the first week in August came up fine, but it all winter killed.

Mr. Holcombe—How much barley do you sow for a nurse crop?

Mr. Waelti—From three to four pecks per acre, and cut it for hay as soon as it is headed out.

Mr. Marty—I will give my experience in growing alfalfa. I sowed some with barley, cut barley for grain and got a good stand.

Mr. Waelti—If the soil is in good condition and the weather favorable, barley can be harvested for grain, but while building the grain, it takes more moisture from the ground than any other time, it usually being hot at that time. It ought to be cut so as to leave the moisture for the alfalfa plants.

Mr. Morgan—Do you sow beardless barley for hay?

Mr. Waelti—No, I sow bearded barley, by cutting it that early the beards do not break.

Mr. Holcomb—How is top dressing for alfalfa?

Mr. Waelti—It will help to improve the stand, but the possibilities are the coarse manure will be raked up with the hay. It is better to get the manure mixed with the soil before sowing the seed.

Mr. Marty—I manured the field, plowed it under and manured it again, and got a fine stand.

Mr. Waelti—That would be all right if we would have plenty of manure, but I would rather manure only once and therefore seed down a larger field. Most farmers cut the alfalfa too late, allowing it to stand until the leaves on the lower part of the stem begin to drop off, thereby wasting the best of feed. If they (the farmers) would only think, when only half a ton of alfalfa cut at the right time and properly cured is equal to thirty-one bushels, or half a ton of oats, they would surely give it more attention, to put it in with good care, at the proper time, to save the leaves as much as possible. As we should all know, the leaves contain more feed value than the coarse, long stem.

## DISCUSSION.

(At Round-up.)

Supt. McKerrow—Mr. Waelti, at that Institute, was questioned about pasturing alfalfa. It turned out that this older alfalfa of his had become very much infested with June grass, Wisconsin blue grass, and he felt safe in pasturing this mixture of alfalfa and blue grass. Let me say, we, from our experience of twelve or more years with alfalfa, and a little pasturing by accident, have concluded to keep either cows or sheep off from alfalfa until it is well matured. Sometimes then you can put them on safely, but to my mind, it is one of the most dangerous things that you can put cows or sheep onto. Bloat will take all the profits out of sixty-or one-hundred and twenty-five-dollar an acre alfalfa.

A Member—How would alfalfa be in the silo?

Supt. McKerrow—We never have tried it. I have seen it mixed with corn where it was very good, and I have seen it alone where it was good, but I think it is preferable to make it into hay for dry feed and put the corn into the silo, because it makes cheaper ensilage.

Chairman Nordman—We put alfalfa into the silo once and it turned so sour nothing could eat it.

A Member—Did you ever have any experience with alfalfa freezing that was seeded down last spring?

Supt. McKerrow—The alfalfa on our best piece was eight inches high when we got a freeze last spring that set it

back, but it came on and made a very good crop.

A Member—At that time I had it almost large enough to cut and that frost killed it right down, so it never recovered all summer long.

Mr. Bradley—It wasn't the frost, it was the July weather.

Supt. McKerrow—I think both of you fellows are right, the frost hurt it to begin with, and the dry weather hurt it later, and altogether it was pretty poor. There is a point right here that Mr. Waelti discovered in his study of this plant before he sowed it, which shows that the alfalfa plant is different from other plants, different even from the clover plant. When it is young, its leaf, or the part above ground, will not stand as much frost even as the clover plant, and that is one reason why it should not be sowed too early.

A Member—Our alfalfa was about eight inches high when that frost came and it cut it off entirely, but we got two crops after that.

A Member—My clover hay was that same way.

Mr. Stiles—I think it makes a difference what kind of soil the alfalfa is on. One of my neighbors had alfalfa on clay land, and it grew up quite high; a snow storm came after that, but he got four crops.

Supt. McKerrow—We got three crops and could have cut four, but we got a snow storm which saved it from the frost, which I presume you did not get. It froze some and wilted, of course; but the snow saved it considerably.



## WHEY BUTTER.

C. F. Doane, U. S. Dep't of Agriculture, Washington, D. C.

The workers of the Department of Agriculture are almost universally interested in conservation, and we especially take delight in applying this principle to the creation of new industries which have for their object the utilization of material in commercial way which has been thought to be without commercial value.

My work in the Department of Agriculture has been along the lines of the cheese industry, both Swiss and Cheddar. I have worked a great deal in the state of Wisconsin and my attention was called to the possibilities of profit in the making of whey butter through some work done in the state of New York, and while I do not claim to have originated this particular industry, I do claim to be the first to establish it on a practical basis in this state, in so far as the Cheddar cheese factories are concerned.

There is a loss of fat in whey, as most people acquainted with the cheese manufacture know. This has appeared to be very slight, but in practical work it varies from a minimum amount of about .12 per cent to a maximum loss under bad conditions of gassy milk or too much acid of more than .5 per cent. The ordinary loss is somewhere about .2 or .25 of one percent. If this could all be recovered and add to it the overrun, which our butter friends claim, it would mean something like an average of 2 1-2 or 3 pounds of butter made from every three thousand pounds of milk delivered to the factory. At present prices of butter, that would mean in the neighborhood of seventy-five cents to a dollar for every thousand pounds of milk; or, say, from seven to ten cents a hundred pounds of milk delivered. If we could save that at a

reasonable cost, it would be well worth saving, of course, for ten cents a hundred on milk more or less may mean a profit or loss to the farmer, above cost of feed and care of his cows.

We entered into a sort of co-operative deal with one of the cheese-makers of Sheboygan county to test out thoroughly the possibilities of the making of whey butter. The outfit required is a good-sized separator, an auxiliary whey-tank, into which the whey can be run directly from the vats, a churn and then a few other small things and the room. The total outlay where the necessary room is not already at hand can be figured at about a thousand dollars. This plant was operated for one season, and all details of cost were carefully followed up. The cost of manufacturing whey butter, as near as we have been able to figure it per pound of butter, is 2 1/2 cents for coal required for the power in running the separator, churning, etc., two cents for labor per pound of butter, one-half cent for package, and about another cent for depreciation on the value of the equipment, which figures out something like six cents a pound altogether.

The butter has been sold at about five cents below the price charged in the cheese factory district for Elgin butter, that has been from thirty to thirty-five cents the past year. The factory owner has continued this work and he has been getting about twenty-eight to thirty cents this year for his butter. He has a factory of about eighteen thousand pounds per day in the flush of the season. It brought him in a maximum, or a gross amount of money, of about \$2,450.00, in 1910. The deal he has made with his farm-

ers is to give them half of the gross returns. He takes the other half and stands the expense, but it has meant for him a profit this year of about six hundred dollars. This meant for the farmers about twelve hundred dollars that they would not have otherwise received, and if you get to figuring this on the basis of all milk delivered to Cheddar cheese factories in the state, it amounts to a big lot of money for you and for the state.

The quality of the butter can be judged somewhat from its price. Personally, I would as soon eat whey butter on my table as the best creamery butter. Eaten alone, it has a decided whey flavor, or what butter judges may call a "smoky" or "burnt" flavor, but when eaten on bread or in table use, this does not seem to appear and the butter makes a very fair table butter, a great deal better quality than some of your gathered creameries are turning out.

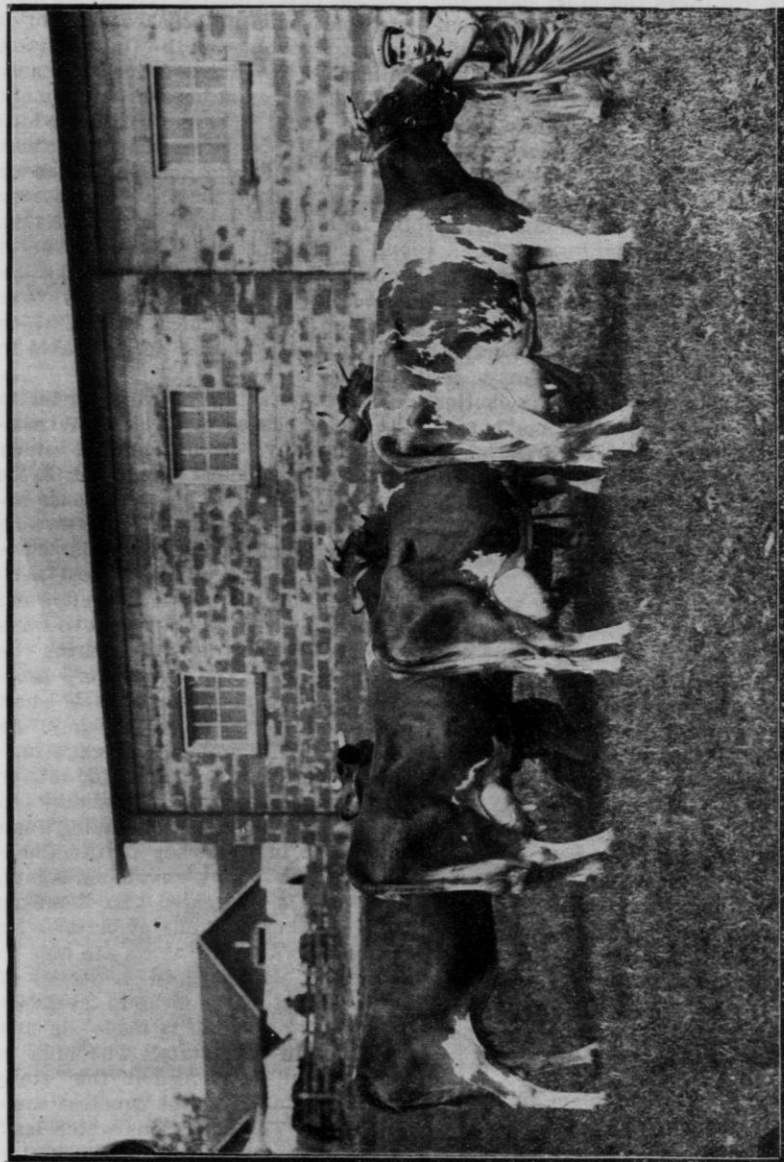
This butter, of course, is of the best sanitary quality. There is no milk delivered to any creamery in the United States that will compare at all favorably with the milk delivered to even the poorest cheese factories. The cheese factory has got to have milk of a certain quality, or it cannot turn out marketable cheese. The creamery can make butter out of most anything that is delivered to them, consequently, most anything is delivered to them, while the cheese factory has to have quality. During the manufacture of cheese, there is nothing that in any manner detracts from this quality, the little rennet that is added to it having no effect upon the butter.

#### The Whey Butter Problem In Southern Wisconsin.

A talk on the question of whey butter inevitably leads up to a discussion of the whey butter problem as it affects the southern part of your state.

Some of you may have heard that during the past winter a few of the dealers, and some of the cheese factories got into trouble with the United States Internal Revenue Office, because the Inspectors got hold of butter made in the Swiss cheese factories which exceeded the moisture limit of sixteen per cent. This question was taken up and after considerable controversy the factories were not required to take out license for the manufacture of adulterated butter, or to pay the imposed fines. This arrangement was made on some technical ground which I do not care and do not feel able to discuss.

The manufacture of whey butter in the Swiss cheese factories of Wisconsin is worthy of considerable study from the economical standpoint. There is perhaps as little business sense applied to this particular industry as there is to any industry of your state connected in any way with your agriculture. The process is faulty and very seriously so, in the only two ways possible. The method of securing the butter fat from the whey very probably recovers not more than one-half of the total butter fat in the whey. As the whey will probably average one-half of one per cent of butter fat, as much or more butter fat remains in the Swiss whey after skimming than is present in the whey of the Cheddar factories before skimming. Again, this whey is so treated that it makes the very poorest grade of butter. No reason exists, so far as we are able to determine, why as good a quality of butter should not be made in the Swiss cheese factories as is made in any creamery in your state. The milk is the best milk produced in the state and is treated with the greatest sanitary care. The conditions which lead to the slight peculiarity of the butter made in the Cheddar factories do not exist in the Swiss factories. I have seen as good butter made in one



First prize Guernsey herd four cows in milk, at Wisconsin State Fair, 1911, owned by W. M. Jones, Waukesha, Wis.

Swiss factory near Darlington as I think I have ever seen in any creamery. In this case the maker did not have the very best of conveniences for the making of butter.

It so happens that the very conditions that lead to the poor quality of product are the ones which lead to excessive moisture. Had this sixteen per cent limit of moisture been enforced against the Swiss factorymen, it would probably have meant an additional income to your Green county cheese district of from two hundred and fifty thousand to five hundred thousand dollars annually. The making of Swiss cheese requires a much higher order of technical ability than the making of Cheddar cheese, but it seems that the Swiss maker expends all his ability in the making of cheese, though the butter represents a very large portion of his profits. The fear of this sixteen per cent moisture allowed, with its attending fines and licenses, would have forced the cheese makers of Green county into a change of plans that would have meant very much to them financially.

To my mind, the necessary changes to make a butter that would come within the limit of the law and would also be of excellent quality, would be very practical and simple. It would be necessary for each factory to put in a separator and some kind of power. This could easily be covered by an expenditure of five hundred dollars, then if some of the dealers would get together and build a central churning plant, where the necessary supply of ice could be provided, the problem would be solved. The Swiss factories are located very close together. I do not believe the cost of gathering this whey cream together would exceed two cents per pound for butter fat. The quality of butter made would almost double the price now received for the whey butter. Separators would secure practically twice the quantity

of butter fat from the whey and the gross income would almost quadruple the gross income now received from the whey butter.

#### The Food Value of Separator Whey.

In closing, I would like to discuss very briefly the probable effect of the separation of whey upon its fattening value. Some of you may have noticed in one of our dairy papers some time ago a discussion of the reported results stated to have been secured in the feeding of skimmed and unskimmed whey to different lots of hogs. In this discussion the writer attempted to show that the butter fat in the whey had a higher value per pound for feed than was paid for butter in the market. We have all of us been taught to believe that butter fat is an expensive hog food and the very small per cent present in the whey, on the basis of comparative food values, represents something less than one-tenth of the actual fattening value of the whey. This is calculating on the basis that the farmer receives all of the butter fat which is not taken out in the process of cheese making. A look at any whey tank connected with a cheese factory will show the weakness of this supposition. A large part of the fat arises to the top of the whey where it can be seen as a filthy covering, which any cheese factory operators would be glad to do away with entirely. If this gets into the cans, it makes them difficult to wash and has its effect on the quality of the cheese made, so it is very probable that as much is lost in quality as is gained by the farmer in having this small quantity of fat for stock food.

#### DISCUSSION.

Mr. Aderhold—I have seen some of that whey butter and in hot weather it seems to be very soft, as though there was too much moisture in it. Is that

the usual condition, and if so, what is the cause of it and how could it be overcome?

Mr. Doane—It is very likely that the percentage of soft fats in the whey butter are greater than in creamery butter and I don't know whether that is due to the particular kind of cows they happen to have in that district, or what it may be. It is not moisture, I have tested the butter for moisture and it runs below the limit, as low as fifteen or fourteen. The butter I saw in New York state did not appear to have that quality, although it was along in the fall when I saw it.

Mr. Aderhold—Couldn't that be overcome by using very low temperature in ripening and churning the cream?

Mr. Doane—No, I don't think so. I don't think that the subsequent condition of fats can be influenced to any great extent by temperatures; that is, a temperature today will not mean any difference on the butter fat tomorrow.

Mr. Aderhold—If it was a lower temperature while it is being churned, wouldn't that give a harder quality of butter?

Mr. Doane—I know that is the usual supposition, but I think it is a mistake.

Mr. Stiles—Can you suggest how much it costs to manufacture where it runs three per cent fat say, a factory receiving ten thousand pounds?

Mr. Doane—It would cost about six or seven cents a pound to make.

Mr. Stiles—Then it is worth about eighteen cents a pound?

Mr. Doane—It was selling at from thirty to thirty-five in the cheese district at one time. In the summer I think the lowest price was twenty-five cents for butter, not butter fat.

Mr. Stiles—Butter sold as low as twenty-four cents this last summer for a few weeks.

Mr. Doane—You know they buy in the butter in that cheese district.

There are no creameries. Whey butter is sold on the basis of the market for creamery butter. That is for home consumption.

A Member—What do you consider the best time for separating the whey?

Mr. Doane—Oh, just as it came from the vat. It seems to be quite easily separated with an ordinary cream separator.

Mr. Michels—How about the keeping quality of that butter?

Mr. Doane—About the same as creamery butter. We had a tub of butter in storage at Plymouth. Of course that did not have any freezing temperature there, it was kept about three or four months and came out in pretty fair condition.

Mr. Convey—Shouldn't there be a legal test of butter fat for cheese?

Mr. Doane—There is a legal test, fifty per cent of fat in the dry matter of the cheese.

A Member—I live down in a foreign cheese district, and they are very anxious there to make whey butter, and the presumption is they get out all the butter fat they can.

Mr. Doane—I don't think it works out that way. It requires a separator to get nearly all of the fat out of the whey, which has been amply demonstrated in numerous tests with milk. Another thing of interest is that it has been believed that the making of whey butter would have a tendency to induce the cheese makers to run all the fat possible into the whey. My limited experience has been just the opposite, and the making of the butter has called the attention of the cheese makers to large losses, which they have tried to overcome.

Mr. Aderhold—If a dozen factories or so in a neighborhood were going to put in a separator for the purpose of skimming the fat from the whey, do you think it would be advisable for each one to try the manufacture of butter, or would it be better perhaps

to concentrate that cream and let one man do the whole skimming work and the manufacturing of it into butter?

Mr. Doane—That depends, of course. Scott has contracted the fat of eighteen factories this year, which is being churned at his own factory. That is the way the whey butter business is run in New York state, and I must say it has not appeared to be very suc-

cessful financially. The concern in Sheboygan county is buying it outright. The way they did in New York was to give the man who did the churning one-third, the farmers one-third, and the cheese factory one-third, but they have had so many difficulties there that it seems it is not practical with them.

## CORN CULTURE.

David Imrie, Roberts, Wis.

Here in St. Croix county I have noticed that many people have made the mistake of buying their seed corn; I never was in any other place where so much was bought every year, and in doing that they get all kinds of seed corn. The corn they buy may have the same name as that they raised the year before and so they think it is all right, but it was really raised in a different part of the state and does not give the results it would give if they had raised this corn themselves. I have always found the best crop produced from seed raised near where it was going to be planted. Corn needs to be acclimated to do its best, so I would advise all farmers to get a good variety of some of the improved varieties, perhaps, and then make the selections from their own farm every year.

### How to Select the Seed.

Perhaps the best way to do that is as soon as the corn is ripe to make a selection from the fields, taking the best ears, of course, those that are fully matured, and pick it and dry it, before the fire is all right, or before cold weather see that it is in some place where it will not freeze during the winter, and in that case you will have good seed. We all know we must

have a full stand, and that we cannot get if part of the seed we sow will grow and part will not.

### Test the Seed.

When spring comes, test your seed corn. This is a good time, about now, to test it; take three or four hundred kernels from a hundred ears. In a very comprehensive test, you will want to make an individual test of every ear of corn, and in making your selection it is not altogether the number of kernels that grow, but it is the ones that produce the good, strong healthy sprout.

I remember one time, when we were planting this big B. & W. corn for silage, some thirty years ago, my brother-in-law saved some one year when the season was such that it ripened enough so that it was in the roasting ear stage. He had some seed from the east, where it was originally grown, and planted them both in the same kind of soil. All grew, but made a very feeble growth, because the seed was very immature. We want to take care of our seed corn, so we will get a strong growth and a quick growth.

### Planting the Corn.

After we have this seed, what do we need next? We ought to have the

right kind of soil. You all know that in this part of the state our seasons are too short for corn as a rule, so we want to give it every chance and hurry it along as fast as we can. We have practiced the three years' rotation since we have been in St. Croix county and before we came here, and under that rotation we always put corn on clover sod, putting all the manure we have on this particular land until it is plowed, using fall plowing, turning it under in the fall about four or five inches deep. In the spring, just as soon as we can, we go over that with a harrow and stop the evaporation from this soil. What we want is to get the soil warmed up, and we want to save the moisture as well as we can. What makes the ground cold is surface evaporation. If I should put my hand in water heated to one hundred, say, and take it out, it gets cold immediately, as soon as it is raised from the warm water, and that is simply because the water is evaporating from the surface of my hand. So, if we can stop the evaporation from our soil, it will warm up faster. If we break up the surface with a harrow, anything to break up the ground, that will stop the evaporation, and the ground below will warm up.

Now, we have on this clover sod an ideal condition for growing corn, there is a lot of humus there, there has been manure applied as the ground is full of humus, we stop evaporation by stirring the surface, and being full of vegetable matter the sunlight can get in there and warm up this soil.

Then, before planting your corn, put on all the work you expect to put on that land until you harrow it after the corn is beginning to come up. We go over it with a disk harrow, then with a spring tooth harrow, and if it should rain, go right over it again. I never have found that you could work your corn too much before the corn was planted. I have heard people say, "This is pretty rough, but we will

plant it because it is getting late and we will harrow it down afterwards." That doesn't do. Some of it is deep, some of it is shallow, and you cover some of it deeper still, while you take off some of that which is shallow, so before you put the seed in at all get the ground in good condition, see that it is level and smooth and nice. Don't work it to a great depth. I would like to have it planted not more than an inch and a half deep, and an inch is plenty deep enough if you get moisture. We know it is warmer near the surface and we want our seed to get the benefit of that warmth and to be above ground as soon as possible.

#### Cultivation.

As soon as we get it planted, we go over it with a harrow, smooth it down, cover up the tracks of the planter, so that if it is on rolling ground the water will not follow these and wash out the ground. After that we harrow it until it is coming up, and then we stop. We do not do as much harrowing after the corn is up as we used to. If the field is nice and level, you can commence with the cultivator just as soon as you can follow the rows, and if you have quack grass on your ground, do not even wait for it to come up, but go right to cultivating as soon as planted. Then cross it with the harrow. After that wait until the corn is up before cultivating again, but after it is up we want to keep cultivating as often as we can to conserve the moisture and kill the weeds.

Do not go too close to your corn for the first time, you can do a whole lot of damage if you run too close. If it has been properly worked and you have commenced cultivating soon enough, you get the start of the weeds so they do not bother you much. You are simply cultivating it to conserve moisture more than anything else, and we cultivate as long as we can get through without breaking it down. Of

course we have to leave it then, although in dry years it will pay to go through it with a one-horse cultivator, though we never have practiced that.

#### Harvesting the Crop.

As to the harvesting of the corn, there need be little said here in that regard, because most every one cuts their corn. There is very little corn left in the field in our country. The very best way I have ever harvested it, the way to get the most out of it that I know of, is by putting it in the silo, because it is all used in that way. Every year we feed corn in a good many different ways, because we have raised quite a large acreage, so we put some in the silo and some we put in shocks and some is simply husked, and the cattle are turned in. In every way we handle it there is waste, except where it is put in the silo, so the largest value is certainly received from our corn crop from that which is put into the silo.

#### DISCUSSION.

Mr. Stiles—I agree with everything Mr. Imrie has told us, except in regard to cultivating late in the season. I think that is necessary, especially in a dry season. I think it is very beneficial to the crop, even if you have to do it with a walking cultivator.

Mr. Jacobs—Mr. Imrie doesn't like to walk.

Mr. John Imrie—We didn't have a drop of rain here this year, we didn't have enough moisture to make grass.

Mr. David Imrie—It is a fact that the drier the weather is the more cultivation our corn needs. Last year we had no rain from the time the ground was planted until the 15th of August, and with our methods, even at that time you could take your feet and dig down and see some moisture.

A Member—Would you recommend planting corn in the same place two years running?

Mr. Imrie—We never do it, and I would not recommend it, unless you have a bad patch of quack.

Mr. Jacobs—If corn is picked after it is mature, but picked early, cured out and kept from freezing, is there danger of that corn not growing?

Mr. Imrie—No, it will grow if it is picked early enough.

A Member—Why is it necessary to test corn?

Mr. Imrie—Under such circumstances I would not test it; that is, if it has been properly handled and stored in the right place; but if you have any reason to be doubtful, I would test it, to make sure it is all right.

Chairman Nordman—The way we do in our section of this state, to be sure of the germinating qualities of this corn, is to cure each ear by itself. We drive a board full of nails, turn the board over and put a number on each place.

Mr. Jacobs—There appears to be a great prejudice against having seed corn where there is grain. I had a great deal of trouble in keeping seed corn until I learned that grain did not hurt it. I read several times that the best place to put the seed corn was in an oat bin; I have tried that for the last five or six years and I have had no trouble with the seed corn I have buried in the oats.

Mr. Stiles—After it was fire-dried?

Mr. Jacobs—No, I just hung it up in the granary. It stands to reason that if you bury your corn in oats—it may freeze there a little—but it remains in that condition until spring comes, it is not continually thawing and freezing, it is really in cold storage, and I have never had any trouble with seed corn since I did that, but I did have everlasting trouble in the fall before that.



Mr. Imrie—We put ours in the cellar in the fall.

A Member—In planting for the silo, do you plant in hills or drills?

Mr. Imrie—We plant in drills mostly. If there is a bad piece, you better plant it in hills.

Dr. Porter—Mr. McKerrow told us that most of the protein in the corn plant is in the leaves. Now, would we not get more protein if we would plant our corn rather thick and plant it in drills rather than in hills?

Mr. Imrie—We want to plant it just as thick as we can for the silo and get an ear on every stalk, so we plant about four to six inches apart, about every six inches. It will be from four to eight inches, and in doing that we have grown corn here at Roberts as high as seventeen tons to the acre, and we didn't get it all.

Mr. Convey—Haven't you found in drilled corn, where you used a two-wheeled weeder after your cultivator, that it tends to keep down the weeds?

Mr. Imrie—We have a weeder, but I have not been able to use it with satisfaction some way or other.

Mr. Convey—I use it right along after the two-horse cultivator, in my drilled corn.

A Member—Isn't it a mistake, if you are going to raise corn, to try to plant three or four kernels in a hill? I believe Mr. Funk recommends planting about three grains in a hill, three and a half feet apart, and when the corn has grown a little so you can see which are the strongest sprouts, he pulls out one and leaves two and raises one hundred bushels to the acre. I have raised corn all my life and I have always had the best results, that is, raising corn for hogs, feeding it, not to make the corn too thick. I have an Edge Rock planter, and I never allow my planter to drop more than three, and even that is too many unless your soil is very rich and you have plenty of rain.

Mr. John Imrie—A brother of mine tried that and husked and measured and weighed the bushels that he received from the different number of kernels in a hill. He planted two acres with three kernels in a hill, two acres with four, and two with five. The hills where he planted three kernels grew the largest ears, but, if I remember right, he got ninety baskets, or forty-five bushels of corn where there were three kernels planted in the hill, he got one hundred and five baskets from the four kernels, and about one hundred and fifteen baskets with small ears from the five kernels in the hill. It seems to me it will pay to get the extra bushels if you want to put it in the silo and you get a great deal more foliage from the five kernels in the hill. That was in northern Wisconsin.

Mr. David Imrie—We must remember that there is a good deal of difference in localities. In central Illinois, where corn grows large, they do better not to plant it too thick. Where it grows small, we can get a better yield per acre by having it a little thicker. There are places in Iowa and Indiana where they have not been able to ripen their corn, and it is simply because every one is trying to raise the very largest variety of corn that can ripen in that locality, and I believe they make a mistake. I believe we can keep up the same yield by planting an early variety that does not grow quite so big but matures better. There is a great deal less feeding value in chaffy corn than fully matured corn.

A Member—I have lived in Blue Earth county, Minn., for the last forty years, and there we can follow one crop of corn with another for three or four years and increase our amount of corn, also make better corn. I do not see why you cannot follow one crop with another in St. Croix county.

A Member—Last year I rented about twelve acres near St. Paul, and we

put about six acres into Wisconsin No. 8 corn. The land was pretty flat and partly running into hills. It had been in corn the year before and had been fairly well manured. We planted this land to corn and dropped from two to three to the hill. We had to go through it once with a hand weeder besides the cultivator, it was very weedy. This fall I sold part of it and in striking a bargain I told the purchaser he could have the corn for fifty cents a bushel, as it was way up in the field, and he could husk as many shocks as he wished and strike an average. He husked out about eight shocks on different parts of the field and the corn ran all the way from a sandy part on the side hill, where we got our best results, to the better land, and the best shock ran one hundred and seventeen pounds of corn in the shock. On the flat, the drouth seemed to affect it worse, and it ran from sixty-seven to eighty-five pounds, but take it all through we had a fine crop of corn. We sold it for fifty cents a bushel and got twelve cents a shock for the fodder, and the five acres brought us one hundred and forty-five dollars in cash. That looks as though following corn with corn isn't always a bad thing.

Mr. Imrie—Let me answer the question of a gentleman over here. We all know that certain crops take certain proportions of the different elements

contained in food stuffs that they find in the soil, for instance, corn takes nitrogen, phosphoric acid and potash. The corn only takes a certain portion of these ingredients from the soil, the tendency of all fertility is to go down and get away from us, so that which we are not using is getting away. If we can put another kind of crop on that land, we meet that condition, because it draws on those ingredients in different amounts, and we think that is an advantage, and so we follow a rotation for that reason. We grow corn one year, seed down with oats or small grain, and then make hay and pasture next year, manure it, plow it up and put on corn again.

Supt. McKerrow—In Wisconsin we are great believers in rotation, because we know that that has helped to put us ahead in the matter of fertility, and in the yield per acre of the leading grains that we grow in this state, and to raise corn three or four years in succession would break the rotation that we have been following; but if we are going into the alfalfa rotation four or five years we may be able to follow corn with corn to advantage.

Mr. Imrie—We have been told that alfalfa is not a good pasture plant, so we are going to raise clover anyway, and the alfalfa will get out of the rotation for a while, because we must have pasture.

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## CO-OPERATION.

Geo. F. Comings, Eau Claire, Wis.

"The spirit of co-operation is the master spirit of the age."—Pinchot.

It is exceedingly embarrassing for me to attempt to talk to you along constructive lines and in such a way that you may think these questions over, and perhaps be led to leave the old beaten paths and move along new

ones. It is much easier to tear down than it is to build up. Any one of you farmers can take a sharp axe and cut down a giant of the forest that has been a century in developing, and destroy it in a few hours.

When I was a young man, I read a story of Charles Reade's called, "Put

Yourself in His Place," and I have thought oftentimes the dairyman makes a great mistake that he does not at times put himself over in the consumer's position and try to look at some of these problems from the consumer's standpoint. Take, for instance, the tuberculin test. It may not always be correct, and yet in the great majority of cases it is; and I think farmers are standing in their own light in fighting it. As a consumer, you would want milk above suspicion for your children. Is it not your duty to be as interested in the life and welfare of your neighbor's child as you are in your own?

I was pleased this morning to hear a young man advocating the forty-acre farm, because as population increases we shall have to get back to the small farm and intensive tillage. Another thing, as the country becomes more densely populated, we shall have to give up one after another of our so-called individual rights. I think it is high time we stopped talking about our rights and commenced talking about our duties.

The farmer has been extremely individualized. The large holdings of land, his consequent isolation, and other conditions, have fostered a spirit of independence. He is behind all other classes in having a true spirit of co-operation. At this time a great deal is being said about co-operation. This week in the state of Ohio, at the National Corn Show, four different sessions are given over to the discussion of this subject of co-operation. Professor Bailey, of Cornell, President Butterfield, of Amherst College, and many leading economists, presidents of colleges and other prominent men take part. So you see we are not the only people talking about it.

I think it was President Cleveland who said "It is a condition, not a theory, that confronts us," and I want to speak of two or three conditions that confront us as citizens.

#### Rural Population Declining.

The first condition I want to refer to is this, that for many years past there has been a declining population outside the cities. Iowa, the richest state in the middle west, has for ten years faced this problem. In Ohio, in cities of five thousand and upwards, is found one-half the population of that state. Outside of these cities the decline of population has been thirty per cent in twenty years. If this continues for another twenty years, where will the farming interests of Ohio be? Where will be the country social life, the rural churches, the rural schools, and the interest in good roads? The declining rural population is one condition that I want you to think of as farmers and citizens.

#### Unorganized Condition of Farmers.

Another condition is this, the unorganized condition of the farmers themselves. I want to use one or two homely illustrations to bring this point before you. You all know what an effective force you have in a mowing machine for doing a certain kind of work. It is an assembling of different parts fitting together harmoniously. But let its parts be scattered, a driving wheel here, a pinion there, the cutter bar somewhere else, and the forceful machine is useless. Farmers, as a class, are the dissembled parts of a machine. While isolated, disunited, they are weak and helpless. Organized and associated, they become powerful and effective. So long as you remain unorganized, you represent your mowing machine with its parts scattered all over the farm.

Sir Horace Plunket, the illustrious statesman and writer, says: "The weak spot in American farming is not so much in technical methods as in lack of business organization. The failure of farmers to combine in days when those engaged in every other commercial industry and calling com-

bine, when farmers of every progressive country in Europe have recognized in combination the condition of economic survival is due simply to the fact that farmers have not understood and no one has thoroughly explained to them the co-operative principle."

President Waters, of the Agricultural College of Kansas, says: "Today the farmer is the only individual of large economic importance in the country who is not compactly organized for his own protection and progress. He buys and sells and conducts all of his business operations as an individual, without any regard whatever to his neighbor or his fellow farmer in any portion of the country. When he has a load of hogs or a bushel of wheat to market, he must accept without recourse the prices for these wares, fixed by a compact of merchants and manufacturers. Co-operating, he does not easily become independent of such organizations, at the same time increasing his efficiency as a producer."

Hoard's "Dairyman," discussing the oleomargarine bill pending in Congress, said: "Because of their unorganized condition the millions of farmers of this country have as little influence in the halls of legislation at Washington as a dish of ice cream would have on the temperature of hell."

A great deal has been said lambasting our rural schools and charging them as the cause of much of the unhappy condition of rural life. Much of this criticism is quite deserved, but we should keep in mind the dark past of ignorance and superstition from which we are emerging, and remember that as a class farmers never yet have had a liberal education, they do not realize its power. They have never enjoyed the leisure that must be had to become educated and cultured. Farmers cannot become a cultured class until they are relieved

from some of the economic burdens that bear upon them.

#### Education and Organization.

I think there are two words in the English language which mean more to the farmer than any other two words. They are the words "education" and "organization." By the word "education," I do not mean that which simply takes a boy or girl through the country school, then to the high school, from the high school to the university, perhaps to a profession, although that might be included in the word. I mean such a training, mentally, that he will understand not only the teachings of the books as they are taught in the public schools, but will understand all the great economic problems which must be understood by the farmer before he can break the shackles which bind him, so I say we must value more highly education. Our children are too often kept out of school because they can be made useful on the farm. They soon fall behind their classes, lose their interest and never catch up.

I have been criticized oftentimes for talking to the farmers too much of idealism. I think farmers need more idealism; the lack of it is the reason the country sides languish as they do. I wish you might all hear Mr. Bryan's or Jenkin Lloyd Jones' lecture on "The Value of an Ideal." Ideals have done far more for the world than its idols have.

I want to say I believe the old order is passing and a new and better is being fashioned day by day. An entire change of the industrial system to a co-operative one is the only one that seems to me to be in harmony with the teachings of the Christian religion. Professor Richard T. Ely, of our own University, says: "The principal reason to suppose that co-operation must ultimately succeed is that it alone brings about such a union of labor

and capital as to prevent perpetual industrial warfare and warfare cannot forever be tolerated. It may be further said that it alone is compatible with the ultimate complete triumph of Christianity. Co-operation means brotherhood, a working for and with one another, not against one another. The principles of co-operation were formulated fifty years ago in England as follows: That human society is a brotherhood, not a collection of warring atoms; that true workers should be fellow-workers, not rivals; that a principle of justice not of selfishness should regulate exchanges."

I think theologians have made some great mistakes in interpreting the Bible. They have taught us to divide our life into two spheres—one we call sacred, going to church on Sunday, singing in the choir, shouting hallelujah, attending prayer meetings in the middle of the week; these are considered sacred duties, serving God. The rest of life is secular. I say the time is coming when all our activities must be considered sacred; when Monday, Tuesday, Wednesday, Thursday, Friday and Saturday will be the days in which we can serve God by serving our fellowmen, and you are not a Christian man in my opinion until you realize that the songs of labor are songs of praise as much as the songs you sing on the Sabbath day.

Dr. Lyman Abbott has wrapped up pretty much all the teachings of the Christian Gospel in a nutshell by saying: "The only way you can serve God is by serving your fellowmen, and the only way you can wrong God is by wronging your fellowmen. And He meant service along these industrial and commercial lines. You do not serve God very much by on Sunday calling a man your brother, at Christmas time being kind and good, and on other days cheating and doing up every one you can. We must all come to realize that our lives are bound up

in the lives of the community in which we live and that we must move along as that community moves along. That is the true ideal of social evolution."

### Social Evolution.

I want to speak to you briefly on social evolution. I will not dwell on the word "evolution." I know good men differ in regard to the origin of the race. All agree, however, in regard to social evolution. Our social organism began in very simple form and has been growing more and more complex. Two thousand years ago, under Roman despotism, there was production and distribution of wealth through a system of slavery. Later came the feudal system, and centuries later the competitive system, and now the co-operative. Each has been a step forward and upward for the race. Each succeeding step has been more and more of the spirit of mutualism and of interdependence.

Mazzini, the Italian patriot, sixty-five years ago, told his countrymen that "association is the coming great word." Pinchot has later said, "The co-operative spirit is the master spirit of the age—the farmer the last to respond to it."

Wallace's "Farmer" advises that one of the first things to do is to form social clubs and get acquainted, learn how much of real goodness there is all about us. Every community has lots of latent talent, all that is needed is the magic wand of leadership, of organization to set these dormant forces to work. Adjoining schools can arrange speaking contests, adding and spelling-down tests, recitations, music, discussions. Schools should be made centers of social life. Verily there is a real hungering and thirsting for social life, for righteousness, which is right relationship.

From social gatherings will evolve plans for co-operative business undertakings, creameries, laundries, test-

ing associations, breeding associations, and stock shipping associations. I want to urge you not to look to these collective efforts so much for dollars gained or saved, but as means of intellectual and spiritual growth. If we let the sharp-witted men of the cities make our butter, bake our bread, cure our bacon, market our crops, sell our stock and control our business relations, we simply fall farther and farther behind in our social and intellectual developments. We must educate, organize, and do things, or lose out.

In conclusion, I want to quote from the Bible of God's call to Abram: "Now the Lord said unto Abram, get

thee out of thy country and from thy kindred and from thy father's house unto a land that I will show thee." So the Lord is just as truly speaking in visions to you and to me, as he did to Abram, bidding us to break from the dead past and seek a new, a better relationship. Will you, like Abram be obedient to these heavenly visions that are calling you to be better farmers, better citizens, and to help build a new civilization so permeated with democracy, with love, with the golden rule, that it may live on and on, to bless, to make fruitful and beautiful the face of all the earth? Adjourned to 7:30 p. m.

#### EVENING SESSION.

The session met at 7:30 p. m., same day. Supt. McKerrow in the chair.  
Music, Piano Solo.

Supt. McKerrow—Twenty-five years ago the 28th day of last November, the first Farmers' Institute under an annual appropriation here in the state of Wisconsin was held at Hudson, and so far as we know that was the first Institute under a continuous state or provincial system that was ever held in the world.

Tonight we have with us one of the men who took part in that program, one of the men who has been very

close to the Farm Institute work of Wisconsin from that day to this, he is one of St. Croix county's farmers, and I believe it is very fitting that tonight he should give you the reminiscences of twenty-five years Farmers' Institute work in this state. I have pleasure, not in introducing to you, because you all know him, but in calling before you Mr. W. C. Bradley of this county.

#### REMINISCENCES OF TWENTY-FIVE YEARS OF INSTITUTE WORK.

W. C. Bradley, Hudson, Wis.

To the few here tonight who remain of the many who attended the first Institute more than a quarter of a century ago I open memory's page; to the younger people here tonight who have noted the rapid changes in the industrial world, some good and

some bad, to you I still give hope of better things.

Professor W. A. Henry, who twenty-five years ago was struggling to make the Agricultural college of some use with the little handful of students he had at that time, suggested to Super-

intendent Morrison the placing of the first Institute at Hudson, where he knew the farmers were wasting the soil fertility by growing grain almost exclusively, and that first meeting was a "hummer," as there were few chores to keep the farmers at home in those days and, strange as it may seem now, we discussed how best to get rid of the straw, whether to scatter over the fields with team and straw pole, or to burn in the stack.

But there were men on that first program who urged growing more live stock, and some of them, Governor Hoard, J. M. Smith, Professor Henry, are known world-wide as agricultural educators, but of those who were on the first program only three are alive today.

#### Skeptics.

In the early days the conductors and workers were regarded by many farmers with skepticism, book farming was in disfavor and it was hard work for Supt. Morrison to get the right kind of men, and a few men who were not practical but great talkers did more harm than good, and for the first ten years it was hard to get the confidence of the people, but when such men as McKerrow, True, Convey, Briggs, Noyes, Goodrich, Cole, Hill and other earnest, practical thinkers and workers got to be well-known, criticism ceased and farmers came with an earnest desire to learn and help on the cause of agriculture, and there are some who have long since dropped the work whose kindly faces will be remembered for years to come. Goodrich and the cow, Arnold and the steer, Wylie and the hog, Phillips with his apples, Kennedy Scott, who always talked in a whisper, could be heard from here to Halifax, Theodore Louis and Charles Linse, with their quaint German characteristics and sturdy honesty, did much to bring the foreign element in touch with the work and

we have noted a great change in the German counties in the eastern part of the state; twenty years ago it was very hard to interest them, a great many could not understand English and came simply to have a good time, smoke and drink beer, but the younger people have taken hold and now we find many of the largest meetings and many of the most up-to-date farmers in the state along the Lake.

#### Changes Brought About by Institute Work.

In the north and western part of the state a great change has taken place in twenty-five years. From grain and baled hay we have changed to meat and milk, so many farms are growing better in fertility, splendid barns have taken the place of straw sheds and good stock is coming fast.

In the potato district of central Wisconsin, in the first years of the Institutes they wanted the whole time devoted to potatoes, but we talked cow, clover and corn till a few became interested, and now Waupaca county is one of the best dairy counties in the state, with hundreds of silos and well filled barns, and they grow as many potatoes on half the acreage.

Southwestern Wisconsin has changed the least of any part in the state; they were growing beef and pork before the Institutes started and keep it up much the same. There are a few dairy districts, a great deal of the corn is left uncut, there are few silos, the farmers have an easier time than in the dairy districts, but the farms do not look so thrifty.

#### Changed Conditions in Growing Live Stock.

The Institutes and Dairymen's meetings have worked a wonderful change in favor of dairy breeds, and community breeding has made Wisconsin noted all over the United States for well bred herds of clean dairy cattle

that have been selling for almost fabulous prices, and with the high price of dairy products and Institute workers urging the building of silos and sowing of alfalfa, we believe milk is produced cheaper in Wisconsin than in any other state, so while there have been many discouraging times in the work, we still think it has been worth while.

#### Experiences.

The workers have met with many funny experiences, some pleasant, some otherwise. Four of us have slept, or tried to, in a room eight feet square, where two feather ticks were thrown on the floor, with two more ticks for covers. I remember closing a very good meeting in Coon Valley, a Norwegian settlement, and on the way to the train a fine looking, tall Norwegian said to me, "Mr. Bradley, you fellows ban give us fine talk, I tank you fule most of dem fellars, but you don't fule me, you no farmer, your hands and talk is soft like preacher man." Well, I said "My friend, I wish you could see me at home and you would change your mind."

So it goes, we are judged and misjudged, but we have made many pleasant acquaintances and we are sure that the thousands who have attended these meetings are glad they live in Wisconsin.

Song Ladies' Quartette.

Scotch Impersonations, Mr. John Imrie.

Music, Vocal Solo.

Supt. McKerrow—Some fifteen years ago Wisconsin sent out a call to the Institute workers of North America for the organization of the American Association of Farmers' Institute Workers, which organization was formed in this state, and it has grown until practically every state in the American Union and every province in Canada is a member of that Association. At our annual meeting last October in the City of Washington, made up of the representative men and women of all these States and Provinces, in listening to the subjects presented and especially the discussions presented by the ladies along the line of work they represented, I heard one lady, who, to my mind, presented her topic in a very practical way. Now, I think if I have received any criticism among my co-workers in the United States and Canada, it possibly has been that I hold the Wisconsin work to the intensely practical. But I was impressed by the practical talk presented by this lady and I said to her, "Will you come over and help us in Wisconsin," and you have the answer to that request here tonight. I take pleasure in introducing to you Mrs. Henrietta W. Calvin, of Indiana.

Mrs. Calvin—And, friends, when Mr. McKerrow said that to me, I said, "I want to come, because Wisconsin has done so much that we of other states are anxious to look to you for leading," and that is the rest of the story.

(Mrs. Calvin's address will be found on page 282.)



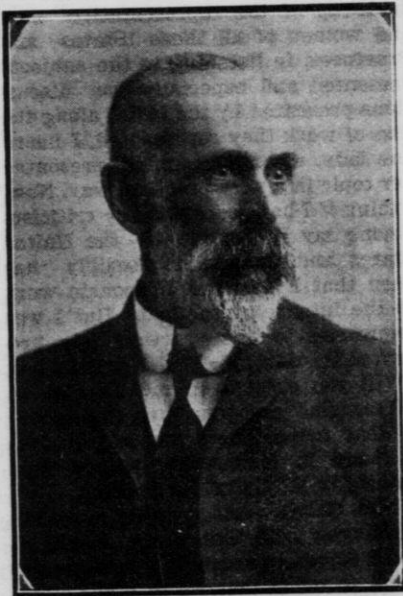
**THIRD DAY.**

The convention met at 9:30 a. m., March 16, 1911.

Prayer by Rev. Blakesley. Mr. Thomas Convey in the chair.

**HOW TO GET THE GOOD COW.**

H. D. Griswold, West Salem, Wis.



**Mr. Griswold.**

The most beautiful and interesting of all things on the farm are the things that live and breathe. The more we study them, the more interesting they become, and the better we feed and care for them, the more profitable they are.

One of the things most necessary to man's life and happiness, and yet one of the most neglected and despised, is the cow. She is fed grudgingly and cursed because she does not give

more. We boast of our state that we are taking the lead in dairying; that we have so many cows that have made large records. True, but we have also a great number that do not even pay for the food they eat. We have cows in this state that have beaten the world in production and the present state contest is bringing out a great number of high producers in all the different breeds. Where do they come from, and how are these records made?

**The Man Behind the Cow.**

In every case, if you trace back to the source you will find a man back of the cow who has studied her breeding, her feeding and her care; a man who has taken time to study type and form, the proper mating, the proper development, and knows how to feed and care for her; has taken the time to weigh and test the milk, in short, has made this work his business, and the result has not been chance, but a natural result of business methods properly applied. Many a cow has lived and died in obscurity that could have made a great record because her owner did not know enough to feed and care for her properly.

What are we going to do about it? Let us go to Farmer A's place and look over the situation. Farmer A. says. "I know my cows are not first-class but I cannot afford to buy high-priced stock and I have not the time to do

this weighing and testing that you talk about." Now, we all have the same amount of time, twenty-four hours each day, no more, no less, and when we say we have no time we mean that we prefer to spend the time in some other way. The farmer says, "Some-

poor man poor. The farmer does get up early and work late, sometimes, but when it comes to business and business methods, he is the most shiftless and lazy of any man on earth.

The cow is your machine, to consume your crude farm products and



Good care.

time I intend to have better cows." My friend, life is short, why not begin today? But he says, "What can I do today?" You can put up a milk sheet and a scale in your stable and begin to weigh the milk. You can send for a tester and begin to test the individual cows, so you can cull out the poor ones. It is the indifference and neglect of these things that keeps the

turn out a finished food product for man. The good cow can make for her owner a double price for his hay, his grain and his corn. It can be done and is being done by so many men now that there is no question about it.

#### The Head of the Herd.

Another thing you can do today is to sell that scrub bull, sell him at any

price you can get; get rid of him before he does any more mischief; he is a curse to your herd and a blight on any future improvement.

The sire is more than half the herd and it is to him you must look for all future improvement. We have good breeds and good animals in all the leading dairy breeds. Choose the breed that suits your fancy and your conditions and then stick to it as long

back, a clean cut head, wide between the eyes, and a full bright eye, small horns and a small neck where it joins the head, and a neck of good length. See that he comes from a line of regular breeders; avoid a shy breeder.

If you can get a mature sire that has heifers of his own getting, you can judge his worth by them. The best test of a sire is the stock he gets.



Third crop of clover.

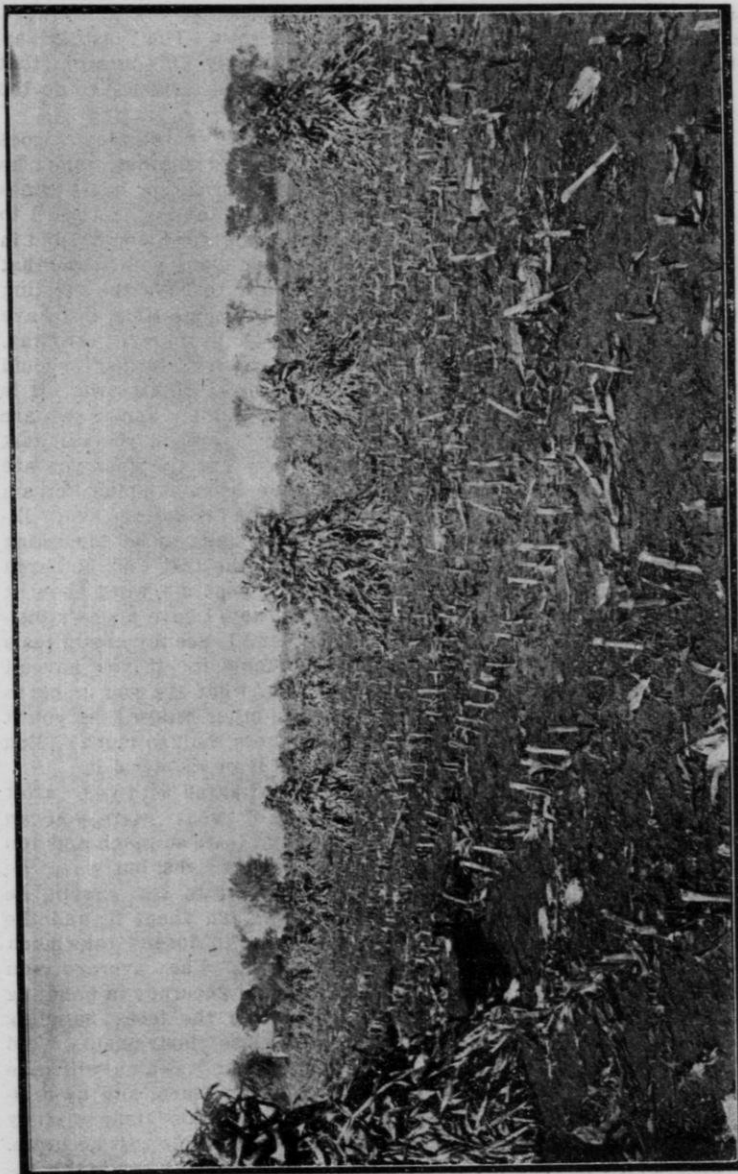
as you live. Our farmers are not so poor today that they cannot afford a good sire for the herd.

The more I study the dairy business, the more I am impressed with the value of the good sire, and it is important that we pay strict attention to his selection. Of course, we want a full blood and one that has a good mother. We are after production and we must have a line of good producers behind this animal on both sides. Look this up carefully. If there are no records, let him alone. Not all full bloods are good, some are worthless, so insist on the records.

He must be well grown, strong and healthy, and have the dairy type. That is, a large, deep body, well sprung ribs, soft mellow hide, a strong

#### Building up the Herd.

Mate this sire with your best cows, which you have found by weighing and testing, and when the calves appear take care of them with the object always in view that they are to be the future herd; always feed them well to develop the best there is in them and have them come fresh not less than two years old, and older is better. Select these again by weighing and testing the milk, and while you are doing these things study the feeding and care and you will find a pleasure and profit that you have never known before. And every man who takes care of these domestic animals as they should be, develops in himself a better citizen, a kinder heart and more



Corn field on the farm of H. D. Griswold, West Salem, Wis. In the dry season of 1910, this field yielded 17 tons of silage per acre.

lovable man in his family; he has the satisfaction of a well filled pocket book, a clear conscience and the knowledge that he is a public benefactor.

#### DISCUSSION.

Mr. John Imrie—Supposing, after you have kept this milk sheet and kept tab on everything, and have reason to expect from her breeding that she is going to be a good cow, she does not come up to your expectation at the end of the first year, would you keep her and try her again, or would you turn her off then?

Mr. Griswold—That is when we make our selections, the first year. If everything, so far as we can see, is all right and she doesn't come up to our expectations, we get rid of her the first year, but if we think there is any good reason why she has not had a chance to do her best, then we wait another year. We consider that a heifer at two years old ought to give from twenty to thirty pounds of milk a day, making not less than a pound of butter fat. If a two-year old heifer will not do that, we do not want her.

Mr. Jacobs—I guess I will have to agree with you that the average farmer is lazy, because I belong to that class myself, but I want to ask you, seeing so many farmers after having all this good advice so many times are doing little or nothing, don't you think we will get better results to advise test associations and try to induce the farmer to go into them, so the matter will be in the hands of some person whose business it is and the work will be sure to be performed?

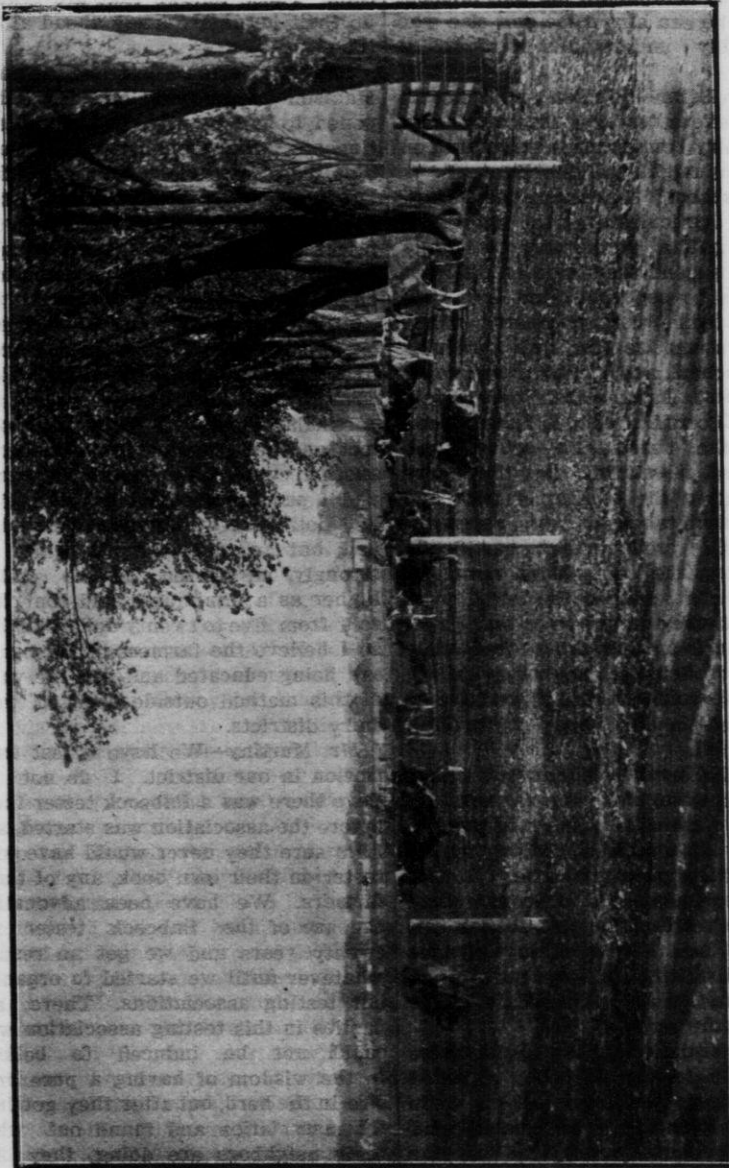
Mr. Griswold—The testing association is all right so far as it goes, but it cannot do away with the individual work. You cannot let out your job to somebody else and depend on that somebody else to do it and do it right; you have got to do your individual work

yourself if you are going to make a success.

Supt. McKerrow—The testing association is simply an educator that will prompt more farmers to do the work themselves.

Mr. Griswold—Yes, the tester goes from one house to another, and he carries good information many times from one man to another in regard to feeding and caring for his cows, and in regard to a good many points, and that is an easy way to have the testing done, but, at the same time, you have to weigh the milk yourself anyway, and I believe every farmer should have a milk tester of his own. It is no trick to test milk, and if you are shipping milk or cream, you can test them and know exactly what you are doing. I have been shipping cream to the city of La Crosse, and every little while there used to be something or other about the test that bothered me when they sent me word how it came out, but now I have my own tester, and when I see my cream tests so much, I know it. If you haven't your own test, what are you going to say when the other fellow tells you it doesn't test more than so much? You cannot prove it or disprove it.

Mr. Jacobs—I agree with you. After an experience of twenty years, you can say your cream tests so much and you know your test is right, but when the average farmer tests his cream, he doesn't know much about it, and the man he sends it to doesn't take much stock in his test. The average man doesn't have that accuracy in handling and manipulating the test, handling those small glass instruments, and other things about it which will take him some time to learn, and he ordinarily will not take the time to study it out so as to make his test accurate. Although I believe with you in the necessity of his keeping these weights, etc., I do not believe, as a rule, that it is going to be practical for the



A herd of good Guernseys at rest on the farm of H. D. Griswold, West Salem, Wis.

farmer to manipulate his test himself. I think he can hire some one else who thoroughly understands it to do it cheaper.

Mr. McLeran—Wouldn't it be practical to have a testing association in those dairy communities something on what you might call the lines of a testing school? I presume the Department of Agriculture at the university is willing, if a community is large enough, to send their men on different occasions to see that they are conducting their work properly. They could systematize that into a regular testing school, and I think a way could be found so that the state could probably issue certificates to different members of the association—school, you might call it—stating that they were proficient in the testing of milk and cream; then when it was necessary they could produce that certificate, show it to the commission men, or anybody that claimed the tests were not right, they would have that paper to fall back on and show that they were as proficient as anybody else.

Mr. Griswold—I think if we have so many cogs in our wheel it wouldn't work at all.

Supt. McKerrow—I believe the most important thing for the farmers of Wisconsin, which Mr. Griswold touched upon, is this matter of grading up the herds with a pure bred sire. It will bring more money to Wisconsin than even the testing. I want to ask Mr. Griswold, has there been any advance in your district in that matter of grading up, and in the value of the grade cow over the scrub?

Mr. Griswold—Yes, there has; there has been a decided advance. I asked our creamery manager just a little while ago how the cream checks paid out at the creamery compared with the former amounts, among those men who were grading up their herds, and as compared with those who were not paying attention to grading up, and he

said, "Those fellows that are grading up their herds are away ahead all the time."

Supt. McKerrow—In traveling out of Madison on the train one day, I happened to fall in with one of the auctioneers, who probably sells more high class farm stock than any other, and incidentally he made this statement to me, "It is wonderful how the prices of grade cows have gone up in the last few years." He was speaking of dairy breeds. "At my sales this winter those showing this kind of grading up have sold at from ten to twenty-five dollars a head higher right along than those which did not show any particular blood." A little later on I met another prominent auctioneer in another county in southern Wisconsin and I put the question to him, if he had noticed any difference. He said he had, but he didn't put it quite so strongly, he started at five dollars higher as a minimum; said that they sold from five to twenty dollars higher, so I believe the farmers of Wisconsin are being educated and see the value of this method outside even of your dairy districts.

Mr. Martiny—We have a test association in our district. I do not believe there was a Babcock tester there before the association was started, and I am sure they never would have got a tester on their own hook, any of those farmers. We have been advocating the use of the Babcock tester for twenty years and we got no results whatever until we started to organize our testing associations. There are parties in this testing association who could not be induced to believe in the wisdom of having a pure bred sire in the herd, but after they got into this association and found out what their neighbors are doing, they became interested, and through the instrumentality of this cow testing association, there have been brought into our locality not less than five or six

pure bred Holstein bulls and three or four Guernsey bulls, which never would have been brought into that locality if it had not been for the cow testing association. The cow testing associations represent the best principles of co-operation, and I am heartily in favor of them, not only in the matter of breeding up, but in other matters; for instance, since we have established ours there have been a great many carloads of gluten feed brought in there, there have been a great many ventilators put in barns and cement floors, and this all comes because the farmers are working together and thinking along certain lines in a concerted way.

Mr. Jacobs—Of course many of these things which Mr. Martiny speaks of have come in as results of the recommendations of our testers. Speaking of the farmers making individual tests, in most every case I know of, where farmers have bought testers, they have used them a few times and then stored them in the garret, not because it was not practical or wise to use them, but because they didn't have the inclination. There are individuals who make a great success, as Mr. Griswold has done, but I feel sure that the farmer is going to get the best results from the association.

A Member—Isn't it difficult to raise a special herd when the neighbors cannot agree on a special breed in the community? There has been trouble out our way. I started with a special breed, my neighbor has another, and they accidentally came through the fence and so there was trouble.

Mr. Griswold—When I started with mine, there were no others of that breed in the town at all. So far as the animals mixing is concerned, a sire should never be allowed to run with the herd anyway, never. We always keep him by himself, so we know where he is, not only for safety, but also in order that we can keep a record

and know when a cow is due to come in.

Mr. Roberts—Mr. Martiny is right in a measure about testing and the consequent improvement, but you can never get the maximum yields from a dairy cow unless she has breeding behind her; it is the breed quality that makes the good cow, quality comes by inheritance.

Chairman Convey—Now, Mr. McKerrow wants to speak, I see.

Supt. McKerrow—You let Roberts steal my speech, but I am going to say a word just the same. I do not wish to belittle the cow testing association and did not intend to do so when I said that breeding up herds would bring in more money to Wisconsin than any other thing, and Mr. Martiny has not convinced me to the contrary, yet. Of course, it is a matter of educating the farmer, and also, of course, this testing of cows is one of the means of educating the farmer, but the auction sale where the animal sells higher than another animal which has not been graded up, that fact will come to the attention of more farmers than will the work of your cow testing association. Therefore, I still contend that grading up will do more good in the immediate future in dollars and cents for the taxable property in the state of Wisconsin than will any other one thing. The test backs up the feed question, and that is almost as important as the breed question. There will be the introduction of pure bred sires. Let us have all the pure bred sires we can. There will be your testing associations; let us have them. We must educate along all lines.

Mr. Jacobs—I think it was the cow testing associations that caused the high prices at the auction.

Mr. Purse—We have had some trouble in our neighborhood where we were trying to keep our Jerseys pure, and it has cost us quite a little loss

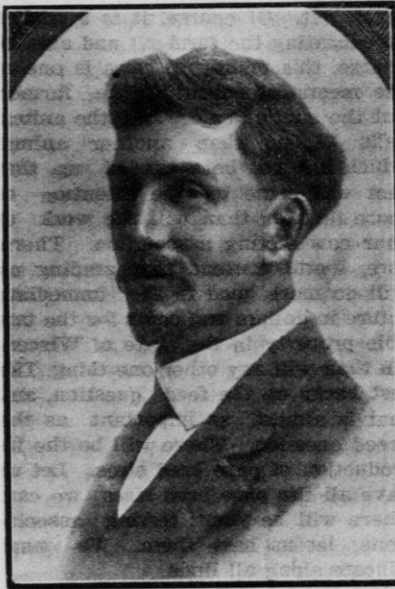


financially in building up our herds. One of our neighbors did a thing which I thought was right, although he hated to do it. He made his neighbor pay, and still it didn't make up for the loss that was caused. Within the last year I had to sell one calf from a very nice Jersey cow for five dollars which I would not otherwise have sold for twenty-five dollars, and I have another one which I would value at fifty dollars and will probably have to sell for a good deal less on account of those accidents. What shall we do?

Mr. Griswold—That is a pretty serious question and will have to be decided by local conditions rather than in any other way. These animals should not be allowed to run at large at all. A community can help itself very much by going into community breeding, and a test association is a great help, but a man has got to do a lot of work himself. You know the old saying, "You cannot get to Heaven on your wife's ticket."

### CARE AND MANAGEMENT OF THE DAIRY HERD.

F. B. McLeran, Wrenshall, Minn.



Mr. McLeran.

I feel somewhat out of place in coming over to Wisconsin from Minnesota to talk dairy cows. In our state on a Farmers' Institute platform, whenever

we want to tell our farmers how poorly they are doing, or whenever we want to hold up an example to them, we always refer to the state of Wisconsin, telling of the wonderful things you people in Wisconsin have done. When listening to these gentlemen who have been talking, I could not help thinking of the first Farmers' Institute meeting which I ever attended, and of a certain piece of advice that was given me there and which comes back to me today. That was about twelve years ago. At that time I had just an ordinary herd of very poor scrub cattle. I was talking to Superintendent Gregg after the meeting, I was pretty young and I had been realizing more and more that there were many things I did not know about agriculture; in fact, I was pretty well discouraged with my farming proposition, and I said to Mr. Gregg, "I believe the best thing I can do is to get away from the farm, because I have grown to manhood, have never had an agricultural education, I don't know very much about all these things you gentlemen have said here in these last two or three days, and I have never realized before how much there was to learn

about agriculture and dairying. I think I had better go back to the city and do some work with which I am familiar." He put his hand on my shoulder and said, "Young man, the fact that you realize that you don't know all there is to know about agriculture is going to be the greatest benefit in the world for you, because you will now go ahead and learn. Remember this, that whenever you want to get information you should go to some man who has had experience in that particular line of farming, not only experience but who has made a success, and then go home and do just exactly as he tells you to do."

Well, gentlemen, if I were to try to cover my subject today briefly as to the care and management of the cow, the best I could do would be to say simply, go home and do just as Mr. Griswold has told you to do, because if you can do the simple things he has told you about, you have solved the problem of the care and management of the dairy cow.

I remember the first time that I ever had an opportunity to put into use this good piece of advice, which I believe accounts more than any other one thing for my being here today. It was shortly after I had been married and the question that was bothering me a good deal was—what in the world I ought to call my mother-in-law. I thought of it a good deal, and all at once I remembered Mr. Gregg's advice to go to some one who had had experience and had made a success. So I went to one of the boys who had been married for some length of time, and I said to him, "George, how in the world do you fix this mother-in-law deal; what in the world should a fellow call her? There is so much fun made of mother-in-laws, so many stories, I don't like to call her that, and I don't like to call her 'Mother,' because I don't want to call anybody

'Mother' excepting mother." He said, "Don't be so serious about it, old man; it is the simplest thing in the world, the first year you are married just call her 'Say,' after that call her 'Grandma.'" I did exactly as he told me to do.

#### Comfort the Watchword of the Dairyman.

On this subject of the care of the dairy cow I want to just run along rapidly and touch the high places. This whole subject can be condensed in one word,—“comfort.” There is no word in the English language that means so much to the dairyman as that one word “comfort,” and he would do well to have that word in big letters right up in his dairy barn, and to remember that anything he can do to add to the comfort of the dairy cow is going to add dollars and cents to his pocket, while any condition he has that is going to take away or lessen the comfort of the dairy cow is going to take dollars and cents out of his pocket. So we want to have a barn that is warm, light, clean and well ventilated, and we want to be regular in caring for and milking this cow; we want to have water in the barn if we can, we want to keep the cow in out of the storms, and we want all these things because they add comfort and that adds to the milk flow and to the profit.

On the other hand, everything that interferes with the comfort of that cow is going to cut down her milk flow and detract from the profit; so if we have our cow in a dark, cold, or ill-ventilated barn, if we take care of her in an irregular manner, leave her out in the cold, or get after her with a pitchfork, the milk-sfool or a dog, that simply reduces the flow and therefore cuts down our revenue and makes the difference between success and failure in our business.

### The Management of the Dairy Business.

Now, as to the management. I think Mr. Griswold summed the matter up entirely when he said we must keep a record with our cow, because if you begin to do that, you begin to appreciate what comfort means, you

grow up and don't know how, the mother has no time to milk, the old man doesn't like to, and the hired man won't, and so it is a pretty hard proposition.

There was a boy reading a paper one day and he turned to his father and he said, "Father, what is the meaning of 'Executive Ability'?" The



"And a little child shall lead them." Some of the "young stock" at Maplewood farm, home of F. B. McLeran.

begin to become a better manager, because that record answers every question that comes up in the dairy business. When we come to the management, perhaps we get down to the detail of the dairy business a little bit. I believe that one of the greatest questions that confronts the dairyman today along the line of management is the question of hired help, the question of getting milkers on the farm. It has been said that today the girls on the farm are too proud to milk, the boys

father answered, "Executive ability, my boy, is the ability to get your bread by the sweat of the other man's brow." Where we dairymen fall down is that we lack in executive ability.

Now, why is it that you can get good men to drive a team, to go out and work in the hay field, to work in the harvesting, and no complaint at all. but if you want a man to sit in a good clean barn on a comfortable milk stool and milk cows for a couple of hours a day it is almost impossible to get

him? Now, why is it? Simply because as a rule we put the milking on to the beginning and the end of a good hard day's work. We make the men who milk get up in the morning and do the milking before working hours, then go out in the field and come back and do the milking after a hard day's work. If I had a young man come on my farm to work for me and if he was not progressive and up-to-date enough in this day and age so that he would kick at those conditions, I simply wouldn't want him on the place at all. The way I manage that on my farm is to have one man who is the dairyman. He gets up in the morning before the other men get up, he milks the cows, comes in and has breakfast with the rest of the boys. He has got to get up early, of course, but then in the middle of the day he has a couple of hours off, and he has that time to make up for the extra time he puts in in the morning and at night, but at half past six everything on the farm is done, the boys come in, all through, at a quarter to six, put the horses away and at half past six the day's work is finished, and after supper they can go to town, or take their girls off riding, or read or study, or do anything they please. I have followed that system for several years now and today the dairyman's job is the best job on the farm. When a man comes looking for work and I ask if he can milk, he generally says, "Oh, no, never milked in my life." But after two or three months he often comes around and say, "I would kind of like to have the dairyman's job." "But I thought you couldn't milk?" "Oh, well, I have milked cows all my life and I can take as good care of cows as that fellows can; give me a show."

#### Some Short Cuts in the Management

Now, just one or two words in the way of management by making some short cuts, for whenever you do that

you reduce expenses and increase profits.

First along the line of feeding. For some years we used to weigh the feed all out accurately for each individual animal, and that is all right, providing you have the time, but we didn't want to use the time, we had it all right, but we didn't want to take it that way, so we simply made a scoop which holds



"Farmer" McLeran.

two pounds of our mixture, sometimes a few ounces more and sometimes a little less. We come along and each cow is named and the name hangs over her stall, and a card showing the amount of feed she needs, and if this cow wants two pounds of grain we give her one scoopful; if the card says that she wants four pounds, we give her two scoopfuls. Thus we can feed very rapidly and accurately.

There is one other way that you can save time; that is the question of keeping the record of the cow. I have

timed it a great many times, going through the entire operation of getting up from the milking stool, weighing and marking it down, and I find that it takes on the average just about thirty seconds to the cow, so if you have a herd of twenty cows it will take you only ten minutes more a day to keep track of what your cows are doing.

On the question of figuring up the records of the cow, we do as Mr. Griswold does, we figure it up at the end of every month, but I find that the average farmer simply will not do that. In the first place a column of sixty figures is somewhat difficult to add and be sure it is correct and they have a lot of columns and that comes along every month and they get discouraged and do not carry it out. So in Minnesota we advocate this method, which is fairly accurate, though of course it is not exactly so. We take the milk from the 10th, the 20th and the 30th of the month, and then we add those together, add on one cipher and we have got very close to the proper results, near enough for all practical purposes. If you have one cow that is a "cracker-jack" and you wish to take the time to add up the entire record, you can do so, as of course you have each day's record on all of them.

One more point. Some of our boys suggested that we should only weigh the milk from the cow on the 10th, the 20th and 30th, but I wouldn't stand for that a single minute, because in doing this we are losing the greatest value that comes from keeping a record. If you weigh the milk every day, it becomes the greatest educator of anything you can do. I believe, farmers, that if you will do that for one year, weigh the milk from your cows every milking for one year, you will learn more about dairying than you will learn in going to the Farmers' Institutes for the next twenty-five years, because you learn that first hand, you

gain that knowledge by your own practical experience, and there is nothing that strikes us so close as what a man learns from his own practical experience. Keeping such a record answers every question that comes up.

You might ask me here today, Does it pay me to feed my cows grain at the present time? We will assume that milk is worth a cent a pound and that bran is worth a cent a pound. I do not believe any of us could answer that question for anybody else. The only way I could answer it for you, for instance, would be to go to your farm and see your conditions, see your cows, take care of them for a while, and at the end of the week I wouldn't know anything about it unless we had weighed the milk from those cows. But suppose you are keeping a record of what those cows are doing; suppose the cow is giving twenty pounds of milk a day and you are not feeding any grain at all, and you start in and feed her, say, six pounds of bran a day, which you know costs six cents; suppose that in a few days the milk flow comes up to twenty-six pounds; that shows that from six cents worth of bran you have received six cents worth of milk, but suppose she comes up nine pounds of milk on six pounds of bran, then from your six cents worth of bran you have received nine cents worth of milk, and consequently you have learned from your own knowledge that it paid you to feed your cow that bran at present prices.

Now, I want to tell you that you ought to keep your cows in when it is cold and wet, but most of you think you ought to get them out for exercise, etc., to keep them free from tuberculosis and all those things, and you will go home from here and the chances are that you won't have much faith in what we have said just because we have said it. But if you are keeping a record and found that certain cows were giving, say, ten pounds of milk

on a certain morning and then a cold snap comes on and the next day your record shows that they have dropped down a pound, and the next day another pound, you will begin to wonder what is the matter. If you were milking the cow yourself, you wouldn't notice the difference of half a pound or a pound, but if you saw the figures before you, ten pounds, nine pounds, eight pounds, then you would begin to realize there was something the mat-

day they stop dropping, then they begin to pick up. You try turning them out again and find that they go down when you turn them out in the cold and go up when you keep them in, and so you learn from your own knowledge that it does pay to keep the cows in the barn in the winter. So I could give you many examples of the great educational value of keeping a record with your cows, but there are other speakers to follow. I thank you.



Gathering milk. Thoroughbred Guernseys at pasture at Maplewood.

ter with your cows, because it would be there in black and white before your eyes. You would look them over and you would say to yourself, they look all right, you would find out they were feeding all right, and then suddenly you would remember, or more likely your wife would remember and remind you, that last week some farmer at the Institute told you you ought to keep the cows in when it is cold. You think to yourself that you will do it just to prove that the fellow was wrong, you keep them in, and the next

#### DISCUSSION.

Mr. Griswold—I want to say a word in regard to the time it takes in taking care of the herd. We have no trouble with the milking problem. We do get up early in the morning, but we do not make long days. We take time to take care of the stock, but we stay at the table and we read the papers and we take a full hour, and sometimes an hour and a half at every meal and so we do not work hard. We take time to do that dairy work and attend

to it right, because it is our work, and then we make up for that extra time morning and night by taking a longer resting time during the day. In that way we can take care of our stock and have a good time at the same time.

A Member—When a cow drops her milk in the fall, can you ever get her back, in the stable or out of the stable?

Mr. McLeran—I do not believe that I could, although I would not say that it is impossible, because in looking over the records of many of our cows that have made enormous records, I find in some cases, although they have dropped very low in one month, they have been brought back to a very good yield. Personally, I have never been able to bring my cows up to the previous flow after I had let them go down once.

Mr. Jacobs—Like Mr. McLeran, I have found no difficulty in getting milkers when the milking was made a part of the day's work. How many cows do your milkers milk apiece?

Mr. McLeran—Sixteen to twenty, as a limit. I have had no trouble in finding men to do this work. One man is willing to milk twenty a day if that is made part of his day's work. We commence to milk in the morning at about a quarter past five, and we begin to milk in the afternoon about a quarter past four, making about an hour difference.

Dr. Porter—I begin about fifteen minutes earlier at night than I do in the morning, and I would like to know if it is just as well to commence an hour earlier at night than the hour in the morning, or should the time be evenly divided?

Mr. McLeran—I believe myself that in order to have the thing just exactly right, the benefit of the doubt at least is in favor of having the milking done at exactly regular periods. I would

prefer to have the milking start at five in the morning and five in the afternoon, but we never have been able to get it down to that system, as it makes it too late getting through at night.

Dr. Porter—Do you milk before you feed in the morning, and if so, why?

Mr. McLeran—Yes, we do. Perhaps the predominating reason is that we ship the milk on the early morning train and consequently we start milking with the least delay. Another reason is that where we feed first we disturb the atmosphere in the barn; getting the roughage in and the movement of the cows stirs up the dust, while if we simply go into the barn and go about the milking in a quiet way we do not disturb the atmosphere or the cows, and consequently there is not as much dust or as many germs circulating around.

Mr. Jacobs—I think that the regularity in the time of milking and feeding is of more importance than the even division of those times.

A Member—How long does it take a man to milk twenty cows?

Mr. McLeran—Of course it depends considerably upon the milker, but it takes in the neighborhood of two hours to two hours and a quarter.

Dr. Porter—Do you allow talking during the milking hour?

Mr. McLeran—Yes, we allow just ordinary, reasonable amount of talking, but no loud talking or hallowing back and forth.

Mr. Jacobs—The cows rather enjoy a quiet, conversational tone.

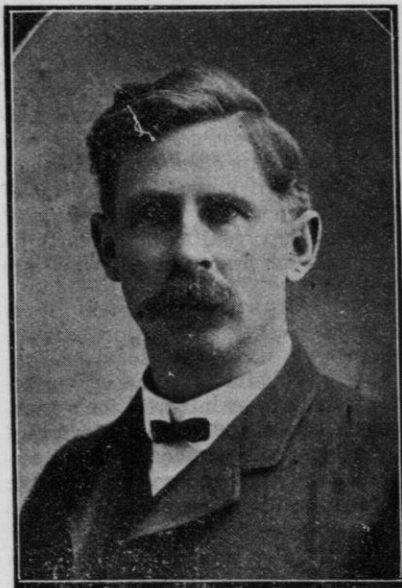
Mr. McLeran—Some of the boys talk to the cows, and that is all right.

Mr. Martiny—Do you find it handier to milk cows when they are not eating?

Mr. McLeran—Yes, morning or night.

## THE DAIRYMAN'S RESPONSIBILITIES.

E. L. Aderhold, Neenah, Wis.



Mr. Aderhold.

The last biennial report of the Dairy and Food Commission contains the dairy statistics for the year 1909 of each county in Wisconsin. From that report it appears that Sheboygan is the banner county in dairy production; also that she produces more milk per cow and per acre than does any other county in the state.

The receipts for cheese and butter manufactured in said county, together with the value of milk and cream consumed as such, bring the total value of her dairy products up to a figure slightly in excess of \$2,500,000.00. It amounts to five thousand dollars for each square mile of territory and approximately 4,800 pounds of milk per cow, containing 170 pounds of butter fat. The average net returns from the

cheese factory was near sixty-one dollars per cow.

The record for this county is very creditable when compared with that of other dairy sections, yet when compared with records made by certain individual dairymen in said county it does not seem worth bragging about, for there are hundreds of dairies there yielding an average of from six to seven thousand pounds of milk per cow, year after year.

It follows then that there must be a great deal of mighty poor dairying done to bring the average production per cow down to 4,800 pounds.

Some of the cow keepers in said county are by no means entitled to be called dairymen, for their stables are dark and filthy; their cows are scrubs, and I have seen herds of cows there that were starved down to a condition bordering on disease.

It would be easy to accumulate evidence, tending to show that in very many Sheboygan county dairies the cows are handicapped by unsuitable housing and improper or stingy feeding.

There are scattering dairymen in that county who secure an average of about eight thousand pounds of milk per cow and one hundred dollars net returns from the cheese factory. Such records have been made with herds that could not be called "half blood," where no individual records were kept and where alfalfa hay and corn silage did not enter into the feed ration.

With better breeding, individual records and with the liberal use of the two above named feeds, even these highest named records might be increased, and the food cost per unit of milk materially reduced, because alfalfa hay and corn ensilage together



are among the very best milk producing feeds and are at present the cheapest feeds we can grow.

#### Just Supposing.

Supposing all the cow owners in said county would use only pure bred dairy bulls; keep individual records of cows; grow alfalfa hay; supply corn silage enough to fill the needs of winter and summer; house the cows in sanitary and winter quarters, what would be the result?

With six years of systematic application of such methods, the production would be easily increased fifty per cent, which practically would be a clear gain because the feed cost would be increased but slightly.

#### Would it Pay?

Subtracting an assumed feed cost of forty dollars from sixty-one dollars earnings, the profit per cow in 1909 was twenty-one dollars. With earnings of ninety dollars, the profit would be doubled.

With the same number of cows, the same range of prices that obtained in 1909 and a like proportion of milk manufactured into cheese and butter, the total value of Sheboygan county dairy products would have climbed from \$2,500,000.00 to \$3,750,000.00

Incidentally, the value of her cattle, because of greatly improved dairy qualities, would be increased at least \$500,000.00.

The foregoing discussion shows plainly that Sheboygan county milk producers have only made a good beginning in the exploitation of their dairy possibilities and that being an "average" dairyman isn't anything worth bragging about when with a little common sense and a little earnest effort one can do so very much better than the average.

And what shall we say of those who are below the average and seem

perfectly contented to remain in that class?

#### St. Croix County.

While you people in this country are in it less extensively, yet you do considerable dairying, but it appears from statistics that your returns per cow are below the average for the state.

You have a good soil and good markets and the best service I can render to you in this discussion is to show your comparative standing in point of production per cow and to suggest that your opportunities for greatly increasing your profits in dairying are excellent.

#### The Square Deal.

Any great industry, in order to endure, should have integrity for a foundation. By integrity in dairying I mean that the consumer shall be satisfied with his purchase, he knowing all the conditions connected with its source or manufacture.

Several years ago a dairyman was arrested for selling cream that came from a very nasty separator. He fought the case, lost out, and when the judge pronounced the penalty he threw in this meaty benediction: "The consumer of dairy products has no means of ascertaining the history thereof. He is at the mercy of the producer. Unless you know your cream to be clean and wholesome you should not offer it for sale."

The foundation of that dairyman's business was not integrity. It was deception.

In our work of inspection, when we find a dirty meat market the owner is usually anxious to promise that he will clean it up promptly. He sells his wares in his immediate neighborhood and cannot afford the advertisement which might follow if he continued to conduct his establishment in opposition to sanitary laws.

The bulk of dairy products, however, are consumed many miles from their source, which renders it easy to deceive consumers and promotes recklessness in the production of said products.

Upton Sinclair appointed himself a committee of one to investigate the condition of certain Chicago packing establishments. That in itself was unimportant, but when he made known to the public the results of said investigation, the government got busy and things began to improve at a lively pace. The result was good for the consumers.

Publicity that benefits consumers surely benefits producers and trade in general, unless deception is relied upon in the sale of goods.

This is a day of organization. In some cities people are organizing under the name of "Consumer's League." It would not be much in advance of the spirit of the times if the work of such organizations resulted in the appointment of committees whose duty it would be to investigate conditions connected with the source, preparation for sale and marketing of food products.

Supposing distant consumers would send committees into the dairy states to investigate conditions along dairy lines. Would it be possible for a lively man to start out from any point and show such committee a dozen cow barns that are a credit to the industry, without encountering a number of barns of a very different type, unless he is a pastmaster in the art of dodging?

What impressions would such a committee receive when it got into townships where it is more difficult to find half a dozen cow barns that are reasonably sanitary, with clean cows, than it is to find two dozen barns that are all around insanitary, with very bad, filthy floors and filthy cows?

Would it whet their appetites for

dairy products if they saw a milker sitting between two such cows, with filth under him, behind him, in front of him and above him, with filthy hands manipulating a filthy surface above the milk pail? Would the marketing of milk so drawn appeal to them as a square deal?

If they undertook to estimate the percentage of milkers that actually strive to prevent dirt, dust, etc., falling from the flank and udder into the milk pail, would they put it at twenty per cent, or would it be nearer five per cent?

Would they sanction the use of unclean cream separators, as practiced in a majority of separator dairies? Would it make their mouths water for butter if they examined the slime in the separator bowl at one of those scattering dairies where they separate cream four times before they wash the separator? Would they sanction the marketing of such cream as food for man?

After investigating dairy separator premises in localities where the only consideration in the stationing of said machines was convenience to the source of milk and to the feeding of the skim milk, it found separators in insanitary cow barns, often containing filthy horse stalls and calf pens and some times chickens running loose, would they be surprised if they found a separator that was used as a hitching post for calves, or that was stationed in a pig pen?

And when they got to the measure of that man at the creamery, that butter maker, who, with contempt for the cleanliness practiced by some of his patrons, contempt for law, contempt for the consuming public, contempt for the welfare of his profession and with no self-respect, sends his haulers out to gather in this cream, with absolute indifference as to quality, mixes it all together and manufactures it into butter, because he knows he

can fool the consumer; when they got his perfect measure and painted his picture according to their true conception of him, what would that picture look like?

If such committee should, in hot weather, happen to arrive at one of those cheese factories where many tons of whey had flooded the soil, and got a good whiff of the predominating odor, could they ever thereafter think of a cheese factory without recollecting that whiff? (And, by the way, if a cheese factory patron is a contemptible cuss, by what better means can he demonstrate that fact than by leaving his whey to befoul the cheese factory premises and the cheese maker's door yard?)

And if such committee should run across a cheese factory that is in the possession of flies to such an extent that nothing in it can be clean for an hour, where the surface of the milk or the whey in the cheese vat constitutes the chief means of catching the nasty things, could they ever again see cheese without hearing the flies buzz? If they examined some whey tanks of the unspeakable type and learned that their contents are carried in the same can that conveys the milk to factory, would that increase their hankering after cheese?

These questions, and others, are pertinent if the foundation upon which rests the traffic in dairy products were investigated, and if the correct answers to them were truthfully made known to the public, what would be the results of such publicity?

Would the consumers be satisfied that we have been giving them a square deal?

The dairy industry needs adjusting in some respects. With very high prices during the past five years, an appreciable portion of the cows were kept at a loss. Something wrong there.

While consumers were paying long

prices for cheese and butter, we frequently deceived them in the quality of the goods. Something wrong there, too.

At times, because of exceedingly high prices of butter and a high tariff thereon, millions of good citizens were compelled to go without it and use oleomargarine. Something wrong there also, when the laboring man must give up the genuine and use the substitute food.

Wisconsin's dairy products are valued, in round numbers, at \$80,000,000.00 annually. That is a staggering figure, yet this production should double a number of times at a rapid rate, provided the industry rests on a good foundation.

The responsibilities of our dairymen, it strikes me, are to produce more abundantly, so that dairy products will not be regarded as luxury; to produce much more economically, so as to enable them to sell at prices within the reach of all good and useful citizens; and to produce, manufacture and handle their wares in an reasonably sanitary way, so that the consumer gets a square deal, for when the public has confidence in the integrity of the industry, good dairying will always pay.

## DISCUSSION.

A Member—Wouldn't it seem reasonable that those who are below the average will have to go out of business?

Mr. Aderhold—They do not know that they are out of business, that is the trouble.

Mr. Imrie—In looking at the records from St. Croix county, it makes some of us feel ashamed. We know there are some that are getting from sixty-five up to one hundred dollars per cow from the creameries, and we do not like to think how low some of them must go to make the average only

thirty-one dollars throughout the county.

Mr. Aderhold—It is no disgrace to be below the average, but I think it is nothing to brag about to be willing to stay there when it is so easy to be above the average.

Mr. Nordman—Do you know anything about the average size of the farms down there in Sheboygan county as compared with the average size of the farm up here in St. Croix county, and would not that make some difference?

Mr. Aderhold—I think very much. In Sheboygan county the farms probably do not average over one hundred acres, there are many eighty-acre farms and quite a number of sixty-and forty-acre farms. A one hundred and sixty-acre farm is a pretty big farm down there, but this ought not to make any difference with the average production per cow, while it would for the average production per county.

Mr. Nordman—If a man has more land than he can handle, he does not have time to do good, thorough work in the barn that he should have.

Mr. Jacobs—I think that one of the reasons why we have such a low average is the number of people who are just keeping a few cows as a side issue. They are farming, not dairying, while in Sheboygan county they are all making dairying their business; their business is keeping cows.

Chairman Convey—Is the dairy business of the state improving, is there a marked improvement in the dairy business?

Mr. Aderhold—There is in the sanitary conditions.

Mr. Imrie—Is there in the annual production per cow?

Mr. Aderhold—I certainly think there is.

Mr. Bradley—I think perhaps one reason why the Sheboygan county people get more per cow is that most of those farmers are small farmers, and

the farmer and his wife attend to the milking. In St. Croix county we have to depend almost entirely on hired help, and we have one kind of a man one month, and another kind of a man next month, and we certainly do not have the kind of help here that they have farther east.

Mr. Jacobs—You have wives and daughters.

Mr. Bradley—Yes, but they won't milk.

Mr. Aderhold—If your farms were only one-quarter as large as they are, you would probably have many more working men in the county than you have now.

Chairman Convey—We must not forget that there is probably much less winter dairying here.

A Member—Even where these dairymen have made their barns in good shape and have these high-priced cows I do not see how they can meet the competition of men whose wives and daughters and sons help, even where the daughters and sons ought to be in school.

Mr. Imrie—I suggest Mr. Jacobs answer that question. His wives and sons and daughters do not help.

Mr. Jacobs—I am dairying by "executive ability." I do not claim I am making the profit that some men are making, but I look carefully after watching the cattle, feeding and caring for them, and am still making some profit and hope to continue to do that.

Mr. John Imrie—I have always done my milking myself, but once in a while, for a Round-up or something like that, I have to hire a man for a couple of days, and I will acknowledge I can generally notice a little difference when I get home in the flow of milk, but I believe if we will put a little more thought and study and energy into it, and be a little more careful in the kind of help we have, and, as Mr. Griswold says, make the milking

part of the day's work, so as not to crowd it into the night or too early into the day, and try to keep the help contented, it seems to me that we can, partially at least, compete with those who do the work themselves. It seems to me that the wife or the daughter of the average farmer generally has enough to do without doing milking. Perhaps we may save a few dollars and cents, we may produce a pound of butter a little cheaper by always doing it ourselves, but whether in the long run it is going to pay or not is something we must study for ourselves. I hardly think it will. I think by going at it intelligently, we can work it out all right.

Mr. Berry—We have two farms over in Dunn county that belong to a corporation, and of course the corporation has no mother, or wife or daughters; it has to hire help, but the hired men work regular time. They commence milking at five o'clock in the morning, the men have an hour for breakfast and an hour after dinner at noon. They being milking again at four o'clock and finish shortly after six, and we have no trouble at all in getting milkers. We have at the present time one single man and two married men, and they have been with us over a year. There isn't as much in it as where you do the work yourself, but still there is quite a little money. We have a good market. We ship our cream. I think it will be all right if the milkers are asked to do a day's work and not two days' work in one day.

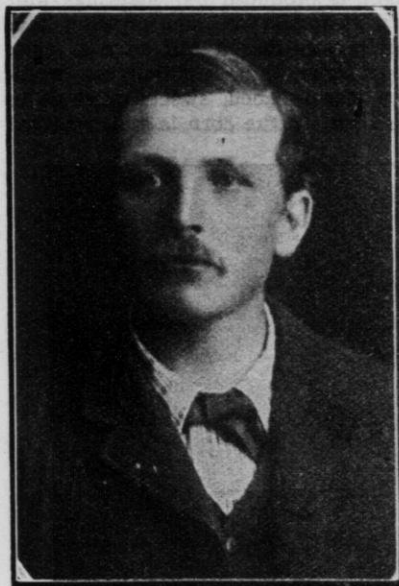
A Member—What does your herd average per month?

Mr. Berry—Our dairy averaged last year \$102.60.

A Member—I belong in St. Croix county, though I now live in the southern part of the state, and I felt bad to hear so poor a report, but, as a gentleman has said, when we get a man to see his condition, he will try to do better. We have been dairying on dry feed, both winter and summer. We went to work and built a silo and we found we could do just as good with more cows, so we are milking now thirteen new ones through the month of January, feeding ensilage and some dry fodder. For December the average was a little over eight dollars for the month. In January, the ten cows gave us a little over eight dollars each. We have been taking our milk over to the Roberts' creamery. Through February the price went down; they did not average us quite eight dollars. By taking the winter dairying with our silo, I think it will give us summer feed in the winter, and I believe our whole sixteen cows will average us over seventy-five dollars a piece. I believe I can do that, one man alone, and I do not know why the rest of the farmers in St. Croix county cannot do it if they will go to work and put up a silo and feed the right kind of feed, and then in the course of time we can come up to the other county, and probably a little bit ahead.

## DAIRYING IN NORTH WISCONSIN.

E. Nordman, Polar, Wis.



Mr. Nordman.

I want to say, Mr. Chairman, when we speak of northern Wisconsin we do not generally include this section of the state. Northern Wisconsin in the popular minds is associated with that newer section which has just been developed. You people have been settled here as long as they have been in the central part of the state and conditions are generally about the same as in the older sections, so this paper does not apply to you at all, but to another section of the state entirely.

As other papers have dealt with the technical features of the dairy business, I propose to confine myself to a discussion of the peculiar advantages that are offered by northern Wisconsin to persons who wish to engage in

dairy farming and to show how men of small means can develop a dairy farm and with it a prosperous, independent livelihood.

#### Lines of Farming to Which This Section is Adapted.

I wish to state at the outset that there are many lines of farming for which this region is adapted. Fruit of different kinds is produced at a good profit. Various special crops, such as peas and sugar beets, are grown as successfully in the northern as in the southern part of the state. Horses and sheep can be reared with as much success here as in southern Wisconsin or in the prairie states. Poultry farming for those who like it can be made as remunerative in this section as elsewhere, and so on.

#### Northern Wisconsin a Distinctively Dairy Section.

But, for several reasons, a few of which I shall try to enumerate, the northern part of our state for a long time to come will remain distinctively a dairy section. To begin with, our soil and climate are well adapted to the growing of crops best suited to dairy production. Considering both quantity and quality, it is doubtful if any section of the United States, outside of the irrigated districts, can excel the one in question in the value of such feeds as can be produced on a given area of land.

Corn can be grown in the northern half of the state, which, when made into silage and fed to good cows, will produce one hundred dollars' worth of milk per acre of corn. To raise such crops will not require extraordinary efforts on the part of the farmer, either; just good, sensible farming, in

which the corn is planted on a clover stubble that has been well manured, the soil of which has been in good previous condition by progressive farming.

Equally valuable crops of clover can be grown, and as to alfalfa, there is every reason to believe that ultimately this crop will be grown as successfully and extensively in northern Wisconsin as in other parts of the state.

of place to mention the fact that it is practical and profitable to grow a quality of ensilage in northern Wisconsin that is equal to the best pasture grass as a feed for dairy cows. Such ensilage is produced by planting flint corn on fertile land and growing it in such a way that it will have a dark green color and yield fourteen or fifteen tons of good, sweet ensilage to the acre. If the corn is well matured



Two Guernsey heifer calves 8 months old, raised on farm of E. Nerdman, Polar, Wis.

Then we have oats and peas and roots, all of which crops produce large yields of very excellent feed. There is one distinctive feature about all kinds of forage crops grown in this northern latitude, they all contain a larger percentage of the protein element than the same crops grown farther south. This is a matter of considerable importance, since it is the protein element in our cow feed that is the most expensive. The more of this element, therefore, that can be supplied in the roughages, the more economical will be the feeding.

In this connection it may not be out

and put into the silo as dry as it will keep, it can be fed at the rate of a heaping bushel basket full twice daily, to an average sized cow with excellent results.

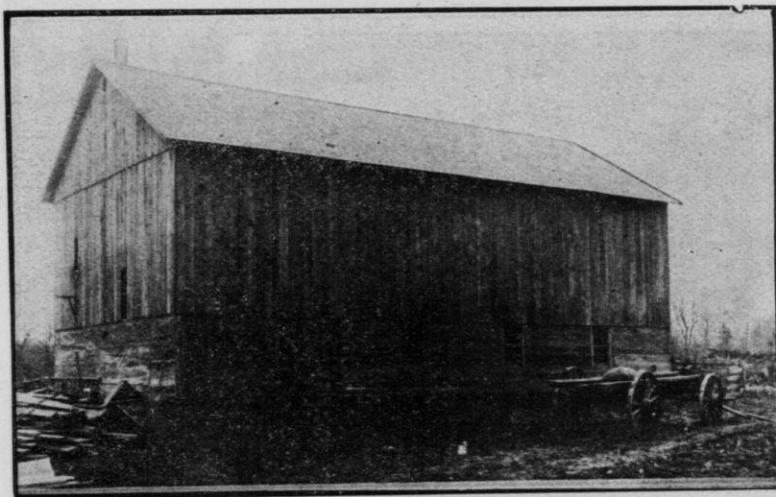
So much for the natural advantages which this region offers for dairy production, but there are other reasons for believing that dairy farming will be the most important industry for this region.

First, the dairy cow is the most economical producer of human food of any domestic animal, and as such she will be utilized to a greater and greater extent as land becomes scarcer and

higher priced. Secondly, the market for dairy products promises to remain the steadiest of any commodity produced on the farm, and third, because dairy farming is the surest means of keeping up the fertility of the soil. This last is of the greatest importance, since the soil of northern Wisconsin, as compared with that of

developed out of raw, cut-over land, of which there is great quantities in northern Wisconsin. Since those who undertake this work are almost without exception men of small means, I shall make my statements from the standpoint of men of that class.

All things considered, I believe that the clay and sand loam soils are best



Wm. Erlandson's barn and concrete silo. The silo is in one corner of the barn and is square. Mr. Erlandson has 11 acres of clearing, will winter 12 head of cattle of which nine are cows and one horse. From four acres of land he raised about 50 tons of flint corn silage. The rest of the clearing was in clover and oats, which was made into hay. Only about one-fourth of Mr. Erlandson's clearing is stumped. The barn is 32x60x14. Mr. Erlandson has lived on his place four years.

the prairie sections, is poor in the element of nitrogen, and any system of farming that does not permit of a return to the soil of a good proportion of the plant food taken from it, will necessarily be ruinous to the agricultural interests of that section.

#### How to Develop a Dairy Farm.

In the following lines I will attempt to state how a dairy farm can be best

adapted to growing crops for dairy animals. In some parts of this region the land is too sandy, being easily affected by drouth, and leechy besides. In other localities there is a stiff clay which is comparatively cold and hard to work. In still other places, where the soil is of the best, the land is rough and hilly, or stony, and for that reason very hard to clear up. If possible, such land should be avoided by

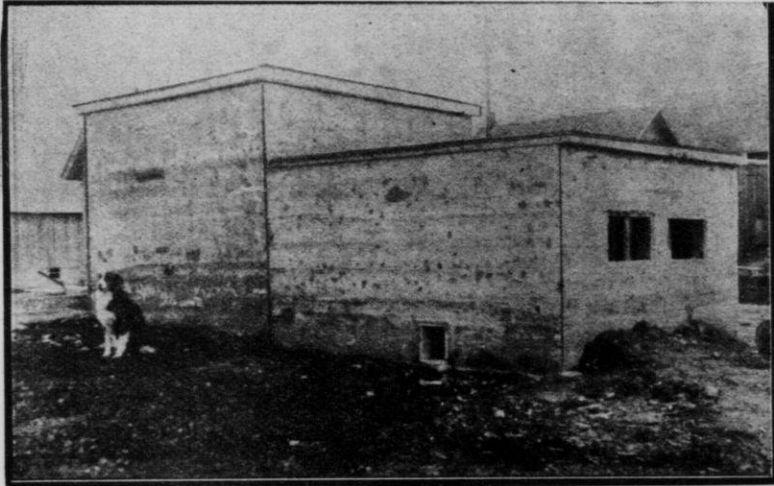


the settler. It is my experience that a sandy loam soil will give the best results, for the reason that in this climate it responds quickly to good treatment, and is sufficiently retentive of moisture and fertility to make it capable of growing the largest crops.

The man of small means should not buy more than forty acres of land on which to build up his dairy farm. Of

per and he must save and carefully apply all the manure in order that he may preserve and increase the fertility of his farm.

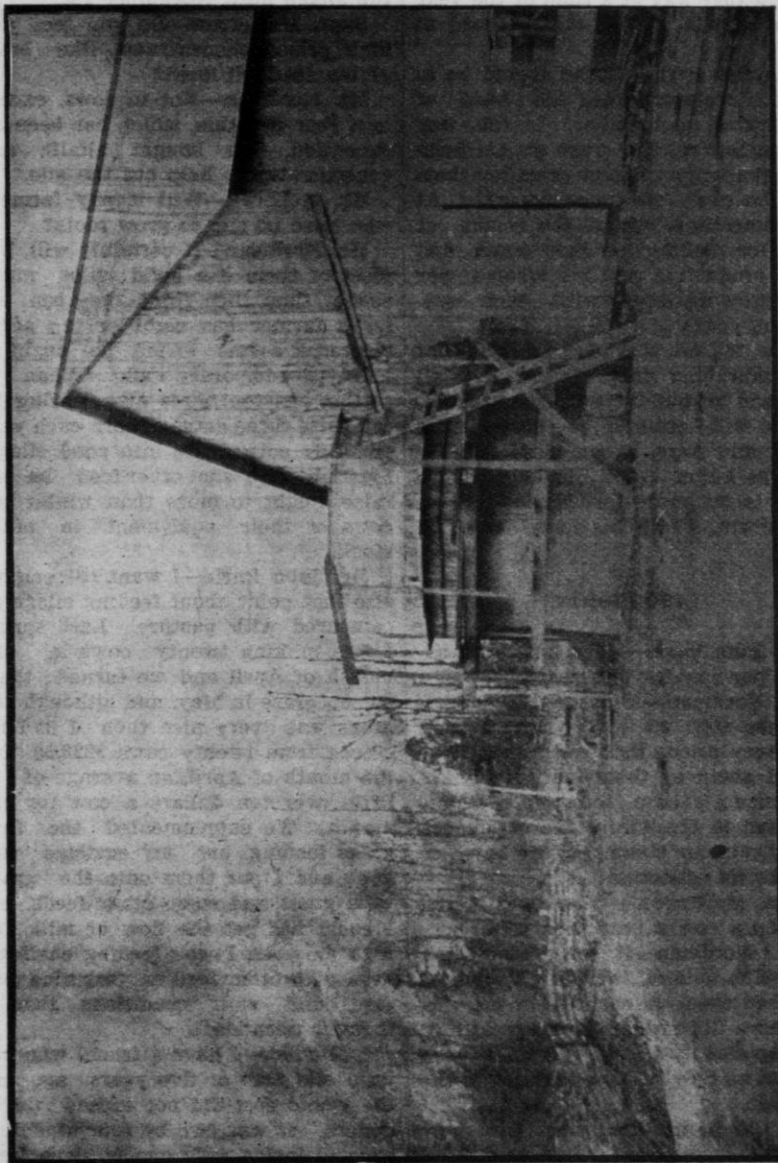
By the time he gets eight or ten acres clear, he should plan on building a temporary silo, which can be built of staves at a small cost. Later on, when a larger, more permanent silo is built, the staves of the old one can be



Cobblestone silo and chicken coop built this summer on farm of E. Nordman, Polar, Wis. These buildings are all cobblestone, except the gravel and about thirty dollars' worth of cement. Roof is made of same material as the rest of the building.

course the forty should all be good land, and if it is, he will find it better to devote his skill and energy to the development of this much land than to spread his efforts over a larger surface. There will also be a big saving annually in interest and taxes if a small tract of land instead of a large one is purchased. The settler should know that after his forty is fenced, he will be able to keep a cow or her equivalent for every acre of clearing he makes. To do this, he must grow the crops first mentioned in this pa-

utilized for other purposes. This will make the first silo very cheap, which fact, however, will not detract in the least from its usefulness. Many settlers would build silos much sooner than they do, but are kept from doing so by the cost of silo-filling machinery. This question is being solved, however, in the same manner as grain threshing; that is, one man buying the machinery and filling many silos with it each year. This is really much the cheaper way of doing it, and besides it affords the farmers an opportunity



Otto Hanke's silo and barn. Mr. Hanke will winter five cows, three head of young stock and two horses on 10 acres of clearing, two-thirds of which is in stumps. The silo is of concrete, 12 ft. by 20, but will be built higher when there is need of it. This silo was filled from three acres of flint corn.

for changing work and getting their help in that way at a time of the year when help is usually pretty hard to get.

The aim of the settler should be to make his clearing and his herd of cows grow up together. In this way he can market his crops on his farm and get a larger average price for them than he could otherwise secure. At the same time, he has the means at hand for making his land more and more productive and his income per acre growing larger with each succeeding year.

If he follows this plan, he will not stop improving when his forty is all clear and his buildings are constructed, but he will continue to grow more clover and cows, to get more fertility to raise larger crops, to keep more cows, to get more fertility, and so on ad finitum, all on his forty acres of land.

#### DISCUSSION.

Mr. John Imrie—What was your average per cow for last year?

Mr. Nordman—About eighty dollars. You see with us we are not getting the fancy prices that you people have talked about at this Institute. We patronize a cheese factory in the summer and in the winter the cream collector gets our cream, but we have to pay for its collection.

Supt. McKerrow—What does it cost to keep a cow a year with you?

Mr. Nordman—It costs less than thirty-five dollars, including pasture. We feed them on ensilage in the winter and a little other roughage with it, and we find the cows will do as well on that as they will on pasture in the summer.

Mr. McLeran—Do you feed any roots?

Mr. Nordman—We do in the fall. Last fall, before we opened our silo, we fed our cows for one month on

roots and we did not have to begin on the silage until November 1st.

Supt. McKerrow—Do you feed any high priced concentrates, like bran, gluten feed, oil meal?

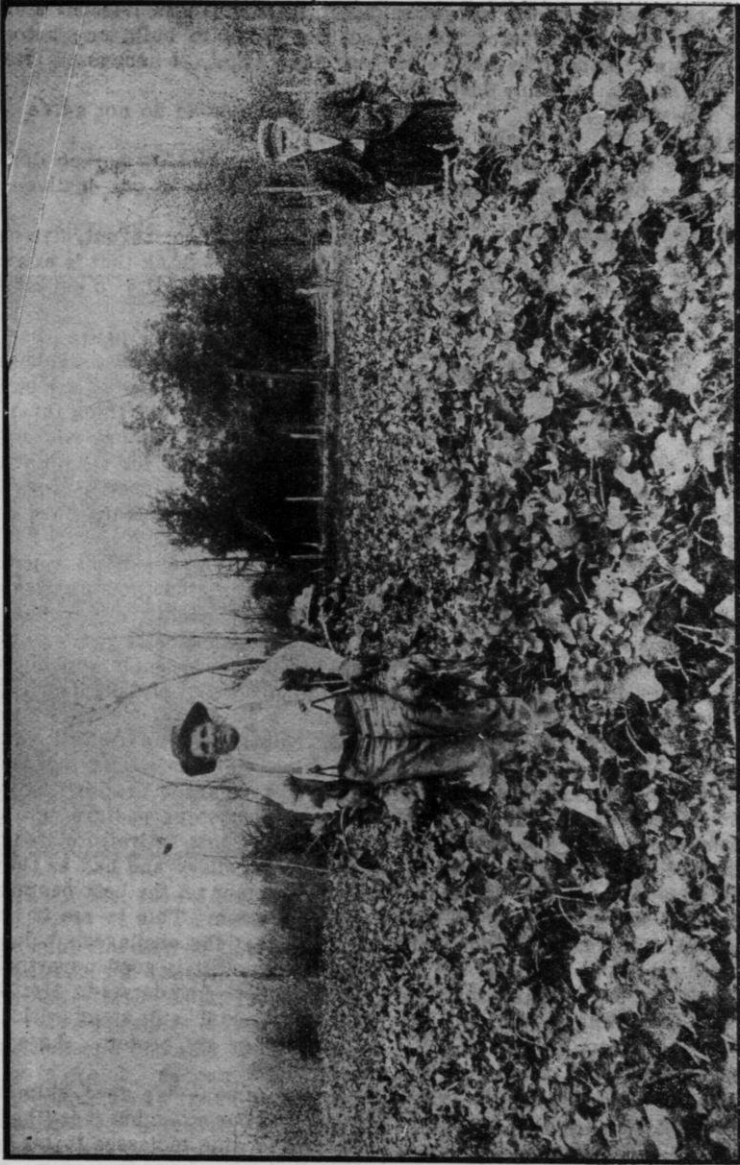
Mr. Nordman—Not to cows, except in a year like this, which has been an exception. We bought alfalfa and concentrates to help out the silo.

Mr. McLeran—Will it pay farmers who have no silo to grow roots?

Mr. Nordman—It certainly will, but most of them can build silos much sooner than they think they can. After a farmer has eight or ten acres cleared it seems to me he ought to build a temporary silo. When a settler has ten acres of clearing he can raise three acres of corn each year and this corn made into good silage, together with what other feed he can raise, ought to more than winter ten cows or their equivalent in other stock.

Mr. John Imrie—I want to emphasize that point about feeding silage as compared with pasture. Last spring I was milking twenty cows in the month of April and we turned them out on grass in May, and although the grass was very nice then I had received from twenty cows \$220.50 for the month of April, an average of a little over ten dollars a cow for the month. We supplemented the first grass feeding, but my ensilage was gone and I put them onto the grass with grass and some other feeds, but I could not get the flow of milk as high as when I was feeding ensilage, even with other feed on very nice pasture, and with conditions that I thought were ideal.

A Member—I have a friend who put up a silo four or five years ago and the whole cost did not exceed thirty dollars. It was two by four studding, sheeted inside with one-half-inch lumber, lathed and covered with roofing felt or tarred felt. He even went along without a cover on it the first year or



Nordman's Rutabaga patch. Twelve hundred bushels, or over seventy thousand pounds, on a measured acre of land. The specimen in the pasture weighs 16 pounds. One was raised on the farm of Aug. Carlson, Langlade Co., that weighed 35 pounds.

two; that has answered his purpose for three or four years, and the silage has kept as good as in the silo of a neighbor which cost three hundred dollars. It was temporarily built, of course, but it will probably last him eight or ten years.

Mr. Martiny—Mr. Nordman spoke about putting up a cheap stave silo. Now, my idea of stave silos is that they are pretty expensive.

Mr. Nordman—The way to do it would be as the gentleman states; go into the woods and cut some hemlock trees or logs and have them taken to the sawmill and sawed into two by sixes. If it is convenient to do so, have them sized and dressed; if not, they will go without. Then buy hoops, and the only actual money is for the hoops. You have got to purchase them and you can get them for five or six dollars. When you build a permanent silo later on you can utilize the lumber for other purposes.

Mr. Imrie—If you are not figuring the work of the man himself, the expense of a concrete silo is only the cement and reinforcing material.

Mr. Nordman—I am speaking now of the man who only wants his silo for a few years, or until he gets ready to put up good substantial buildings all around. Of course concrete is the cheapest material out of which to build your permanent silos. Two years ago I constructed a silo that holds one hundred tons and I put just thirty-eight dollars' worth of material into it that I had to purchase. It took three of us three weeks to build it.

Mr. David Imrie—At an Institute at Ellsworth, a man told of the cheapest silo I ever heard of. His land was such that he could dig right down into the clay, he made it low down in the ground, and it only cost him a few dollars for cement inside of the clay. He had made two or three of them and it took only about ten dollars' worth of cement to each.

Mr. Jacobs—As long as it is assumed that a man's time isn't worth anything in northern Wisconsin, if you are not going to build any better silos than that, I suggest raising roots.

Mr. Nordman—I do not agree with you.

Mr. McLeran—How much does it cost around here to put ensilage into the silo?

Mr. Imrie—About seventy-five cents.

Mr. Jacobs—I think that is extreme; I should say from fifty to seventy-five cents.

Mr. Nordman—We figure that our ensilage cost us in the neighborhood of \$2.50 a ton in the silo; the cultivation of the corn, everything, even the rental of land. You know land up our way would not rent for very much, although it is just as good as your land down here after you once have it under cultivation.

Chairman Convey—Don't you think your statement that you can feed ensilage almost exclusively is liable to make mischief when it goes out in the Bulletin, because people will not realize the necessity of balancing up a ration?

Mr. Nordman—The kind of corn we can raise up there, and that I do raise, is a balanced ration in itself, just as much so as pasture grass is. Our cows do just as well for us in the winter on ensilage and hay as they do in the summer on the best pasture we can give them. This to me is an indication that the ensilage is balanced, or, if it is not, it is good nevertheless.

A Member—I understand Mr. Nordman feeds skim milk along with this silage. They get protein there too, don't they?

Mr. Nordman—We feed skim milk to some of our cows, but it is like Mr. Martiny feeding molasses to his cows, they do better from this skim milk, but at the same time the cows that do not get skim milk are the ones I am

talking about when I say they give just as good results as they would on pasture grasses. In corroboration of what Mr. John Imrie has said, I will say we always have a falling off in the milk flow when our cows go out to

pasture, no matter how good the pasture is.

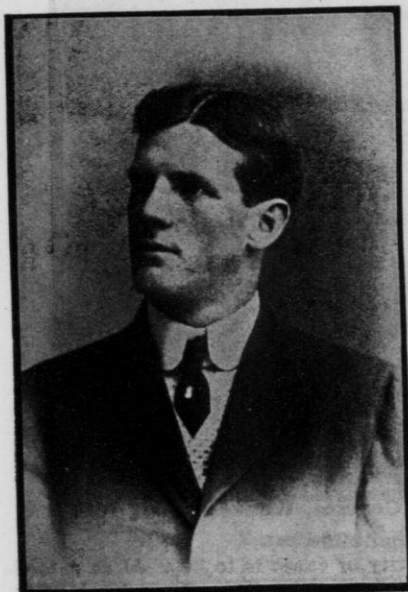
Dr. Porter—Does feeding skim milk cause the cows to suck themselves?

Mr. Nordman—No, they have not done so on our farm.

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### CERTIFIED MILK.

R. W. Rowlands, Secretary State Board of Agriculture, Madison, Wis.



Mr. Rowlands.

The subject assigned to me for this short discussion, that of the production of certified milk, is one that from the peculiar nature of its production and demand is not an industry in which we can all engage. The product is one that all milk consumers will not purchase, because of the increased price; nor is it one that all dairy farms can be utilized for, because location and shipping con-

veniences play a large factor in satisfactory marketing; nor is it one that all dairymen will indulge in, because the exacting nature of the requirements for the product can be complied with only by a studious application of brains and skill.

Thus you will understand that the production of certified milk does not come under the classification of a common commodity, and as I understand the purpose, as well as the practice of our Institutes is to add to the knowledge of every farmer in attendance, engaged in whatever phase of farming he may be, I fully realize that all that can be said on the topic may not be of immediate importance to all in attendance. For that reason I shall endeavor to treat of the things that are important, and not occupy more of your time than is necessary to portray in a very general way some of the methods and necessities in the production of this article. If anyone wishes to obtain further information, I shall be glad to talk to them after the meeting.

#### The Delicate Nature of Milk.

One thing, however, I wish to bring out and impress upon your minds, as it is of practical importance to each and every man, woman or child, and one that affects both producers and consumers, and that is the delicateness of the milk product, its nature to so rap-

idly absorb whatever germs or odors there may be in its immediate surroundings.

There is no one food that is of such prime importance to the welfare of the human race as milk, and I dare say there is not one that is as much abused by both producer and consumer. And not only is milk of such value because of its nature, but its food value is great when compared

approved by a commission appointed for the purpose of investigation and has been tested by bacteriologists and found to comply with the requirements set by a national commission. Both commissions are appointed by a medical society, but as the rules for equipment are usually decided by the local city commission, their rules may vary and be more or less drastic.

The purpose of the milk in the ma-



Farm home of R. W. Rowlands, Genesee, Waukesha Co., Wis.

with other foods, and I believe that today, milk is the cheapest food, next to bread, of any on the market.

But milk is of such a nature that its actual food value increases or decreases in proportion to its condition of purity and preservation. The very purpose for which milk is used renders it absolutely necessary that it be clean and wholesome, and if it is not clean it is not wholesome and its value is decreased thereby.

#### How Milk is Certified.

Milk is certified when it is produced on farms whose equipment has been

majority of cases is to be used as a food for infants and invalids, and is sold largely upon the recommendation of physicians. For this purpose it is very necessary that it be as near in composition as possible to its condition when drawn from the udder, and herein hinges our entire story, and it is brief and simple in saying. Put this product inside of the consumer's door in as much as possible the same condition as when it was drawn from the cow.

The test of its condition is decided largely by ascertaining what is called the bacteria count, which is a method

of determining the number of small, fine organisms, or germs in a cubic centimeter of the milk. These organisms seem to adhere to everything pertaining to the dairy; they are in a dormant form in the cow's bedding, in the stalls, and adhere to the hair of her body; indeed, they are so numerous it is impossible to eliminate their presence entirely. But we must get the milk out of the udder and into the bottle and allow as few as possible of

These bacteria are of many different natures. Some are comparatively innocent, and are of no harm unless in too great numbers; others that are very common when conditions are decidedly unsanitary, are often of an evil propensity and are malignant in nature. It is then we have epidemics among babies in the summer, and often outbreaks of typhoid and other dread diseases. Other things being equal, the quality of the milk is largely deter-



Farm buildings of R. W. Rowlands.

them to get into an element that is so full of food. The milk being warm, they multiply with wonderful rapidity, feeding upon the food properties therein, and at the same time changing its composition. Thus we have two points at which we must stand guard over these little creatures; first, and the most important one, is to allow as few as possible to get into the milk when it is being drawn; the second is to get the milk cooled as quickly as possible to prevent them from multiplying.

mined by the number and type of these bacteria contained in a cubic centimeter. To show you how many there are, it is frequent that millions are found in that small space. The ordinary milk on the market in Chicago when not pasteurized will have on an average from 1,000,000 to 3,000,000, the average in Milwaukee from 700,000 to 1,500,000. The requirement for certified milk is its number be kept down to 10,000, with other requirements in regard to acidity, sediment, flavor, etc.

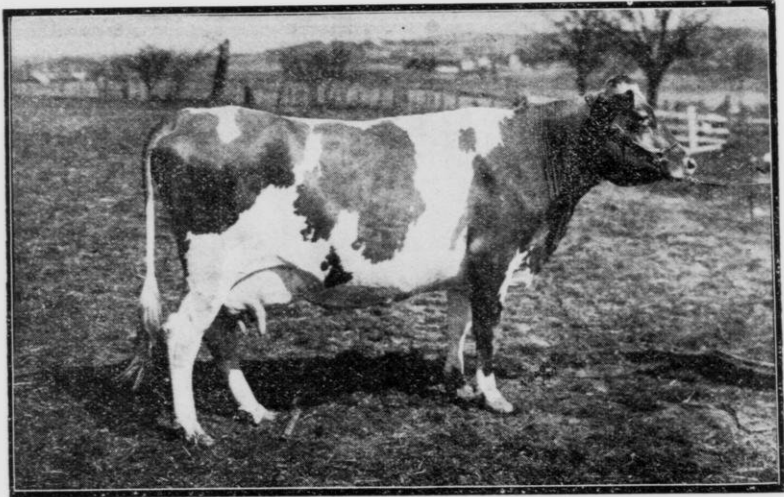


### The Field For This Product a Good One.

Up to the last few years, this milk has been produced almost entirely by wealthy people who owned farms in the country and were satisfied to derive much pleasure with little or no profit from this work. For this reason, and because the enterprise did involve a larger capital than was needed

and of which some of our wide-awake farmers are taking advantage. Our cities are getting so large and densely populated that there is a very large class of people who are willing to pay from two to four cents more a quart for good milk, not certified, but good, clean milk, and this market has been worked but very little.

Clean milk that is within reach of our common people is scarce in our



**Bessie, Grade Guernsey cow, owned by R. W. Rowlands, Genesee, Waukesha Co., Wis. This cow made 777.9 pounds butter fat in one year, equal to 907.55 pounds of butter.**

for the production of ordinary milk, it was commonly supposed that it could not be produced at a profit.

But, gentlemen, I think it is a field in which farmers should be very active. We may not all be located near to large cities, nevertheless, the higher class product we produce, the more demand there will be for that product, and the better the quality of the milk you can send to our large cities, the more people will drink that milk.

And there is another market to which I wish to call your attention,

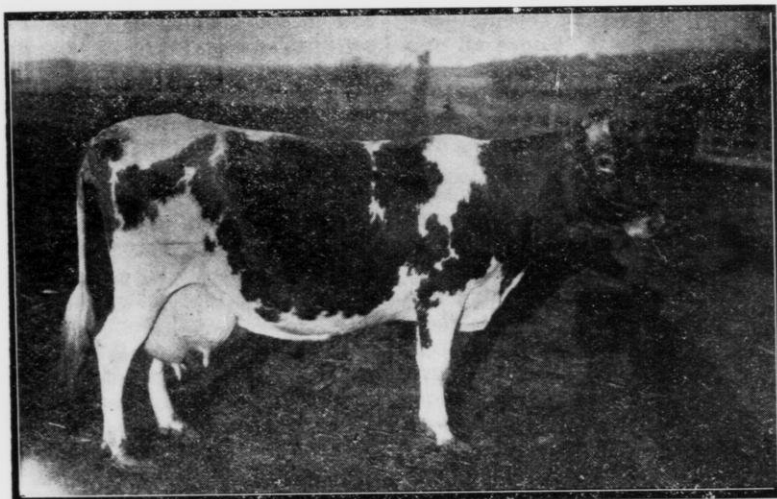
cities, when you realize that you cannot go to but few restaurants in Chicago or Milwaukee and call for a glass of milk, and after that glass has stood for a few minutes by your plate, you will see a dark cloud of settlings at the bottom. You know what this is, gentlemen, it is fertilizer that has fallen from the cow's flanks into the milker's pail and was shipped in cans to the cities, there bottled and sold to the consumer, and which should be on the dairyman's fields and not in a glass of milk intended for food. It is

estimated that the city of Berlin, Germany, consumes several tons of barnyard manure yearly in milk, and many of our American cities are no better.

#### Some Essentials in the Production of Clean Milk.

But in order to produce a very high-class product, I wish to efface from your mind the idea that a costly, elabo-

fairly good barn with a tight floor over your cows, so that no dirt will fall through; all hay chutes must be closed to the floor, and hay and straw brought in by opening a door on the side of the chute; all ledges and places for dust to accumulate must be avoided as much as possible, as bacteria are numerous in dust but do not multiply until they come in contact with some moist, warm food property like milk.



**Beauty, Grade Guernsey cow, owned by R. W. Rowlands, Genesee, Waukesha Co., Wis. In one year this cow produced 9,843 pounds of milk, 550 pounds of butter fat, equal to 641 2-3 pounds of butter.**

rate establishment is necessary. Good milk can be produced without a ten thousand-dollar barn or a three thousand-dollar bottling house, or the countless other frills and expenditures whose chief virtue lies more in their ornamental effect than in any real bearing they have on the product. All these will amount to naught if the few principles which are within reach of most men are not complied with.

I will just enumerate briefly some of the essential points. You must have a

A good system of ventilation must be provided, whereby the air is changed on the average of every hour, and as sunlight can kill more germs than any other germicide we know of, and providence has provided it in plenty, use it in abundance, have about four square feet of window to each animal.

Cement floors you must surely have, and the finishing coat of a nature that the surface can be always kept clean.

Lime is a cheap and a good disinfect-

ant, therefore everything inside of the four walls of the stable must be white-washed within reasonable periods. Disinfectants may be used reasonably freely, but not in such quantity as to taste the milk.

Animals must be tuberculin tested and be otherwise healthy. Hair on udders, flanks and under parts must be kept short by frequent clipping, so that dust and particles of dirt will not adhere to these parts of the body. All animals must be groomed well at least once a day, so as to remove all dust and particles of scaling skin.

Silage must not be fed within an hour prior to milking, or any other thing done that will tend to raise dust or leave an odor in the barn.

All refuse must be removed from barn and barnyard each day, and on no account should it be allowed to accumulate within a considerable distance of barns, in short, nothing foul or stagnant must be allowed anywhere near to dairy buildings.

Water supply must be clean and abundant and from a source where there would be no danger of surface water coming in contact.

Bottling house must be located in a clean place and where good drainage can be had. The whole equipment need not cost over \$1,200.00 to \$1,500.00. It must have a boiler large enough to furnish ample steam for sterilizing all milk utensils and bottles. It must be equipped with a bottle washer, aerator and bottling machine, and plenty of good water. The interior walls must be finished with some material which will permit water and steam to be applied with hose.

Milkers must be men of clean habits, and attired in clean clothes. Before milking, the cows' flanks and udders must be washed with a wet cloth and wiped with a damp cloth, so as to leave the parts just moist. Running water must be supplied in the barn and no milker must milk more than

two cows without rinsing his hands in clean water.

It is the custom in most places to draw the milk into covered pails; that is, each milk pail is covered with two layers of thin gauze with a layer of absorbent cotton in between. Thus the milk is strained through the cotton into the pail, and the gauze prevents anything that might fall into the pail from falling into the milk. The milk is poured into a can with a faucet in bottom and sent on a trolley to the bottling house. There the can full of milk is put over the aerator, which is hung over the bottling machine, then the faucet in the can is turned open and the warm milk trickles down the side of the aerator and falls into the bottling machine, thence into the bottles, cooled to a temperature of forty-five or less. The bottles are immediately sealed with a strong paper seal and put into crates and packed with ice.

It is the aim to have the milk in the crates and iced inside of fifteen minutes from the time it is drawn from the cow.

All these things are links in the chain which are fundamental principles in producing certified milk, and certainly a neglect of any one of them will defeat the object of your enterprise.

#### DISCUSSION.

Dr. Porter—Do you keep special cows from which you save milk for special babies?

Mr. Rowlands—We did that about a year or two years ago more than we do it now. You know it is generally believed now that if it should happen that that one cow should have something wrong with her udder the baby would be affected.

Dr. Porter—Do you prefer the milk of twenty cows mixed, or the milk of one cow?

Mr. Rowlands—That is for you, as a physician, to say.

Dr. Porter—Isn't it true that it is disputed among intelligent physicians, men who are well posted?

Mr. Rowlands—I understand that it is.

Dr. Porter—And isn't it true that the milk of a cow will vary from two or two and one-half per cent today to five per cent tomorrow, and that in fact it varies more or less every day?

Mr. Rowlands—It is not my experience that they vary that much. Very often they will vary some.

Dr. Porter—And isn't that bad for the baby?

Mr. Rowlands—I think it is. The idea of getting the milk for the baby from one cow was emphasized more two or three years ago than it is today. The belief is gradually growing that it is just a little safer to take the milk from twenty cows than from one.

Dr. Porter—Is it true that there is less danger from tuberculosis?

Mr. Rowlands—I don't think that question should enter in; your herd should have been tested for several years; that question is settled.

Dr. Porter—Out with me, they are not tested at all.

Mr. Rowlands—Then you couldn't furnish certified milk anyway.

Mr. John Imrie—I believe it is a fact that the milk of twenty cows would be more uniform, taking it right along, than that of one cow.

Mr. Rowlands—I think so, too; I would rather risk twenty cows.

Mr. Aderhold—How would you compare the cost of the production of milk in the way in which you do it, with producing milk which is reasonably clean, for the ordinary market?

Mr. Rowlands—I should judge from about one to two cents for what we call "inspected milk," and from two to three cents for "certified milk," above the common price per quart.

Mr. Aderhold—What is ordinary

milk selling for in Milwaukee this winter?

Mr. Rowlands—Six cents.

Mr. Aderhold—What does the farmer get?

Mr. Rowlands—I think the farmer hardly knows what he is getting now. There is a conflict there; the farmers want \$1.25 a can, which, when the freight is deducted, equals about \$1.15, and the dealers want to buy it for less.

Mr. Nordman—This extra cost you speak of would be mostly for inspection?

Mr. Rowlands—The clipping of the cows' udders, their washing night and morning, rinsing of the hands, the cost of your strainer cloth, your absorbent cotton and your Gurler pails, also the interest on the investment, should be figured on all these things, you have to have a larger investment for producing that kind of an article than you do ordinarily. I don't know whether you would call cement floors and whitewashing and all that extra or not.

Mr. Imrie—All these things do not cost very much.

Mr. Rowlands—It doesn't cost me half a cent more to produce this milk. Having pure bred cattle, you like to have them look as well as possible always; it is necessary for them to be well groomed, and for you to have your stable well ventilated and white-washed anyway, and if I were selling on the general market, I couldn't sell for any more than the man who was producing in any old kind of a barn.

A Member—Can you keep the smell of silage out of your barn entirely?

Mr. Rowlands—With a good system of ventilation, it cannot be detected very readily, at least it would not affect the milk in any way.

A Member—What do you get for certified milk?

Mr. Rowlands—We get twelve cents a quart in Milwaukee and fifteen cents a quart in Chicago.

Mr. Martiny—What provision is made for inspecting certified milk?

Mr. Rowlands—The certified commission of Chicago send out an inspector about once in a month, or once in two months; they gauge that largely upon the test that you run. They test for bacteria, and for other qualities once a week or once in two weeks. They get the milk off the wagon.

A Member—Did you have any difficulty in getting a market for that milk and how do you handle it in order to distribute it?

Mr. Rowlands—The milk is bottled on the farm and shipped in crates to distributors in Milwaukee and Chicago. We make a contract with some large company that is distributing ordinary milk to distribute our milk at so much a quart, and they take all the responsibility of distributing it.

A Member—Do you have any trouble in getting rid of it?

Mr. Rowlands—They are very glad to take care of it. We pay from two and a half to three cents to the distributor.

Mr. Martiny—If he gets one hundred quarts of this certified milk from you, does he ever sell two hundred quarts off the wagon?

Mr. Rowlands—Of course no economical person will buy this milk for cooking purposes, so that a family will usually take one quart of ours and two quarts of the ordinary milk, and in that way a wagon distributes both kinds of milk and our bottles are sealed with paper seals, which cannot be removed without the customers knowing it. Our bottles are stamped with "Williams-Rowlands Co., Guernsey Milk."

A Member—What does the breakage in bottles amount to?

Mr. Rowlands—In Milwaukee it is small; in Chicago it is so heavy we made arrangements with the distributors for them to furnish the bottles. You take a firm like the Bordens, who

are selling hundreds of thousands of bottles daily, and the few hundreds or thousands of bottles we ship them are hard to keep separate.

Dr. Porter—I understand the question of bad flavors is an important one. What feeds give bad flavor?

Mr. Rowlands—Turnips; rye pasture will make a taste in the milk.

Mr. Bradley—If you have trees in your pasture, won't the cows eat the poplar and oak leaves?

Mr. Rowlands—I expect they do; it doesn't affect the milk in any way. We do not pasture very much in the summer time.

Mr. Bradley—Last summer we fed some rye along in the middle of June and the word came to us that our cream was off. I didn't know what was the matter. Then the complaint was reiterated. I wrote and told the man I thought it was all right now, that the cattle had been in a pasture where they had eaten the leaves and even the bark of certain trees, and I thought since they got down to the wood on the trees the flavor would be all right.

Mr. Rowlands—I would naturally suppose that the flavor of poplar leaves or bark would affect milk.

Supt. McKerrow—I want to ask a question which may be a little personal. Did you start this business yourself, or did your distributor start and work it up for you?

Mr. Rowlands—They would never start a business for you like that if they could help it.

Supt. McKerrow—Isn't it a fact that you went into Milwaukee and personally secured your customers and carried in bottles of milk in a grip sack to them?

Mr. Rowlands—Yes, we sold two quarts a day at first.

Mr. Martiny—Just tell us how you started your business.

Supt. McKerrow—I advise you not to tell, because Martiny will be walking over to St. Paul with two or three

bottles to get a certified milk business started.

Mr. Rowlands—It started in a row.

Supt. McKerrow—That starts a good many things.

Mr. Rowlands—We wished to get a higher price for our product, because we thought it was of a higher quality than ordinary, and the dealers told us they would have to work up a special trade for that milk and that they wouldn't pay us the higher price till they had the trade. We requested the commission in the city of Milwaukee to certify our product, but their rules at that time were such that we would have to move our barns a little bit one way and our horse barn another way, so we opened an office on the east side of Milwaukee and began to advertise our milk. We had two customers to start with and they each took a quart a day. We delivered that to them in the morning, solicited customers during the day and went home at night, came back the next day and solicited customers again. Today we are furnishing something like seven hundred bottles in Milwaukee and a little over

fifteen hundred in Chicago. The whole trade is two thousand a day. When we had grown to sufficient size, so we were in competition with other certified milk dealers, a large distributor came to us and made us a proposition. They asked permission to distribute the milk for us and to take it on the same percentage as they were distributing the other milk. We had no trouble in making an agreement and everything was done in about three days' time.

A Member—How many cows do you milk?

Mr. Rowlands—From thirty-five to forty-five. You see there are five of us producing this milk.

A Member—Do you feed silage?

Mr. Rowlands—Yes.

A Member—Do you have any difficulty with these milk men trying to substitute their milk, trying to destroy your trade?

Mr. Rowlands—No; the customers are too suspicious; that is the best security we have. They are very careful to see that the distributor is not loing any substituting.

Recess to 1:30 p. m.

## AFTERNOON SESSION.

The convention met at 1:30 p. m. Mr. David Imrie in the chair.

## TUBERCULOSIS.

Thomas Convey, Ridgeway, Wis.

Tuberculosis is a much discussed subject at the present time. Each man has an opinion entirely different from all others and those who know the least about the subject are frequently the most pronounced in their opinions. It is, however, a matter of general interest, affecting alike the city and country. The law as it is at present is only a half-way measure and yet it has created so much antipathy its repeal is demanded. This is a case where the people need protection from themselves. Any law affecting so large an interest, and so many people, is difficult of enforcement. The people have to be educated to the necessity, or advantage of the law.

The problem to be considered is that a transmissible and fatal disease threatens the cattle, hogs and poultry of the country—even worse than that, human life is endangered. This was a mooted question a few years ago, but circumstantial evidence tends to prove its transmissibility, especially to infants, a large percentage of those being raised on cow's milk dying from tuberculosis of the bowels, which could not be accounted for in any other way.

Several cases of feeding hogs tuberculous milk for a very short period developed the disease.

The notion that we can get along in the future, as we have in the past, is like the ostrich hiding its head in the sand to escape pursuit. Calamity is certain.

The disease has been introduced

from Europe and has made alarming headway in some localities. I have never known of a case originating among our native cattle, but they are no more immune than any other cattle. The only safe thing that can be done is to locate and remove the infection.

Wisconsin has been an extensive buyer of pure bred cattle, which in many cases introduced the disease. Even with our present law, where a certificate from a graduate veterinarian is required with stock from outside the state, some cases of tuberculosis are coming in. There is no likelihood of stock contracting the disease in transit, but you have no remedy, except to avoid such people in the future. We have tried to profit by the experience of others, and have bought nothing but tested cattle, and have taken the additional precaution of buying of people who were above suspicion.

It is unfortunate that tested cattle cannot be retested for a considerable period, as they will not react, though they may be unsound. That is the reason why cattle must be tested by a disinterested party under the present law.

There have been several cases in this state, where parties have called a dispersion sale, where unsound cattle were sold that established centers of infection, in several cases where no disease existed before. It was to guard against similar results that the present law was established

It would certainly be a silly business to continue paying for diseased cattle and take no precaution to guard against the spread of the disease. The disease is only transmissible under favorable conditions; unless the disease is brought in, it may be avoided. Pasture conditions are not favorable to its extension. The sunlight kills the germs. Barn conditions may be exceedingly dangerous, bad ventilation, limited sunlight and a common drinking vessel, may furnish the medium.

the same experience with every new system of medication introduced; vaccination, antitoxine, treatment for hydrophobia, have been condemned by these people who are wise in their own conceit.

We should appreciate the value of governmental interference. A few years ago the country was threatened with the cattle disease known as "foot and mouth disease." The government established a quarantine, eradicated the disease at such a trifling cost compared with its value to the country,



Convey's cows, free from tuberculosis.

#### The Reliability of the Tuberculin Test.

To guard against the introduction of this and other communicable diseases has been a matter of paramount importance with every stockman worthy of the name. There are too many people who are careless in this respect. The tuberculin test law helps both of these parties. Scientific men do not question the reliability of the test, and they are the best judges. Good stockmen everywhere have been using it since its introduction. The fellow who knows nothing about it says it is a humbug. We have had

that its occurrence has been forgotten.

Texas, or splenic fever caused a large loss in diseased cattle and commercial restrictions. The cause was discovered and this simplified matters to such an extent that it is not now regarded as a serious pest.

That eminent German, Dr. Koch, spent a lifetime in studying germ diseases. He identified tuberculosis as a germ disease and supposed he had a cure in tuberculin, but it was a false hope. However, the knowledge he gave the world has deprived tuberculosis of half its terror and fatality. Like yellow fever, tuberculosis is not so dangerous when you know its history.



The most ardent advocate of the tuberculin test law in the state is the man who knows the most about it; his life work has been along that line. He not only secured the best knowledge this country afforded, but studied under several, if not all of the prominent specialists of Europe. He knew of the first appearance of disease in the state. He should receive credit that Wisconsin has a smaller percentage of tuberculous cattle than any of the leading dairy states and is in the best position to get rid of those that re-

#### The Principal Sources of Infection.

There are two principal sources of danger—the whole milk creamery and cheese factory where the by-product is not sterilized, and the purchase of diseased cattle. The latter has been the most prolific source of infection.

Tuberculin is the only remedy we can depend upon to locate the disease in its early stages. Its accuracy in some cases has been questioned, because lesions are not always found on slaughter, but in about all cases some



Thos. Convey's dairy herd.

main. I allude to Dr. H. L. Russell. This may sound like flattery, but it has the redeeming quality of being true. It is certainly unfortunate that when we can profit by the skill, energy and philanthropy of others we refuse to do so.

Talk of the high cost of living; the most expensive thing in life is ignorance. Mistakes have been made in testing, and some of them have been intentional. When we look for something we do not want to find, mistakes are always possible. Everybody interested in cattle should use the test and then avoid the introduction of the disease.

of the lot show absolute evidence of the disease. This should prove its reliability.

Tuberculosis is more prevalent in hogs than most people suppose, its increase is, in fact, alarming. In some districts, the farmer sells his hogs subject to examination after slaughter and refunds for diseased animals. Two per cent of all passing under government inspection are condemned because of this disease. As the disease exists only in limited territory, the percentage is large in the localities. Hogs acquire it from cattle in three ways, the use of milk, having access to droppings and eating carcass.

### The Economic Side of the Question.

We underestimate the danger to the financial interests of the country. Much indignation is expressed by the farmers because city people demand that stock be tested. Is it any wonder the people who pay high prices for food should demand it shall be clean and not dangerous to their very existence? Health officers tell them so and practically everybody else who ought to know. Besides they are submitting to loss in voting for the test law and it would never have been established except for that assistance. The farmers should understand that other property than farm property pays three-fifths of the state taxes. They are willing to tax themselves to pay for our unsound cattle. We know they are dangerous to our health, dangerous to our prosperity and injurious to the reputation of Wisconsin as a dairy region. Testing under state supervision has shown only four and one-half per cent of reactions. Tests have been made where the disease was most prevalent. In districts where the least testing has been done, there is very little disease. This would reduce the percentage considerably.

The compulsory test law was enacted in the east several years ago. It was repealed because of its unpopularity. Testing in New York state in 1910 showed over twenty-four per cent of reactions. If we must learn from our own experience, we cannot complain if our education is rather expensive. Our Wisconsin people are all right when they understand the conditions. Legislation in this case was a little ahead of our knowledge of the subject. Our people do not like freak legislation, but this is not a case of that kind. When we have an opportunity to clean up, we ought to do so. Wisconsin has a splendid opportunity to do some advertising as a dairy state; the cost will be trifling com-

pared with the advantages arising from it. Send the unsound cattle to the same cemetery with the filled cheese and poor butter which some of you remember. If you do so, Wisconsin will have taken a long stride in advance of her dairy competitors.

### DISCUSSION.

Supt. McKerrow—You stated that we had reduced the number of reactions to four and one-half per cent. Wasn't it less than that in the one hundred and twenty thousand cattle tested last year and up to the first of February?

Mr. Convey—I do not know; this was taken in 1909.

Supt. McKerrow—It was found to be less than three per cent up to the first of February.

Mr. Michels—I had my cattle tested and found them all right, but there were five in our neighborhood that were tested and showed reaction and then after sixty days they were retested and did not show any reaction.

Mr. Convey—They have discovered quite recently that when they retest cattle within a short time, in very many cases the fever rises before the ten hour period passes. I heard the State Veterinarian say that and that we should look for the rising temperature long before the ten hours, and possibly there would be no reaction noted at the usual time, because the temperature has risen before that and passed by. This test is the only thing we can depend upon, because we must in buying cattle look out against the introduction of disease into our herds.

Dr. Porter—Do you mean to say that if you inject your cows at eight o'clock p. m., the temperature is liable to rise before six a. m.?

Mr. Convey—That is what they have announced lately, that they have found in retesting that the high tem-

perature rose and practically dropped again before the ten-hour period passed.

Supt. McKerrow—That is in a very few cases, understand, not always. Now the instructions say that cattle that have been previously tested are more apt to show early reactions, say, at eight hours.

Mr. Martiny—I am sure it is right along this line that a great many mistakes have been made in testing, so that when we hear of cases like this gentleman has brought up, before we arrive at any decision we should find out more about the circumstances. Were these cattle recently bought, or had they been in the herd all the time?

Mr. Michels—I have reason to think they were raised in the herd.

Mr. Martiny—This man only found one or two reactors in the whole herd, whereas I think if you had taken the temperatures of the whole herd, without introducing any new cattle at all, there would be some that you would find reacting. I do not think those that did react, should be condemned at all. I think if we knew all about it, we would find it was because those cattle were tested before and that they reacted; that is, that the rise of temperature had come before you took the subsequent temperature, or that they did not have the disease.

Mr. Convey—I would think in this case there was no disease, that it was due to some other cause. I was reading an account of a herd which was tested in this locality recently, in the preliminary test the temperature was one hundred and three, and the temperature showed high all through the test. We all know there are reasons why animals should not be tested at special times, and in that case they had no right to test these animals at that time. I would not consider that was a case of tuberculosis at all.

A Member—What is tuberculin manufactured from?

Mr. Convey—From tubercle bacilli. They sterilize it by cooking for a considerable time, sufficiently to kill all germs of tuberculosis—at two hundred and twelve degrees. It was Dr. Koch a most eminent bacteriologist, who prepared tuberculin first. He prepared it for human use, and if there was the least suspicion of its being dangerous to either persons or animals, he would never admit or recommend its use. Physicians have used it on people and in no case have we heard of any mischief arising, except in the minds of some people who reported on the east side of the state that it produced tuberculosis, although when they are asked for actual cases they refer you to the west side of the state for information. It is sterilized in such a way that there is no possibility of infection, with five per cent carbolic acid in it.

A Member—Dr. Waymen, a professor at the University of Michigan, says that a cow should not be tested within one month before parturition, or until one month after parturition. Is that correct?

Mr. Convey—That is not the rule here. Our rules say five days before or after, but of course, there is a good deal of that work that we are not really positive about yet. The professor may be right and everybody else wrong, but that is the rule laid down by the Live Stock Sanitary Board, that you do not use the test within five days previous or subsequent to the parturition of the animal.

A Member—Is it not possible that a considerable per cent of the cattle that have been tested, if not killed immediately would have reacted by repeating the test, say, a month afterwards?

Mr. Convey—The chances are that where a considerable number actually react under the test, where you take the precaution to allow sufficient time to have the system of the animal in

proper condition, that it will not be immune from tuberculin reaction, that you will get a reaction in almost every case. I have known of several cases where that has been tried.

A Member—What per cent of cattle that are tested and react do not have tuberculosis?

Mr. Convey—Do you mean show no lesions?

A Member—Yes, that is it.

Mr. Convey—I do not know what the figures are.

Supt. McKerrow—Last year we tested in this state between forty-eight and forty-nine thousand cattle, and of those that reacted twelve per cent showed no lesions, but that does not prove that they did not have the disease. The other day there was a government official—not inspector, but an investigator—working at Milwaukee where these cattle were killed. His principal business is to work on still-born calves from cows that are killed, to investigate if the disease is inherited, but at times he is idle, so now he is putting in his time on the no-lesion cattle, that have been marked “no lesion” by the regular inspector, who, after he sees that the animal is fit for food, goes no farther.

This investigator was inspecting carefully and opening a lot of glands, and he came to a certain small gland and said, “See here, just like the point of a pin, here is the beginning of the disease.” So that carcass which had been marked “no lesion” was marked “lesion.” The trouble with the tuberculin test from one standpoint is that it is too good, it catches these little lesions like the point of a pin, which may be hid away anywhere in that carcass and not seen at all by that inspector. On another “no lesion” carcass, a little spot was found in the skin, it was not a gland lesion, but a lesion on the skin. A little German boy who hangs up tongues said, “What is

this?”—there was a speck the size of a pea near the end of the tongue, and that was a lesion, not a gland lesion, but simply a membrane lesion. Evidently there had been a little break in the end of the tongue, that germ had passed in there and established itself. Now, of this twelve per cent that do not respond, we do not know how many might have shown lesions if they had been closely examined. In our own cattle in one case there were no lesions found, though there was reaction. That happened to be a highly bred heifer for which we had refused three hundred dollars; my son owned it and he felt very much interested. He got out his papers and looked them over and submitted the matter to the chief inspector. He said, “I do not doubt there is a lesion somewhere but we cannot afford to cut up that carcass,” but they went over it again and found a small lesion about the size of a pea. So I say again that the tuberculin test is criticised by people who want to be a little careless as being too strict, but it is pretty nearly right just the same, and it is the best thing we have.

A Member—Is it true that if you inject tuberculin into an animal that might show some lesion that it hastens the breaking down of that animal?

Mr. Convey—Where this test has been applied to persons it has been found in some cases it benefited the individuals, seemed to have quite a marked benefit. With others it did not seem to have any perceptible effect. We know in the case of cattle, that where they are advanced with the disease, there may be no reaction at all.

A Member—But the question is, does it aid the breaking down of those that might show lesions?

Mr. Convey—That is an immaterial question, because if they are dis-

eased, the sooner something kills them the better it would be for everyone concerned.

A Member—Is there any animal free from lesions of some kind?

Mr. Convey—What we are discussing is as to lesions from tuberculosis; they may have other lesions from some other diseases.

A Member—Do you mean tuberculosis of the lungs, or any breaking out of the body?

Mr. Convey—Tuberculosis can exist in almost any part of the system, all through the carcass; it may show up, or may exist without showing up. It has even been found in the bone and the marrow.

A Member—Is not tuberculosis of the lungs and liver the most dangerous?

Mr. Convey—In the open form, where the lesions are discharging, is the dangerous form of the disease. In the closed form it is not so dangerous, so far as communicating the disease. In either case it is equally fatal.

A Member—When we think of the "White Plague," or tuberculosis, we think of some form of consumption.

Mr. Convey—Which is the same thing, although it acts somewhat differently in the case of an animal.

A Member—A neighbor of mine told me that he had eight head killed out of eighteen inoculated, and he could not see that more than one had tuberculosis.

Supt. McKerrow—Lesions, you mean?

A Member—The others, so far as they could tell, were perfectly healthy. In another case, the veterinarian who was testing said of an animal that her lungs and liver were so rotten they would have to be handled with a scoop shovel, and she was afterwards killed by a butcher in this city and the man who owned the cow took one-half of the liver and the butcher took the other half, and so far

as the liver and lungs were concerned, they were all right, they were perfectly well.

Supt. McKerrow—Evidently the veterinarian did not know anything about it. The fact is, a physical diagnosis does not tell anything about it to a certainty. The tuberculin test tells the story. As I have said, out of nearly forty-nine thousand cattle slaughtered in the state of Wisconsin only twelve per cent showed "no lesions" under the government inspector's work. If an investigator had been there to go into the matter thoroughly, for one I have not any doubt that he would have found several that would have been added to the lesion list, but that is not the business of the government inspector, to find lesions, but to find out whether that carcass is fit for food. He goes over the lungs and the liver and if he finds no lesion, he simply puts on his mark "Fit for food." Even if he finds only one small lesion, he marks it that way, and if he finds two small ones not in the second stages, he marks that "Fit for food," but if he finds two pretty well developed, it goes into the tank. Of course, in Denmark, they cook up that class of animals. You know one hundred and fifty degrees of heat kills these germs, but in making tuberculin they heat it to 212½ and allow it to cool down slowly, so no germs can live. Now, a gentleman raised the question about the disease being hastened by the injection of tuberculin into the body. I am only a farmer as he is, but the scientists who have been experimenting for nineteen years after Dr. Koch, who discovered this germ, are practically all agreed that the tuberculin test does not injure the animal. On our farm, our animals have been tested about once a year on the average for seven years. Those that were diseased were killed, with the exception of a bull that was kept in quarantine for two years, and

he was fit for food when killed two years later. But there is where the danger is, you do not know how bad they are; it may be in the lungs, it may be thrown out with every breath of the animal, it may be thrown out with all the excreta, so the safe thing is necessarily to clear out all those that show reaction. It costs something, of course, it has cost something like sixty thousand dollars to kill those cattle that were killed, but spreading it over nearly forty-nine thousand head of cattle that were tested, it made it about \$1.25 per head for the whole state. That is what it cost to test those cattle and clean out those that reacted, and it probably costs seventy-five cents each for the testing to farmers of the state. That ought to be considered. Now, the great economical question is, did it pay to test those forty-nine thousand and clean out those that reacted at a cost of two dollars a head? Are not the cattle which are left worth more than two dollars a head more than they were worth before? I would gladly pay two dollars a head more for cattle if I were buying that had been tested, if there was no law. How many of you would be willing to pay two dollars a head more for cattle which were tested if there was no law? Well, that is a big showing of hands. Now, how many would not be willing to pay any more? I see just two hands. An auctioneer told me that all the cattle he had been selling this winter had not been tested, some were unable to get tuberculin and so could not test, but he said, "I believe it makes fifteen or twenty dollars a head difference in their value to have them tested." I made this statement over at Johnson's Creek the other day, and a German farmer jumped up and said, "Oh, worth two dollars more. I am buying cows this spring, and I won't go near any if they are not tested, and I would give ten dollars more a head

if they are tested." We have got to discuss both sides of all of these questions and the man who has had experience in testing is the man who can give the best testimony. I find that nineteen out of twenty—yes, I think I can say ninety-nine out of every hundred—of the men who have had their cattle tested two or three times will say, "We do not want to buy any cattle that have not been tested."

A Member—Are we sure of an honest test and how do we go about it to get it?

Mr. Convey—It is your own fault if you do not have an honest test. You have to have an honest man, of course, who is able to make the test, and then you want to know how to make the test yourself. Take a man like this gentleman who has been talking over here. You read a good deal, you know what has to be done, you understand the condition. It won't take you five minutes to learn to read a clinical thermometer and then you have a check on the whole business. The present law should give the Live Stock Sanitary Board absolute control over the tuberculin that is to be used, and over the individuals who make the test, so if a party is careless, or does not comply with the regulations, he can be bounced. It takes a man of skill to do this work, and he should be responsible to the Board. He is able to take a reliable test and his evidence is worth something, even where the lesions are not observable to the ordinary man, he can locate the germ; a man skilled along that line can tell a tuberculosis germ just as easily as he can tell a mushroom, he knows the form of it and he can locate it. Dr. Russell has been associated with the Live Stock Sanitary Board; he has been studying up these things that the people do not and cannot understand, and he has no question as to the results of the test. It is just as reliable as vaccination or antitoxin, or any-

thing of that kind. Of course mistakes are sometimes made, but after all it is something we can depend upon, and I think it is suicidal for men to try to bolster up the present opposition to the law. We do not know all about the test, not so much as we will in the future, but that is no reason why we should ask for the repeal of this law, and I feel that it would be an awful mistake to repeal the tuberculin test law. Last year we sold \$79,000,000.00 worth of dairy products and we can easily make \$100,000,000.00 or more, and it is very important to us to have a reputation for having things right here in the state of Wisconsin.

Mr. Aderhold—I heard of a man who was doing testing in the southern part of the state, who made a guarantee to the farmers that there would be no reaction if they would engage him to do the testing. What do you think of that?

Mr. Convey—He was a big humbug, and you know it.

Mr. Purse—What is the law in regard to who shall test these cows, in this state and in other adjoining states?

Mr. Convey—For outside shipment you have got to have the certificate of a graduate veterinarian. Testing within the state has to be done by somebody who has a license, or is permitted under the law to make the test, that is a graduate veterinarian, a licensed veterinarian; and included in that class are people who have been practicing prior to the enactment of the law and also people who have received a license from the Board to make tests. I think in all cases that outside of the state they require a certificate of graduate veterinarians.

Supt. McKerrow—We do not demand that any cattle shall be tested to go outside of the state; it is the other state that demands that, and we have a law not permitting outsiders to ship into our state without

the test, they will be quarantined until they are tested.

A Member—Is it true that a great deal of so-called tuberculin is no good?

Mr. Convey—Where it is being bought in many different places, the chances are that more or less of it will not be of proper quality. It would be a whole lot better for the Live Stock Sanitary Board to supply or supervise all the tuberculin to be used.

Supt. McKerrow—You can depend on the fact that all of the tuberculin sent out by the Sanitary Board is all right, but there has been some sold in different places in this state; for instance, around Waukesha there was some used by two veterinarians where there were no reactions, and some of those cattle had reacted previously and some reacted afterwards, and it was finally discovered that the tuberculin was no good.

A Member—Dr. Ruggles, in a recent article published, says that some years ago the United States government sent a man into Wisconsin to buy up tuberculin and it was found to consist of carbolic acid, water and something else. The insinuation is in that article that the failure of the test in many cases is due to this mixture. Now if that is true, if the state permits the sale of such stuff, it is a pretty serious proposition.

A Member—In order to get cattle testing done right and at a reasonable price, every community should see to it that they can get a reliable man to test their cattle, otherwise they will not believe in it.

Mr. Convey—Mr. McKerrow knows that four years ago I remarked that very thing to a couple of the committee who had that law in charge. They asked my opinion, and I said, "The people are not ready for it; you establish it now and it will be discredited and the people will have such an antipathy to it that it will give it a backset which it will take years from

which to recover." They asked for my opinion in writing and I sent it on.

Then next thing I knew they wanted me to go to Madison and appear before the committee; I went up there and the first man called upon to present the matter to the committee was Dr. Russell. He made a splendid argument in favor of it and the next man called on was Thomas Couvey. I never felt so small in my life, but I was not going to back down, and I made the fight before the committee that the people were not ready for it, it would be absolute nonsense to try to establish a law to test all cattle and test them annually at that. I said, "You cannot do it, it will cause a reaction that will cause permanent mischief." I do not suppose anything I had to say about the matter had any weight, but it was tabled, it never was referred back to the legislature and nothing further was done about it at that particular time. Dr. Russell was rather indignant that an old Institute man would take the position I did and I expected I would be disqualified for Institute work, but I didn't care two cents. The real fact of the matter was the legislators were afraid of the reaction themselves and I was their excuse for dropping it, as I usually am.

A Member—I was talking with Professor Hoxey a while ago and he told me that the farmers passed as good an examination as the veterinarians. If that is the case, does not that show that the veterinarians are not any better as testers than farmers, and we cannot always rely on the veterinarians.

Mr. Roberts—I believe it is the misapplication that brings it in disrepute.

Chairman Imrie—This winter I noticed an article in the New Richmond "News," stating that a man who had had a good deal of experience in this testing had given a certain communication to this paper and it was cir-

culated all over the county, stating that it was costing the state one hundred dollars for every animal that reacted throughout the state. How much does it cost, Mr. McKerrow?

Supt. McKerrow—Last year, closing with the first of July, there was paid out of the state treasury something like eighty-three thousand dollars. I have the figures here as to what was paid back into the state treasury from the sale of the hides and the beef that were passed as "fit for food." I can give you some figures as to the number of reactions in the state of Wisconsin. One year it was seventeen per cent, then eleven per cent and then it got down to seven per cent, and now the last was four and one half per cent, so we find the reactors growing less in numbers, because more herds are tested that show no suspected animals. The percentage of those that are condemned as unfit for food also goes down, showing there are more animals in the beginning stages the farther along we get. We used to expect sixty to sixty-five per cent to be thrown into the tank; that was when we were testing only suspected animals. Last year there was only twenty-seven per cent, because there were more of them just in the beginning stages. They were passed as fit for food, up to the extent of seventy-three per cent. Last year it cost the state of Wisconsin, paid out of the state treasury, eighty-three thousand dollars to test these cattle; that includes the expenses of the Live Stock Sanitary Board, the expenses of the State Veterinarian and paying for the cattle that were slaughtered; 2,171 were slaughtered. Then over thirty thousand dollars came back into the state treasury, which leaves fifty-three thousand dollars as the net cost, but fees for justices of the peace and brokers would probably bring that up to sixty thousand dollars. In round numbers, it cost thirty dollars a



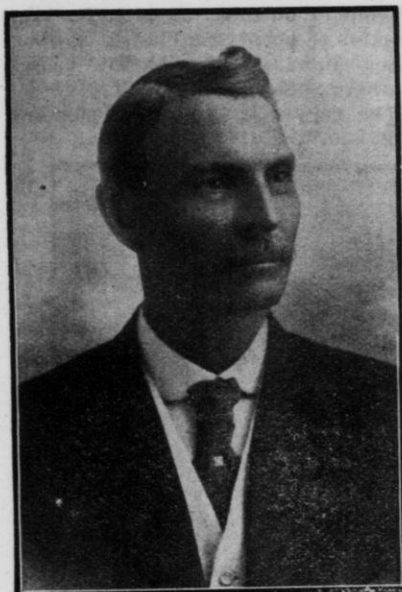
head for the 2,100 head that were slaughtered, to pay for the machinery that condemned and slaughtered them, or one dollar and twenty-five cents for all cattle tested. Then I add seventy-five cents for the testing, which made two dollars a piece for all the cattle tested, so the man who wrote in that paper did not know what he was talking about, and that is the main trouble with the gentlemen who oppose this test. The men of experience are all supporting the test, the men who have been testing we find all over the state without exception are supporting it.

Some of the mistakes that have been made have been serious. Over in Sheboygan county there were a number of Holstein cattle tested and they swelled up and some of them have since died. The veterinarians could not diagnose the trouble; it was undoubtedly a case of some kind of infection and the owner did not know whether to charge it to the tuberculin or to the needle which was used, but he admitted that the man who made the test was about half drunk when he made it and that he had to hunt up his instruments and thermometers, that he broke the top off one bottle, was not able to get the cork out—I guess he had been getting too many corks out. Anyway he had a lot of trouble, spilt a lot of the tuberculin and tried to gather some of it up, and all that sort of thing. I do not believe a farmer is sensible to let a man in that condition go on, but he lost four head of cattle and this man thought the state

should pay for them. There was no reaction according to the test, but he evidently got some kind of infection into those cattle that died. I heard of a case like that over in Grant county, where an animal swelled up and in two days it was dead, and that farmer declared that was tuberculosis, because when they skinned the animal they found tuberculosis clear to the tail. That was not a test at all because the tuberculin was not in the right condition, it was either a dirty needle or dirt got into the tuberculin, or something was wrong. A gentleman living near Eagle told me at an Institute that he talked to a man, a veterinarian, whom he knew had been testing a lot of cattle, and asked him what he would charge to come over and test his cattle. He said a dollar a head. The farmer said, "I have a large herd, I do not want to pay out fifty or sixty dollars to test my cattle, it is too much." The man who was to test replied, "You must remember when I test them there will be no reaction, you get some other humbug to test them and there probably will be a reaction." The farmer said, "You cannot test my cattle if you do it for nothing, because if there is any disease there I want to know it." We had that man up before the Sanitary Board and there are two or three more in this state we had up before the Board, either because they did not make the test correctly, according to the rules, or because we knew they had been acting dishonestly.

## BUSINESS METHODS FOR THE FARM.

R. E. Roberts, Corliss, Wis.



Mr. Roberts.

Common sense business methods are as essential to the success of the farmer as they are to the success of the merchant or manufacturer. No merchant could remain in business if he failed to supply the goods wanted by his customers; no manufacturer could exist if he made an article that did not pay for the expense of producing it, or if he left all his machinery in the yard around the shop to rust, yet some farmers expect to make a living by raising the same crops year after year, without trying to restore the slowly diminishing stock of fertility. Still others expect to get a living by keeping an inferior grade of live stock that will not pay for their feed, and by leaving their implements out in the snow all winter. Comparatively

speaking, a farm is like a violin, in that if it has received proper care, it becomes more productive and more valuable as it grows older.

We should treat our farm the same way we treat our bank; if we issue checks continuously against our account without making a deposit, our funds would soon be exhausted. If we raise crops continuously on our land without restoring the necessary plant food, the ability to raise a crop will soon be exhausted.

## How To Maintain Fertility.

One of the greatest questions before the American farmer today is, "How can I maintain the fertility of my farm?" This is usually a local problem, but the general features are the same everywhere, and the farmer of today is learning to profit by the experience of others, as well as by his own experience. He is not using his hands less but his head more, and by studying the underlying principles of successful farming he is raising in short rotation those crops which are best adapted to feeding live stock, and at the same time restore the necessary richness to the soil.

The greatest soil restorative is clover. It has been shown by experiment that a ton of clover contains forty pounds of nitrogen and a ton of manure contains ten pounds; thus the business farmer of today finds it much more profitable to feed out his crops than to sell them for cash, as it makes the farm self-sustaining.

## Good Seed and Good Implements Essential.

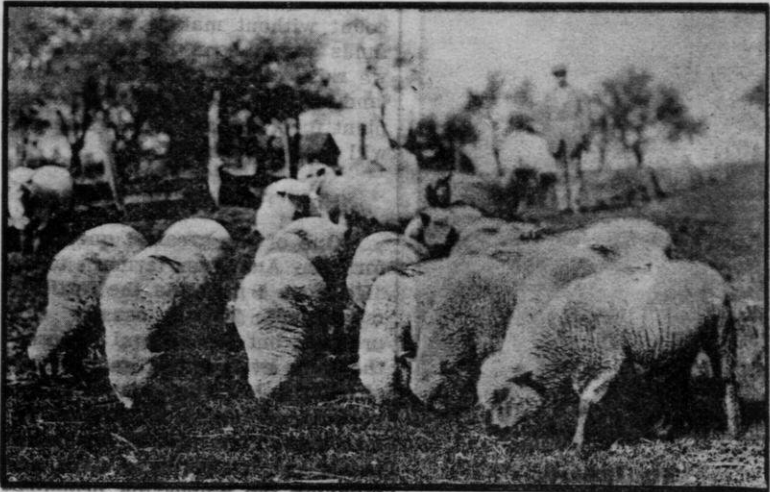
A careful man will use only the best seed that is adapted to his locality, for if care is taken in selecting clean seed

and proper care is given same, much labor and loss by foul weeds and weak vitality will be prevented.

Good seed is a necessity, but no seed can give satisfactory results unless it receives good cultivation. Some farmers appear to be making a profit by using slip-shod, easy-going methods, but the result is not due to any ability on their part.

working out in the open air, they would conclude the heads of that concern had lost their reason. It is just as reasonable and sane for the Case Threshing Machine Co. to leave their machinery outside, as it is for the farmer to leave his binder, mower, rakes, plows and disc harrow behind his barn somewhere.

The man who is always planning



Shropshire ewes on farm of R. E. Roberts & Son, Corliss, Wis.

To get the soil well cultivated, one must have the most efficient implements and know how to use them. It is one thing for a man to own many implements and another thing to know how to care for them. One can give a machine agent a roll of money for a binder or mower, but it is the man who is able to figure things out that knows a binder will depreciate more in value while standing in a snow bank all winter than it would from several seasons' wear in the harvest field. If those, from this state, were to go to Racine and should see the J. I. Case Threshing Machine Co. leaving all their machinery outside and their men

ahead, will never leave the repairing of a machine until he needs the implement, but will send for it long before, so no delay will be necessary. An excellent time to look after repairs is on rainy days, when you are unable to work outside, for time is valuable when a crop is ripe and waiting to be harvested, so valuable, in fact, you cannot afford to spend it waiting for repairs.

#### Live Stock Raising.

The care and use of implements and the rotation and growing of crops are but two of the ways in which a farmer must use his business ability. In

truth, no detail requires as much thought or intelligence as live stock raising.

The subject of live stock raising is becoming more important each year, not only to the farmer who markets his fat stock, but also to the dairyman. It is a mistake to assume that dairying is in any way antagonistic to other classes of stock raising, because all branches run parallel. Good horses

that is bred and adapted for a special purpose in view, and not to be contended with raising some poor, non-descript, criss-cross bred scrub.

Some farmers who own good stock do not care for them properly. They force them to rough it through the winter by letting them pick their living from a straw pile, and stand under some open shed through a cold winter night. This kind of a business-



Shropshire ram lambs on farm of R. E. Roberts & Son, Corliss, Wis., barn and tiled silo in the distance.

are in demand in both city and country and will be for many years to come, while the great mass of people in our cities are constantly demanding good beef, mutton and pork to such an extent that those who raise these classes of stock receive large returns; however, I have observed in passing over this state that at this day and age of expensive feeds and high-priced lands, many farmers do not pay enough attention to the breeding of good stock.

To make live stock raising a paying business, we must turn our efforts to producing some definite type of ani-

like man is usually denouncing the use of high grade breeding stock and is always able to tell how much more his neighbor, who owns some inferior bred stock, is making than he is, entirely forgetting that feeding and care are one-half and breed quality the other. The person who fails to combine these necessary qualities does not have a good paying business.

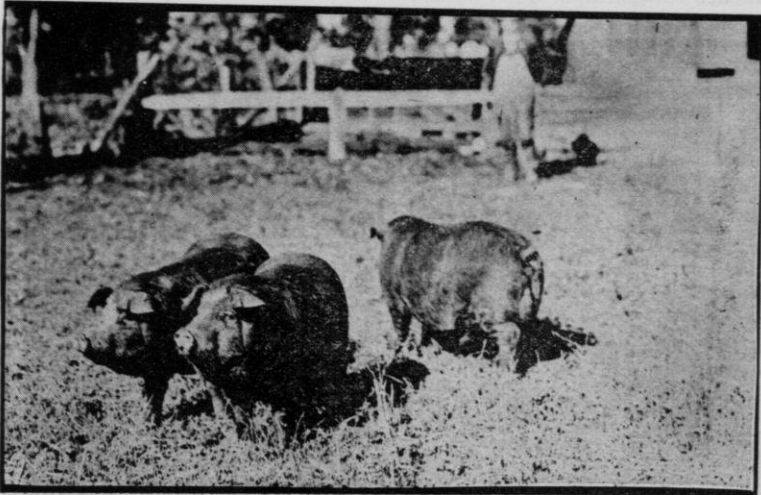
#### A Silo a Necessity in Good Business Farming.

The business man on the farm realizes that with the increase in prices of feed and grain his liabilities are

increased and to make his position pay he must increase his resources. This he does by building a silo, which he uses as a vault for storing away his crop of golden corn. But storing corn in a silo is unlike storing away of money, the corn crop will increase forty per cent in feeding value by the time it is fed out as compared with the old method.

he must have the managing ability of the manufacturer, combined with the care and shrewdness of the merchant.

The man who never cares whether his land is in good fertile condition, or his implements are housed, is usually the one who owns the scrub stock and keeps them in a dark, dirty, unventilated barn. He is always complaining about the hard life of a farmer; it is



Poland Chinas on the farm of R. E. Roberts and Son, Corliss, Wis.

#### The Business Farmer the Successful Farmer.

The good manager will never allow his stables to become dirty, for a clean, well lighted and properly ventilated barn not only means healthier stock, but also a good reputation. Therefore every man who wishes to make a success of farming should apply every bit of business ability he has, his aspiration, inspiration and a reasonable amount of perspiration, for there is no occupation that requires more capabilities than is required of the farmer of today. He must be a manager, superintendent, cashier, clerk, mechanic and general workman; to fill each one of these offices,

he who spends his spare time at the corner grocer's store, exchanging tales of woe; who blames the weather as his crops yield less and less each succeeding year; the administration of government when prices are low, his failures to so-called "bad luck," and he is never able to do anything, because he thinks he cannot afford it.

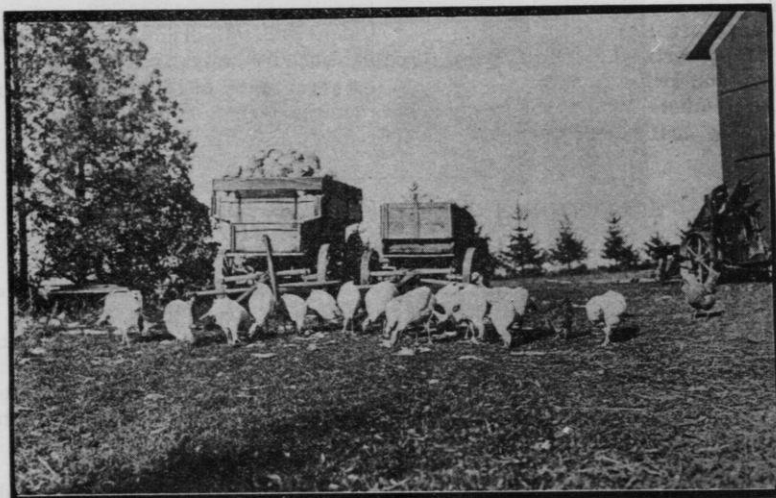
Now, the farmer who plans his work in a business-like manner is the one who prospers, whose farm is increasing in value and who owns the fine, well bred stock. He would not exchange his farm and business for any city position, for he knows there is no place where he can get as much real enjoyment in life and as large returns for his labor and capital invested. It

is he who is directly helping to elevate this great profession of ours to a higher plane, also greatly in the estimation and respect of all other classes, and to uplift country life toward that high standard where our Creator intended it should be, towards better things that enrich the mind and soul.

#### DISCUSSION.

A Member—I object to one part of that paper, the insinuation that farm-

ren than I found it in, and I believe I have improved that farm in the six years I have been on it. In the last three years my son and I have sowed seventy-five dollars' worth of clover seed and have hardly had more than five or six tons of grass. Alfalfa I do not believe in at all, because it does not come in the rotation. This man says the business farmer has got to be equal to the banker, the lawyer and all the rest of them. A farmer might be president some day for all I know. Where can you find a man



White Holland turkeys on the Roberts' farm.

ers are any less business men than other men. I have seen business men fail and I have seen them succeed. I have seen business men who were more shiftless than we farmers are. There are some of us who are shiftless, but I am satisfied with the farm, I am making an easy living on the farm, and I am not such an awful hard-working man either. I stay at home and attend to my stock, but I am not a bit more shiftless than most of the farmers. I am trying to leave my farm in better shape for my child-

smarter than Mr. McKerrow, but I do object to his saying that the farmers are shiftless.

Mr. Roberts—My dear sir, I have not alluded to shiftlessness, as that will lead any person to adversity in any business he may attempt to pursue. You are successful, evidently, because you have applied business principles in your work and farm operations.

Mr. Jacobs—Talking about business methods, I want to inquire what kind of a business would stand such a comparison as has been made here

between St. Croix county cows and the cows in some other counties, or between the best cows that are being kept in St. Croix county and your poorest cows? What manufacturer could afford to do such poor work as some men are doing on the farm all the time, when others are doing twice or three times as well right in the same neighborhood? I do not think there is any other business that is so badly misused as is our business of farming.

Mr. Martiny—In the use of your business methods upon your farm, what are the principal sources of revenue, Mr. Roberts?

Mr. Roberts—Dairying, pure bred sheep and swine raising.

A Member—Would you recommend carrying beef cattle and dairy cattle

hand in hand on the same small farm?

Mr. Roberts—No, sir. I would devote a small farm to dairying absolutely.

A Member—I think our Farmers' Institutes and agricultural schools have improved the business methods on the farm wonderfully. One reason why farm boys are leaving the farms a good deal is on account of what appears to be drudgery, and a good Farmers' Institute, or agricultural school in a community does away a good deal with the drudgery. The boy wouldn't mind hauling manure for two weeks if he understood the science of plant and soil, also live stock breeding. I am sure they have helped to solve a great many of the business problems on the farm.

### SELECTION AND PLANTING OF FRUIT TREES.

D. E. Bingham, Sturgeon Bay, Wis.

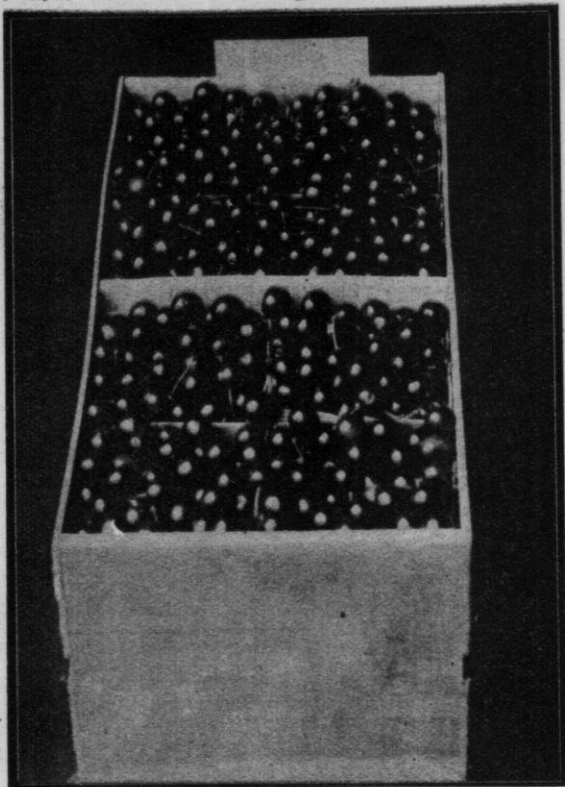


Mr. Bingham.

Much has been said about the selection of fruit trees and also the planting. There are many opinions concerning varieties, because there are so many things entering into the selection of a variety; individual taste, soil conditions, location, climatic conditions, color of fruit and market. The farm orchard, to my notion, would not be of the same varieties as the commercial orchard, entirely. Some varieties are valuable in both places and some are valuable in the home orchard that would not be as much of a success in a commercial orchard. Many varieties have to be dropped from the commercial list on account of a tendency to poor foliage, small fruit and unproductiveness. The farmer hasn't the opportunity to study these conditions, or does not study them in many instances, and then when confronted with the smooth-tongued tree agent who comes from another state, and, by reason of this is considered an encyclopedia of information for which he

makes no charge, the farmer is persuaded to buy trees that are of no value at all. The agent gives at length methods of treatment, propagation and cross fertilization, and has beautiful colored plates to show and prove what he says.

York, and the man also; the tree can be budded stock, piece root graft, or whole root graft, but if these different kinds of propagation are in the hands of the tree agent, he endeavors to make capital out of the peculiar propagation.



Crate of Montmorency cherries from orchard of D. E. Bingham, Sturgeon Bay, Wis.

#### Some Standard Varieties.

For years it has been claimed that New York trees are superior to all others, and it is without foundation. There are two things entering into the production of a good fruit tree; one is the soil, and the other is the man behind the tree. The soil may be in Alabama, in Wisconsin, Illinois or New

We find agents advocating age of tree as a consideration of buying. One must know something of the growth of the root system to be able to judge of the age of tree to plant. The one-year tree has a fibrous root system; as the tree grows older, this system is changed to larger roots and fewer fibrous roots.

There are always new varieties to



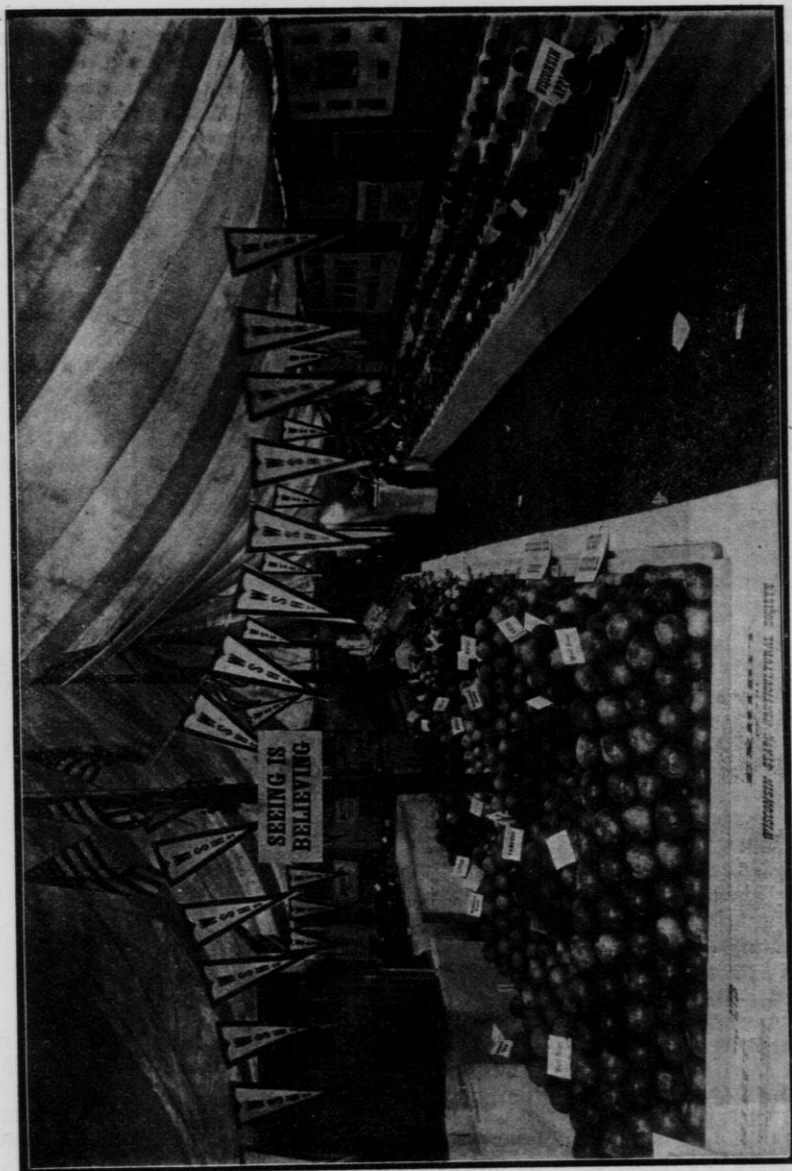
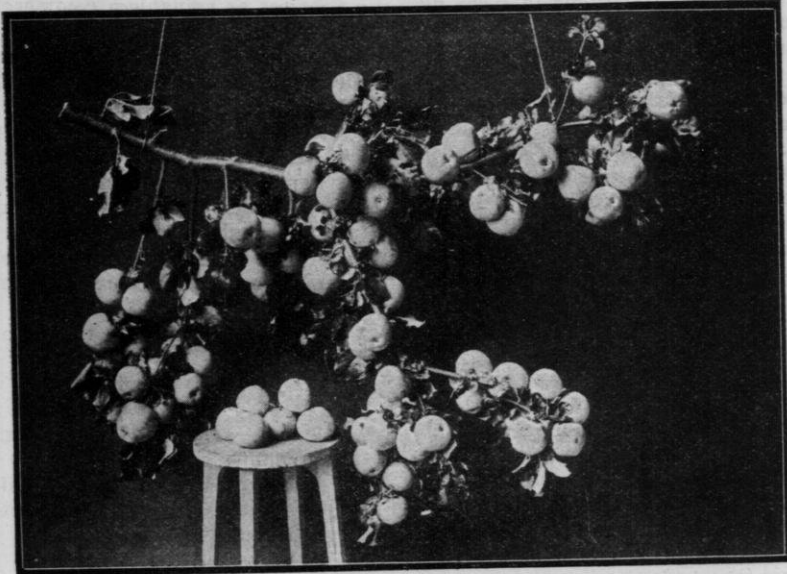


Exhibit of Wisconsin State Horticultural Society at Wisconsin State Fair, 1911.

interest the farmer, varieties they cannot sell to the local dealers because of the high price they ask. The Wealthy, Duchess, Northwestern Greening, Snow, McMahan and Dudley are the very best varieties for the commercial orchard, while Snow, McMahan, Tallman, Northwestern Greening are very good for the home orchard. When the tree agent names

consin, were sold in DePere for one dollar per tree, because the party who sold them was from another state and so must know his business.

The farmer must learn to choose the variety best adapted to Wisconsin, not the strictly winter apple, but the summer, late fall and early winter apple is what Wisconsin can make a reputation in growing; varieties



Limb of McMahan apples, from orchard of A. L. Hatch, Sturgeon Bay, Wis.

these varieties, they sound too common; he must have some kind not so well known, like the Delicious, Baxter, Bismark, or King David, and ask a big price, then the farmer thinks he is getting something better than ordinary.

Now, I am not saying that these last named varieties are not good: they are good in their place, but one must know something of them before buying. The Osthlem and Northwest cherry, practically unknown in Wis-

consin, that produce in large enough quantities to make it pay, that have good foliage, bear early and are best known on our large markets.

#### The Age of the Tree.

In reference to the age of a tree, in apples the best would be a two-year 11-16, four to six feet, but three-year trees can be used with good results. If buying a one-year tree, take the largest grade, whatever that may be.

Cherry trees, either one or two-year, not older. Plums, two-year tree. Plums and cherries are usually budded and apples are grafted. All budded stock should be planted with the union covered and the grafted stock a little lower than in the nursery.

#### Planting the Tree.

Planting is a simple matter, and yet thousands and thousands of trees die from improper planting. The land should not be wet when planting. Do not plant a tree with the bark in a wrinkled condition; better try to plump it up with plenty of moisture, and if this cannot be done, better throw it on the brush pile. It is a good plan to puddle a tree before planting, as the dirt will not adhere to the dry roots. To puddle a tree, dig a hole large enough to put the tree in, then fill the hole with water, making a thin mortar, and dip each tree as it is planted.

In digging a hole to set the tree, be sure it is large enough to take the roots in their natural shape, then fill in around the roots, allowing no sods to come in contact with them. Tramp the dirt down well around the tree.

When the planter receives the trees they have about one-fifth of the root system they had in the nursery and all of the top; each bud a little pump drawing moisture from the ground through the roots. Now, as the tree has only one-fifth of its original roots, you can very readily see the necessity of cutting back the top and leaving all of the roots. In cutting back the top, you should remember to take out all bad forks, broken branches, and make a low, spreading top.

Distance apart to plant is governed by variety. Cherries should be planted twenty feet, European plum, sixteen feet, Native plum, twenty feet, apple, twenty to twenty-five feet, according to variety.

#### DISCUSSION.

A Member—What apples do you recommend?

Mr. Bingham—McMahan, Wealthy, Northwestern Greening, Dudley, Duchess and Snow would be a good list for Wisconsin.

A Member—How about the Peerless?

Mr. Bingham—I would not consider the Peerless as valuable a commercial variety as the others.

A Member—Do you think the Snow apple would grow all right in the northern part of the state?

Mr. Bingham—We have to be a little more careful about the location of the Snow apple. For northern Wisconsin the Wolf River, Hibernial and Longfield are probably hardier than the others, and could be planted where they do not expect so much in quality.

A Member—What about the Peter?

Mr. Bingham—That is simply a Wealthy. There is no difference in color.

A Member—What kind of an apple is the McMahan?

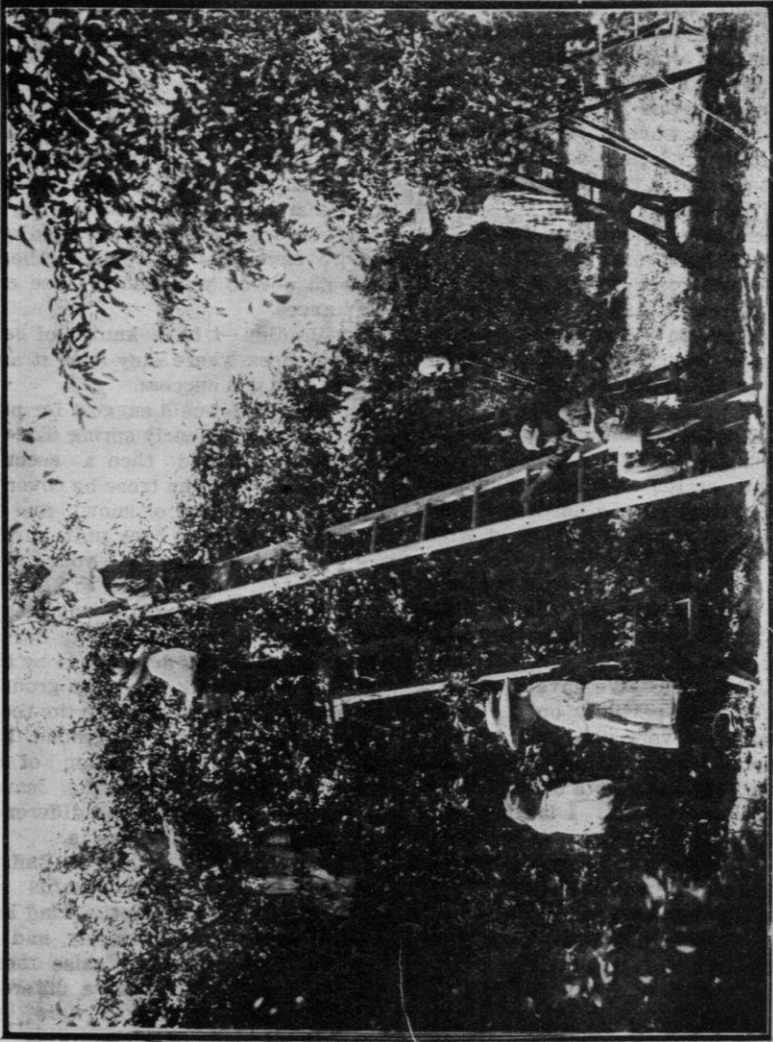
Mr. Bingham—It is a large white apple, about the size of the Northwestern Greening.

A Member—Will the Wealthy do in our northern country?

Mr. Bingham—I think it will. It depends on the location somewhat and then also the kind of winter we have. This winter would be severe on fruit trees, because it has been exceedingly dry.

Chairman Imrie—What little growth we got last year was early in the season, so the wood would be ripe enough before the winter came on.

Mr. Bingham—There is a certain amount of evaporation all winter long, and if the soil is perfectly dry down below, it will dry off the ground above, and often there is a root injury where that happens, where they do not get



Picking cherries from 13-year-old trees in orchard of A. W. Lawrence, Sturgeon Bay, Wis.

enough moisture to keep them in good, plump condition.

A Member—We put manure around our apple trees along in December, when there was some snow on the ground after it froze up. Would you consider that a proper thing to do?

Mr. Bingham—Well, we have not had any rain this winter. To mulch around a tree when the ground is dry is generally an injury, because it does not get the water that might naturally get to the roots.

A Member—I thought to retard the growth in the spring.

Mr. Bingham—I do not think you would gain anything by that.

Mr. Nordman—Would you like to have your orchard planted out where it was in the shade of buildings, or a grove?

Mr. Bingham—There might not be so much danger of winter injury on the south or the east of a bunch of timber cutting off the northeast wind. I believe in some localities a windbreak is favorable.

Mr. Nordman—I have noticed over in our locality that the trees which are doing the best are those that have this protection.

Mr. John Imrie—We have a grove on the south and partially on the west and have had very good success with our apples. We have the Wealthy and Duchess, they have both done well and we have all we want. I lay it a good deal to the protection against the wind. I have found that a good deal of injury was caused to apple trees by warm southwest winds.

Mr. Bingham—The southwest winds, if they were warm enough to start a little flow of sap, would cause more bark injury and would result in considerable injury to the tree. Usually a belt of timber is so placed that it does not allow good circulation of air and if there is warm enough weather in the winter to warm up the bark of the tree, the result is an injury. That is the only objection to a windbreak.

Mr. Bradley—Did you ever know of any good results where apple trees were set in the open places left by cutting oaks out of an oak grove?

Mr. Bingham—I doubt very much if that could be made a success, on account of the excessive feeding roots of all forest trees. The roots of apple trees extend out thirty feet sometimes, and I do not see where they would have any chance to get the amount of plant foods they ought to have among big timber trees. I have only seen it tried where older trees have died out and we have tried to replace them. They do not do well under those circumstances.

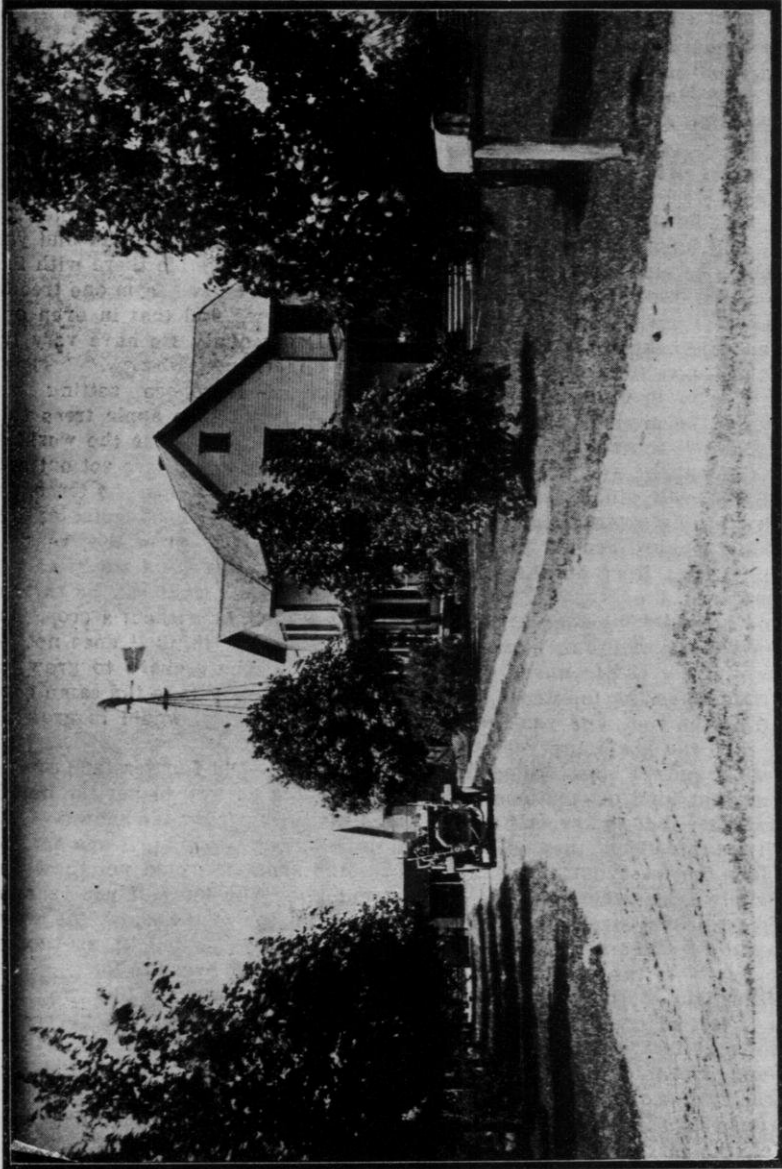
Mr. Bradley—I have known of several instances where they tried it and I never saw it a success.

A Member—I would suggest for protection against an early spring like we had last winter and then a second-hand winter, that the trees be covered with about two feet of snow, and in that way keep them back until spring really comes. What is your idea about that?

Mr. Bingham—I think it would be a fizzle, because the blooming out of fruit trees is always determined by the warmth of the air above the ground. We tried it in Madison where the roots were left in solid frozen ground, but where there was a circulation of air and it was warm enough, the leaves would come out, it made no difference what condition the soil was in.

Chairman Imrie—I noticed in Buffalo county that there were orchards on top of high bluffs, where the wind had a good sweep, growing nicely, and in the valleys we couldn't raise them. Those on the bluffs had a different look altogether, and they were exposed to all kinds of wind storms.

Mr. Bingham—I think the valleys would warm up in the spring of the year enough to cause a circulation of sap and then if they froze up, it would certainly cause considerable injury to the bark, bursting it, and all sorts of



Residence of D. E. Bingham, Sturgeon, Bay, Wis.

things, apple canker would set in and all those things would tend to shorten the life of the tree; whereas on the hill you would have a little different soil condition and probably not quite such a rank growth as you would in the valley, and a better circulation of air the year around.

Mr. Convey—In regard to retarding the growth of the tree by covering the ground with manure or snow, or anything of that kind, it is not only of no value, but it is an absolute danger to the life of the tree. I have found that out, because I have tried that kind of a scheme. The heat of the atmosphere causes the leaves to come out and the growth to come in the top of the tree and catches the ground in such condition that the roots will need the growth right along, and if you do not kill the tree, you will at least hurt it to a considerable extent. So this idea of banking manure around a tree to guard it against frost after the frost has gone into the ground will certainly do mischief, because it retards the growth of the root to such an extent that there is not root connection just at the time when the top needs sustenance from the root, and you can be certain that you are doing your trees mischief. I know I have killed trees with just that kind of treatment. Not the first year, but the second season you will see the effects, they will die.

Mr. John Inrie—Would that same theory apply to strawberries? We are instructed to cover strawberries in the fall of the year and then to uncover them partially in the spring.

Mr. Bingham—I think with strawberries it is just the reverse. If you cover them on top with a foot of snow, you would probably retard the starting of the strawberry plant for a week or ten days. In the case Mr. Convey spoke of, the air is sufficiently warm to cause the starting up of the circulation of sap. If the roots are still frozen, the top of the tree takes

nutrition from the roots and the tree will shortly die.

A Member—What causes fire blight?

Mr. Bingham—I do not know. Any more than a rapid growth we know is more apt to cause it than a slow growth. Then we find it more plentiful in a rich soil than we do on a poor soil. We find that where the soil is a little bit deficient in nitrogen, the tree will not make a rank growth and you have very little trouble there with fire blight. It will spread from one tree to another, but we find that in even our soil in Door county we have very little fire blight.

A Member—I propose setting out twenty or twenty-five apple trees this spring. Would you advise the working of the soil before they are set out and also afterwards, between the trees, using it, for instance, for vegetables during the young growth of the trees?

Mr. Bingham—Yes, I would advocate cultivation. That can be carried on with a crop, or without a crop, just as you prefer. I think it does not do any harm to the orchard to grow a crop. You simply take the same care of the soil as you would in growing any other crop.

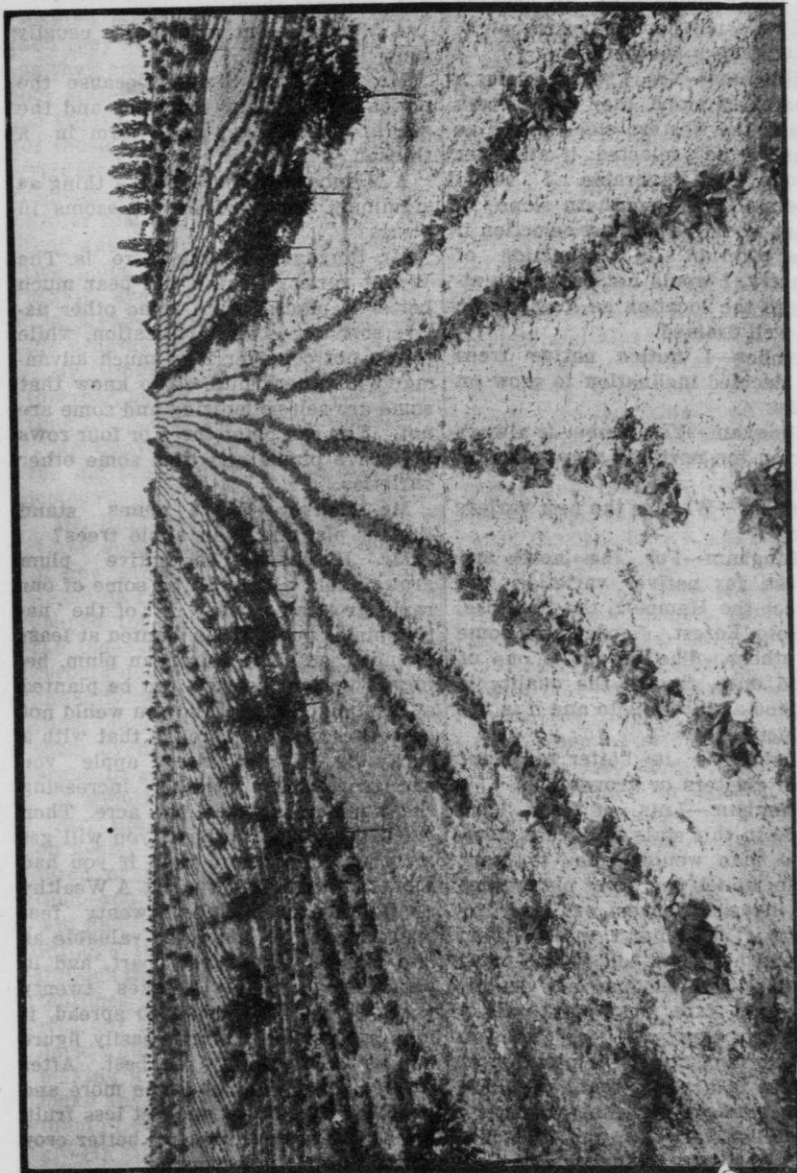
A Member—Did I understand you to say it would be well to put the mulch on strawberries over the snow?

Mr. Bingham—I said if it was applied over the snow, it would not thaw out so quickly. You know if you spread manure on top of the snow, the snow doesn't get off so quick as though there is no litter over the top.

A Member—I would like to ask whether the Himalaya blackberry is hardy in Wisconsin? It is a very heavy fruiter. I have not been able to find out whether it has been grown in this state and whether it has been found hardy.

Mr. Bingham—I never heard of it.

A Member—I have been told it would outbear the common varieties.



Trees planted 1910; photographed June 1, 1911, showing bean crop grown between hills. Trees planted 20 feet apart.



A Member—From what you have said, I would judge that an orchard planted on a northern exposure might be better than a southern.

Mr. Bingham—Yes, I would prefer a little northern slope, then the eastern slope, and the western slope would be the last to be selected, if all other conditions were favorable. I would not like much of a southern slope; in fact, that would be the last selection if it is very abrupt. In our section of the country, I would not pay much attention to the location as long as the land is well drained.

A Member—I notice native trees show a decided inclination to grow on side hills.

Mr. Bingham—Yes, timber is always heavier on the northern slope than on the south.

A Member—What is the best variety of plum?

Mr. Bingham—For the north and northwest, for native varieties, you can select the Hammer, the Surprise, the DeSoto, Forest, Garden, and some of the others. The Wyant is one of the good ones, though the quality is not as good as the DeSoto and it is not as productive.

A Member—Is it better to plant plums in clusters or groves?

Mr. Bingham—Lots of trees have been sold in this state with that statement. A man would come to your place, he would see your plum trees as you have set them out, and he would say, "You didn't plant them right," and he would tell you to plant four in a square and one in a center, or, at any rate, to plant them very close. Now, let me tell you there is nothing about the planting of plum trees in a group that will add anything whatever to the productiveness of those varieties, and it is just simply a handicap to that extent that you cannot handle your trees as conveniently as if they are in rows. They will die out just as quickly and you

have them in such shape that you cannot cultivate them.

A Member—But wild plums usually grow in thickets.

Mr. Bingham—Simply because the plums fall off near the trees and the seedlings come up and form in a thicket.

A Member—Is there such a thing as staminate and pistillate blossoms in plums?

Mr. Bingham—I think there is. The Wyant variety I think will bear much better if planted with some other native sort. In cross fertilization, while we do not consider it of much advantage with other fruits, we do know that some are self-pollenizing and some are not. You can plant three or four rows of native plums and then some other varieties.

Mr. Convey—Won't plums stand thicker planting than apple trees?

Mr. Bingham—The native plum grows about as rapidly as some of our rapid growing apples. All of the native plums ought to be planted at least twenty feet. The European plum, being an upright grower, can be planted at least sixteen feet, and you would not be bothered going through that with a spray rig. The Wealthy apple you can grow closer together, increasing the number of trees per acre. Then when they begin to bear, you will get more out of an acre than if you had them twenty-five feet apart. A Wealthy apple orchard, planted twenty feet apart, would be doubly as valuable as one planted thirty feet apart, and in our country, where it takes twenty years before they begin to spread, it is a proposition you can easily figure out as to which is the best. After twenty years, we can prune more and keep the tops down and get less fruit, but at the same time get a better crop and more on the aggregate.

A Member—Would you expect such trees to live that long, many of them, in this northern country?

Mr. Bingham—We have them now planted sixteen and seventeen years and they are certainly looking as nice as they ever did. In some sections of our state we get eight or ten, or may be twelve winters before we get one of those winters that will kill lots of fruit trees. In my life time, within my remembrance, we have only had one winter that killed the fruit trees, and that was 1898. I want to say, the native plum ought to be pruned very heavily every year.

A Member—What is the best time for pruning apples?

Mr. Bingham—About this time of the year, before the growth starts, any time after the cold weather is over.

Mr. Convey—How is it best to prune the old orchard which has been neglected?

Mr. Bingham—You will find lots of water sprouts and you will find lots of new growth on top of the limbs. Selecting those that will form the best shaped tops and cutting off some of the older wood, keeping the water sprouts down and going over the tree annually, you can make very good trees out of old orchards. Stimulate them by cultivation first and then prune to get them back into shape.

A Member—What is a water sprout?

Mr. Bingham—You will find those on nearly all trees that have been injured or neglected in any way, and then you give the cultivation, you will find lots of water sprouts starting through the thick bark, right up through the larger limbs, and they oftentimes take the entire growth of the tree. It is a good plan to rub them back when they first start, that saves making a scar; if you allow them to make any growth before getting rid of them of course it takes just that much growth from the balance of the tree.

A Member—The little suckers that come up at the root of the tree should be pulled off, shouldn't they?

Mr. Bingham—Yes, all those should

be cut away when you are taking the sod away.

A Member—At one of our Institutes, a man from the central part of the state advocated for this sun blight that comes on in the spring with the March sun to place a board on the south side of the tree for a couple of months in the spring.

Mr. Bingham—We are not troubled that way in our section of the country, but a little bunch of straw would serve the purpose just the same, and it would serve as a protection from rabbits and also serve as a protection when you are cultivating, as well as protecting from sun scald; at the same time it allows good circulation right through it and has none of the injurious effects of anything like tar paper and is much cheaper. It is better than the board, too, for the wind does not blow it against the tree, scarring the tree up.

A Member—I have noticed quite a number of our farmers, from the looks of their orchards, have turned them into silk worm factories, at least it looks that way. When I see that, I think that one of our speakers was right when he said the average farmer was a lazy man. I think it would be a good idea for a good many of those farmers to get up a little earlier some morning and apply a torch to those trees.

Mr. Bingham—You have reference to the common tent caterpillar. They can be very easily controlled with a little poison, and that is safer than a torch. Just one little spraying with Paris green water, or arsenate of lead, will control them entirely. That is also true of the cherry slug; that comes on late in the fall and will eat the green part of the leaf and thereby cause considerable winter injury, just at that time before the wood is mature. About three pounds of arsenate of lead to fifty gallons of water will kill all those leaf-eating insects.

A Member—Isn't there danger of mice getting into that straw around the trees?

Mr. Bingham—No. You can treat that straw with Bordeaux mixture and keep the straw on it for four or five years. It is very seldom you see mice going on cultivated land anyway.

A Member—Does too much pruning injure the productiveness of the orchard?

Mr. Bingham—Yes, if a person prunes very severely every spring, you will get a strong wood growth and perhaps less fruit buds.

Mr. Convey—How would you prune cherry trees?

Mr. Bingham—Just simply taking out the cross limbs, leaving low-headed trees and leaving on the little limbs through the center of the tree. They form fruit buds early, you get your fruit entirely from those little limbs and they are taken off after they produce one crop. Those little limbs are no interference to the growth of the tree. Cherry trees bear as soon as they are large enough to bear, and by pruning and taking off all the fruit buds you can delay the fruiting for several years.

A Member—Can you tell the differ-

ence in strawberries between pistillate and staminate varieties?

Mr. Bingham—Not before they are in bloom. The pistillate variety, the part of the flower which forms the berry is just full of little stamens, and the staminate variety has lots of barren pistils around the outside of the flower, covered with dust or pollen, while the other hasn't any of that at all. I do not know the different parts of a flower very well myself, but I can tell them at a glance when they are growing, and also when you get familiar with the varieties you can tell by the foliage. The flowers that have a great amount of yellow are the staminate varieties.

A Member—What is the benefit derived from spraying fruit trees?

Mr. Bingham—It is the cheapest way to protect them against insects. You also keep them healthy and if the tree is in good, strong, healthy foliage, it will ripen up its wood better and especially in the line of cherry trees. Shot-hole will frequently injure the trees in a few days; about two years of that and the tree will be dead.

Miss Cray's kindergarten class from the public school gave a little exhibit of its work with singing, which proved very interesting.

## REPORT OF COMMITTEE ON RESOLUTIONS.

Submitted by Dr. Porter.

Whereas, one of the largest and most important of Wisconsin agricultural interests is represented by its live stock and by the income therefrom, which is estimated to amount to more than one hundred million dollars annually, and

Whereas, we believe that the state of Wisconsin should in the improvement of the character and increasing the production of the domestic animals

of this state move forward as it has in other lines, and

Whereas, the Wisconsin Live Stock Breeders' Association is organized for the advancement and protection of the live stock interests of the state and is limited in its accomplishments only by reason of lack of sufficient funds to properly carry forward the large interests of the live stock industry in this state and is unable without larger

financial support to properly protect interests of such magnitude and of such value to the state of Wisconsin, be it

Resolved, at this Twenty-fifth Annual Closing Farmers' Institute, assembled at the city of Hudson Wisconsin, on the 14th, 15th and 16th days of March, 1911, and representing the farmers and stock raisers of the state of Wisconsin, that we do hereby express our unqualified endorsement of the proposal to appropriate out of the State Treasury an adequate sum for said association and its work and we do hereby particularly endorse and urge the legislature to pass Bill No. 702A now pending before the Wisconsin legislature relating to said matters.

Resolved, that we heartily commend the grand work being done by our State Agricultural College and the Agricultural Extension work being done in the county and high schools of the state.

Resolved, that we endorse the present tuberculin test law, but believe it should be made more effective.

Resolved, that we favor the parcel post and the maintenance of the present tax on oleomargarine.

Resolved, that we tender our sincere thanks to the committee of arrangements for their kindness in providing for our entertainment in Hudson and to all those who delighted us with their excellent music.

A Member—I live in St. Croix county and I felt pretty badly about that comparison Mr. Aderhold made this morning with Sheboygan county. I would like to know if Mr. Aderhold has any statistics which would show a comparison of the tuberculous cows in the two counties?

Mr. Aderhold—No, none whatever.

The Member—I have a little. We have been testing cattle some in this part of the state. I know a man who has tested about five hundred cows

and he has found only about eight or nine among those that have reacted. Among our native scrub stock he has found only one. Among cattle that have been shipped from the eastern part of the state, where they have been endeavoring to improve their herds, he has found the rest of them; in one herd of five Jerseys, which had been shipped in, two of them reacted. In another one, where there was a full blooded Shorthorn bull, there was one badly affected. In another case there was a yearling Holstein bull, shipped in when he was a calf, he was badly affected, while among our scrub cattle, where we get only a limited return for our dairy products, our cows are healthy.

Mr. Aderhold—That shows that the tuberculosis which you have had here was brought in through stock that was shipped in here. If the law we have now had been in force at that time that could not have happened, so it is a good thing to have that law, simply for the purpose of preventing the spread from one herd to another in the state.

Mr. Bradley—If our cattle in St. Croix county are earning thirty dollars a year and those in Sheboygan county are earning sixty dollars, we cannot afford to keep on that way just to keep our cattle healthy; you cannot make much profit out of them that way. I tell you we can have our cattle healthy and have them profitable, too. We can keep them warm, we do not have to turn them out of doors to get chilled and feed them on straw to keep them healthy. I have had Jerseys fifteen or twenty years, we test them right along and we do not have any tuberculosis.

Supt. McKerrow—I rise to a point of order. The question under discussion is the passage of that resolution.

Resolution put and carried and resolutions adopted as presented by committee.

## CLOSING REMARKS.

Supt. Geo. McKerrow, Madison, Wis.

Ladies and Gentlemen: We have been here with you three days to hold this twenty-fifth closing Wisconsin Farmers' Institute. We have been in the task twenty-five years at places where we have had many, many more people in attendance at the closing Institute, but numbers do not make an Institute. We have been at many places where they furnished more suitable weather; your weather here started in too fine, because it made the business farmers—not the swiftless fellows—anxious to get things ready for spring work, so that the first day I think they were busy, and then the second day it was too stormy, and that took the sand out of both days. Today is a very nice day and we are pleased to see so many here. I was over at the ladies' hall and that is full to overflowing, and here there is a goodly number.

I have not been at any Round-up where I have been any better pleased with the material that we manufactured for the Bulletin. It bothers me to bring out a Bulletin with new material in it each year, material that will have in it the best things for the Wisconsin farmer and still vary from the Bulletin of last year, but I feel sure that we will have a good variety in this year's Bulletin.

Now, while I have said that this is not one of the largest audiences at a Round-up Institute, I am here to say it is one of the best.

Mr. Aderhold called your attention to the fact that the Sheboygan county cows produced an average of sixty dollars and the St. Croix county cows only thirty-one dollars. They produce a good many boys and girls down in Sheboygan county, too, and some of them have turned out very well, Aderhold is proof of that himself, because he is one of Sheboygan county's products;

still, though I have been in a good many Sheboygan county Institutes, I can assure you they cannot produce any better lot of boys and girls than the little people who performed right here on this platform, nor have I seen any better teachers in Sheboygan county.

One reason I have been pleased with this audience is that they have made up in warmth what they have lacked in quantity. We carry thermometers to the Farmers' Institutes and they are sensitive to the slightest degree of heat or cold, and there has been sufficient heat here to generate ideas, we could see that, because Tom Convey and Bradley respond very quickly to that kind of heat, and they and some of the other fellows have warmed up pretty well at times.

I have been pleased with the way in which you have taken part in these discussions and stirred things up, for in that way we get the best out of our discussions, we turn things over and look at both sides of them.

I have been pleased with the way in which the local committee of this city of Hudson have met us; we have been to places where they met us with brass bands, but nowhere have things been in better working shape than they have been right here.

Now, in closing this Twenty-fifth Annual Farmers' Institute, I want to add to the resolutions which have been passed my personal thanks to the committees in charge, to the people in general, to every one who has taken part in our program, who has helped in its entertaining features, as well as its instructive features. I wish to thank you all and to say to you that the Institute workers in this closing Institute will always remember in a very kindly manner the Twenty-fifth Round-up at Hudson. I thank you.

**WOMAN'S DEPARTMENT.****COOKING SCHOOL.**

Held at Hudson in Connection With the Closing Farmers' Institute,  
March 14, 15 and 16, 1911.

Conducted by Miss Edith L. Clift, Chicago, Ill., and Miss Marie Fenton,  
Manhattan, Kansas.

Assisted by Mrs. Henrietta W. Calvin, Prof. Household Economics, Pur-  
due University, Lafayette, Indiana, and Mrs. O. W. Dynes, Super-  
visor Domestic Science, Abraham Lincoln Center, Chicago, Ill.

Stenographic Report by Miss Nellie E. Griffiths, Madison, Wis.

**FIRST SESSION.**

Tuesday Afternoon, March 14, 1911.

**VEGETABLES AND EGGS.**

Miss Edith L. C. Clift, Chicago, Ill.



Miss Clift.

I wish the Cooking School could be regarded more in the light of a Housekeepers' Conference, then I think we would exchange ideas more readily. I would be very glad this afternoon to have questions during the work. Please do not feel as a lady did the other day; she had quite a lot of interesting questions, but saved them until the close, so no one but herself had any benefit. When I asked her reason for not asking them earlier, she replied, "I was afraid my neighbors would think I knew nothing."

I do not think any woman need be ashamed of not knowing all there is to tell about cooking; there is so much that can be learned every day, and we have come to know that cooking is something we do not learn as we do a trade. We go and learn to be a dressmaker or a milliner and can learn it all in a few years, but when we take up cooking we find it is impossible to learn all in a great many years. I have

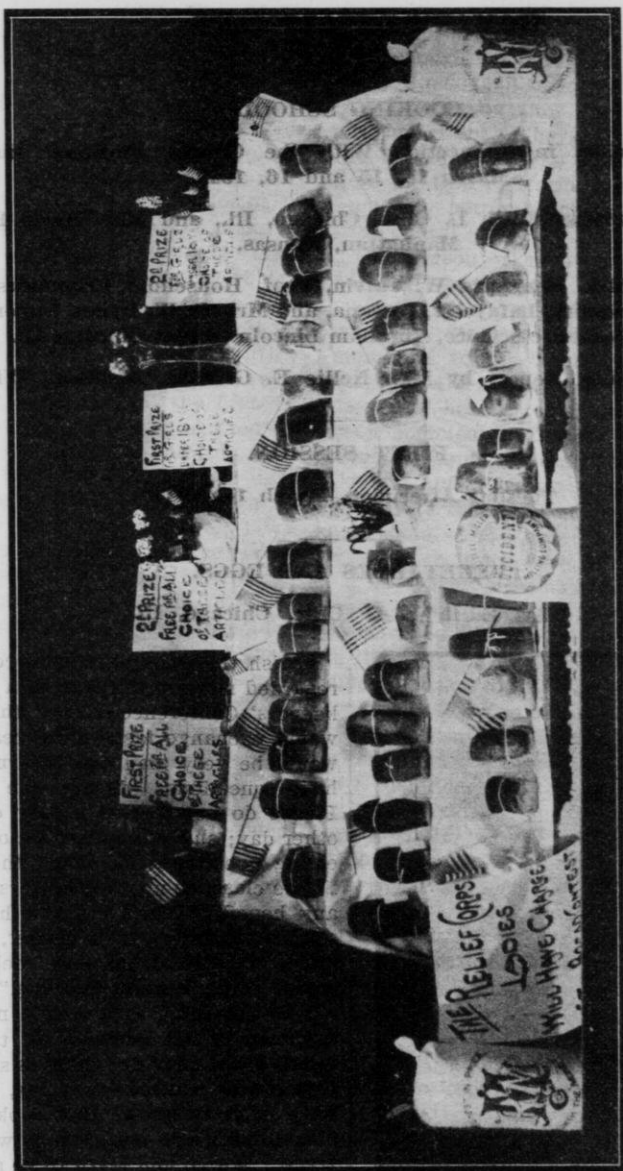


Exhibit of bread at Round-up Farmers' Institute, Hudson, Wis., March 14, 15, 16, 1911.

found in my work that usually the ladies between the ages of thirty and sixty are more interested than the younger women, they have found out by experience that one never knows it all. Most women will agree with me that any amount of time can be used in the preparation of foods; what we should look for and aim at is to prepare foods with as little amount of labor and waste as we possibly can, and to use those most suited to our purpose, always keeping in mind that to have good health we must have sufficient nourishing food. It need not be rich, but it must be well cooked, if we are going to receive full benefit.

Another thing we have to consider quite a good deal is to find the things which are most suited to those for whom we are cooking. A menu for a farmer would not answer for a man in an office, because the man on the farm needs more heavy, bulky food than the man in the office does.

This afternoon we are giving our time to the consideration of vegetables and eggs; both of these are excellent foods, and in most homes are used every day. It would indeed be a hard thing to give up eggs, so many dishes depend on them for their success.

I am afraid there are still some women who think there are only three or four ways in which eggs may be cooked; this is a big mistake, there are dozens of different ways if we will only give a little time to the preparation.

When we are boiling eggs then we want them absolutely fresh. To test eggs to know if they are fresh, drop in cold water. If the egg is fresh, it will sink, if it is not, the large end will always tip up, because that is where the air space is. An egg will stand in a glass of water when it is three weeks old; it will not sink to the bottom.

For some dishes it is very necessary to have fresh eggs, but for others we

can get a very good tasting dish without their being actually fresh.

Vegetables and eggs differ quite a good deal in composition, and yet there is a similarity. In some of our vegetables, such as potatoes, we have a good deal of starch; we do not have much in the egg. Potatoes and eggs are always a good combination, the two together are very satisfactory, and in a great many dishes we use this combination very successfully.

If an egg is dropped in boiling water then we will see just about the same result as we do when we put a piece of beef into very hot water, that is, the egg coagulates. This shows that eggs must be cooked at a low temperature to get the best results; also that they contain a large proportion of albumen. If they are boiled, they are tough and hard, they will neither be appetizing nor digestible. Raw eggs are more digestible than cooked ones, therefore we are always careful, especially in sickness, not to over-cook them.

This afternoon we will prepare and serve Corn Chowder, Spanish Omelet, Potatoes O'Brien, Steamed Eggs with Tomato Sauce and Combination Salad.

I want to cook eggs in two different ways this afternoon, so that you may compare them. When cooking eggs for breakfast, we allow one and a half pints of water to every two eggs. Have your water boiling when you drop your eggs in, then move the saucepan to the side of the fire, so that it cannot boil any more. The eggs will take from six to eight minutes, it depends a great deal on how fresh they are. Or we may put them in cold water and let them cook until they come to a boil, and they will be almost as well, but it is not quite as safe as a rule to go by.

Now we will cook this egg in the old-fashioned way, taking enough boiling water to cover the egg and letting it boil furiously during the three minutes we usually allow. The result is as you



see, a tough, stringy egg, very different to the other jelly-like substance when cooked below the boiling point.

Bacon fat is particularly good to fry eggs in, but if the fat sputters when an egg is dropped into it, it is too hot. Cool it off a little.

I like to scramble eggs in the double boiler, it takes a little longer, but you are sure not to burn or cook the egg hard. When prepared in this manner, allow one tablespoon of milk to each egg and one level tablespoon of butter for every two eggs. Dish on thin toast, be quite sure the eggs are served hot. Any egg mixture should be served just as soon as it is cooked.

#### Steamed Eggs with Tomato Sauce Recipe.

Put enough tomato sauce in a shallow dish to cover bottom of dish, then drop in eggs, sprinkle with pepper and salt; add enough of the sauce to just cover, stand in a dish of hot water, put in moderate oven and cook for five minutes. The eggs should be "set" before taking from the oven.

There are many different ways of preparing eggs cooked in this fashion. Another good way is to take these little round earthen cups, butter them and sprinkle with finely chopped parsley, season with salt and pepper, and put a teaspoon of cream over each egg. They may also be placed in a pan of water to cook. If you have one of these spatulas with a flexible steel blade, you will find it very easy to turn eggs out by just running it around them. The eggs are more apt to break if your cups are as deep as these are. If you can get the shallow ones, be sure to do so.

Question—Where do you buy those round earthenware cups you are using?

Miss Clift—At any china or hardware store. They are fire-proof, and

they may be also used to bake custards in for the children to carry to school. If you want something to tempt an invalid, then put a little tomato sauce around the egg, the green and red make such a pretty contrast.

#### Tomato Sauce.

##### Recipe.

One can tomatoes or one and three-fourths cups fresh stewed tomatoes, one slice onion, two and a half tablespoons of flour, one-eighth teaspoon pepper, one-fourth teaspoon salt, one teaspoon sugar, and three tablespoons butter.

Cook onion with tomatoes fifteen minutes, rub through strainer and add to butter and flour (to which seasonings have been added), cooked together.

For a very thick sauce we use three tablespoons of butter and three of flour to one cup of liquid. It is a very safe way to measure your flour and liquid to be quite sure you have the right amount, then you will not get too much or too little. Many good housekeepers can measure without spoon or cup, but in making sauce it is better to use a spoon, so as to be sure that you have the right quantities, and do not have to add more flour, as it takes more time and your sauce is not quite so good. We often heat our milk, just because we can mix the sauce more quickly when it is warm than when it is cold.

Question—Do you have to cook your sauce just as long with hot milk as with the cold milk?

Miss Clift—It is put together a little more quickly by using the hot milk. For my part, I would rather wash an extra dish than stand ten minutes stirring a pint of milk.

The sauce should always boil for several minutes to cook the flour or it will have a raw taste. You may use a little bay leaf and whole mace when

making this sauce, if you like the flavors. Always be careful not to season too highly. Sometimes we cover the buttered cups with bread crumbs, and that gives us a variety in a dish of this kind. You may use a little paprika on the eggs, that is very good with any egg dish. It also gives a little color.

We will put the boiling water around this, just half way up, so they will be steamed. If the oven is too hot and you are afraid of them getting too brown, you could lay a sheet of paper over, but I think it will be unnecessary to do that today.

Question—How long do you leave them in the oven?

Miss Clift—That would depend a great deal on the heat of the oven. Do not let them get hard. Generally they will cook in five or seven minutes.

The easiest and quickest way to chop parsley is a very simple one. Always wash your parsley first and shake dry. Then gather the sprigs up and with a sharp knife cut in this fashion, holding the parsley quite firmly between the finger and thumb of the left hand. It is not at all difficult, and in a very short time you can cut up a good deal. Some people like to use the scissors and clip it. Parsley when wilted should go into fresh, cold water. To keep parsley you may wrap it in a piece of cheese cloth and place on the ice, or put in a mason jar and keep it tightly screwed down. Either way is quite satisfactory. Parsley is certainly a very useful herb to keep on hand.

Now we will prepare the omelet.

### Omelet.

#### Recipe.

Separate three eggs, with the yolks put a little pepper, salt and one tablespoon cold water (milk toughens the eggs), beat the whites to a stiff froth lightly mix in the yolks. Make a pan

rather hot, grease lightly, pour in the mixture, cook three minutes on the hot stove, then place in a hot oven and cook until just setting, fold over and turn onto a hot platter. If your oven is not warm, turn the omelet carefully over, and cook a few minutes on the other side.

Minced ham, chicken or beef all make a pleasant change, a little chopped parsley may be added to almost any meat. I find most people enjoy a corn omelet. For that we take a half a cup of corn to every three eggs. Mix the omelet as usual, then fold in the corn the last thing. Sometimes we have a few green peas on hand and these may always be used up with the meat.

Some people use an entirely different rule when making a Spanish omelet, but I think this one answers very well for many varieties. I will take a cup of the canned tomato, a few thin slices of this green pepper and a little chopped onion, and let them cook together until about the consistency of thick cream, then spread over the cooked omelet, just as we would the jelly when making a sweet omelet, but the jelly would not need cooking as it is already cooked.

Now a word about the pan. A nice, smooth granite pan, or the ordinary iron spider will be found quite all right if perfectly smooth. If your iron pan is not smooth, take a little salt and scour thoroughly. If the pan is rough, the omelet will stick and you will have a hard time taking it out of the pan.

Only use sufficient butter to grease the pan; never have any surplus of fat. I cannot tell you how much to use, because it depends on the size of the pan you are using.

Be sure your eggs are perfectly fresh, otherwise your omelet will be a failure. If the eggs are quite cold they will beat light more quickly than warm ones. Always add a pinch of

salt to the whites before beating, this causes them to beat light more quickly and to retain their lightness. Do not beat the eggs perfectly light, as you would for a frosting, but so that it will adhere to the egg beater. Add the salt, water and pepper to the yolks of the eggs. They will be quite light enough beaten with a fork, and it will save some dish washing. By using a shallow bowl and a wire beater, we can get more bulk to the egg than if we used a Dover egg beater in a deep bowl. In an omelet of this kind, we like to have as much bulk as possible. Never keep an omelet waiting for the people, it is a good deal better to keep the people waiting for the omelet. A properly made omelet will hold its lightness quite a long time, but we never serve it until the people are seated at the table, because it is much better to have it piping hot.

Always be careful not to have too much salt with an omelet, if you do, it will not be so light and is apt to be thin and stringy. Add the cold water to the yolk of the egg. Many cooks use one tablespoon of water to each egg, and if you find you have success in doing so, it will be all right. I prefer one tablespoonful to the three eggs. Other cooks always use boiling water and depend on that mainly for their success. It seems merely a matter of preference, because I find that the omelet is equally good with the cold or the boiling water. It will depend a great deal on the cook. Never stir it after you have added the yolk, just mix it thoroughly and get it on to cook as soon as possible. Do not have the pan smoking hot, or the lower part will cook before it can be cooked through. No matter what way we are preparing eggs, we should always remember that they should not be cooked too fast in order to have the best results.

Now we will turn our attention to the vegetables. Mrs. Rorer says,

"Few things show the difference between comfortable and slovenly house-keeping more quickly than the dressing of vegetables."

We have two classes of vegetables, the starchy and the non-starchy; tomatoes, celery, green peas, asparagus and spinach are examples of the non-starchy. The water from these vegetables is always good for soups. We have not time to consider the different vegetables at any length today, but I would advise any of you ladies who are interested to procure a copy of Farmers' Bulletin No. 256. There are a great many excellent recipes, as well as general information in this book.

We have one rule which never varies. That is we put all our vegetables in boiling water, not always salted, but generally so. Turnips and parsnips are examples of vegetables which are often best cooked, at least part of the time, without salt. A little baking soda will soften the water and so enable the vegetables to cook more quickly.

Always remember to add salt, so that the flavor may penetrate right through the vegetables. I do not think anything is more insipid than vegetables without salt. A man was telling me only last week, "My wife makes dandy bread, but she has one little fault, that is she so often forgets the salt." It is the same with so many things, when we forget so readily it is as well to look for the cause. Lack of interest will often be found to be the real reason, I think. We generally allow one teaspoon of salt to a quart of water, but oftentimes we find that amount is not sufficient and you quickly learn to salt food to your own taste. I like to measure with a tablespoon, because it saves so much guessing. Occasionally you hear a cook complain that preparing a dinner spoils her appetite, quite often I think there would be less tasting if there

were more measuring, and also a better appetite.

Celery is one of the vegetables that should be cooked just at or below boiling point. It gets tender more quickly and will not be so strong. It is one of the few vegetables we can use the cook-box for. Beets are another vegetable we like to cook in the fireless cooker.

We would serve a white sauce with the celery, made of part milk and the liquid that it is cooked in. There are a good many vegetables which are much improved by serving cream sauce with them. Cabbage, especially, is wonderfully improved with cream sauce. For an occasional change, there is nothing quite so good as cabbage, when properly cooked. I think I cannot do better than give you Miss Parloa's rule for cooking it. So many people seem to have an entirely wrong impression of how cabbage should be treated to get the best results.

#### To Boil Cabbage.

"Cut a small head of cabbage into four parts, cutting down through the stock. Soak for half an hour in a pan of cold water to which has been added a tablespoon of salt; this is to draw out any insects that may be hidden in the leaves. Take from the water and cut into slices. Have a large stewpan half full of boiling water, put in the cabbage, pushing it under the water with a spoon. Add one tablespoon of salt and cook from twenty-five to forty-five minutes, depending on the age of the cabbage. Turn into a colander and drain for about two minutes. Put into a chopping bowl and mince. Season with butter, pepper and more salt if it requires it. Allow a tablespoon of butter to a generous pint of the cooked vegetable. Cabbage cooked in this manner will be of delicate flavor and may be generally eaten without dis-

treas. Have the kitchen windows open at the top while the cabbage is boiling, and there will be little if any odor of cabbage in the house."

To serve with cream sauce, cook in this fashion and then pour over the cabbage the cream sauce. And I think you will agree with me that it is delicious.

Turnips should be cooked the same way. If you boil a turnip in a small quantity of water, the whole house smells of it. Turnips should not be boiled quite so fast as the cabbage, as it is woody and needs to be cooked slower in order to get the very best results. If the water is very hard, use a little bit of soda, but I am always very shy about recommending soda with vegetables. Just a little bit goes a long way, a piece the size of a pea in with the turnip will help quite a good deal. It softens the water and that is why it cooks more readily. Any woody vegetable cooks more readily in soft water.

We will now prepare the corn chowder.

#### Corn Chowder.

##### Recipe.

One can corn, four cups potatoes, cut in one-fourth inch slices, one and one-half inch cube fat salt pork, four cups scalded milk, eight common crackers, three tablespoons butter, one sliced onion.

Cut pork in small pieces and try out, add onion and cook five minutes stirring often so that onion may not burn, strain fat into a stewpan. Parboil potatoes five minutes in boiling water to cover. Drain and add potatoes to fat. Then add two cups of boiling water. Cook until potatoes are soft, add corn and milk, then heat to boiling point. Season with salt and pepper, add butter and crackers split and soaked in enough milk to moisten. Remove crackers, then turn chowder into a

tureen and put crackers on top. This quantity will serve six people.

A chowder differs from a soup, because the soup is strained, the chowder is not; for this reason it makes a very hearty, appetizing dish. For children at school this chowder would make a good meal, with the addition of some dessert, there is so much in it that is nourishing.

The fat has been tried out in a pan to save time and we cook our onion in that and strain it out. Many people object to the flavor of onion. So many ladies say, "My husband won't eat it if it has onion in it." If you do not say anything about it, he may never know it is there. We think a little deception of this kind is quite all right. The other day I was preparing the smothered potatoes and the recipe says you may add onion and get a very good flavor, but I left it out and when the dish was passed, I saw a lady taste them and then make a very wry face. I thought something was wrong, so I asked her if she didn't like them, and she said, "I would, except for the onion, it is so unpleasant, it always makes me feel rather sick." I replied, "I did not expect there was going to be enough in so that it would be noticed," and she said, "It really is quite strong, I cannot eat anything with onion in it, even if I can't taste it, and know it is there." The other ladies had to laugh, because there was no onion in it at all. She just imagined it was there and so she could taste it, and your husband may be the same way, you know.

You can use other fat besides salt pork for this, but it gives a better flavor than some of the other things, and just a thin slice will be sufficient. If you have to economize with butter, then may be you would rather not put three tablespoonfuls in this soup, although it improves the flavor and gives us some of the fat we really need.

We will cover the potatoes with the boiling water and just let them come to a boil; boil for a few minutes and then pour off the water before using the other. We do not think a small quantity of potato water will poison anyone, but it has a very disagreeable taste. We parboil the potatoes when we want to use the water, as in bread or any other thing. It is better to cut the potatoes in dice rather than in slices, because the slices break up so much.

Question—Do you always use boiling water with potatoes?

Miss Clift—Always with new ones; some old varieties are just as good if started in cold water, but it is better to soak the old potatoes in cold water some time before using, and then you may safely put them on with boiling water. You see the reason for doing this? The new potatoes contain a great deal of water, but those we have kept through the winter have dried out and so the flavor will be improved if we put some of it back. Never leave potatoes standing in the water when they are cooked, as they will become water-soaked. If you want to keep them hot, drain off every drop of water and stand on the stove without the lid to dry. It is a good plan to take a clean dish towel and throw it over the top, then put your lid on, which will condense all the moisture and keep them dry for thirty to forty-five minutes. If your stove is over-heated, stand them on the back of the stove where they won't burn. They do scorch in a short time, because of the amount of starch in them.

There are many starchy foods, and they should always be prepared in the same fashion. Rice and macaroni are best cooked in boiling water. This winter we have been experimenting with the cook-box and cooked rice very satisfactorily. Take it out and stand it on the hot stove, so that the heat will dry it very thoroughly. It is not

quite so nice as when cooked in a quantity of water, but certainly it is less work when prepared in this manner.

Have the onion cut up into small pieces, it will cook more quickly and you will have more flavor in the chowder. We do not like the onion to brown at all, because if it does it spoils the color of the soup. Just have it cooked soft in the pork fat, it does not brown so quickly as in the butter. Move it around and it is not likely to get brown.

Many people think they cannot digest boiled milk, and it is not necessary to boil it for this soup. Cook the potatoes in the boiling water, add the corn, then the scalded milk and crackers, and the soup is ready to serve.

#### Potatoes O'Brien.

##### Recipe.

One quart of potatoes boiled and cut in cubes, one tablespoon finely minced onion, one tablespoon finely minced parsley and two tablespoons of pimientos, three tablespoons butter, salt and pepper.

The pimientos are the Spanish red peppers which come to us in the cans; they have a very nice flavor and quite often we have a little left over and we could use it up in this way. Use a little more if you are fond of the flavor. They are bright red and add a pleasing touch of color to many dishes.

Question—How much is a tablespoon of onion?

Miss Clift—A spoonful of onion is measured level, just the same as anything else. With a quart of potatoes, this may seem a small amount, but when we use several flavorings or seasonings, at one time, we must be careful not to have too much of any one thing.

I am using forks to stir this mixture, so that the potatoes will not be

broken. These are only fried potatoes with the seasoning mixed in, but they make a pleasant change when we have cold potatoes on hand. Today I am using the frying pan for them, but you may put them in the oven and bake until a nice brown, and it will answer the purpose just as well. Always have them browned, they look, as well as taste, a great deal better. For a supper dish, we may tire of creamed potatoes baked in the oven, but I do not think we often have a chance to. I know of no dish one may use so often without people tiring of it. Baked potatoes are good and so little trouble to prepare that it is a wonder more housekeepers do not take advantage of this simple way to prepare them.

We will now prepare the salad dressing.

#### Salad Dressing.

One-half pint sour cream, two tablespoons lemon juice, two tablespoons vinegar, one teaspoon salt, one-fourth teaspoon pepper, one teaspoon mixed mustard and one tablespoon sugar.

Beat the cream with an egg beater until smooth, thick and light. Mix the other ingredients together and gradually add to the cream, beating all the while.

This dressing may be modified to suit different vegetables. Having sour cream for a foundation, the seasoning may be anything desired; for example, the mustard and lemon may be omitted and the dressing may be seasoned highly with any kind of catsup.

A sweet cream may be substituted for the sour. It should be quick thick. This dressing is very simple. It is always good to find something that is little work and yet satisfactory.

By whipping the cream with an egg beater, we get a very smooth consistency. As it says at the end of the rule, we can use the sweet cream instead of the sour, but with most vege-

tables we prefer the sour cream to the sweet.

We always like to beat this just before adding the rest of the ingredients. If your vinegar is very strong, do not put in the full amount until you have tasted it. Too much acid always spoils the best dressing. You may add the two tablespoons of lemon juice but do not add too much vinegar until you are sure you need it. I would like to add a word of warning concerning mustard, quite often too much is used. A little goes a long way in a dressing. It is always better to have too little than too much.

For our salad today we are using cabbage, tomato, green pepper and pimento. This will give us an agreeable combination. It is very hard to give the exact amount for any salad. It is best to use your own judgment. I made the same remark the other week and a lady in the audience asked, "What if we have no judgment?" To which I was bound to reply, "Then you can never be successful as a salad maker, for the success depends mainly on taking the right quantities and the thorough blending of them."

The vegetables must always be quite fresh, and if you are using cooked

vegetables, be careful not to break them up too much. We have the cabbage shredded and have changed the water twice to insure it being perfectly cold; this is the secret of crisp cabbage, cold water and plenty of it. To dry the cabbage, place in cheese cloth and swing it around several times.

If convenient, do not combine the salad with the dressing until you are about to serve it. The dressing will always wilt the lettuce. Individual salads look tempting, but quite often we find it impossible to mix every thing as thoroughly as we can when prepared in a bowl. It is always possible to pass salad dressing, so that more may be added if cared for.

The lettuce was washed before dinner and the leaves placed separately on this cheese cloth and then lightly rolled up. Do not screw it too tight, or you will bruise the leaves and spoil the appearance. Lettuce brought to the table dripping with water is very unsightly and may always be prepared some hours before using, in fact, it will keep perfectly crisp for two days if placed on the ice.

And now if the committee will pass the spoons, we will let you sample the dishes prepared.

## SECOND SESSION.

Wednesday Afternoon, March 15, 1911.

## THE UTILIZATION OF LEFT-OVERS.

Miss Marie Fenton, Manhattan, Kansas.



Miss Fenton.

Yesterday afternoon we learned how to prepare vegetables and eggs separately and in pleasing combination. Both are very necessary to the human body, vegetables because they yield heat and energy; eggs because they give us the required food for building body tissue.

All that is necessary to keep alive the human organism, but it is also necessary to keep peace in the family. To do this we must be careful not to throw away on a teaspoon more than the man of the house can bring in on

a shovel. This means the utilization of left-overs, about which every woman should have some knowledge.

Many people think that meats which have been used in the preparation of soup are no longer of any use. Soup meat contains a great deal of nourishment; it is true it has lost some of its flavor, but nine-tenths of the nutritive material of meat is insoluble, hence it remains in the meat. If the meat is thrown away, you have used only one-tenth of its value and as "half the cost of living is the price of food," you have greatly increased that price.

Today we will consider left-over meat, vegetables and cake. Not exactly left-over cake, but cake that is too dry to be served can be used in this way.

The program will be Oak Hill Potatoes, Casserole of Rice and Meat, Meat Souffle, Potato Dumplings, Gingerbread Pudding and Creamy Sauce.

Everything except the creamy sauce has been made with left-overs.

We will make the gingerbread pudding first, because it will take one and one-half hours for steaming.

## Gingerbread Pudding.

## Recipe.

One pint milk, one cup stale bread broken small, one-half cup currants or raisins mixed, a little candied peel chopped fine, a grating of nutmeg or one-half teaspoon vanilla, two eggs, three tablespoons butter, three tablespoons sugar.



Put bread to soak in cold milk, leave for thirty minutes, beat eggs slightly; put layer of bread in greased mold, then some of the fruit and a few pieces of butter; mix sugar, milk, eggs and flavoring together and pour over, steam for one and one-half hours. Any liquid sauce may be used, but lemon is particularly good.

The pudding is better if you are using gingerbread than a finer bread. If you use gingerbread, a pint of milk is too much; a cup and a half will be plenty. I am going to change this recipe a little, because we have white bread and I want to have it as much like gingerbread as I can, so I will add one teaspoon of ginger, two tablespoons molasses and about three tablespoons of sugar. We do not want too much sugar, because with the sweet sauce it will make it too soft.

If you have gingerbread left over or dried so that you cannot serve it, you can use it for your puddings and then use the recipe given in the Farmers' Institute Cook-book No. 3 as Cavendish Pudding (P. 70), but if you use the white bread it is best to add the extra material.

In measuring liquids, a spoonful is considered all you can hold on a spoon, but in the dry materials, such as flour, a spoonful means level with the edges of the bowl of the spoon.

I have my buttered pan ready for my pudding. I will put the bread in the bottom, then the raisins and then pour the liquid over it, so the raisins will not sink to the bottom. If you are especially fond of nutmeg, it would be all right to add a considerable amount.

Question—May I ask what kind of molasses you use?

Miss Fenton—I do not know what kind this is; this was given to me.

Miss Clift—Do you prefer any special kind of molasses?

Miss Fenton—The New Orleans mo-

lasses is considered the best for cooking.

Miss Clift—I find there are some you get such a sticky mixture. I find the New Orleans the best. Would you use just the same proportions if you were baking that instead of steaming it?

Miss Fenton—I would. Of course the heat is more intense if it is baked than if it is steamed, but still the same proportions will do very well.

This recipe calls for three tablespoons of butter, so by marking off this pound the way Miss Clift did yesterday, I will not have to measure my three tablespoons with a spoon.

Miss Clift—Could you butter the slices, if you used them?

Miss Fenton—Yes; if you used the slices of bread it would be just as well to butter them before putting the pudding together, instead of putting the butter on the top.

This is a good way of using up bread crumbs; any kind of bread pudding is a good way to use stale bread.

Miss Clift—If your bread is very dry, would you advise soaking it first?

Miss Fenton—It would be better if your bread was very dry, then you are sure it is entirely softened.

I am going to steam this in the water on that little trivet, so as to keep it off the bottom of the kettle, and it wants to steam about an hour and a half.

The next thing I will make is the casserole of rice and meat.

### Casserole of Rice and Meat.

#### Recipe.

Line a well greased mold with steamed rice. Fill center with two cups of cold, finely chopped, cooked meat seasoned with salt, pepper, onion juice; one-fourth cup cracker crumbs, one egg slightly beaten and hot stock or water to moisten. Cover meat with rice, cover with buttered paper to keep

out moisture and steam forty-five minutes. Serve on platter surrounded with tomato sauce.

I have a stock I am going to use this afternoon to moisten this with instead of hot water.

All meat should be removed from the paper as soon as it comes from the market, because all meat is of the same structure, being composed of small tubes, which hold the juices, joined together with connective tissue; and if we let the paper stay around the meat it will soak up the juice, so we must remove the paper immediately and put the meat on a cold plate, in a cold place; it will keep much better and we will have better meat, because then we will get all the juice there is in it.

You have probably heard some people say that red meats were less digestible than the whites, but experimenters tell us that red meats are just as easily digested as the whites, and all are very easily digested; so we need not be afraid to eat red meat. Another way of using your left-over meats, especially if you have a little left from the evening meal, you could make a white sauce, mix with the meat and shape, then roll in cracker crumbs and egg and crumbs again, and fry in deep fat. It makes a very healthful meal, is very appetizing and has a very pleasing appearance.

There are four recipes for making this white sauce I spoke about. The one that is a thin sauce has one cup of milk, one tablespoon each of flour and butter. We usually serve it with meats. We also use it for cream soups. There is another recipe that is called Sauce No. 2. It has a cup of milk and two tablespoons each of flour and butter; that is, just one tablespoon thicker than the first. It is used for creamed potatoes, or creamed meats. Then there is another recipe which calls for three tablespoons each of flour and butter, and that we use for

souffles. Then the very thickest is made with four tablespoons each of flour and butter to one cup of milk; this we use for croquettes. But in making croquettes, if the meat has a great deal of fat in it, it is better not to use four tablespoons of butter, but substitute two of the fat. One nice thing about the white sauces is that we can make them in the morning and put them away until we are ready to use them, or make quite a quantity and have a store to fall back on.

Not many of us have left-over chicken to do with, but if, instead of throwing away the chicken bones, you would stew them, you could have a very good soup for the next day's meal, because there is a great deal of material which clings to the bones which we are unable to get off.

Then, too, instead of throwing away the chicken giblets, we can mince them, put a thin white sauce with them and serve them on toast for breakfast.

Then if we have a little chicken left, not enough for serving the family, if we put a little veal with it for bulk, we can have a very appetizing chicken salad, or we might make chicken croquettes the same as with any other meat; or escalloped chicken, which is made by taking the cold sliced meat and using macaroni or rice with it and the white or brown sauce or tomato sauce, with the buttered crumbs on top. Or we could use chicken the way I am using this meat today, fix it in the little dishes, or use one large dish. Any kind of meat can be used this way.

Question—Was the rice you are using just boiled?

Miss Fenton—Yes, just boiled. Instead of steaming this, I am going to set it right in a pan of water and put it in the oven.

Miss Clift—Did you cook the rice in the cook-box?

Miss Fenton—No, I cooked it in a

double boiler on the stove. Rice is something I do not like to cook in the cook-box; it might be used, but it is better for vegetables to be cooked in boiling water, so that the water is in rapid motion, and if it is in the cook-box the water is not in motion.

Miss Clift—There is not any motion in a double boiler.

Miss Fenton—No, but the water underneath is in motion. In the cook-box the water is gradually losing heat into the rice, while in the double boiler the water underneath keeps its heat.

Question—I suppose it would not be necessary to serve potatoes with this?

Miss Fenton—No, because the starch in the rice will take the place of the starch in the potatoes. This can be served in place of potatoes, or if you do not want to take the trouble of fixing them this way, you could cream the meat, cook the rice separately, put the meat on a platter and garnish it with the rice instead of cooking it right with the rice.

The next thing I am going to make is the meat soufflé.

### Meat Soufflé.

#### Recipe.

One cup white sauce No. 3, one-half cup bread crumbs, two cups cold chopped meat, yolks three eggs, whites three eggs.

Add bread crumbs to sauce and cook two minutes; remove from fire, add meat and yolks of eggs, then fold in whites. Turn into buttered baking dish and bake thirty-five minutes in a slow oven, or set pan in pan of hot water to bake.

In making the white sauce, you melt the butter, as I believe Miss Clift told you yesterday, stir in the flour and then add your liquid.

Question—How much butter do you take?

Miss Fenton—For the white sauce

No. 3 it is three tablespoons (level) of butter to three of flour.

Mrs. Calvin—If you were using chicken, couldn't you use the chicken fat instead of butter and be more economical?

Miss Fenton—Yes, it would be more economical and it would give a better flavor to your soufflé.

Miss Clift—Don't you think the double sauce pan is good to try out chicken fat in?

Miss Fenton—I think it is better than to put it in a pan directly over the hot fire, because it is just as hot and it will not burn.

Flour should always be sifted before it is used, because it will pack. You can get almost a quarter of a cup more before sifting than after it is sifted.

After the white sauce is made, stir in the bread crumbs and let it cook about two minutes longer. Then remove from the fire and add your meat and the yolks of your eggs and then the last thing add your beaten whites. They should be beaten until they are quite stiff. Bake in the oven, or steam about thirty-five minutes.

If you put it in the oven, it is best to put it in a pan of hot water and let it bake in that; that will keep the bottom from burning.

How many of you ladies ever pack eggs? How do you pack them; little end, or big end, down?

A Lady—The little end down.

Miss Fenton—The little end down? Why?

The Lady—To keep the yolk whole.

Another Lady—The big end down, because the air space is at the big end.

Miss Fenton—Surely, the air space is at the big end and you want it on top so the weight of the egg will not break the membrane and the egg spoil. If you will scrape out the little particles of white that cling to the shell of a dozen eggs you will have enough

for one egg. That is another way to be economical.

The white sauce is not quite ready, so while we are waiting we will look at the recipe for the Oak Hill potatoes.

### Oak Hill Potatoes.

#### Recipe.

Cut four boiled potatoes and six hard "boiled" eggs in one-fourth inch slices, put layer of potatoes in buttered baking dish, sprinkle with salt and pepper, cover with layer of eggs, repeat and pour over two cups thin white sauce, cover with cracker crumbs and bake until the crumbs are brown.

It requires four cold boiled potatoes, six hard cooked eggs, salt and pepper and thin white sauce.

Instead of saying hard and soft "boiled" eggs, use the word cooked in place of boiled. We should not boil our eggs. We should say hard or soft cooked.

We slice our four potatoes, put a few of them into the bottom of a buttered baking dish, then we slice the cold cooked eggs, then another layer of cold potatoes and then over the top we pour the white sauce. Two cups of white sauce No. 1; that is, one cup of milk to one tablespoon of flour and butter.

Mr. Toole—Some years our potatoes are bigger than others, while our eggs keep the same. Does that make a difference?

Miss Fenton—You will have to use the number of potatoes according to the size of your family.

Mr. Toole—Then you wouldn't put in more eggs?

Miss Fenton—Not necessarily.

Mrs. Calvin—The size of the eggs changes also. Sometime when I buy them I think they are fearfully small.

Miss Fenton—Perhaps they differ more in price than the potatoes, but I do not think that makes so very

much difference, because you can have a great deal of the potato or just a little.

Miss Cliff—Did you put the eggs in boiling or cold water?

Miss Fenton—I put them in boiling water and removed to the back of the stove so they would not boil any more.

Miss Cliff—How long did you leave them there?

Miss Fenton—About three-quarters of an hour.

Miss Cliff—Don't you think they will cook in the cook-box? In thirty-five minutes they are perfectly done.

Miss Fenton—Yes, they cook very readily and very nicely in the cook-box.

After your eggs are cooked, if you will dash them into cold water before starting to shell them the shell will come off very easily; but do not let them soak in the cold water, just enough to cool the shell.

These eggs did not peel very nicely, but I hope they will be all right after they are in the Oak Hill potatoes.

Question—Can you give any reason why they will not peel sometimes; why they will stick to the shell?

Miss Fenton—No.

A Lady—If they are freshly laid they will not peel as well; they should be two or three days old.

Question—Why does the yolk sometimes turn dark?

Miss Fenton—They are cooked too long and the sulphur in the egg yolk darkens them.

Question—Do you call that a hard cooked egg?

Miss Fenton—Yes, it is. Presumably there is a mutual disagreement between the egg yolk and the white, because they will not stay together.

Question—How long were those eggs cooked?

Miss Fenton—Three-fourths of an hour in the boiling water on the back of the stove.

Miss Clift—Are you using buttered crumbs for the soufflé?

Miss Fenton—Yes, I am going to use the buttered crumbs on top.

Miss Clift—You can do without them if you are in a hurry.

Miss Fenton—Yes. We do lots of things when we are in a hurry that we would not do if we had plenty of time.

Buttered crumbs are very nice to use and you should use them if you make macaroni with cheese and put it in the oven to bake, because the cheese will get too hot and it is indigestible when it is cooked so hard; so if you will sprinkle the buttered crumbs over the top, you will keep the heat away from the cheese.

Question—How do you prepare the buttered crumbs?

Miss Fenton—Put them through the meat grinder, melt butter and put them in the melted butter. If you haven't a meat grinder, you can rub the pieces of dry bread together and get the crumbs that way, or chop the dried bread.

Question—About how much butter do you require?

Mrs. Calvin—I take one-fourth as much butter as bread crumbs.

Miss Fenton—The next thing I am going to make is the potato dumplings.

### Potato Dumplings.

#### Recipe.

Boil three or four potatoes in the meat stock and when done mash with a silver fork and beat in a good sized piece of butter, size of an egg perhaps, or less if stock is very rich. Beat good and when cooled a little add two or three eggs one at a time and beat well. (Eggs need not be beaten first.) About one-half of a cup of milk, or more if you want to make a good many, but one-half a cup is plenty, and flour with two teaspoons of baking powder and

about one-half a teaspoon of salt. Cannot tell the exact amount of flour, but sift two cups with the baking powder and if you need more you can add it later. They need to be stiff to drop well.

You can use your left-over mashed potatoes for this. That is one way of using them instead of throwing them out. Or if you want to make them and haven't any left-over mashed potatoes, use your boiled potatoes and mash them. About two cups of mashed potatoes would be plenty. The recipe calls for three or four potatoes.

After they are mashed, if you use the hot potatoes, you can put the butter right in and beat it in with them. Use about three tablespoons of butter.

If you care to use soup stock, that will make them a great deal richer and will moisten them and you will not need to use so much milk.

Then add two eggs, add them one at a time, and beat them in. About a half a cup of milk, or if you want them not very stiff put in more milk, or put in less milk and more stock. And about the flour. You cannot tell the exact amount, because it will vary with the amount of potatoes you have, but if you sift two cups of flour and two teaspoons of baking powder with it, that will probably be plenty, if not, you can add more flour, but the two teaspoons of baking powder, I think will be sufficient.

Use just enough stock or milk to make a drop batter. It all depends on the individual taste. Some like them stiff and some do not like them quite so stiff.

Question—Would it be necessary to use the stock if you were using the milk too?

Miss Fenton—It is not necessary, but it makes a richer dumpling, I think, to use the stock.

Question—Was the butter melted or solid?

Miss Fenton—I used the solid but-

ter, but if your potatoes are cold, the butter will mix in a great deal better if it is melted, but if your potatoes are hot it will soon melt.

Miss Clift—If you were going to use left-over potatoes, it would be better to put them through the ricer before they were quite cold.

Miss Fenton—Yes, that is better, or if you do not intend to use them until they are cold, you might put them through the meat grinder, that will soften them, and if we beat them together when mixing they will be fine enough. The more you beat the potatoes, the whiter they are, and you also mash them in the process.

These dumplings want to cook about fifteen minutes. Drop them right in to your hot soup stock, or if you have a stew drop them right into the liquid that is around the stew, then cover them tightly. They will not be as good if they are uncovered.

Miss Clift—If you do not have stock, could you use water or milk?

Miss Fenton—I would use water well seasoned.

If you have potato dumplings to serve with the stew, it would not be necessary to have potatoes with the meal.

In measuring your flour into a cup, dip it lightly (after it is sifted) into your cup and then level it off with a knife; but do not pound the cup to be sure it is full, because then the flour will pack and you will have more than you want.

If you have any left-over creamed potatoes that you do not know what to do with, you might make a potato soufflé, the same way I made the meat soufflé.

Question—Have you any choice of baking powder?

Miss Fenton—Well, not particularly, either Dr. Price's or Royal. I do not like to use Calumet, because it is adulterated with alum. Everything that is adulterated must be marked so and

the word Calumet has "alum" right in it, that is why it is allowed on the market. The constituents of baking powder are cream of tartar and soda, with flour or corn starch to keep it dry. To use alum is a very bad practice, Besides cheapening the powder, it leaves a residue in the system which is very harmful. Some people prefer to make their own baking powder. They can get economical powder material at the drug store, have it weighed there and then they know they have no more of one material than they ought to have.

Another very pleasing dish that we have made at home a number of times (we haven't named it), is one in which we use quite a number of left-over vegetables; for instance, peas, or perhaps a little bit of tomato soup, with cold meat and potatoes. We could combine all of them in a buttered baking dish, putting a layer of potatoes on the bottom, then a layer of cooked meat, then a layer of onion, if you care for it, if you do not, leave it out. "Eat onions in May, no doctor to pay," so it is better to put them in, then on top of that put your tomato soup, or stewed tomatoes, and then put it in the oven. Just before it is ready to take up, sprinkle on your peas. The green peas on the red tomato make a very pretty garnish and it is a very appetizing dish. Has anyone here the name of that dish?

Miss Clift—That is called "scouse." It is a Scotch dish.

Supt. McKerrow—My mither didna make that kind.

Miss Fenton—You might use left-over creamed potatoes for croquettes, if you did not want them in soufflé, then if they were thick enough they would not need any added white sauce. Just roll them in bread crumbs and egg and crumbs again and fry them in deep fat.

With left-over corn you might make corn fritters, with a cup of flour and a

teaspoon of baking powder and perhaps two teaspoons of salt, a little pepper and a few eggs.

These are ready to be cooked and I am going to have them cooked in the kitchen, because I haven't room on my little stove.

Question—Will you please show us the consistency of the batter?

Miss Fenton—Yes, it is a stiff drop batter.

Question—Did you use more than the half cup of wetting?

Miss Fenton—Yes, I did; I used almost a cupful; I had more potato than I thought I had, but I did not use all the flour.

Question—Are those dumplings to be cooked with meat?

Miss Fenton—In a meat stock, with the meat if you wish. You can serve them in place of potatoes with your stew.

Now I am going to return to the meat souffle.

Question—In the corn fritters, how much corn would you use?

Miss Fenton—It depends on the amount of corn you have left over. Well, perhaps a cup would be plenty.

Miss Clift—We have a rule which calls for half a cup of corn.

Miss Fenton—That depends entirely on the amount of corn you have left.

Bread crumbs are handy things to have, so instead of throwing away any of your crusts, cut them off and dry them and then grind them up for crumbs. We always have a supply on hand, because mother and I have a great fancy for using bread crumbs.

Question—Do you prefer bread crumbs to cracker crumbs, or is it a matter of economy?

Miss Fenton—It does not matter, except that you usually have bread crumbs handy and do not have crackers, and then, too, the bread absorbs more moisture than the crackers.

This mixture is a little too stiff, so

I am going to add some of the stock to moisten it.

You want to watch the souffle closely while it is cooking, so as not to overcook it, for then it will fall; the egg is all that makes it light and if it is cooked too long it will collapse. Cook it until it will bear the weight of a spoon; if it springs right back with the spoon, it is done and ought to be served while hot. If it falls before serving, return it to the oven for a few minutes and it will come up again.

A cheese souffle is very appetizing. If you have cheese that is too hard to use for table, just grind it, mix it with the white sauce and eggs the same as the meat, and it is very good.

I am going to make the same white sauce, or rather tomato sauce, that Miss Clift used yesterday to serve on my meats. Instead of using a recipe for tomato sauce, I take my white sauce and use the liquid from the tomatoes in place of the milk.

Question—You are not using the onion with it?

Miss Fenton—No, I am not using the onion today.

I am now going to make the creamy sauce for the pudding.

### Creamy Sauce.

#### Recipe.

One-half cup butter, one-half cup powdered sugar, juice and grated rind of one lemon, one-fourth cup cream.

Beat the butter to a cream, add gradually the sugar and heat again; when very light add the cream a little at a time; place the bowl in a basin of boiling water and stir constantly until the sauce is light and smooth; take from fire, add rind and juice of one lemon; serve at once. Caution: Do not boil or it will curdle. You may leave lemon out if you like.

Question—Is that sour cream?

Miss Fenton—No, it is sweet cream.

Miss Clift—If you wanted something less expensive, don't you think the first sauce in the Farmers' Institute Cook-book No. 3 would be good to use? We cannot always afford that much butter and cream and that is a very good sauce; the first one on page 79.

Miss Fenton—Yes, that could be used.

Miss Clift—Are you using powdered sugar?

Miss Fenton—Yes. This is the consistency of the creamy sauce; it is just like cream.

Here is the souffle. If you care to, this may be served with tomato sauce, the same as the other. Most any meat dish can be served with tomato sauce.

Question—Do those dumplings stay in shape?

Miss Fenton—No, they do not stay in shape very well; that is, they are not perfect, because you drop them from a spoon into your hot stock. They will have some shape, however, because the egg will hold them together.

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### THIRD SESSION.

Thursday Afternoon, March 16, 1911.

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## THE COST AND NUTRITIVE VALUE OF FOODS.

Miss Marie Fenton, Manhattan, Kansas.

Food is that substance which when taken into the body may be used to build tissue, repair waste, or supply energy. It includes flesh of all animals, fish and fowl; root, stem or seed of vegetables; beverages, condiments or flavors; air and medicine.

### Classification of Foods.

Foods are classified as follows: I. Protein, which includes all animal foods (except milk), eggs, meat, gluten of wheat, some of the legumes, peas, beans, lentils, peanuts, some of the cereals, oats, wheat, barley, rye and corn.

II. Carbohydrates, which includes all starches and all sugars.

III. Fats and oils: butter, cream, fat of meat, fish, cereals, nuts.

IV. Mineral matter: common salt, carbonates, sulphates, phosphates and iron.

V. Water—constitutes about two-thirds of the body weight.

The amount and kinds of foods depend on—age, sex, occupation, climate and season; a. flesh, weight; b. shape of person, tall and slender; short and plump; c. degree of activity; d. variation of climate; e. age.

Blood and muscle, bone and tendon, brain and nerve—all the organs and tissues of the body—are built from the nutritive ingredients of food. With every motion of the body and with the exercise of feeling and thought as well, material is consumed and must be re-supplied by food. In a sense, the body is a machine, it requires material to build up its several parts, to repair them as they are worn out, and to serve as fuel. The steam engine gets its power from its fuel, coal or wood; the body from food. In both cases the energy which is latent in the fuel is transformed into heat and power. In the body the power is employed for muscular work; the heat is used to keep the body warm. If too much heat is generated, it is wasted.



One important difference between the human machine and the steam engine is that the former is self-building, self-repairing and self-regulating. Another is that the material of which the engine is built is very different from that which it uses for fuel, but part of the material which serves the body for fuel also builds it up and keeps it in repair. Furthermore, the body can use its own substance for fuel; this the steam engine cannot do.

But the body is more than a machine. It has not simply organs to build up and keep in repair and supply with energy; it has a nervous organization; it has sensibilities; and there are the higher intellectual and spiritual faculties. The right exercise of these depends upon the right nutrition of the body. Every muscular effort is performed at the expense of muscular tissue; every mental effort at the expense of cerebral tissue; and so on with all the forces of life. This consumption of tissue demands continual supplies of food for its renewal and as all the working organs of the animal are composed of nitrogenous tissue, it is clearly necessary that we should be supplied with nitrogenous food to renew them, because the nitrogen of the air cannot be assimilated by animals at all.

Besides doing mechanical or mental work, the animal body is continually giving out heat, and its temperature must be maintained. Food is also demanded for this and the non-nitrogenous foods is the most readily combustible.

The chief uses of food, then, are two: (1) To form the material of the body and repair its waste, and (2) to yield heat to keep the body warm and furnish muscular and other power for the work it has to do.

The principal tissue formers are the protein compounds, especially the albuminoids. These make the framework of the body, muscle, tendon and

cartilage, bone and skin, and the corpuscles of the blood. They are sometimes called "flesh formers" or "muscle formers."

Fats and carbohydrates (sugars and starches) are the chief fuel ingredients of food, the fat being a more concentrated fuel than the sugars or starches. If the body has not enough of one kind of fuel, it can use another, protein being sometimes used, but neither fats nor carbohydrates can take the place of the protein in building and repairing the tissues. The natural food of man furnishes fats and carbohydrates in liberal amounts, along with the protein.

To the man with an income of five thousand dollars a year, it may seem to make little difference whether he pays twenty cents or two dollars a pound for the protein of his food; but to the one who can earn only five hundred dollars or less a year for the support of his family, the difference is an important one. His wife goes to the dry goods store to buy a dress for her daughter and hesitates between a piece of cloth at forty cents a yard that would please her better and one at thirty-five cents that is not so pretty but just as durable, and is very apt to take the cheaper one because she feels that she must. She does not get more cloth than is needed and use part of the excess for lining and throws the rest away, nor does she try to economize by getting poor trimmings and cheap thread. But when she goes to the grocer or to the butcher or to the fish market for food to build up their bodies and give them strength for work, she often pays one or two dollars a pound for protein to make muscle when she might obtain it in forms equally wholesome and nutritious for from fifteen to fifty cents. The food she buys is apt to supply some of the nutrient in excessive amount, as well as at needlessly high cost; and only too often a part

of it finds its way into the drain or the garbage barrel, instead of being utilized for nourishment.

#### Value of Foods as a Whole.

A subject that has received but little attention in this country is the relation of the nutritive value of food to its cost. We purchase food by gross weight or measure. Part of it consists of nutritive substances, the rest is made up of water and various materials which serve only as ballast. In comparing different food materials with respect to their cheapness or dearness, we are apt to judge them by the prices per pound, quart or bushel, without much regard to the amounts or kinds of actual nutrients which they contain. Of the different food materials on the market, what ones are the most economical?

I want to show you how much of actually nutritive material one may get for twenty-five cents in the different foods at ordinary prices.

The first thing we notice is the cheapness of vegetable foods as compared with the animal foods. But it is to be remembered that the animal foods contain more protein and fats, which are the most valuable food constituents, while the vegetables consist mostly or entirely of sugar, starch or other material, important for nourishment but far less valuable. pound for pound, than the protein and fats. Then too, the protein of the animal foods is more easily and completely digested than that of the vegetable foods.

#### Nutritive Value.

Coffee; tea: Stimulating, diminishing sense of fatigue.

Fruit: 1. Small per cent of nutrient in form of sugar. 2. Stimulates appetite. 3. Improves digestion, stimulant to peristaltic action. 4. Laxative. 5. Gives variety to diet.

Sugar: Easily digested; quickly available. 1. Furnishes energy for heat and work. 2. May be stored as reserve in shape of fat.

Starch: Same as sugar except less easily available.

Vegetables: 1. Valuable mineral salts. 2. Freshness and acids; stimulant. 3. Starch and sugar furnish energy. 4. Cellulose gives bulk; not used as food. 5. Bulk stimulates intestinal movements; aids digestion. 6. Protein less easily taken care of than animal protein.

Cocoa and Chocolate: 1. Concentrated form of nourishment. 2. Agreeableness to taste. 3. Not expensive.

Cocoa: 1. Nourishment lost by removal of fat is replaced by preparation with milk.

Ceals: 1. Rich in nutrients, compact and well absorbed. 2. Should be combined with cream, milk or eggs to balance.

Fats and Oils: 1. More concentrated than sugar or starch. 2. Furnish energy for heat and work. 3. Stored as reserve energy in form of human fat.

Eggs: 1. Rich in protein and fat. 2. Very nutritious and completely absorbed. 3. Good substitute for meat. 4. Should be combined with foods rich in carbohydrates.

Milk: 1. Complete food for infants. 2. Requires too large an amount for adults. 3. Easily digested. 4. Easily combined with other foods.

Cheese: 1. Concentrated food. 2. One pound contains all casein and most of fat of one gallon of milk. 3. Cheese at eighteen cents is more valuable than beef at twelve cents. 4. Difficult of digestion. 5. Digestibility increased if finely divided and mixed with starchy foods.

Meat: 1. Valuable source of easily digested proteid. 2. Valuable source of mineral salts. 3. Combined with foods rich in carbohydrates.

Gelatine: 1. Spares proteid. 2. Replaces fat and carbohydrates.

Animals feed; man eats. The in-

Grape fruit; cream of wheat with sugar and cream; beefsteak; potatoes; muffins; coffee or cocoa.

| Food Material.   | Price (as-sumed). | Amount for 25c. lbs. | Nutritive Material.                        |            |  |
|--|-------------------|----------------------|--|------------|--|
|  |                   |                      | Protein, lean of meat, gluten, wheat, etc. | Fats, lbs. | Carbohydrates, sugar and starch, etc. lbs. |
| Beef, sirloin.....   | \$0.25            | 1                    | Lbs. 1-8                                   | 1-8        | .....                                      |
| Beef, lower price.....                                     | .20               | 1.25                 | 1-4  | 1-4        | .....                                      |
| Beef, round.....   | .16               | 1.56                 | 3-8  | 1-8        | .....                                      |
| Beef, neck.....  | .08               | 3.13                 | 1-2  | 1-2        | .....                                      |
| Mutton, leg.....   | .22               | 1.14                 | 1-8  | 1-8        | .....                                      |
| Smoked ham.....  | .14               | 1.79                 | 1-8  | 1-2        | .....                                      |
| Salt pork (very fat).....                                  | .12               | 2.08                 | 1-16                                       | 1-5-8      | .....                                      |
| Salmon (early in season).....                              | 1.00              | .25                  | 1-32                                       | smaller    | .....                                      |
| Salmon. (later.).....                                      | .30               | .83                  | 1-8  | 1-32       | .....                                      |
| Mackerel.....  | .10               | 2.50                 | 1-4  | 1-8        | .....                                      |
| Codfish (fresh).....                                       | .08               | 3.13                 | 5-8  | 1-32       | .....                                      |
| Salt mackerel.....   | .12-1-2           | 2.00                 | 1-4  | 5-8        | .....                                      |
| Salt codfish.....  | .07               | 3.57                 | 1-2  | 1-32       | .....                                      |
| Oysters a pint.....  | .20               | 1.25                 | 1-16                                       | 1-32       | 1-16                                       |
| Eggs, dozen.....   | .30               | 1.15                 | 1-8  | 1-8        | .....                                      |
| Milk, a quart.....   | .07               | 7.14                 | 1-4  | 1-4        | 5-8  |
| Cheese (whole milk).....                                   | .15               | 1.67                 | 1-2  | 5-8        | 1-16                                       |
| Cheese (skimmed milk).....                                 | .08               | 3.13                 | 1-1-4                                      | 1-4        | 1-4  |
| Butter.....  | .30               | .83                  | .....                                      | 3-4        | .....                                      |
| Oleomargarine.....   | .15               | 1.67                 | .....                                      | 1-1-2      | .....                                      |
| Sugar.....   | .07-1-7           | 3.50                 | .....                                      | 3-1-2      | .....                                      |
| Wheat flour.....   | .03               | 8.33                 | 7-8  | 1-16       | 6-1-4                                      |
| Wheat bread.....   | .07-1-2           | 3.33                 | 1-4  | 1-32       | 2  |
| Corn meal.....   | .03               | 8.33                 | 3-4  | 1-4        | 5-7-8                                      |
| Oat meal.....  | .05               | 5.00                 | 3-4  | 1-4        | 3-1-2                                      |
| Rice.....  | .08               | 3.13                 | 1-4  | 1-32       | 2-1-2                                      |
| Beans.....   | .05               | 5.                   | 1-1-8                                      | 1-8        | 3*   |
| Potatoes, 75c. bu.....                                     | .01-1-4           | 20.                  | 1-2  | 1-32       | 3-5-8                                      |
| Standard for daily diet for laboring man at moderate work: |                   |                      |  |            |  |
| Voits German.....  |                   |                      | 1-4  | 1-32       | 1-1-18                                     |
| Writers American.....                                      |                   |                      | 1-4  | 1-4        | 1  |
|  |                   |                      |  | Or         |  |
|  |                   |                      |  | 100 grams. |  |

teelligent man alone knows how to eat. Let us consider what to eat.

#### Breakfast Menus.

Oranges; oatmeal with sugar and cream; boiled ham; creamed potatoes; pop-overs or muffins; coffee.

Baked apples; Quaker rolled oats with sugar and cream; creamed fish; baked potatoes; golden corn cake; coffee.

Bananas; puffed wheat with sugar and cream; scrambled eggs; potatoes; graham gems; griddle cakes; coffee.

Sliced oranges; shredded wheat; warmed over lamb; French fried potatoes; raised biscuit; buckwheat cakes with maple syrup; coffee.

Strawberries; hominy with sugar and cream; bacon and eggs; baked potato; rye muffins; coffee.

Raspberries; oatmeal; dried smoked beef in cream; hashed brown, potatoes; baking powder biscuit; coffee.

Watermelon; puffed rice with sugar and cream; broiled halibut; potato cakes; sliced cucumbers; biscuit; coffee.

**Dinner Menus.**

Cream of celery soup; roast beef; potatoes; Yorkshire pudding; macaroni and cheese; tomato and lettuce salad; chocolate cream; black coffee.

Tomato soup; baked fish; Hollandaise sauce; potatoes; cold slaw; fig pudding; crackers; cheese; coffee.

Vegetable soup; veal cutlets; horseradish; mashed potatoes; cream of lima beans; celery; pudding; coffee.

White soup; boiled salmon; egg sauce; boiled potatoes; green peas; cucumbers; strawberries and cream; cake; coffee.

Tomato soup; braised beef; horseradish sauce; escalloped potatoes; squash; baked Indian pudding; coffee.

Cream of pea soup; boiled mutton; caper sauce; mashed potato; rice with tomato sauce; graham pudding; fruit and nuts.

Cream of lima bean soup; roast duck; mashed sweet potatoes; cauliflower; rice croquettes with currant jelly; grapes; crackers; cheese; coffee.

**Supper Menus.**

Creamed chicken; celery; rolls; grapes and apples; tea.

Lamb croquettes; dressed lettuce; baking powder biscuit; gingerbread; cheese; tea.

Split pea soup; crisp crackers; egg salad; wheat bread; oranges; cocoa.

Cold sliced meat; cheese fondue; bread and butter; sliced peaches; cookies; coffee.

Broiled ham; escalloped potatoes; brown bread and butter; sliced oranges; wafers.

Escalloped oysters; rolls; celery; tarts; tea.

Oyster stew; crackers or dry toast; pickles; cream whips; lady fingers.

**Conclusion.**

What then is necessary to maintain this standard of physical

strength? Good digestion waits on appetite. Exercise is the best sauce.

A sound firm has credit at the bank; a little pinch for money does not seriously disturb it; if one customer does not pay another does.

When a business house has to call on all it possesses day by day, it is on the verge of bankruptcy. A sound man has a store of health to fall back upon. He can bear cold and wet and hunger for a day or two, readily. When a little change in diet, a change in temperature or humidity seriously disturbs a man's health, he is nearly or quite a bankrupt.

Every minute, yes every second, our bodies are being broken down and being rebuilt. If we do not have protein food to repair with, we are going to use what excess is stored as body fat or sugar. Of course to some extent we use the fats and carbohydrates, but those are required for heat and energy and then we will be low in all foods and wonder why we are not well.

If we will study the different cuts of meat and know which are the best and most nutritious and demand those cuts when we go to the market, then we are sure to have sufficient food material.

An older person who is in his or her decline does not need the nutrition of a growing child. For him we might get the sirloin, which is tender, juicy and easily digested.

But always remember to treat food as you would your body, because in time food will become a part of your body.

The most healthful food is that which is best fitted to the needs of the user.

The cheapest food is that which yields the largest amount of nutriment at the least cost.

The best food is that which is the most healthful and cheapest.

## DISCUSSION.

Question—What would you consider a good breakfast for school children?

Miss Fenton—That depends of course on the age and climate. We would not give a southern child the same kind of food as a northern child, but a good breakfast would be a dish of breakfast food with sugar and cream and a glass of milk. Give them poached egg instead of fried egg.

Question—What effect has cocoa on a growing child? Is it nutritious?

Miss Fenton—It is very nutritious if made with rich milk.

Question—Would you advise making it with water and then add the milk?

Miss Fenton—Yes, mix the cocoa and sugar together, then add the water and cook until the cocoa is smooth and glossy, then add the milk and let it come to the boiling point again.

Question—Do you take off the scum?

Miss Fenton—I do not, for it is the nutritious part of the cocoa. The scum is merely the albumen of the milk, which, when cooked, comes to the surface. If you will beat it with a Dover egg beater two minutes, or until froth forms, that will prevent the formation of scum.

Question—What effect does cocoa have on a nervous child?

Miss Fenton—Mrs. Calvin, will you answer that, please?

Mrs. Calvin—There is in cocoa, as there is in tea and coffee, a substance we speak of as theobromine, which is a stimulant to the nerves; but we get less of it in cocoa. We put about a teaspoonful and a half of cocoa in a cup. In this teaspoonful and a half we have some protein, a little fat and starch, consequently after we have added it to the milk, we only get a minute part of the theobromine. In coffee we make a decoction. We have no protein, no fat, there is no good in that cup of coffee save its flavor, and we say there is so little good and so much bad we will not give it to the growing child, but we older folks just shut our eyes up to the bad and drink it for the sake of the flavor.

Question—Is cocoa and bread and butter a good breakfast for children?

Mrs. Calvin—Cocoa made with milk and bread and butter would make a satisfactory breakfast, but we must add some fruit. We must give sufficient nourishment and give it in such a form that the nourishment will be correct. So it is in regard to breakfast. Not one of us should eat breakfast without fruit of some kind, so I should say that two cups of hot cocoa and plenty of good, wholesome bread and butter would make a good breakfast for a child, but I hope they would not have to go too long to lunch.

## SERVING A SIMPLE DINNER.

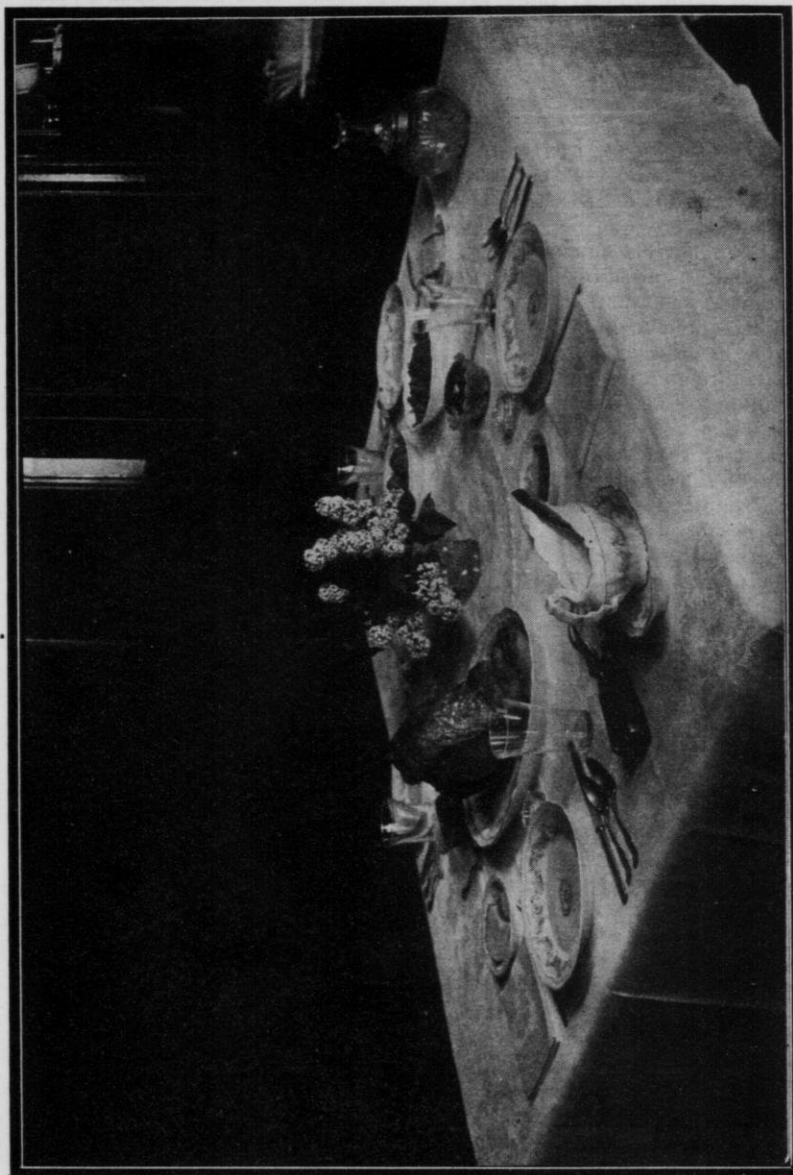
Miss Edith L. Cliff, Chicago, Ill.

"Three dishes well dressed, and a welcome for all" is a quotation we are all familiar with, and when preparing a meal for company we would do well to keep this in mind.

Please do not try to do too much and remember it is much better not to experiment with any new dish if you are not quite sure the people invited

like that particular combination. There is a perfect madness for something new these days, but if the old things were always well cooked, I think we would not be inclined to worry so much for something new.

Life would be easier for us if we could keep in mind the motto, "Plan your work, then work your plans."



Everything in readiness for dinner.

However small the dinner, there are many little things which are apt to be overlooked and cause a good deal of hurry just at the last. If very warm and tired, we do not feel like talking, and so try to be quite calm and cool when the guests arrive.

One of the most enjoyable meals I ever ate was served in a little log cabin in Canada; there was no polished table, but two barrels supported the planks used as a substitute, the cloth though coarse was spotlessly clean, and the knives and forks were placed on the table in order, not thrown on carelessly, as we so often do see them. And the dinner was served smoking hot. These are some of the little things that help to make the simplest meal attractive and enjoyable.

A stock soup may always be in readiness; cream soups must not be mixed together until the last moment or the mixture curdles. There are many nice desserts which may be prepared early in the day without always depending upon ice cream and cake.

We are not considering a course dinner today, but just what we would usually find served at any of the farm homes in Wisconsin.

#### Laying the Table.

First of all we will put on the silence cloth; even though your table is not polished, it is a good thing to use a cloth of some kind, for it does as the name implies, deadens the sound of dishes as they are placed on the table. If your table is polished then be quite sure you have something thick enough to protect it. Asbestos is the very best thing we have found for this purpose, but it is also expensive, and you will find the double-faced cotton flannel quite good.

The asbestos mats may be bought at almost any store, with the white linen covers to fit, and these may be placed under any hot dish.

Be careful to have the cloth on the table perfectly straight. A large cloth

always looks much better than a small one. Do not have it starched stiff or it will not fall gracefully.

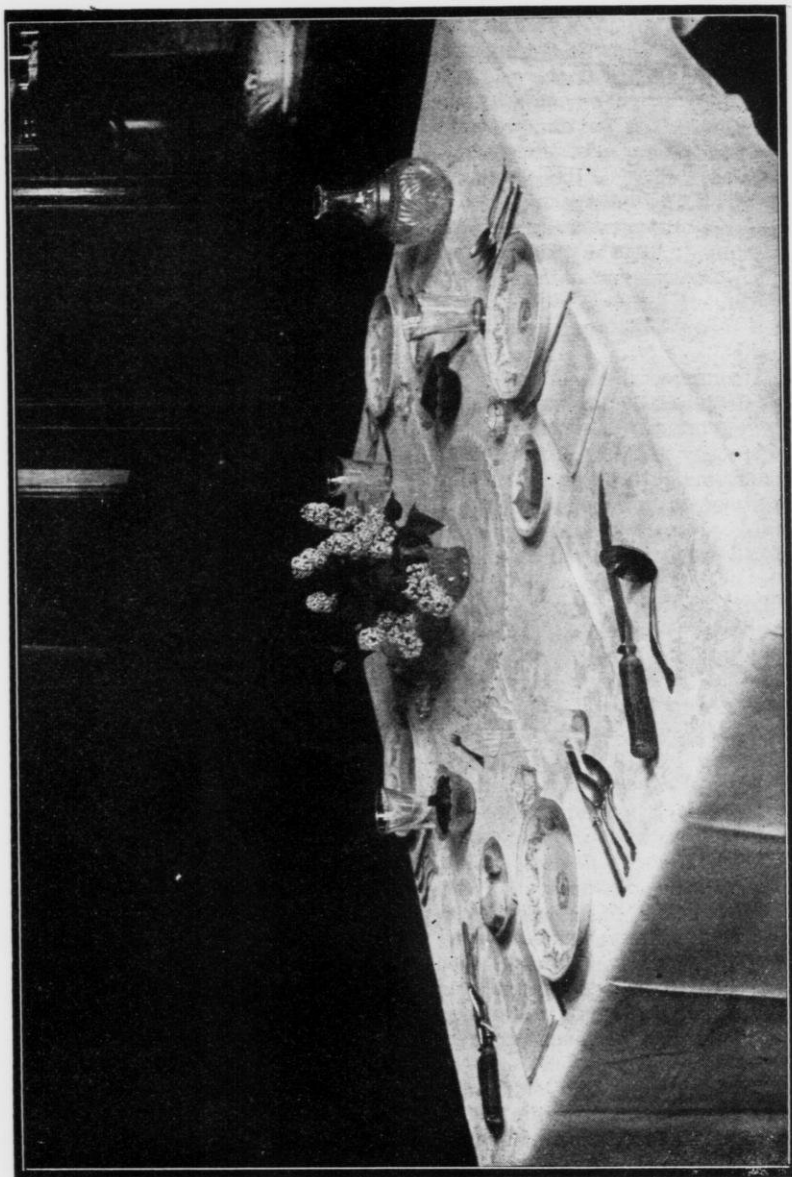
Choose your center piece according to the size of your table; a white one is the most serviceable, as it looks as good as new when washed. A small plant, fern or a few flowers help to brighten the table. Do not have the flowers in a tall vase; it is much pleasanter when possible to see each other's face. In the autumn, brown leaves are very pretty, and only the other day I saw carrot tops used for this purpose, and very pretty they looked.

Place the knife to the right, the fork to the left, leaving space for the plate. One or two teaspoons are usually placed by the side of the knife. This will depend entirely upon what we are serving. The soup spoon we will place on the outside, as it is the first spoon used; the glass for water is placed by the top of the knife; the table napkin usually to the left. The bread and butter plate is placed to the left of the fork. If you use butter spreaders, place one on each plate, or by the side of the plate. The table spoons are placed at the corner nearest the dish they are intended to serve, the carving knife and fork at the right hand side. If the carving is done in the kitchen, then place a serving fork on the platter. Never have less than one salt and pepper for every four people. If individual salts are used, one should be placed at the top of each plate.

Do not have more than one pickle and one jelly on the table. Sometimes the table is crowded with things that cannot possibly all be used.

#### Serving the Dinner.

Have the bread cut up in neat slices and the water pitcher filled ready for use. The glasses should not be filled until the dinner is served, as warm water is never very pleasant.



A plea for less dishes on the table.



Have everything in readiness before announcing the dinner. Serve the table quietly and quickly. If you have a maid it simplifies matters a great deal, but there is no reason why the daughter should not do this work. I visited a home some time since where one of the boys changed the plates and did the necessary serving. When I remarked on the graceful way in which he did it all, the mother replied, just because her children were boys instead of girls she saw no reason why she should do everything; neither did I.

When changing the plates, take them from the left hand side, or when passing vegetables, hand them from the left. Any liquids are always placed to the right. It is not necessary to lift up the glasses to fill them.

#### DISCUSSION.

Question—Whose place is it to do the carving?

Miss Clift—It is usually considered the husband's, but if the wife is the best carver, she may do it.

Question—Is it permissible for the carver to stand?

Miss Clift—Yes, if it is found more convenient to do so. By the way, a carving cloth is a sensible thing to use, as it may be removed if splashed at all.

Question—When is the salad served?

Miss Clift—With or after the meat course. If it is served separately, crisp wafers should be passed around.

Question—When would you serve the coffee?

Miss Clift—It is considered most correct to serve it after the dinner, but if preferred it may be brought on with a dessert.

In conclusion allow me to say that an elaborate table never compensates for a poor dinner. Never try to do more than is within your power or your dinner will surely be a failure.

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#### VEGETATION AND EDUCATION.

Mrs. O. W. Dynes, Chicago, Ill.

To one who was born and reared on a Wisconsin farm and whose memory reaches back more than thirty years, retaining vivid impressions of how potatoes were picked from wet, frosty ground in October, corn husked in the cold days of November, cows milked in straw covered sheds and grain bound by hand, the idea of farming will always suggest as much prose as poetry.

With the decreased hardships and increased comforts of rural life today, it is not difficult for the agent of land companies to reveal its roses and conceal its thorns in a prospectus that fairly dazzles the city-bred youth. But real farming by real farmers is still, and will ever be, a sober occupation

that has its somber as well as its bright side—the weeds yet grow with the corn.

The last quarter of a century has introduced vast and wonderful changes in the management and products of the farm and has clothed the progressive farmer with a dignity that is becoming enviable. Time will carry the change farther—perhaps too far. We are already beginning to contemplate with some apprehension the complex courses of study that our Agricultural Colleges and Universities are outlining as the necessary curriculum to fit the farmer's boy for his place as the head of the farm.

Here are a few of the subjects to be mastered: Agronomy; animal hus-

bandry; botany; chemistry; dairy husbandry; economics; English literature; entomology; horticulture; military; physical training; rhetoric; thermology; zoology.

When we try to comprehend the effect of applied science upon the future farmers, as well as upon the future farms, some of us are disturbed by a vague dread that possibly "the worst is yet to come."

But why borrow trouble? The farm is not yet driven with the waste-proof economy of the shop, or the system-ridden regulations of the office. We are still living among the old-fashioned "go-as-you-please" farmers, as well as among their progressive brothers. We can be one or the other, as temperament or taste may direct. The human equation is still potent.

One of Wisconsin's sons who has attained eminence in the practice of a learned profession recently made the following commentary on the new order of things: "I can't quite keep step with these regulations controlling the cultures of bacteria on drinking cups and requiring that only pasteurized milk, coming in sterilized cans, from tuberculin tested cows, fed on balanced diet, while standing on a cement floor, is safe to drink. When I was a boy on the farm if I stepped on a rusty nail my mother would tie a rag over the wound; when I had an old fish-hook jerked into my hand my father cut it out with the little blade of his jack-knife; frequently when milking out in the cow-shed a kitten would climb up to steal a drink out of a full pail behind me and losing its balance fall into the milk. Many such kitten I have saved and the milk too. Yet we were always well on that farm."

Between the extremes that the foregoing story points to lies a sane and sanitary medium for the farm life of today.

Believing this, I was not long in deciding last October, when given my

choice between an expensive city home and a real farm. I read the "ads" in that day's paper and the next morning called upon the real estate man, the foremost requirements being good soil, that the farm must have a creek, brook or river and must be near enough the city to insure good markets. The first "ad" I read seemed to fulfill all these and we chose a day to go and see the farm, taking the electric line and walking the mile and a quarter from the station.

Nature, in spite of the owners, had done a vast amount for that farm. The creek, about twenty feet wide, fed by springs, wound in and out among beautiful oak, walnut and ash trees through the entire pasture and woodland of about eighty acres and the broad fields under cultivation were of deep black loam.

Dairy cows and mares with their young colts would surely have felt in those surroundings that the "happy hunting ground" had been reached.

Good out-buildings were provided; cow barn with cement floor to accommodate forty cows, spacious horse barn, pig house, double corn crib, granary and tool house, hen house and duck house, with yard and water tank, and a steel windmill to provide extra water.

But where were the animals and chickens and geese and ducks? The pasture, even in October of a dry summer, was rank with grass ungrazed. One fourteen year-old cow, her year-old heifer, a cow which had been fattening two years, an under-sized eleven-months-old bull of scrub variety, one sorrel horse which had run away three years before in Chicago and had been boarded ever since at five or six dollars per month, regardless of the advancing prices of hay and grain, and five little burrows from an amusement park at fifty cents per week were the sole tenants of that field.

Five dogs, one blind, one deaf and

nearly blind and all uncertain of their claims to "pure breed," met or overtook us upon the premises.

There were eleven pigs in the sty, which had a two-acre run of weeds; two of them were runts of the offensive variety, having large heads and dwarfed bodies, two weighing about one hundred and fifty pounds, could, and have been fattened within four weeks to weigh about two hundred and fifty pounds. The horses, all mares, had not raised colts the last few years, because "these were all the horses needed and colts were a bother."

The hens of four noticeable varieties and many mixtures were all over the farm,—“free range” meant nests in the pig house, granary, horse barn, cow stable, duck house, woodshed and behind the washing machine—in fact, everywhere outside the hen house.

The wood lots were being devastated by the neighbors, who were given the wood for clearing the land. “Clearing” meant taking the good wood and leaving the brush to be burned and stumps to be grubbed by the owner's hired man at twenty-five dollars per month so there would be enough winter work to warrant keeping him.

The old Scotchman who owned the farm the past ten years was exceedingly fond of fruits and flowers, and many costly shrubs had been brought there, but the currant bushes were planted under the grape vines and the raspberries allowed to use that same trellis. I looked for the rhubarb and asparagus and was told “the two rows ran north from the large ash tree, on the west side of the hen house, but hadn't seemed to do well.”

Young apple trees had been brought to replace old ones which had rotted away, but had not prospered on the same spots where their predecessors failed. The orchard ground had remained untilled for decades because

“The sod always looks pretty across the road from the house.” It was a place where farm and farmer had merely vegetated.

“Progress has a strong current and he who ceases to row is going down stream.”

The laws of supply and demand were here calling for an adjustment. Results were but waiting the direction of a progressive system. Almost before the deed was signed, ways and means were outlined for deriving from the farm three lucrative and interesting lines of product and more than a dozen small ones, and this without going beyond what sane experience has elsewhere tested and practice has proved.

#### Some Practical Possibilities.

I will ask your permission to briefly place before you a suggestion of the possibilities included in these three larger lines of production and a few of the smaller ones, warning you, however, that in this I am not generalizing nor offering suggestions unqualifiedly adaptable to every farm.

This farm of over two hundred acres of excellent soil and well watered would readily support a dairy of forty cows; a milk station was but one mile distant and within eight miles of a city of over two million inhabitants, affording a regular market for milk in the cans at an average price of little less than five cents per quart. Moreover, a milk bottling plant a mile and a half distant was in the market for as much sanitary milk as the farm could produce at a substantially higher price per quart. With a dairy herd that could average ten quarts per cow for three hundred days out of the year, the forty animals would yield an annual revenue of six thousand dollars. This one product, on the basis indicated, would yield yearly returns more than seven hundred per cent

greater than had been realized from the entire production of the farm.

A second profitable enterprise was afforded by the maintenance of twelve heavy brood mares, which in addition to furnishing the horse power necessary to do the farm work, would produce from the fourth year an average of ten young draft horses, readily salable at upward of two hundred dollars each, or a total annual yield of two thousand dollars.

A third profitable production was offered through an arrangement with a large and established breeder of a certain variety of chickens, whereby pure bred birds, mated and penned under the general supervision of his manager, would be taken over at prices varying according to their grades and classifications from two dollars and a half to seven dollars and a half each. This enterprise, planned on the basis of producing upward of one thousand birds annually, after the first year, would yield at the minimum price per bird twenty-five hundred dollars per annum. In addition to this yield, the breeder would take over all the eggs produced from December 1st to April 1st, which are not needed for hatching purposes, at prices graded according to the pens producing them, ranging from one dollar and a half to five dollars per sitting.

These three farm products will yield on the basis of calculation outlined a total of \$10,500.00 annually.

Among the smaller products of the farm, ducks, geese and other poultry, kept separate from the pure bred variety, will more than supply the house consumption.

Hogs, pure bred, of the Duroc Jersey variety, or other varieties suitable to the locality, can readily be produced to the limit of forty animals, which, after supplying home demands, will leave a balance to be marketed as breeders or fattened animals at an

aggregate of approximately six hundred dollars.

This farm's proximity to a large consuming center makes the possibilities of market gardening reach to figures of astonishing proportions, under intelligent culture and scientific management. But in this connection I deem it sufficient to say that even with the labor necessarily employed on the farm for other purposes, a variety of vegetables, berries and other fruits can be produced under the principles of by-product economy that will furnish the home table, winter and summer, with a select menu that leaves little to be desired.

A life lived in the open air of the farm with its healthful exercise, its interesting nature studies and wholesome foods, yields to mind and body a strength and vigor that dwarfs by comparison all sordid calculations of financial gain. View it from what angle you will, it is an occupation second to none. Its compensations defy computation. Morally, mentally and physically it has been and ever will be the producing field of the majority of the nation's great men and women.

David Grayson was well within the truth when in his quaintly humorous style he said:

"We dig and plant and produce, and having eaten at the first table ourselves, we pass what is left to the bankers and millionaires. Did you ever think, stranger, that most of the wars of the world have been fought for the control of this farmer's second table? Have you thought that the surplus of wheat and corn and cotton is what the railroads are struggling to carry?"

"But we farmers, we sit back comfortably after dinner and joke with our wives and play with our babies and let all the rest of you fight for the crumbs that fall from our abundant tables."

## THE NORMAL CHILD AND ITS CARE.

Mrs. Henrietta W. Calvin, Lafayette, Ind.

The average child is born into the world well. Few, if any, children inherit disease. Indeed there are but two conditions which go to produce sick children. Where the mother is insufficiently fed before the birth of the child or where the father suffers from a vicious disease, the child may be born into the world enfeebled and abnormal, but the great average human being is born to be well. Most of the studies that are made in regard to the care of children are made upon children under abnormal conditions, that is, the well child in the individual home attracts little attention and is rarely studied, while the sick child, the orphan child and the child of poor parentage is often found in institutions and because it is in institutions it becomes subject to observations and experiments. Much of the published material relates then not to the normal child under normal conditions, but to the abnormal child under abnormal conditions and the child suffering from malnutrition and the child artificially fed are the ones for whom most rules are formulated. The greatest effort should be though to keep the normal child from descending into the abnormal class and a more general knowledge should be disseminated of those conditions that will continue the child in the upper class.

The child at birth undergoes a wondrous change. Lungs that have never been filled are inflated. Nerves of sight and of hearing that have never been used receive impressions. A circulation dependent upon external conditions sets up an individual and separate system. That the thread of life that holds the child is fragile is not to be wondered at. That it requires protection and care and intelli-

gence cannot fail to be recognized, yet for generations it has not been deemed necessary to teach the prospective mother anything in regard to the care of an infant and her whole knowledge has often been but that which has been received from other women not better informed than she has been. It has been thought immodest to discuss with unmarried women the care of a child and it has been deemed sufficient to assume that natural instinct would dictate to a mother all the care that her child required. From birth on a child requires pure air, not a covering of its head and face. It requires some water to drink because milk is a food and not a drink. It requires a daily bath not chiefly for cleanliness but mainly for skin stimulation. It needs to be protected from abrasions by harsh clothing, yet it requires sufficient clothing to maintain its body temperature. Its clothing should be soft, light and warm, yet not to overheat the delicate child, for many children suffer from too much wrapping in winter time while others suffer because of undue exposure of arms and shoulder and legs in summer time. No child should have any tight garment upon it; not even a band is required after the eighth or ninth day. The free movement of its limbs should never be prevented. Many of the newer rules for the care of the children would direct the mother to only take up the child when it required attention, that is when it was hungry or cold or distinctly uncomfortable. While these rules are well enough it should not be forgotten that a child becomes physically tired from remaining down too long and to lift a child and fondle it is a rest to the child and a pleasure and children feel

love and thrive upon it, and intelligent care alone is never sufficient.

No child should be put upon the bottle unless the nursing of the child will be injurious to the mother or distinctly detrimental to the health of the child. When a child has been taken from the mother's breast and put upon a bottle its chances for life are divided by two and before the decision is made care of the mother's physical health, the alteration of her milk by proper diet and hygiene should be tried and only as a last resort should her child be taken from her care. The baby coming into the world has no habits. Some one must make the habits for it, and one of the first good habits to be formed is that of regularity of eating. A properly nourished child gains from six to eight ounces per week until it is six months old when it will have doubled its original weight and then it gains three or four ounces per week until a year old, when it has more than tripled its weight at birth. A child should be weighed every week and if a week passes without a definite gain, the cause should be sought and the difficulty removed.

For at least nine months the breast fed child should receive no other nourishment than that furnished by its mother and the bottle fed child no other food than properly altered and prepared cow's milk. At about nine months the nursing infant may be introduced to diluted fresh cow's milk, one feeding a day being given to it. If this experimental feeding creates no disturbance of the child's digestive tract, two feedings a day from the bottle may be given and this gradually increased until all of the day nourishment is from the bottle. If this process is as gradual as it should be, the child will be ready for complete weaning at about twelve months. There has been a prevalent idea that the weaning of a child should be sharp

and abrupt. This has been a grave error. Neither child nor adult should ever be forced to make an abrupt change in the diet. All changes should be gradual. Children born in the spring time are well accustomed to cow's milk before the close of the second summer, but children born in summer time should, if possible, be nursed over the second summer and weaned upon the approach of cold weather.

No solid food of any kind should be given to a child under a year old. Many people who are ignorant assume that because an article is easy to swallow it is easy to digest and offer to little children such articles as potatoes and bananas and bread softened with gravy and then when the child becomes ill teething is assigned as the reason and not the fact that the child was given unsuitable food. Teething is a perfectly normal process, causing some little uncomfotableness, some slight suffering and making the nervous system easy of derangement, but much illness that is blamed upon teething is due to bad foods fermenting within the digestive tract of the child. The ignorant young mother is told by the older woman that she, the older woman, fed all of her children thus and so and therefore that it is all right for the younger woman to feed hers, forgetting that half of the children die under five years old and that two-thirds of those deaths are due to diseases which could have been prevented by the mothers. And forgetting also that many children survive bad food conditions but lack in efficiency all their lives because of injured digestive organs, or depressed mental conditions.

To summarize, then, the child is born into the world well and if rightly fed and rightly clothed, supplied with fresh air, given unrestricted muscular freedom and encouraged by loving kindness, it will grow into vigor-

ous youth and efficient manhood, but lacking these it stands one chance out of four of dying before a year old, and one chance out of two of dying before five years old and no one can tell its percentage of chance of life or in-efficiency.

## WOMAN—HER RELATION TO NATIONAL WEALTH AND WELFARE.

Mrs. Henrietta W. Calvin, Lafayette, Indiana.

[Delivered at Evening Session, March 16th.]

In the thirty-first chapter of Proverbs there is the careful description of the ideal woman of three thousand years ago. There is nothing to prove that all the women of the time were like her, but at least there were some with all her admirable characteristics. First of all she was a good woman in whom the heart of her husband could safely trust. She was energetic, for she arose early and prepared breakfast for her family and for the maids of a household. She took great care in the household manufacturing for not only was her own household well provided for, but the merchants were acquainted with the quality of her excellent weaving. Her husband was known in the market place because of his well made garments and general look of well-being. This prophet of old here recorded an observation that could still be made with equal truth, i. e., the husband of a good, thrifty and kindly woman always shows in his looks and bearing the kind of a home from which he came. This Hebrew woman was a good financier for she saved her money, bought a vineyard and planted it. The poor were aware of her charities—her children called her blessed. It is all a beautiful picture of a beautiful woman. It shows the economic and social conditions of the times.

The early Greek and Roman women were also producers of wealth, vitally interested in all that bore upon the economic condition of the nation.

The early colonial woman of America carded, spun and wove material, provided the household linen, the carpets that covered the floors, the heavy woolen garments that were worn by the men, the knitted stockings and gloves. She gathered the medicinal herbs of the garden and forests and stored them for winter use. She made great kettles of soap and when necessity forced it upon her, aided in the tillage of the fields.

The Holland women who settled in New York shared in all the occupations of the men save only hunting and fishing. While the woman of the south did not perform the manual labor performed by her sisters of the north, she was no less efficient in her sphere, having to teach the servants and administer large households where great executive ability was required.

About the middle of the nineteenth century radical economic changes occurred and almost all types of productive industry went out from homes and into large factories. At the same time opportunities for liberal education were made available for great numbers of American women. Because of these two changes the women of the present generation are undergoing a period of readjustment. It is being forced upon them to meet entirely new conditions from those under which their ancestors labored. The woman of today is no longer in any considerable degree a producer of wealth. Only nine per cent of American women are

wage earners; about thirty-seven per cent are farm women; the rest of the women are city dwellers and consumers of wealth. The farm woman is still a producer of wealth in that she produces food by raising poultry and eggs; she assists in the care of milk and the manufacture of butter; she often contributes by her labor to the cultivation of the garden. She purchases raw materials such as muslin and other fabrics and manufactures gowns for her family and in many ways adds to the value of materials already made or produces articles of real worth.

The townswoman does few of these things. Much of her food comes to her prepared for use; her clothing is purchased ready made; her household supplies are made in the large factories. Her economic value then is not as a producer of wealth, but must be as an intelligent consumer,—consequently it is quite as necessary that she learn to intelligently spend money as it was that her grandmother learned to manufacture articles. Ninety-five per cent of all spending, that is, final consumption, is under the direct control of women. They select their own gowns and the gowns of their children. They decide the type of floor covering, wall covering, furniture and draperies that are within their households. They select the food upon the table. They are the ones that purchase pianos, books, and pictures. Indeed women are the determining factors to be considered in all production, yet the average woman buys without knowledge, trusting almost wholly to the dictates of fashion or the recommendation of the salesman. She has slipped from her shoulders the old responsibilities and has not assumed the new responsibilities of intelligent purchase and use. Because of this new and unusual condition thrust upon women, much confusion has arisen and many false ad-

visors are today offering suggestions. There are those who are recommending that women should eliminate the separate home and the individual manual labor concerned in caring for that home. That homes should be consolidated and administered by a few while all the other women go out into the world to compete with men. Even the question of rearing children is being treated by these writers and because some mothers are not good mothers, they are advising that all the children be gathered together under expert nurses thus relieving the individual mothers from responsibility and care on the supposition that the children will be better cared for. That these theories are being advanced is regrettable, for many are being misled by them. The relief from physical toil which has come in part has aroused in many women a desire for complete relief and there is gradually developing a sentiment among women that they are entitled to ease and luxury and that to do real work is an unmerited hardship which is degrading to the worker. Therefore, it seems that all intelligent women should band themselves together that the coming woman shall be a capable, executive, well prepared, womanly woman recognizing the responsibilities together with the privileges that are her right and willingly slipping in to her right position as regards national wealth and welfare. The woman who is the mother of children has produced one of the most valuable forms of national wealth. If those children become physically strong, intellectually trained, morally sound, she has greatly increased this wealth. This all entails sacrifice. It necessitates that a woman cease looking upon children either as personal property that she has a right to completely control or as a burden that she has a right to completely shirk. Her children belong to the nation not to her and even as the



Spartan woman hardened herself against natural affection that her nation might be supplied with great soldiers, so the American woman today must look upon her children as being a part of the country's assets entrusted to her but not to be used for her personal pleasure.

If women are to attain the highest ideals they must be trained from young girlhood to look upon homemaking and proper household management as occupations worthy of their best intellectual effort. Women must be educated in a knowledge of the laws of health. Officers of public welfare recognize that the eradication of contagious diseases can only be accomplished through the intelligent cooperation of women and if all women today knew the bacteriology of contagious and infectious diseases and

willingly follow the rules necessary to control these diseases, it would be but a few years before a great death loss would be completely avoided. While public officials may provide in large cities satisfactory water supplies and excellent sewage systems, the individual woman has a far greater control over the real well being of the inmates of the household and may undo, by her ignorance, all of the good that is provided by health authorities.

Hence—we conclude that all women should be instructed in all of the various sciences which bear upon household conditions. That they should be taught to respect their own profession and that a warning note should be sounded against the directing of woman's energy into fields antagonistic to the development of individual homes.

### WISCONSIN'S NEW HIGHWAY LAW.

W. O. Hotchkiss, State Geologist.

When the Geological and Natural History Survey began its investigation into the highway situation in Wisconsin in the summer of 1906 it was found that a progressive movement known as the "State Aid Movement" had been inaugurated in practically all the states about us, and that ours was the only state north of the Ohio river and east of the Dakotas that had not made some advance in getting the towns and counties to improve their roads with assistance from the state. In fact Wisconsin was the only really progressive state in the union that was not giving state aid in some form for the improvement of its country roads.

The legislature of 1905 had passed a resolution to amend the state constitution so as to make it possible for the state to aid the towns and counties, but it was the general opinion of those

interested that unless something was done to present the matter to the people of the state the resolution would not pass in the legislature of 1907. As a consequence of this condition of affairs the Geological and Natural History Survey took up a study of the road situation and published a bulletin on "Rural Highways of Wisconsin."\*

The general state of road affairs as found in that and succeeding work is briefly summarized here.

The roads of Wisconsin have been almost without exception constructed and maintained under an antiquated system that was abandoned in Europe a hundred years ago—that of the inde-

\* Rural Highways of Wisconsin, Bulletin XVI, Wisconsin Geological & Natural History Survey, by W. O. Hotchkiss.

pendent small road district, with the road tax paid in labor. Few counties in the state are treating their roads as a system to be developed in a uniform manner under careful supervision. The result of this, of course, is a great loss of time and effort. Statistics were collected in the preparation of the bulletin on "Rural Highways" showing it to be the judgment of nearly five hundred representative farmers of the state that about half of the present road tax would produce as good results if it were properly expended. What this means in the aggregate can only partly be appreciated as there is no means of knowing exactly how much money is spent on the roads of the state. This is due to the fact that most towns do not keep their accounts in a manner to indicate the total. The mill tax, usually paid in labor, is the only tax regularly levied for roads. The aggregate amount of this is nearly \$2,500,000 but most towns spend on roads, in addition to this, a large part of the general fund, and this amount is not known.

It is a conservative estimate that the total yearly expenditure on Wisconsin roads is about \$4,000,000. If nearly fifty per cent of this great sum is wasted it is apparent that the people of the state are already paying enough to build good roads if the money were only properly applied. The big problem in roads in this state is to get 'A Dollar's Worth of Road for Every Dollar of Tax.'

To attain this end will necessitate a radical change in our system of road work. It means abandoning our present antiquated methods and patterning after more progressive states and countries where they have already secured good roads, or are in process of securing them. It calls for a definite departure from the ways of our grandfathers and going ahead on lines that are new to us. This, of course, cannot be accomplished in a year or by a

single legislative act. It must come as the result of a lively demand from the people of the state, and this demand must be created by leading them to a thorough appreciation of the situation.

In former times the landowner did everything for himself. He tanned his own leather and made his own shoes and harness; he grew his own wool and flax, spun the fiber, wove it into cloth and made his garments of it; he ground his own grain into flour; he made his own tools and vehicles; he made his own tallow dips. He also built his own roads. From the fact that each man was his own tanner, shoemaker, spinner, weaver, tailor, miller, blacksmith, carpenter, candlemaker and road maker, it was impossible that he could be expert in all these lines, and consequently the things he made and the comforts he enjoyed were crude and did not begin to compare with what he has at the present time. It has been very truly said that even a pauper of the present time has more comforts than a wealthy man had a few centuries ago.

Let us see how this betterment came about. The farmer turned over to specialists nearly everything but the running of his farm and the building of his roads. In conjunction with his neighbors he even hires a specially trained butter and cheese maker to handle his milk and cream—and serves a higher grade of butter and cheese on his own table as a consequence. The short term that describes this change that has so greatly increased the comfort and working power of the farmer—and everyone else as well—is "division of labor." In so far as the farmer has turned his work over to people specially trained for that work just to that degree have his comforts increased. Those things aside from farming which he still does for himself,—such as road making—are the ones that are done in the poorest way.

The best, most successful farmers, almost without exception, prefer to pay their road tax in cash and not be bothered with doing what they feel poorly equipped to do.

This shows plainly the principal reason that the average country road costs twice what it should—it is the product of the labor of men who have no special training or experience in the work. It compares in quality with the tools and clothes and vehicles which were in use when the farmer had to make them for himself.

This present system takes farmers away from their farm work when they feel that they should be at home working with their crops. It serves each man's self-interest at the time to avoid doing any more on the road than he can help, and the consequent lack of interest cannot help but produce poor results. The ideal system of road work is one in which the self-interest of each man is appealed to to see that good work is done on the roads, rather than one in which his self interest works the opposite way. Such a system, to be practical, obviously can not be one in which each man is called on to actually do the public work, but must be one in which he is set to criticize the work—where he has some one other than himself to blame if the roads are not good.

Farmers are exceedingly critical of the work and expenditures of their town boards. If they had some few men who were actually charged with the duty of keeping their roads in shape they would be just as critical of the road work as they are now of their town boards.

#### The New Law.

In order to put a system such as suggested above into effect, the legislature of 1911 passed what was commonly known as the "Donald" bill providing for state aid to towns and counties in building their roads. This law is

one of the best laws in effect in any state in the union. It is based on two fundamental ideas; 1, that the county should be the unit for road construction because the county is able to employ well qualified, experienced men and to provide the necessary expensive machinery for proper construction, and to keep this machinery working throughout the whole road-building season, and 2, that wherever the state puts in a dollar of money the state should have ample means of assuring itself that every dollar of its money is properly spent.

The law is very carefully drawn and is based on the experience of other states as well as on the experience with regard to Wisconsin conditions gained by the Highway Division of the Wisconsin Geological and Natural History Survey. The law is particularly designed to do away with the abuses which have crept into other states where politics rather than efficiency is occasionally the basis for the selection of men in charge of the road work.

**State Highway Commission:** The State Highway Commission is composed of five men serving absolutely without salary and giving a considerable part of their time freely to the state for the purpose of looking after this great project. The only money they receive from the state is that paid for their actual expenses in attending meetings of the Commission. There are three members appointed by the governor: Mr. J. H. Van Doren, of Birnamwood, appointed for a term of six years, Mr. John S. Owen, of Eau Claire, appointed for a term of four years, and Mr. John A. Hazelwood, of Jefferson, appointed for two years. The successors to these men will be appointed for terms of six years.

In addition to the three members appointed by the governor, the law provides that there shall be two ex-officio members of this commission, the state geologist, Mr. W. O. Hotchkiss, who

started the state highway work in Wisconsin and has had charge of it up to the creation of the new commission, and the dean of the college of engineering of the state university, Mr. F. E. Turneure.

**What the Commission Must Do:** The State Highway Commission is given general charge of all matters pertaining to the expenditure of the state highway fund in the improvement of roads and bridges in the state. They are given these broad powers so that they may carry out in the best possible manner the purpose of this state aid law which is to secure a dollar's worth of road for every dollar of tax. There is no justification for the existence of a state highway department unless that department is going to save to the people of the state more than this department costs by increasing the efficiency with which the road money is spent. It is perfectly evident to anyone who looks into the matter that it will be very easy for such a highway commission as we have in Wisconsin to save to the people of the state far more than the fund which this highway commission is permitted to spend for the work of supervising the state aid work. There will be from \$1,200,000 to \$1,300,000 spent in the construction of state aid roads in 1912, \$350,000 of which is paid by the state and the remainder by the towns and counties. But the great burden of seeing that all this money is spent in the most efficient manner possible is laid upon the State Highway Commission and they are the ones finally responsible for any efficiency or inefficiency that is to be found in this work.

Aside from the \$350,000 which the state has appropriated as direct aid to the towns and counties, a fund of \$40,000, or so much of this sum as may be necessary, is placed at the disposal of the Commission for the purpose of hiring engineers and expert road builders to look after this work

and assist the towns and counties in securing the highest possible degree of efficiency in road building, and for the purpose of maintaining its office in the Capitol. As stated, it is obvious that it would be very easy for the Commission to save far more than \$40,000 in the expenditure of this great amount of money to be spent in 1912.

The commission is directed in the law to see that roads built with state aid are maintained in proper manner by the counties. This is a very important duty for it is useless to spend large sums of money in building good roads and then neglect them and allow them to go to pieces in a short time, which they always do if they are not cared for properly. The subject of maintaining roads built with state aid will be given a great deal of attention by the commission. They are directed in the law to withhold state aid entirely from any county that does not maintain its roads up to a proper standard.

If any county board desires particularly to inform itself with regard to the qualifications of candidates for the office of county highway commissioner, it has the right to request the State Highway Commission to give a civil service examination to these candidates to determine their relative ability to fulfill the duties of the office.

In addition to the previously mentioned work, the Commission is required to continue the work of advising towns, villages and counties with regard to the construction of their roads and bridges in exactly the same manner that such work has been carried on in the past by the Geological and Natural History Survey. If a town or village has any road upon which it desires to have expert advice, it can get this advice free, of charge by applying to the State Highway Commission to have an engineer sent there. In this connection it may be well to mention that the plans of all

bridges constructed by the town and county jointly must be approved by the engineers of the State Highway Commission before contracts can be legally put into effect. In carrying out this work, the Highway Commission sends out engineers to examine the site for the bridge so as to make sure that the foundations will be properly designed, and they either supply standard plans to the town, or examine the plans of the successful bidder, to make sure that the bridge will be of the proper strength.

#### System of Roads to be Improved:

Each county board is to select a system of roads as the prospective state highways. This system is to include at first not more than 15 per cent of the total road mileage of the county, and shall begin at the corporate limits of the county seat and of the various market towns and railroad stations of the county and include the main traveled highways leading into each town in the county. Each county board, or its committee shall by conference with the county boards of adjoining counties, or their committees, or otherwise, cause their respective systems to join so as to make continuous direct lines of travel between the counties.

For improvements on these roads the county must pay at least one-third and the total paid by the town and county together must be at least two-thirds, but the county board, if it so chooses, may pay any greater part of this two-thirds, but this percentage must be uniform in all towns in the county. Thus if a county wants to pay one-half of the cost of the road and only requires the town to pay one-sixth, leaving the state to pay the last one-third, the county board has a right to pass a resolution to this effect.

**How Localities May Get County and State Aid:** The ordinary procedure will be to vote, say at the spring town meeting in 1912, to levy a tax the fol-

lowing January to build roads in 1913. The town has the right to vote a special tax of not less than \$250 for building bridges on the system of roads previously mentioned as being selected by the county board, or a tax of not less than \$400 for building a road on this system. They may vote any larger amount they wish but the total amount of such tax must not exceed three mills on the dollar of the assessed valuation of the town unless by a three-fourths vote the limit is raised to five mills.

After the tax is voted, the town board notifies the county clerk before the first of September and the county clerk sends all of these notices in to the State Highway Commission before the first of October, and the allotment of the state aid fund is made by the State Highway Commission in time so that each county board has this allotment to guide its action at the November meeting.

When the tax is raised it is paid into the county treasury and is paid out under the direction of the county highway commissioner along with the county and state money. This money is used to pay for the complete construction of the road, including everything from the very beginning to the completion and is not like the former system of county aid under which the surfacing only was paid for out of the joint fund.

In extending state aid to any locality the Commission is directed in the law not to grant aid unless the improvement petitioned for provides the best practicable grade and style of construction for that particular locality. Thus in some communities it will be possible to extend aid to the building of main traveled dirt roads. In other communities it might be necessary, owing to local conditions, that the highest type of macadam road be constructed before the Commission would be justified in granting state aid.

**County Highway Commissioner:** Each county board is directed under the law to elect a county highway commissioner. His term is fixed by the law at not less than three years, but the county board can elect him for a longer term if it chooses. He must be paid not less than \$600 a year. If there is a small amount of work in the county so that the election of a man for this length of time to draw this amount of money is not warranted, the county board may request the State Highway Commission to send one of their men to take charge of the work in the county, and this man's salary and expenses are paid by the county board for the actual time during which he is employed in that county. The thing contemplated under the law, however, is that eventually each county will have a county highway commissioner and that as the people come to appreciate the efficiency of this sort of administration of the highways, his duties will increase rapidly and that this office will be one of the most important county offices. It is necessary, therefore, that a man of good business ability, a man capable of getting work done rapidly and cheaply, should be employed. A man of this sort will be cheaper than a poorer man even though he were paid double the salary of the poorer man.

Many counties recognize the necessity of having a high grade man for this purpose and practically none that have any considerable amount of work to do pay as little as the minimum salary. The salaries of county highway commissioners vary up to \$2,400 per year and a \$2,400 man can easily save a county three times his salary in the expenditure of a \$20,000 road fund.

The county highway commissioner has charge, under the direction of the State Highway Commission, of all work done with town, county and state money, and he is the man who is directly responsible for the spending of

this money efficiently. If he proves to be incompetent or wasteful or extravagant, or otherwise unfitted for his work, he can be removed either by the county board or by the State Highway Commission. This provision is in the law so that the state can prevent the waste of state funds by incompetent men.

#### How the State Highway Fund is Distributed.

As previously mentioned, the county clerk forwards to the State Highway Commission before the first of October all the information with regard to the amount appropriated by the various towns or counties so that the Commission has before it the total amount of money wanted in the state for road and bridge construction in the following year. The Commission then proceeds to divide the money in the state highway fund and allot it to the various counties in the following manner.

There is first determined the amount that each county paid in taxes into the state highway fund. This amount is set opposite the name of each county. Next is set down the amount of state aid petitioned for in each county. This amount may be much greater or much less than the amount which the county has paid into the state highway fund. With these two columns of figures the Commission is then ready to allot the funds. If the amount petitioned for is less than what it paid into the state highway fund, the county is given the full amount requested.

If the amount petitioned for by the county is more than that paid in taxes into the state highway fund, it is first allotted the exact amount it paid into the fund. By referring to the accompanying table, which gives the allotment already made for the year 1912, it will be noticed that Adams county paid \$932 into the state highway fund and that it petitioned for only \$125. Adams county is therefore granted

\$125 from the state highway fund, and there remains from the amount which Adams county paid into the state highway fund \$807. Other counties did not petition for the full amount which they paid into the state highway fund and the total amount of money above that which these counties desired to have paid back to them amounted to \$61,251.

On the other hand, many counties petitioned for much larger amounts than they paid into the state highway fund. For instance, Florence county, which although the poorest county in the state so that it paid only \$486 in taxes to the state highway fund, raised enough taxes locally to ask for \$14,000 state aid, requested \$13,514 more than it paid. Many other counties all over the state were in this same situation, asking for more than they paid, and these counties altogether asked for \$164,668 more than they paid into the state highway fund. The amount \$61,251 mentioned above is then divided in a second allotment to those counties asking for more than they paid in, so that each county gets 37.2 per cent of the excess which it requested. Thus Florence county, which will be seen on the table requested \$13,514 more than it paid in, is given a second allotment of \$5,027, so that it gets a total of \$5,513.

Only six counties failed entirely to take advantage of the offer of state aid for 1912. These are Burnett, Calumet, Pepin, Iron, Vilas and Ozaukee. When these counties realize that they are compelled to pay their share of the state highway tax whether they ask for state aid or not, which really means that if they will not use the money themselves that they will be helping to pay for roads in neighboring counties, they will doubtless fall in line and build roads in their own county.

**Bonding by Town and Counties for Highway Improvement.**: The new highway law provides that towns or counties may issue bonds running not longer than ten years to raise money for highway improvement. It is provided that these bonds shall be non-taxable and shall bear 4% interest and that they shall not be sold to non-residents of the town or of the county by which they are issued until the residents shall have been afforded an opportunity to buy them. It was the belief of the legislature that many of the wealthier farmers of any community would be glad to hasten the construction of improved roads by subscribing for these bonds. Several towns in the state are already beginning to agitate the matter so as to get their roads constructed rapidly.

There is a difficulty in this matter of bonding in that the state is not able to issue bonds to meet the funds raised by bonding in the towns and counties. It is a strange situation, but there is no county in the state that has not the legal power to issue bonds for a larger amount of money than the whole state has. Under the constitution any county in the state can issue bonds to 5 per cent of its total assessed valuation, but excepting in cases of great emergency, such as war or invasion, the state is forbidden to issue bonds, for more than \$100,000. A large number of the towns even in the state of Wisconsin can legally borrow more money than the state itself.

If the bonding matter becomes important in this question of road building, it may be found necessary to amend the state constitution so as to give the state the right to issue bonds to meet the amount raised by the towns and counties, as was done by the state of New York and other states.

**Distribution of \$350,000 state highway fund available for construction in 1912.**

Based on taxes voted by towns and counties as reported by all county clerks on or before Oct. 1, 1911.

| County.          | Amount paid into state highway fund. | Amount petitioned for. | First allotment. | Total allotment. |
|------------------|--------------------------------------|------------------------|------------------|------------------|
| Adams.....       | \$932                                | \$125                  | \$125            | \$125            |
| Ashland.....     | 2,140                                | 9,800                  | 2,140            | 4,989            |
| Barron.....      | 2,789                                | 1,350                  | 1,350            | 1,350            |
| Bayfield.....    | 2,027                                | 3,450                  | 2,027            | 2,556            |
| Brown.....       | 7,082                                | 10,433                 | 7,082            | 8,329            |
| Buffalo.....     | 2,347                                | 1,250                  | 1,250            | 1,250            |
| Burnett.....     | 754                                  | 0                      | 0                | 0                |
| Calumet.....     | 3,352                                | 0                      | 0                | 0                |
| Chippewa.....    | 3,739                                | 3,825                  | 3,739            | 3,771            |
| Clark.....       | 3,702                                | 8,400                  | 3,702            | 5,450            |
| Columbia.....    | 5,751                                | 14,750                 | 5,751            | 9,098            |
| Crawford.....    | 1,751                                | 650                    | 650              | 650              |
| Dane.....        | 16,214                               | 29,912                 | 16,214           | 21,309           |
| Dodge.....       | 9,610                                | 9,575                  | 9,575            | 9,575            |
| Door.....        | 2,059                                | 7,369                  | 2,059            | 4,034            |
| Douglas.....     | 6,014                                | 6,014                  | 6,014            | 6,014            |
| Dunn.....        | 2,960                                | 1,600                  | 1,600            | 1,600            |
| Eau Claire.....  | 3,694                                | 3,575                  | 3,575            | 3,575            |
| Florence.....    | 486                                  | 14,000                 | 486              | 5,513            |
| Fond du Lac..... | 9,243                                | 2,425                  | 2,425            | 2,425            |
| Forest.....      | 1,314                                | 2,300                  | 1,314            | 1,681            |
| Grant.....       | 6,909                                | 16,633                 | 6,909            | 10,526           |
| Green.....       | 5,385                                | 11,725                 | 5,385            | 7,743            |
| Green Lake.....  | 2,792                                | 3,200                  | 2,792            | 2,944            |
| Iowa.....        | 4,827                                | 2,000                  | 2,000            | 2,000            |
| Iron.....        | 879                                  | 0                      | 0                | 0                |
| Jackson.....     | 2,062                                | 8,525                  | 2,062            | 4,466            |
| Jefferson.....   | 6,843                                | 7,500                  | 6,843            | 7,087            |
| Juneau.....      | 2,276                                | 2,450                  | 2,276            | 2,341            |
| Kenosha.....     | 5,308                                | 5,150                  | 5,150            | 5,150            |
| Kewaunee.....    | 2,464                                | 1,600                  | 1,600            | 1,600            |
| La Crosse.....   | 5,389                                | 9,300                  | 5,389            | 6,844            |
| Lafayette.....   | 4,999                                | 6,271                  | 4,999            | 5,472            |
| Langlade.....    | 2,178                                | 1,600                  | 1,600            | 1,600            |
| Lincoln.....     | 2,323                                | 7,550                  | 2,323            | 4,267            |
| Manitowoc.....   | 7,098                                | 500                    | 500              | 500              |
| Marathon.....    | 6,211                                | 6,875                  | 6,211            | 6,458            |
| Marinette.....   | 3,530                                | 7,750                  | 3,530            | 5,100            |
| Marquette.....   | 1,424                                | 1,500                  | 1,424            | 1,452            |
| Milwaukee.....   | 68,960                               | 77,800                 | 68,960           | 72,248           |



*Distribution of \$350,000 state highway fund available for construction in 1912—Continued.*

| County.          | Amount paid into state highway fund. | Amount petitioned for. | First allotment. | Total allotment. |
|------------------|--------------------------------------|------------------------|------------------|------------------|
| Monroe.....      | 3,474                                | 4,200                  | 3,474            | 3,744            |
| Oconto.....      | 2,809                                | 3,025                  | 2,809            | 2,889            |
| Oneida.....      | 1,595                                | 2,500                  | 1,595            | 1,932            |
| Outagamie.....   | 7,251                                | 2,030                  | 2,030            | 2,030            |
| Ozaukee.....     | 2,889                                | 0                      | 0                | 0                |
| Pepin.....       | 849                                  | 0                      | 0                | 0                |
| Pierce.....      | 2,744                                | 6,275                  | 2,744            | 4,058            |
| Polk.....        | 2,558                                | 2,424                  | 2,424            | 2,424            |
| Portage.....     | 2,886                                | 8,075                  | 2,886            | 4,816            |
| Price.....       | 1,498                                | 500                    | 500              | 500              |
| Racine.....      | 8,841                                | 1,500                  | 1,500            | 1,500            |
| Richland.....    | 2,716                                | 5,950                  | 2,716            | 3,919            |
| Rock.....        | 10,173                               | 14,800                 | 10,173           | 11,894           |
| Rusk.....        | 1,363                                | 6,443                  | 1,363            | 3,253            |
| St. Croix.....   | 3,568                                | 4,015                  | 3,568            | 3,734            |
| Sauk.....        | 5,383                                | 25,343                 | 5,383            | 12,807           |
| Sawyer.....      | 1,163                                | 2,500                  | 1,163            | 1,660            |
| Shawano.....     | 3,410                                | 2,000                  | 2,000            | 2,000            |
| Sheboygan.....   | 8,137                                | 3,300                  | 3,300            | 3,300            |
| Taylor.....      | 1,691                                | 3,125                  | 1,691            | 2,225            |
| Trempealeau..... | 3,022                                | 5,552                  | 3,022            | 3,963            |
| Vernon.....      | 3,639                                | 5,137                  | 3,639            | 4,197            |
| Vilas.....       | 1,180                                | 0                      | 0                | 0                |
| Walworth.....    | 6,769                                | 7,750                  | 6,769            | 7,134            |
| Washburn.....    | 851                                  | 600                    | 600              | 600              |
| Washington.....  | 4,414                                | 4,822                  | 4,414            | 4,566            |
| Waukesha.....    | 6,737                                | 6,844                  | 6,737            | 6,777            |
| Waupaca.....     | 3,960                                | 4,600                  | 3,960            | 4,198            |
| Waushara.....    | 2,283                                | 6,400                  | 2,283            | 3,814            |
| Winnebago.....   | 8,904                                | 3,000                  | 3,000            | 3,000            |
| Wood.....        | 3,526                                | 1,975                  | 1,975            | 1,975            |
| Total.....       | \$350,000                            | \$453,417              | \$288,749        | \$350,000        |

Another provision in the section of the law relating to bondings provides that owners of property abutting on highways to be improved, if they so desire, may agree to pay \$10 per year for a term of five years for each 80 rods of frontage upon the road, and the

town may issue bonds to raise this amount, such bonds to be paid by a special tax against the abutting property.

**Conclusion:** The people of Wisconsin are to be congratulated upon having on their statute books a highway

law which bids fair to work out with so little red tape and with such a high degree of efficiency. The problem before the progressive people of the state is no longer to arouse interest in this matter and stir up the people to make appropriations for road building, but rather to consider wisely and carefully how the road building which the people of the state have decided shall be done, can be most efficiently accomplished and how the money necessary to be paid for this work can be secured. Already, before one shovelful of dirt has been turned under this new law, the towns and counties have asked for over \$100,000 more than the legislature appropriated. If the demand for money for building roads increases as rapidly in the counties just

beginning this work as it increased in the counties which started work under the county aid system, the next legislature will have to appropriate in the neighborhood of a million dollars a year to meet the demand at that time. If such is the case, with a million dollars each from the state, the counties and the towns, there will be fifteen hundred miles of good roads per year built in Wisconsin. At this rate it will not be long before Wisconsin will have one of the best road systems of any state in the union, and there will be no grounds for the complaint so often raised at the beginning of this movement by middle-aged men, that they would not live to see the day when they could travel on good roads.

## THE UDDER AND MILK SECRETION.

Dr. H. M. Reynolds, College of Agriculture, University of Minnesota,  
St. Paul.

(From Report of Wisconsin Dairyman's Association, 1910.)

### Structure of the Cow's Udder.

It may be helpful to a correct understanding of the milk glands to know that they are closely related to skin structures and that the milk producing glands are similar in part to the skin sweat glands and in part to the skin oil producing glands. The milk secreting structure of the cow's udder is to be regarded as a process of evolution from simple surface skin.

It may not be quite pleasant to know that many things are excreted through the udder. Science knows no likes or dislikes and has no quavers of feeling. Everyone knows that some medicines given to a cow or to a human mother are readily excreted in the milk,—in fact we occasionally give

medicines to the nursing calf or baby in this way.

The cow's udder consists of gland tissues proper; i. e., the milk secreting tissues and a connective frame work, together with blood vessels, lymph vessels and nerves. The cow's udder is divided into two lateral halves the partition extending lengthwise of the body. Each lateral half of the udder is encased in a tough, fibrous sack,—a sort of capsule, and each side half has two glands; the front and back quarters which are not separated by partitions like the two side halves.

The internal structure of each quarter shows that it is divided into distinct masses of gland tissue, and these distinct masses, which we call lobes, are again divided into smaller lobes or

lobules. There is one outlet milk duct, or tube, for each lobule. It is through these small milk ducts that the milk from each quarter passes on its way to the milk cistern at the base of the teat.

The mammary glands are undeveloped and rudimentary until maturity and become active, as a rule, in the manufacture of milk towards the close of the first pregnancy.

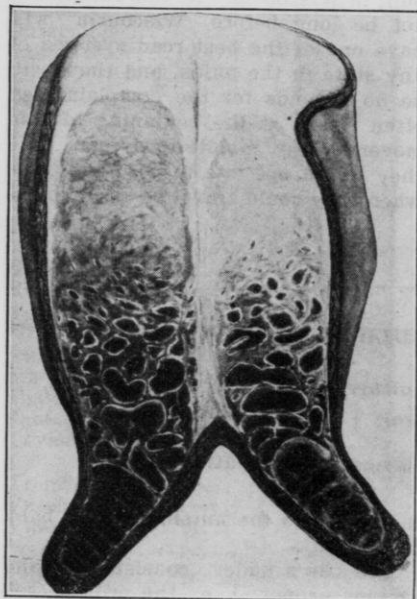


Fig. 1.—Section through the front quarters of cow's udder; crosswise of the body.

From the strong capsule, the fibrous sack, which surrounds each side half of udder, layers of this same tissue branch off and extend into and all through each quarter, constituting the coarser framework of that quarter. The relative amount of this connective tissue, i. e., frame work tissue, varies greatly in different udders, and varies at different periods of life in the same udder. The farmer who understands this general structure of the cow's udder will easily understand why some

cows with large udders produce little milk, and other cows with small udders produce much milk. The frame work tissue produces no milk. That will be brought out more clearly later.

Most of you are probably familiar with the fact that we have within every animal body two sets of vessels, or tubes, through which fluids circulate. We have the blood vessels and the lymph vessels. The blood vessels act as general distributors, or wholesalers, of food material as well as wholesale collectors of refuse matters. The lymph vessels serve as retailers and small collectors and are immediately concerned in delivery to the manufacturing cells of food material; i. e., raw materials for manufacturing processes. The lymph vessels also collect the waste, the refuse which is passed on to the blood for excretion.

We have two sets of blood vessels, or tubes, in the cow's udder, as in practically all other structures of the body; i. e., arteries through which flows into the udder pure blood; and we have the veins in which flows back to heart and lungs, the impure blood. There are two sets of lymph vessels; first, the superficial lymph vessels distributed to the capsule or sheath around the udder and to the skin, and another set of lymph vessels which, all through the udder, supply the little bottle shaped groups of milk producing cells which we will name the alveoli.

The blood vessels split up into finer and finer branches until they are finally microscopic in size. We will call these invisible blood vessels, capillaries, the word referring to their hair-like shape. These tiny blood vessels, the capillaries, form net works around the little milk tubes and bottle-shaped groups of milk secreting cells which I called alveoli.

The lymph vessels form tangled meshes of minute lymph vessels, or

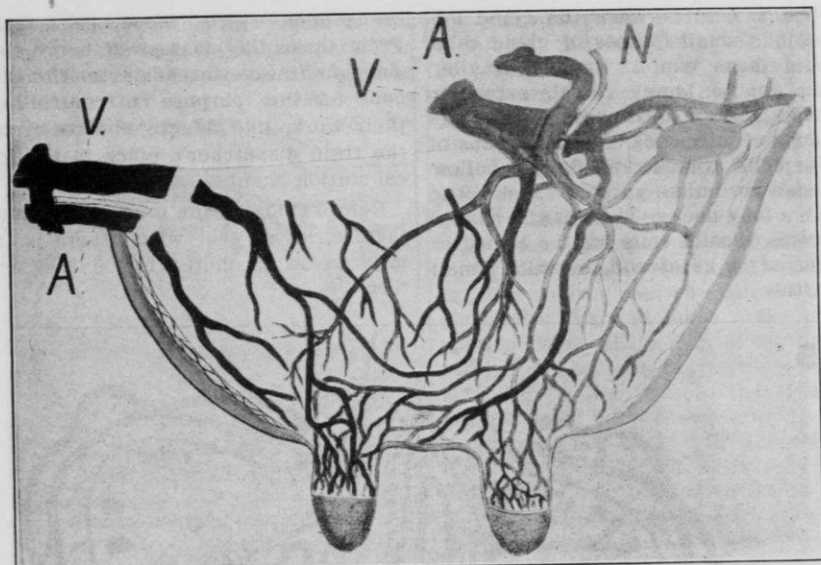


Fig. 2.—Circulation of blood in cow's udder. "V" veins; "A" arteries; "N" nerve. Vein at the left is the one which extends under the cow's belly, commonly known as the milk vein. Note close relation between nerves and blood vessels.

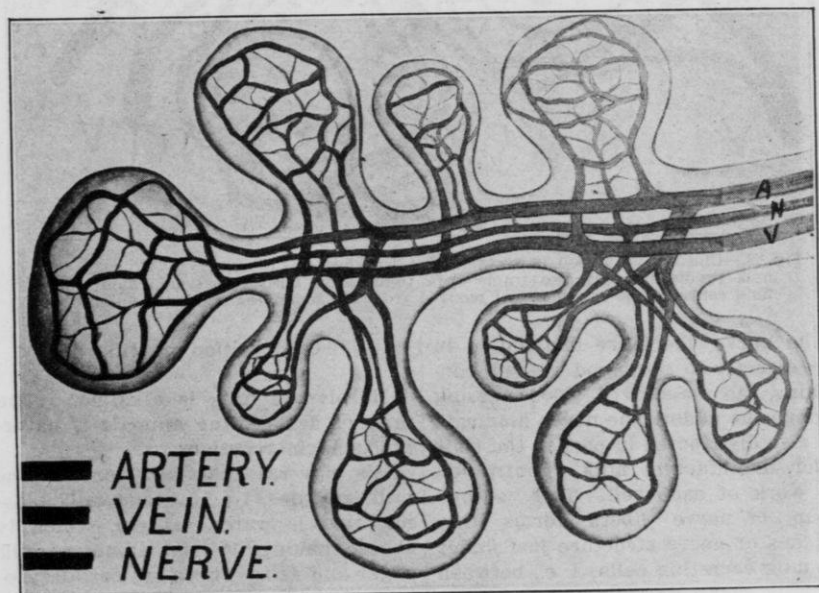


Fig. 3.—Grape-like clusters of alveoli (milk producing bodies.) "A" artery; "V" vein; "N" nerve. Note close relation of nerve supply to blood supply.

tubes, in and between the gland lobules and small masses of gland cells. From these lymph vessels, smaller, very minute, lymph vessels extend to lymph spaces surrounding the little groups of milk cells. These groups of milk cells are arranged in hollow masses not unlike a round water bottle with a long neck. These bottle shaped masses of milk cells will be hereafter referred to as alveoli, meaning small cavities.

brane upon which these cells rest. From these tiny masses of nerve tissue, small nerve threads extend to the cells for the purpose of controlling their work, like telegraph wires from the train dispatcher's office to the local station agents.

Before studying the process of manufacture, let us see what there is in milk to be accounted for in the factory.

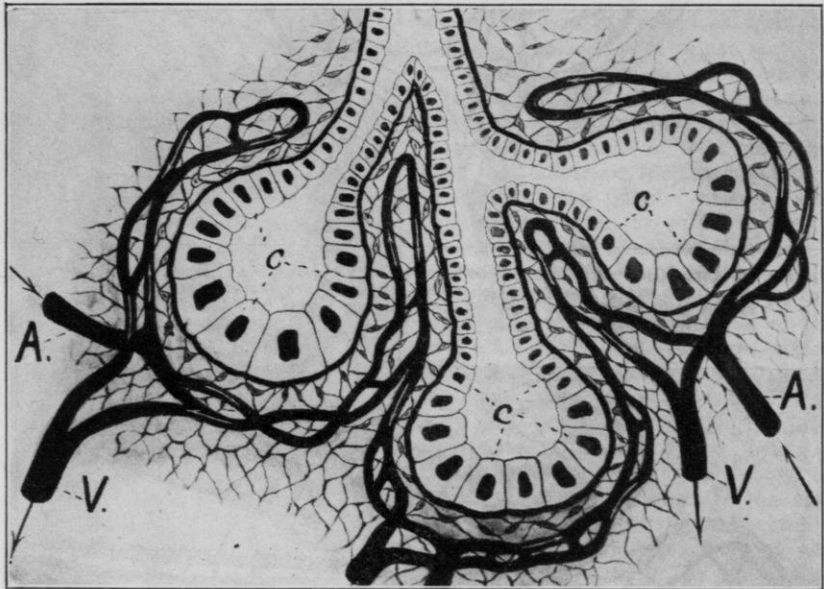


Fig. 4.—Clusters of alveoli in section, split lengthwise. "A" artery; "V" vein; "C" milk producing cells; also frame work tissue mesh filled with lymph fluid, which fluid contains the raw material received from the blood for milk manufacture.

The nerve fibers are distributed in part directly to the blood vessels controlling the amount of blood passing through the udder. The nerve filaments are also distributed in part to the cells which manufacture milk, controlling the work of each cell. This second group of nerve fibers forms tiny bunches of nerve structure just under the milk secreting cells; i. e., between the milk secreting cells and the mem-

#### Composition of Milk.

Herbivorous milk is alkaline. The milk of flesh eating animals is naturally acid in reaction

We may say that milk consists of milk globules, i. e., fat, and milk plasma, that is water, casein, which is cheese making material, albumen, milk sugar and ash. There are certain proteid or nitrogenous bodies in milk, We

know these as milk albumen, and casein from which we make cheese. The proteid or nitrogenous materials make up about four parts in 100. Cow's milk usually has about four and one-

one part per hundred of ash or mineral matter; i. e., calcium, soda, potash, etc., and about 87 per cent water. Colostrum, the first milk drawn after delivery, differs from normal milk in that it contains much nitrogenous matter, especially albumen which coagulates upon boiling, and little fat, sugar or mineral matter.

Milk fat consists of several different kinds of fat combined and put together in little round masses called milk globules. These globules make up a true emulsion with a film of the liquid portion of the milk between globules. It is interesting to note that ash in the bodies of very young animals corresponds very closely with the ash in the mother's milk, but it is very significant to note also that the ash in the mother's milk differs very widely from the ash of the mother's blood, proving actual manufacturing processes in the cow's udder, even for the ash.

Now I am going to try to make plain and simple the process of milk formation.

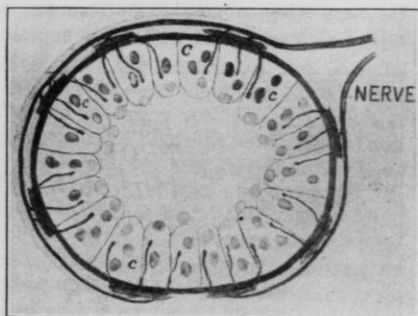


Fig. 5.—Showing nerve distribution to milk manufacturing cells, "C."

half parts per hundred of milk sugar, and from three to four parts per hundred of butter fat, varying greatly according to individuality of the cow. Milk contains also a little less than

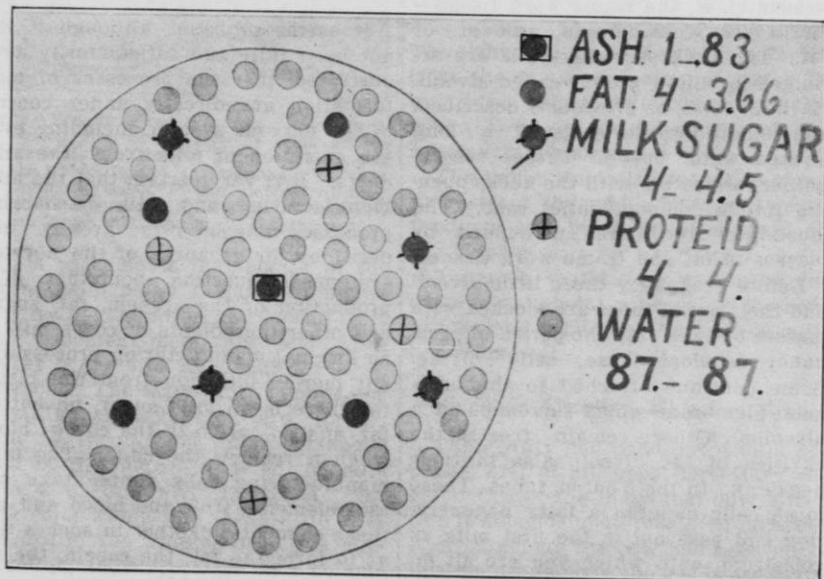


Fig. 6.—Composition of milk showing what is to be accounted for in the factory.

### The Process of Manufacture.

Where do these come from—this fat, and sugar, and all this casein, and the ash? Well, it is fully demonstrated that they do not exist in the blood before it reaches the udder. All the blood carries to the udder are the products of digestion, i. e., nutrition materials from digested food, so that back of this manufacturing process in the udder, we must have the digestive process in the stomach and intestines.

It would be interesting for any one who is not familiar with this subject and who wishes to follow it farther, to look up the history of the several food groups, the carbohydrates, the proteids, and the fats, from the time they enter the digestive organs until the digestion products are distributed by the blood, and then see what use the body makes of each one of them—especially what use the udder makes of them.

Before pregnancy the milk glands are composed largely of connective tissues; i. e., the frame work tissue—and a very considerable amount of fat. The milk secreting cells are arranged in hollow groups called alveoli. Each alveolus, as previously described, has something the shape of a long necked water bottle. These are together in clusters with the necks opening into a common outlet tube. The clusters of alveoli are surrounded by masses of fat and frame work tissue.

Before pregnancy these little alveoli and their outlet tubes are blocked with masses of cells. As the period of pregnancy develops these cells divide. Some continue attached to the basement membrane which surrounds each alveolus. Others remain free in the cavities of the alveoli, also in their necks and in their outlet tubes. These loose cells undergo a fatty degeneration and pass out in the first milk as colostrum, with which you are all familiar. Colostrum may appear later in

the progress of milking but its formation always indicates a lack of complete and perfect process in manufacture. The cells which remain attached to the basement membrane go into the business of manufacturing fat and other normal constituents of milk.

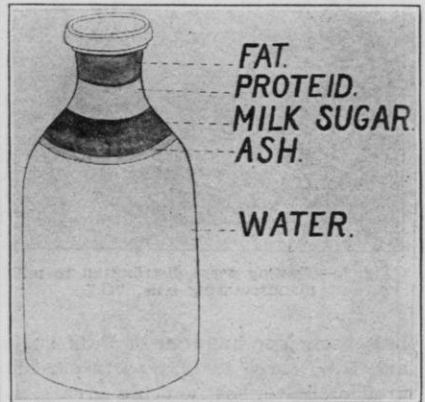


Fig. 7.—Composition of milk, presented in another way.

It seems probable, although it has not been fully and satisfactorily demonstrated, that the processes of milk formation are directly under control of the nervous system, including even the excretion of milk from the milk ducts. It is very certain that the milk manufacturing and milk discharging processes may be very greatly hindered by disturbances of the nervous system—no question about that. The production of the casein, fat, sugar, and other ingredients of cow's milk is an original manufacturing process and not merely filtration from the blood, for there is no milk sugar, no butterfat, and no casein in the cow's blood when it reaches the udder. The milk manufacturing cells simply take certain elements from the blood and put these elements together in such a way as to form the fat, the casein, the sugar, and even the ash.

There are two processes in milk formation. First: Milk cells, lining the alveoli, or tiny milk cavities, or portions of those cells, undergo fatty changes. The cell manufactures the fat which accumulates in the free end of the cell. The free end of the cell changes into a tiny fat globule and separates from the portion of the cell in contact with the basement membrane. The portion thus left we will call the parent cell. This parent cell then lengthens again and develops another fat cell, at the free end, which in turn separates from the parent cell. You will thus see that this butterfat production is a process of moulting, or shedding, just as the hair sacs produce and shed hair. The fat globules escape into the udder and thence to the milk cistern at the base of the teats.

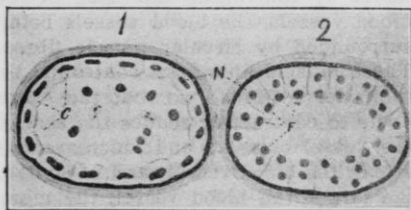


Fig. 8.—Process of butterfat production. Cross section view of an alveolus (milk producing body.) 1. Resting gland. 2. Beginning the production of fat globules. "C" milk producing cells; "F" fat globules forming; "N" cell nucleus. Note that the milk cells are larger in 2 than in 1. Diagrammatic.

It is presumable that some of the parent cells many themselves undergo fatty degeneration and loosen from their basement membrane, and later appear in the milk as globules.

Second: The water, nitrogenous materials, sugar, salts, etc., are formed from the lymph fluid which surrounds each bottle shaped cluster of milk cells, i. e., the alveoli. When the milk cells which line these little cavities are in the process of active milk secretion, they are large and column

shaped instead of flattened ovals as in the resting gland.

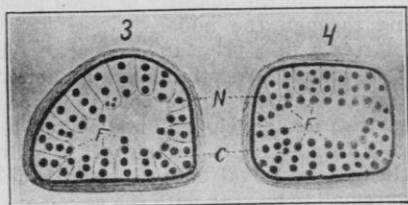


Fig. 9.—Formation of fat globules. Note that milk cells have lengthened still further in 3. In 4 the fat globules have escaped into the cavity. "F" fat globules; "C" milk cell; "N" cell nucleus. Diagrammatic.

I hope that I have succeeded in giving the impression to everyone that the production of milk is clearly a manufacturing process. It has been shown, for instance, that an animal may produce milk fat without a particle of fat in the food. Excess of fat in the diet does not materially increase fat in the milk under normal conditions. Material used in milk formation comes directly from the lymph fluid contained in little spaces surrounding the clusters of milk cells. The lymph fluid receives raw material from the blood and simply passes it on to the milk forming cells over the fence, i. e., on the other side of the basement membrane.

The lymph fluid also serves to carry away from the udder tissues, waste products and finally returns these to the blood stream for excretion.

A person would very naturally inquire at this point concerning the conditions and influences that affect milk secretion.

#### Influences Affecting Milk Secretion.

The quality and quantity of milk depends, first of all, upon hereditary peculiarities of the individual cow. After this it depends upon food. It depends upon how long the cow has been milking, upon how long she has been carry-



ing her calf, upon the condition of her nervous system, and to a very great extent upon the quantity of blood passing through the udder.

After a first pregnancy occurs, the milk glands are stimulated to active growth and the little bottle shaped cavities are developed and lined by milk forming cells. Each cell is a little flattened oval shaped body, much too small to be seen with the naked eye. Late in the period of pregnancy there develops a scanty and imperfect secretion of fluid which later becomes the colostrum, or first milk drawn after delivery.

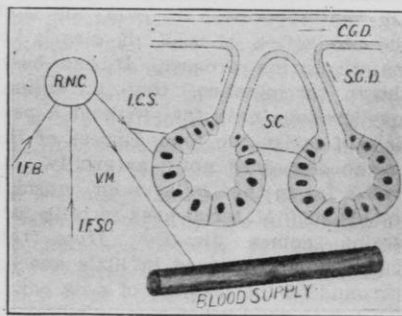


Fig. 10.—Relation between nervous system, blood vessels and milk producing cells. "R. N. C." reflex nerve center; "I. F. B." influence from brain; "I. F. S. O." influence from sense organs, e. g., the skin; "V. N." nerve which controls size of blood vessels; "I. C. S." nerve controlling secretion, i. e., milk manufacture by the cells. Note in Fig. 10 that an impulse, e. g., fright from the brain reaches the reflex nerve center and from there communicates both with the blood vessels and with the milk forming cells. Influence, e. g., chill or irritation from lice, from skin surface also goes into the reflex nerve center and from there communicates with both the blood supply and the milk cells.

The milk manufacturing activity in the cow's udder is directly stimulated by the developments of the embryo within the mother's body. When another pregnancy occurs during the period of milking, some influence from the mother's uterus naturally leads to changes in the composition of milk, and, normally, the secretion lessens

and stops before the next delivery. This natural tendency to a marked change in the composition of milk and to stoppage of secretion toward the end of a succeeding pregnancy has been partially overcome in the breeding of high type dairy cattle. As a matter of fact long, continued milk production during pregnancy is an abnormal thing physiologically.

Some physiological relation between the milk glands and the womb is very evident, and that the process of milk manufacture is under the control of the nervous system is equally evident. There is reasonable evidence that the milk of the human mother has been altered in chemical composition or suddenly suppressed by strong emotion. There can be no question but that the nervous system controls the amount of blood flowing through the udder by controlling the size of the blood vessels, the blood vessels being surrounded by circular muscle fibres. These muscle fibers are controlled by their nerve fibres, so that they are made to contract or reduce the size of the vessel or relax and increase the size of the blood vessel; and of course, the larger the blood vessel, the more capacity it has for carrying blood. This process of enlarging or reducing blood vessels and permitting more or less blood to flow through a certain part is nicely illustrated by the flushed face of a person under embarrassment or the pale face under the stimulation of sudden fright, the difference in color being wholly due to the amount of blood in the blood vessels of the face.

It is very evident to practical dairy-men that there must be some intimate relation between the cow's nervous system and her process of milk secretion. You all know that nervous disturbances of any kind are apt to check the milk flow. A crowd of strangers passing through a stable, where high type and highly organized dairy cows

are kept, sudden noises, rough handling, all check the processes of milk formation. The only possible connection between the noise outside the animal body and the process of milk manufacture inside her body is by way of the nervous system.

A bond of connection and intimate sympathy between the udder and the womb is also found in the common blood which flows through both organs.

Certain investigators (Starling and Lans-Clayton) have shown that an extract from the unborn rabbit injected under the skin of the young female rabbit that has never been bred produces a genuine development of milk glands just as does pregnancy. This seems to prove that some influence from the body of the unborn young, travels by way of the blood and lymph streams and stimulates the milk glands to active growth and preparation for work. This is a most interesting discovery and explains some things that have been very puzzling. Evidently there is some specific chemical substance formed in the body of the young animal unborn which stimulates growth and development changes in the udder of the mother. Similar extracts from the afterbirth, and from the womb itself, have no such effect, thus proving that the specific substance which stimulated the udder growth and development must come from the body of the young, unborn animal.

Indications developed in the course of this work point to the fact that this chemical substance in the body of the unborn promotes milk gland growth, but checks milk production. At birth of the young animal, this substance within the body of the young is, of course, removed from the body of the mother; and could no longer exert any chemical effect through the blood stream upon the udder. Soon after the foetus is removed from a mother's

body, growth and development of the udder stops, and active milk secretion begins. This general statement holds true again in the reverse condition when a second pregnancy occurs and a new foetus is developing within the mother's body. There is a marked tendency to the development of udder structure in preparation for another period of milk production and a tendency to check milk secretion.

One further interesting point may perhaps be mentioned in this study of conditions affecting milk formation. Pressure in the milk ducts and milk cavities within the udder checks the manufacturing process in the individual milk cells. As soon as milk contained in the udder—and therefore pressure started upon these cells—is removed, then secretion starts again—in other words, the pressure brake is released, and the wheels begin to revolve again. The act of emptying the cow's udder and merely relieving pressure upon the milk forming cells therefore amounts to a natural stimulus of milk cell activity.

#### Summary.

I hope to have made clear the general structure of the cow's udder and to have shown that it is not all gland or milk-forming tissue. There is a veritable proportion of connective tissue framework and glandular, or milk-secreting tissue. This explains how an udder may be large and inefficient or relatively small and capable of great production.

It is important to remember that the two side halves of the cow's udder are completely separated by strong partition, but the front and back quarters in each half are not so separated. This is important in connection with garget and other diseases of the udder.

It has been my endeavor to make plain the general scheme of circulation

of pure blood in the arteries and impure blood in the veins and the circulation of fluid in the lymphatic vessels. It has been shown that the blood acts as general or wholesale distributors or collectors, i. e., distributing to and collecting from lymph fluid in the lymph vessels, that lymph fluid acts as the retail distributor of nutritious material and as retail collector of refuse.

The amount of blood flow and the processes of milk formation are under control of the nervous system, and the production of milk is a process of original manufacture, not a mere filtration from the blood. There is no butter fat or casein or milk sugar in the blood which comes to the udder.

I have endeavored to show the process of forming the fat globule in the elongation and rupture of the milk-forming cells lining the alveoli and by this rupture furnishing the fat globule. The other milk materials are also formed from the lymph fluid which surrounds the alveoli.

The influences affecting milk secretion, are heredity, food, period of milking, stage of pregnancy, condition of the nervous system, and especially the quantity of blood passing through the udder. I have endeavored to explain a very interesting relation between the unborn young and the development and preparation of the udder for the next process of milking, also the checking effect which some chemical substance within the body of the unborn young animal has upon actual milk formation. When the young animal is born and therefore separated from the mother's body these relations cease, and development and preparation of the udder ceases. At the same time the chemical substance which restrains milk formation is removed, the brake is released and the active secretion of milk is begun. Finally, pressure of milk within the udder checks secretion, removal of

this pressure stimulates or at least permits secretion.

I may sum up the influences affecting secretion in another way. The amount of milk produced depends upon the amount of blood flowing through the udder. The amount of blood depends upon the size of the blood vessels, and size of blood vessels, is controlled by the nervous system. The composition of milk depends primarily upon the hereditary peculiarities of the cow.

The composition of blood for milk production depends upon the amount and character of food received, thoroughness of digestion, and thoroughness of absorption from intestines into the blood. It should be understood that when we speak of an efficient producer, either a steer producing beef or a cow producing milk, and say that this animal has large digestive capacity, we should really mean large power of assimilating and using digested food. Actual experience and experiments do not indicate that as a rule there is so much difference in actual digestive ability as there is in ability to assimilate.

The amount of milk produced, assuming an abundance of blood and abundance of nutrition in the blood and a dairy tendency, depends upon the actual number of healthy epithelial or milk secreting cells. The number of milk secreting cells for an udder of given size depends upon the relative proportion of the gland tissue and connective tissue. The relative proportion of gland tissue and connective or frame work tissue is presumably a matter of heredity except as the udder is affected by injury or disease.

Finally, ability to digest large amount of food material; the tendency to dairy assimilation; the capacity for large flow of blood through the udder; the tendency to a large number of gland cells within the udder; and the tendency to relatively large proportion of gland tissue as compared with the

connective tissue, are all matters hereditary, fixed by a long line of intelligent breeding.

### DISCUSSION.

Mr. Michels—Where does the water in milk come from?

Dr. Reynolds—The water comes directly from the blood. That is the only thing in milk that is not manufactured. The water comes to the blood from the lymph spaces here and from the lymph spaces it extends through the membrane and then is excreted through the cavity of the alveolus.

Mr. Everett—Doctor, you showed us that a large blood circulation is very important, and we judge from that, that a large heart and lungs are also important, and if true, what is their size compared with those in the beef animal, and what is the effect of good or bad ventilation on that lung power as affecting the flow of milk?

Dr. Reynolds—We haven't any positive information that rests on demonstration, so far as I know, which shows the relative sizes and weights of the lungs and heart of a beef animal as compared with the dairy animal. Isn't that true, Professor Boss, so far as you know?

Professor Boss—I do not know anything very reliable. I have made a number of records of that kind and in proportion to the size of the animals, the heart and lungs of the dairy animal are larger than those of the beef animal. Again, the conditions under which animals are kept has very much to do with it. There was one thing quite surprising to me, and that was to find that the chest and lung cavity of animals of the dairy type was much larger correspondingly than those of the beef type; in other words, the width and depth of the chest of the animals of the beef type is composed of the fat of the animal rather than the frame work.

Dr. Reynolds—Of course an abundance of oxygen, or an abundance of good, fresh air will enable the lungs to get rid of the waste to great advantage, and will also supply the oxygen needed in the process of milk manufacture. Of course the cow's capacity to produce depends upon her condition and good health; her ability to digest quantities of feed which is necessary in the production of large quantities of milk, depends on her condition and health.

Mr. De'and—When does this process of elaborating milk take place? It is often stated that it is done only during the process of milking. Is the udder filled with milk during the day, or is it only elaborated during the time of milking?

Dr. Reynolds—A very large proportion of the milk is manufactured during the time of the milking. The udder is capable of storing only a comparatively small proportion of the milk which is drawn. The explanation is just this, so far as we can judge: There is of course a certain amount of milk stored in the udder, and when the milk-producing cells are all full, the milk factories are shut down, but the materials are stored in the cells; the cells are full of materials ready to combine and the minute the pressure is relieved and the milk on hand drawn, then those things are put together and rapidly excreted, very rapidly, so that a portion of the milk is manufactured during the time of milking, but everything is all ready just as the wood is ready to burn, and when it is touched with a match it burns.

A Member—What causes garget in a cow's bag?

Dr. Reynolds—A very large percentage of garget is caused by infection, as it extends up through the teat into the udder. Sometimes we have what we call an infectious form of garget; it spreads quite rapidly through the herd on the milker's hands. When

a man has a cow of that kind, she should always be milked last; and then the hands most thoroughly disinfected. The treatment of garget is rather complicated; plenty of hot water is necessary; foment with hot water morning and evening and give good, full doses of saltpetre to keep the bowels open.

Mr. Everett—I get a good many letters in reference to caked udders, that is, in one-fourth of the udder. Won't you speak of the remedies and the use of the milking tube in connection therewith for the relief of caked udder?

Dr. Reynolds—Well, a caked udder, of course, is practically garget. At the time of calving, there is always naturally some slight condition of garget or caked udder. The worst case of caked udder is simply a natural process gone to extremes. The best treatment is the same as for garget and that is prevention. If a cow is healthy before the calf is born and properly handled then and afterwards, and the udder handled in a perfectly clean way, there isn't much probability of garget. So far as the use of the milk tube is concerned, I am very much opposed to its use. My advice to every one who asks me is never to use a milk tube except as a last resort. Sometimes there is nothing else to do, but there is so much danger of carrying infection into the udder, which will give a much worse condition than the one you are trying to relieve, that the milk tube should always be considered rather dangerous. If you must use it, boil it thoroughly; the teats should be thoroughly disinfected and the part of the tube which enters the teat should never be touched with the hands, and even with all this care, there is a great danger of infection. Experienced men, I think, feel that they should never use the milk tube if they can avoid it.

Mr. Glover—A solution of boracic acid injected into the infected udder would be helpful, would it not?

Dr. Reynolds—I think the most experienced veterinarians are now opposed to the injection of any disinfectant into a cow's udder. Boracic acid at best is a very mild antiseptic, with very limited germ-killing qualities.

A Member—Do we understand that a 3 per cent cow will give milk containing 3 per cent fat on marsh hay?

Dr. Reynolds—I said with normal feed and a good chance, she will continue to be a 3 per cent cow.

A Member—Can you increase that to 5 per cent?

Dr. Reynolds—Not on a well balanced ration; with the cow in normal health.

Mr. Michels—Why is the first milk drawn so much poorer in butter fat than that which comes later?

Dr. Reynolds—That is explained very nicely in this way: A moment ago somebody asked the question whether the milk was all in the udder ready to be drawn, or whether it was manufactured during the process of milking. There is a certain amount of milk stored in this little cavity, but the material from which a great deal more can be made is stored in the little cells. When this milk which is stored in the cavity is drawn off, the cells manufacture more and they work very rapidly in the manufacture of butter fat and casein and milk sugar and ash, and they seem to manufacture those things more rapidly than the water comes from the blood.

Mr. Everett—What are the first noticeable symptoms of milk fever and the first quick remedy?

Dr. Reynolds—First, the cow is a little restless, somewhat uneasy; she steps about a good deal in her stall and walks with a little irregularity. I might say that even before that you will notice a little constipation. Then

comes this expression of uneasiness before she goes down, probably a peculiar expression in the eye, a slight staggering as she walks.

The best treatment for milk fever is prevention. We have a treatment that is very satisfactory, but prevention is much better. One prepared to treat a case of milk fever knows just how to do it. A man who wants to establish a milk record with a cow may be excused perhaps for feeding heavily right up to the time of calving, but the man who wants to prevent milk fever will feed rather lightly for two weeks or so before the calf is born. He should give a diet rather laxative in its effect and a reasonable amount of exercise and with these precautions the cow is not apt to have milk fever. After the calf is born, if the milk pressure in the udder is relieved by milking, there is very little danger of milk fever. It is the cow with a big dairy capacity that is liable to have milk fever; the half-fed, half-starved cow never has milk fever. After the calf is born, there should be no more milk drawn than just what a calf just born will take; the man who follows that rule will practically have no milk fever in his herd. After that first milking and during the next twenty-four hours very, very little should be drawn; then, on the third day, more should be drawn. No matter what the udder is full of, water, or oxygen, or milk, if it is left there, the cow will have no milk fever.

A Member—In the case of a cow twelve years old having the early symptoms that you have described, would you advise breeding her again. In other words, is she likely to have the same symptoms and have them worse the next year?

Dr. Reynolds—I think a cow that has had milk fever once is rather more likely to have it again, but I would not discard a cow, if she is a good one, simply because she has had milk fe-

ver. I would prevent it the next time by not milking her too much.

A Member—What would you do with a cow's udder that is broken out? Is there anything that can be done to save that quarter?

Dr. Reynolds—Probably not. You simply treat that as any other abscess or wound,—clean surgical treatment.

It is my own opinion that a cow never has garget or any other serious disturbance in the udder and fully recovers from it.

Mr. Scribner—A man told me the other day that when he got ready to dry off a cow, he just quit milking and he never had lost a dairy cow yet. What do you say to that?

Dr. Reynolds—I wouldn't do it.

Mr. Scribner—And I second the motion.

A Member—If she was a persistent milker and you couldn't dry her off, what then?

Dr. Reynolds—There are not many that you can't dry off by limiting the feed and feeding dry feed. If you can't do anything else, you can give her a little bella donna and that will surely dry her up.

A Member—I had a cow that milked three years steady. I couldn't dry her.

Dr. Reynolds—It would have been better for her and the calf too if she had had a rest period.

Mr. Everett—How long a rest period?

Dr. Reynolds—I am not a practical dairyman; I am a veterinarian, but I would say at least a month.

Mr. Clark—When a cow has some restriction, so that it is hard, sometimes impossible, to milk, would you use milk tubes, or would you use a bistoury to make the holes larger?

Dr. Reynolds—The best treatment for that is simple dilatation. You can get some little cone-shaped tubes of different sizes for that; and have them perfectly clean. They only go up a very little ways into the teat and if you

put one of those in half an hour before milking, it will make it very much easier. I don't like the bistoury; it simply makes a little cross-shaped cut which must heal up and the scar makes it worse than it was in the first place. On the other hand, if a cow milks too freely, slightly cauterize the end of the teat, and the scar healing will reduce the size. The whole difficulty is just at the very end of the teat in those hard milkers, not all the way up.

A Member—Where a cow has tuberculosis can she raise a healthy calf?

Dr. Reynolds—Yes. But she cannot nurse the calf, nor the calf cannot stay in the stable with her, but as far as heredity is concerned, it doesn't cut much figure. I see some of you look as if you wanted to scrap on that proposition a little bit, but the fact is, this question of heredity of tuberculosis is simmered down to just this, practically we are pretty sure that heredity of tuberculosis, if it ever amounts to anything at all, which I do not believe, is an increased susceptibility or increased sensitiveness toward tuberculosis, so that infection is a little easier and the development of

the disease a little more rapid. A calf from a tuberculous cow ought not theoretically and reasonably be more resistant than the calf from a healthy cow. I will illustrate it in this way. Civilized white people regard measles now as a very trivial affair. For a great many generations we have been gradually developing an immunity to measles, but if a white person goes to Patagonia and carries the measles there, those black people will die like flies with it. I think we are doing the same thing, as we have done with measles, toward smallpox and tuberculosis. That is, gradually developing an immunity toward contagion.

Actual experience shows that a very large proportion of calves can be raised from tuberculous cows if they are not raised on the mother's milk. The same is true of the sire; he may sire a large number of very healthy calves, but must be kept isolated from the rest of the herd; he must be quarantined; it is only with a very valuable bull or cow that a man can afford to go to that trouble and expense. But if it is worth while, it can certainly be done with very little danger.

## HEALTH, THE FARMERS' BEST CROP.

Dr. Woods Hutchinson, New York.

(Excerpt from Address in Report of Illinois Farmers' Institutes, 1911.)

I wonder if we could have a little fresh air in this room. I know perfectly well, of course, that all farmers are used to fresh air, because they get so much of it in ordinary life, but those of us who have not that privilege, appreciate it, and it is sometimes rather a difficult article to obtain.

I am particularly desirous of having fresh air in any audience I am ad-

ressing, because I am sensitive on account of the amount of hot air I am adding to the air already in the room. If an audience goes to sleep while I am talking, it is hardly fair to blame it to the atmosphere, although, of course, it is not my fault!

I am always glad of the opportunity to talk to an audience of farmers, although I should never have known this to be one had I not been told.

The farmers now days are different than they were when I was a boy. You can all see how long ago that was. I understand and that now a good share of the farmers' time is spent, in the morning, trying out his new automobile, and in the afternoon, attending directors' meetings at the bank; also that he does a large part of his work from town by use of the telephone.

I think all of us would like to be farmers these days. There was a time when we did not consider it such an advantageous and preferable occupation. In these days it is regarded, by those of us who do not have a farm, as the ideal thing. If we had a farm we would probably find out something very different in a short time.

The position of the physician—the doctor in the community—is one which has changed very remarkably within the last ten or fifteen years and he is very glad of that change. There was a time when a doctor would not have been selected to address an audience of this kind at all. There was a time when the doctor would not have been consulted by the school boards or the teachers in the school room as he is now. There was a time when the doctor would have had very little to do in politics or in public life of any sort or description. They were expected to attend simply to the patients, pills, and powders, and let pretty much everything else alone. The doctor became a disfranchised class—almost as completely disfranchised as the "better half" of the community still is. The doctor has got back his voting rights and I believe that the "better half" of the community is going to vote before very long.

There was a time, only a short while ago, when it would not have been considered proper for the doctor to talk in public, at least not about professional secrets. He might give

away something he hadn't ought to. He was not allowed to appear in public on the platform. Now, the doctors are beginning to preach and the preachers are beginning to practice and the millenium is beginning to dawn. It is almost in sight already.

If the doctor of today has some information which is of real value to the public—not only as to the immediate care of health, the relief of suffering, and so on, but also about the improvement of the efficiency of the community—he is broad enough to impart it in public.

There is a cash value to health now days. There is a cash value to human life! There is a cash value in the prevention of disease, and in the raising of human efficiency. I would not be surprised if, before very long, the doctor would be regarded as one of the financial advisors, if not a financial magnate of the community. He is going to take a larger part in public life, I believe, than he has ever done, and with great benefit both to himself and to the public.

I do not want you to think, however, that I have an exaggerated opinion of the part that the profession is going to play in the future. It is certain, however, that the part it fills in the general community life of today is infinitely broader in scope than the part it was permitted to fill in preceding generations.

#### Human Health, Efficiency and Association.

The importance of health as a crop on the farm is, I think, something that would not be disputed for a moment by any intelligent observer. After all, what are we in this world for, except to grow and progress and accomplish something, and, what can we get out of life except such enjoyment as we are able to get out of exercising our powers and enjoying ourselves as we go along? We can not do any-



thing in the way of happiness or of success or efficiency, to any high degree, without help, and the purpose of the farm and of the whole of our civilized life, is to promote human efficiency and human health and human association.

I need not tell you, of course, what an enormous part the farm and the farmer have always played and must play in the raising of this most important crop, not merely for the farmer himself, but also for the entire community. Every point at which you touch the health of the people, you have to count on the farming community. Everything that has to do with the purity of food, with the bone and sinew and the nutrition of the country, of course comes back to the farmer. The farmer is perpetually raising a crop of health for the whole of the rest of the community, and the question I want to ask tonight is whether he gets his fair share of that crop himself or herself?

#### The Vegetable Bug—Tuberculosis.

It is a magnificent work that the farmer is doing for the rest of the community. We are proud—and rightly proud—of the enormous value of the crops of wheat and other things which he produces yearly, but there are other crops, almost as extensive, that we are not at all so proud of raising, yet we keep on raising them every year. Every year we raise a crop of the little vegetable bug called tubercular bacilli, the net results of which are something like 150,000 deaths every year. The value of a human life is now computed at \$3,000, so there is nearly half a million dollars we are still wasting on that most unprofitable crop. It is raised on the farm too, I am sorry to say, as well as in the cities. It is no respecter of persons and the conditions which ought to be most ideal for the feeding and thriving of this crop of disease

germs are costing almost as much as any other crop. The amount of those which are propagated on the farm is still very much greater than it should be.

The farmer, I think is in one respect very much like all the other workers of the community: that is his principal function and business is to work, and the more hours of the day he can put in at that work, the more meritorious he thinks it is. Work is done because it has to be done, or from ambition or from a laudable desire to get on in the world, but how often do we sit down—we who are workers in any field—in profession, business, commerce, transportation, farming, and figure out what it is really all about?

Is the purpose of life, work? Not by any means. The purpose of life is living and growth. Work is only beneficial in so far as it promotes that growth, and I have sometimes said, both to my business, professional and working friends, that I did not believe from a biologic and sanitary point of view, that there is anything we do with much less intelligence, than work. We simply work and drive ourselves for all there is in it and then when the break comes we sit down and wonder what we did it all for, and whether what we have accumulated is worth the struggle and breakdown. We do not stop to consider what we are living for, or how we may live to the greatest degree of efficiency, comfort, health and rational enjoyment of life.

It has been said that the habit of unremitting toil is one of the most dangerous habits, from a hygienic standpoint, that anyone in this world can form. I have always taken great pains never to form it and shall still struggle against it for many years to come. But the driving of ourselves, without stopping to consider whether we are really working our machines to the best advantage—that is the

thing to which I want to call your attention.

I don't know whether you have been noticing the interesting changes that have taken place in other fields of labor from this point of view. Whenever the working day has been shortened, in any trade or in any occupation, the result has been an enormous increase in the output of the individual worker. It has not increased the labor cost of the product. It has diminished it in practically every instance. There has been an increase of individual output, there has been an increase of wages, there has been an increase of health and comfort from every shortening of the working day that has yet been accomplished, and I don't know whether it would be possible for farmers to join a union and insist upon having limitation of hours of labor, though I think it would be highly profitable if their wives could do so sometimes. The farmer has control to a higher degree, than most any other class of the community, over his hours, over his conditions of work, over his liberty, and over his own behavior.

A very great and beneficial change might be made in the direction of limiting and lessening the hours of labor and doing the labor at a higher tension, a higher efficiency, during the time of work. I do not believe there is any one problem that would give a richer yield in efficiency, in health, and in happiness, than an attempt on the part of the farmers to get together and see if there is not some other way of working than that of from dawn until sundown.

The temporary pressure of the season would, of course, make that practically impossible, at that time, but I believe if attention were given to effectiveness of work, and, with the tools we have not properly utilized yet, a beneficial change could be made. We have not properly taken advantage of the tremendous increase in knowledge, the tremendous con-

quest of the forces of nature which science has made within the last seventy-five years. Wealth has been created by the utilization of the forces of nature, by steam, by electricity, by the chaining of water power, by improved methods in chemistry, machinery and engineering. That work has actually created in the last 75 years, more wealth than had ever been created in all history before, and still we are going right ahead working our ten, twelve, fourteen, sixteen hours a day, as if we had to do it all with our own two hands and two feet without thinking how we may best carry out to the highest efficiency and with the avoidance of that labor which tires and breaks down, and ultimately kills, is, I believe, one of the most important things that we have to consider in this working world now days.

What is the use of hitching our wagon to a star if we simply let that star drag us through too many hours a day, working all the harder, and getting no more satisfaction, no more time to enjoy what we have done?

The improving of human efficiency by an abundance of rest, by an abundance of play, by an abundance of the very best kind of food put under the boiler of this machine we call the human body—those are the real problems of statesmanship and of statecraft for the immediate future.

#### Pure Water First in Importance.

One of the first things to be considered and one of the most important in the consideration of the raising of the health crop on the farm—and I need not point out to you, knowing as you do, that the efficiency and effectiveness of animals depends so much upon their condition of health—what an enormously important thing it is for the human animal—the human machine—to stop and consider the conditions which will perfect its working efficiency to the highest pitch.

One of the most important things, of course, is the supply of pure water. Now in the days when I was living on the farm, the method of procuring the water supply was simplicity itself. There was a deep pit, anywhere from 18 to 25 or 30 feet deep dug at some convenient place a certain distance from the house. Then a short distance away, possibly not more than 30 or 40 yards, was a somewhat shallower pit and into that was thrown all the excreta from the house. The rainfall drained into this shallow pit and seeped down into the deeper pit. Now days, that evil is being removed and replaced by very deep wells, and the utilization of springs and careful preventative measures.

In a large percentage of the states of this nation, the healthy open country has a higher death rate from typhoid than have the crowded towns. The crowded towns, by the very menace of their surroundings have been compelled to fill in and cover over their shallow wells and get their water supply from some reasonably safe and pure source. In the state of Maryland the death rate is three times more than it is in Baltimore, and Baltimore is not an ideal city from a sanitary point of view. In many other states of the Union there is still room for an immense improvement in the matter of the water supply on the farm, either by combining with others and forming reservoirs, etc., or by means of the deep well.

The old water supply was clear and apparently pure. We can not judge the purity of water by its looks, or even by its smell; in fact, very unfortunately, it so happens, as sanitary experts found some time ago, that perfectly pure water often tastes just a little flat, because the salts which go into impure water give a little snap or flavor to it. The vegetable matter which gets into it decomposes, gives

off carbonic acid, and you have a natural soda water. That is the reason most of us, in the old days, were sure our well water was the best in the country. We liked the taste of it. We got accustomed to it. The particular brand of contamination that got into our well tasted a great deal better to us than that which got into the wells of another community, while pure water tasted flat.

My grandfather used to tell a story of a girl who lived in the Lincolnshire fen. That is the old malarial district where the Puritans came from. The water is taken mostly from shallow wells. This girl went into service in an adjoining county, on the chalk, where the water came pure out of the limestone. She had been there about three weeks when she disappeared. The mistress went in search of her, and found the girl at home. She wanted to know why the girl had left, and the girl did not seem to want to tell. The work, she said, suited her all right and the food and care were good enough; the other servants were kind to her, and she was treated very well. Finally she said the real reason was that she never could stay in a place where the water had neither taste nor smell.

The fact that we like the taste of the water and are firmly convinced it is the best water in the county, is unfortunately, no absolute certificate of its purity and its safety; the protection of the water supply, of course, is, in one sense, a relatively small matter. That is a thing that every one of us has within our own control, but there is another element which is not always so easy and simple of solution, and that is the problem of air and of ventilation.

#### The Problem of Air and Ventilation.

Now, of course we say, "Free as air." If there is any place in the world where the very best of air

ought to be breathed all the time, it is in the open country. Unfortunately it is not always the purest air that is breathed by the people who live in the open country while they are in the house. In fact I remember a cynical and sarcastic individual who was a fresh air crank, enthusiastically in favor of sleeping with the windows open, and all that sort of thing. After sending some patients out into the country he came back with the cynical report that the air in the country was always good because the farmers kept all the bad air shut up in their bedrooms. Of course that was a slander, but at the same time I have seen many places where nothing needed to be done but to simply throw open some kind of an aperture and get in the free air of heaven, and yet it is not done at all.

I was in a farm house three summers ago in Nova Scotia. Of course that is on the other side of the land, and entirely apart from anything that occurs here. I wanted to open a window. I found that such a thing had never been thought of in that particular room. After a good deal of trouble and work with a chisel, I succeeded in getting the lower sash raised two inches. I wanted my window open at the top for the purpose of ventilation—so as to allow the foul air to get out as well as to let the fresh air get in. I started with a hatchet and chisel to move the upper sash. The farmer said that he believed that it was built in solid with the frame work of the house and it would take considerable work to get it out.

The only air that you are any way sure is pure, is the air that is in motion. Air for live people, to do them any good, must be air that is alive. The only time you are sure it is alive is when it is on the run. When you get inside the building and imprison it you kill it and in a short time it is not fit to breathe. The lack of venti-

lation is even greater in the country houses than in the houses in crowded towns.

The problem of ventilation is very important. Some people tell us that draughts are very dangerous. You remember the old saying used to be. "Whenever a draught blows through a hole, say your prayers and mend your soul." A draught across the back of the neck, I remember, was considered particularly injurious. Every bad thing that happened in the way of bronchitis, pneumonia, and tuberculosis, was put down to exposure to draughts. If they could not remember one—any particular draught—they invented one for the occasion. I do not think many were so sensitive as that particular woman who had such a horror of anything like dampness that she confided to one of her friends that she was quite sure a certain patient got his "death of cold" from having his gruel given him in a damp basin. But we have an awful dread of anything like damp or cold, and particularly at night. Colds haven't anything to do with cold air.

It is perfectly ridiculous—they are due to foul hot air. The colds you catch in theaters, churches, and traveling on the cars are not from the draughts, but from the group of bugs left there by the last individuals who occupied those rooms. The air in some churches starts in at the beginning of the season, is enriched by a fresh crop of bugs every Sunday, reheated and served up fresh, and then the congregation wonders why it goes to sleep under the ministrations from the pulpit.

Fresh air is apparently one of the most dangerous things there is, judging from the way in which people persistently avoid it. I frequently am called upon to address State sanitary organizations and organizations composed of medical men and I have yet to see any of them meet in a decently

ventilated room; I simply insist on some one throwing the windows open. In a church you do not expect any ventilation. It is built for the next world and not for this. I challenge anybody to tell me they got sick from sitting near a window that I ordered open. I will cure the cold and give a premium or bounty. I never heard of anybody who was damaged or hurt by a draught of cold fresh air.

Night air is something awful to breathe (?). However, it is all there is at night—some people seem to think there is something else to breathe at night except night air. Where they are going to get it from I don't know.

#### The Importance of a Proper Heating System.

The problem of heating is a serious one always. I am not one of those who believe that times always get worse. On the contrary, I believe they are getting better all the time. I do not look back with regret to the good old days when there was a huge open fireplace on one side of the room piled full of logs that had been hauled in from the woods. I do not regard those as ideal times. I think the old fashioned fireplace was the most unmitigated hoary humbug the sun ever shone on. If it got any fresh air, it got it all. Then you had a draught across the back of your neck—it came in cold across the floor and left the top untouched.

Heat a room so that you can open one or two windows in it and not freeze. That is the kind of heating that is most wholesome. The old type of heating with the open fireplaces and little stoves, is not nearly as desirable as the modern method of heating by furnaces, or something down in the basement that will heat the floors by warming the space below. That is the best solution of problem of wholesome house heating.

When you do that you not only get rid of a large number of chills and conditions which produce rheumatism, but also you get rid of a great deal of dampness and germs that breed only in damp—germs of tuberculosis and other diseases.

Thorough drying out of all parts of the house by means of a furnace or some general method of heating, located down in the cellar, is one of the most important factors in the preservation of health. It will cost more in fuel to heat your whole house and heat it well. You will waste a lot of heat by throwing the windows wide open, however, you will save by avoiding doctors' bills, sickness and discomfort. I do not think there is any more important thing that can be done than to put some really adequate modern system of heating in any house, either town or country.

The only room in any house that you can depend upon never to have an open window in it, is the room that has no heat in it. Don't you remember the cold, sepulchral air of the best parlor that was only opened for funerals, or that room known as the best bed room that had not been slept in for two or three months? The cold shivers that developed between those damp sheets and caused the occupant to take cold. In reality it was not the damp sheets that made the occupant take cold—it was the group of germs left by the previous visitor. The room was not heated and consequently not much ventilated, and in rooms of that sort trouble is pretty sure to originate. The houses that are haunted—the houses where there is much sickness and death, are houses that have damp cellars, windows that will not open freely, and defective system of heating and ventilation.

#### Use Plenty of God's Sunlight.

Another most important thing in the health of the farm home is

sunlight. This, of course, is just as free as air. We can have all we want of it. How much of it do we actually get except when working out of doors? We build our houses with screens, blinds, curtains and shades to keep out the sunlight. We build our churches where we might as well have a good, fair amount of God's sunlight, but in such way as to block-ade it all with stained glass. They are beautiful and artistic embellishments but not to be compared with sunlight in healthfulness and wholesomeness.

If we get a sufficient number of windows in a room we proceed to decorate them with two or three pairs of curtains, and a shade, and perhaps a set of shutters on the outside. We are afraid that dreadful thing "sunlight" will get in and fade the carpets, spoil the furniture, and run the hangings. I seldom say anything critical of the so-called gentler but really sterner sex, but there is one point upon which great improvement could and should be made. The male instinct, I believe, is more developed in that regard. If you will notice those houses down town that are the exclusive resort of the male members of the community, known as "club houses," you will see that the backs of the windows are not cluttered up with shades and curtains so that sunlight and fresh air can not enter. I do not say that the abundance of sunlight or fresh air is the only thing that causes men to spend so much time in those institutions, but I think the sanitary conditions in that respect are better than they are in many homes.

Let sunlight into every room of your house. Build the house facing to the southeast so the sunshine can get into it. There is nothing better worth planning to get into your house than plenty of sunlight, no matter what it may do to your furniture or carpets.

I think I shall have to tell you a

little joke on myself at this point. I was in the south last winter and was lecturing on tuberculosis. One evening I was addressing an audience composed of negro people—an Anti-tuberculosis League. I was telling them of the advantages of sunlight. I had a little phrase I was in the habit of using, and not thinking of the character of my audience, I said: "Let in the sunlight; it will put more color into your faces than it will take out of your carpets!" They smiled and took it very well indeed.

Sunshine is the most valuable thing in the world. Human beings need sunshine just as much as do potatoes and corn. We grow spindling in the dark just as potatoes do down in the cellar. If sunlight can get into a place the useful plants will grow. If it can not get in, then other kinds of plants will thrive—germs, bacteria and bacilli. Those are the things that flourish in the absence of sunlight, and as the old Italian proverb says, "Where the sunshine never comes, the doctor often does."

The commonest cause of disease, the tuberculosis bacilli, will die if exposed to direct sunlight. The dark places are where disease germs breed and are passed on from one person to another. They breed in dark, damp, ill-ventilated rooms. Then let in the sunlight—get rid of all the dampness in the house, and you will have made your home a place where the tuberculosis bacilli can not breed. You know the system evolved by those who have achieved such brilliant success in the cure of tuberculosis calls for unlimited sunshine and fresh air. One of the most famous of these institutions in the United States is here in Ottawa under the care of my old friend Dr. Pettitt. They take a great deal of pains there, or did in the early history of the management, to prevent the transmission of the disease from one patient to another. They

take the greatest possible precaution in the handling of the sputum, compel the patients to use a cloth or handkerchief over their mouths when they cough so there can be no transference of the germs from one patient to another. After that had been going on for a number of years, one of the leading men in that work said to me: "I believe, Hutchinson, that most of our precautions in that respect are practically superfluous because by the way we let air and sunlight into every place, those germs are killed inside of an hour, and have little or no chance of being transferred to another patient."

We ourselves make the conditions under which tuberculosis can develop. It can practically only be caught indoors, in a room, and as a rule, in a house which has an insufficient supply of sunshine, and a surplus amount of dampness.

Another of the great advantages in this regard is, the coming in of the modern systems of heating, in the cellar. We get away from that abomination, the old cabbage and potato cellar in the house. I dare say most of you remember the time when the cellar was a dark cave under the lower floor. In that dark cave were put, for storage any amount of potatoes, apples and cabbages. The rats would get in there and burrow around and eat some of them. You began to find some of them decaying. You picked them over and took out the worst. All winter long there was going on down there a perpetual formation of damp and mould and bacteria. Anything you put down there, in the way of cream or butter, took on a cellar flavor almost at once on account of the swarms of germs breeding in that atmosphere.

Get rid of the old-fashioned storage cellar.

#### A Wide and Liberal Variety of Diet.

The next most important consideration in health as the crop on the farm, is food. Now, of course, I do not need to tell any audience of farmers what to eat, nor do I need to tell you that the efficiency of any machine is just in proportion to the amount and quality of fuel that is placed under that machine. We have little or nothing to say now days, even in my profession, about the influence of drugs in the promotion of health. We are getting over our belief in drugs, I am glad to say. We are getting almost as tired of giving drugs for everything as our patients are of taking them, and that probably is saying a great deal. When it comes to the permanent cure of any disease, the prevention of any disease, or the short-circuiting of any disease, except a few for which we have specific remedies like quinine for malaria, we no longer trust to drugs; but pin our faith more than ever to sunlight and fresh air. No longer do we pour drugs of which we know little into bodies of which we know less. The more we learn about the bodies the less reliance do we place upon any general use of drugs.

There used to be a time when the physician went about and took an orator with him wherever he went. The physician used to diagnose the disease and prescribe the medicine. Then the orator persuaded the patient to take it. That was necessary in the olden days. Bitterness and unpleasantness was then an important part of the medicine, but now we are getting over that and medicines are not so hard to take. They are, for the most part, rather agreeable. Anything that is a good food and a good medicine at the same time, as a general thing, must taste good or it does

not cut much more figure in medicine than it does on the table today.

We had rather implicit confidence in drugs. We had a confidence at one time in drugs, almost equal to that of a colored practitioner in one of our southern states. He was a very old gentleman, and had great success in practice. He did not know a great deal about medicine, but he knew a great deal about something else more necessary to the success in practice, and that is human nature.

He could not always tell what kind of disease the patient had, but he could always tell what kind of patient the disease had. That was an important point gained in the treatment. On one occasion this doctor was called in after a neighborhood fracas of the kind they have down there. Someone had been shot through the abdomen. That, of course, is very serious. It may result in hemorrhage of the intestines, peritonitis and a lot of dangerous complications. The old gentleman looked wise, and proceeded to make up five or six pills almost as large as the patient could swallow. He said, "now, you take one of these every two hours." The patient made a good recovery, without a single bad feature. The old man got a lot of credit. One of his white colleagues met him and said, "if you don't mind, I would like to ask a question." "Certainly, sah, whenever you doan know anything come to me, and I will tell you; ask any question you like." "What was it you gave that man who had the gunshot wound in the abdomen?" "What I gave that man was a pill of alum and resin, equal arpts." "Why under heavens did you give such a mixture as that to a man with a gunshot wound in his intestine?" "The alum was to pucker the parts together and the resin was to make them stick."

We do not give medicine with that sort of sublime confidence any more. I have no doubt that in many cases that got well, the medicine had about

as much to do with it as it had in that particular instance. The things that we depend upon for medicines are the things that everybody like and everybody ought to have and we are getting altogether away, I am glad to say, from that old laboratory idea of profuse dosing with drugs. We are getting away from the idea that food consists only of proteids, carbohydrates, and other elements. We are placing more importance upon flavor and the qualities which lend to food the value which comes from the food being thoroughly relished.

These scientific elements in food are very pleasant things to talk about, but they don't give you the sense of satisfaction inside. The advocates who urge them are chiefly the advertisers of patent foods. The real strength of these foods is in the advertisements. You might just as well read the printed page and be done with it, if you are figuring on getting any strength from them. Even the different kinds of foods that are so extensively advised by diet reformers, the things that contain a large amount of cheap protein, so much for five cents, so much per pound, like oat meal, corn meal, and the cereals, soups, potatoes, cheese, peanuts, beans and peas, and things that nobody would eat if they could get anything else, are taken because they are cheap and because they have a high degree of nutritive value. That idea of dietary value is going out of fashion altogether.

After all, when you come to feed anybody, sick or well, there is nothing for them to do, except to feed on the real old-fashioned kinds of food, the sort that mother used to make, beef steak, bread, pie and cake, gravy and sausage, and buckwheat cakes, and coffee with cream in it, not "Post-mortem" stuff. Those are the things we prescribe now days for a good judicious dietary.

Another thing we have come to find



out is the sort of food that has made us such a success as animals; because of course, we now know perfectly well that instead of man being one of the weakest animals and succeeding only by virtue of this expanded pulp on top called brain, he is physically the strongest, the most resourceful of animals and every other animal that has had any experience with a man makes tracks just the minute it smells or sees him anywhere—and shows mighty good judgment.

We are the toughest, most dangerous animals, and can live on all kinds of animal and vegetable food. When we cannot get flesh to eat, we can eat fish, fruits, almost anything under heaven. Man is absolutely omnivorous, eating anything, in early ages that we could get our teeth into, and being able to digest it. That is the reason we have arisen above the rest of the animals. We have kept up that indiscriminateness. The minute we think that lima beans and oat meal or one or two other things are all that is necessary, and we don't need any trimmings or fruits out of season, or unnecessary luxuries, we begin to lose in most cases, something of the individual vigor and activity if not actual vitality. We need every one of these things to keep us in vigorous health. We never can come to any kind of restrictive dietary, not even in disease, on which we can keep going for more than a few weeks at a time, without doing harm instead of good—except under unusual specific circumstances.

we cure disease by limited dietary, but sometimes in curing the disease we make the general health of the patient worse. It should be our aim, and I think it is particularly true of the rural districts and smaller towns, to plan deliberately for as wide and as liberal a variety of diet the whole year around, as we can obtain.

When I was a boy on the farm there

used to be a kind of feeling that any work in the garden, among fruit and vegetables and things of that sort was a woman's work and anything spared in the way of horses or men from the farm work was that much time wasted. I hope that idea has been totally dispelled by this time.

#### Plenty of Good Rich Food for Children.

A good vegetable garden, a good fruit garden, and a good supply of every kind of fruit or vegetable the whole year around is one of the most important and one of the most necessary elements to the vigor and success, wholesomeness, and happiness upon the farm as well as anywhere else. That is particularly true in the feeding of children.

Now we used to have a kind of notion, that anything children liked particularly well was pretty likely to be bad for them. We used to feed children and arrange their dietary a little too much upon the plan of the nursery maid who happened to miss a couple of her charges. She sent another person to look for them, giving this instruction, "Now you go and find Tommy and Jimmie, see what they are doing, and tell them to quit."

Whatever the child likes, cake, pie, candy, pickles, and things of that sort—those are the things which were supposed to be bad for him. Occasionally you will find some remaining fragments of those theories. You hear someone deploring the prevalence of sugar, the dangers of eating candy and how terribly our modern teeth are going to pieces because we eat so much sugar. Our modern teeth are better than those of any known savage. The only reason we think they are bad is because we have higher standards than we ever had. Sugar, instead of being simply a flavoring—a thing we might as well dispense with and save money is, in fact, one of the most important

single foods we have. Let the children have plenty of candy, plenty of cake and plenty of pie. Let them have a second helping if they want it. They know what they want, and they also, if you give them a good chance, know when they have enough. If a child will gorge itself upon cake, or pie, or candy, in such a way as to do itself harm, it is a sign the child has not had enough in the regular supply before. Because of the craving that results the child goes to that extreme.

There never has been any kind of cheap food invented that you can raise children on profitably. They must have the best and most expensive things that the sun shines on. There is not an animal, nor a bird, no matter what it may do later in life, but starts out as a carnivorous animal. Every one of us is born carnivorous. We want large quantities of protein. Even the English sparrow, which lives the greater part of the year on grains and seeds, as soon as it must take care of its young it begins to be a destroyer of insects, because the young need to have animal food to grow up strong. The old idea that meat was bad for children was born of stinginess and puritanism, equal parts. It is one of the best things for children. A diet that contains plenty of meat and milk and fat is a diet that will make children grow strong and happy.

#### Educate by Promoting Growth.

Another thing to be remembered in the case of children is the extra ordinary amount of preparation for new life that is going on in childhood. We talk a great deal about our boasted systems of education and they are doubtless of great value and importance. Sometimes we talk as though we thought children would hardly grow up in their right senses if not taught the three R's and put in the right way they should go, but here is the fact which has not attracted the attention

it should have, and that is that every child by the time it has reached the age of seven, has got seven-eighths of the total brain growth he is going to have, before the school has done anything to him at all. A large share of the boasted success of our systems of our popular education has been due to the irrepressible toughness of the young human animal. If it had not been for that, they would not have survived some of the systems of education to which they have been subjected. I think that some of the splendid success which used to be achieved by the little red school house, and the fine type of men and women it turned out was due to the fact that the school session only lasted from three to five months each year and the youngsters had a chance to grow up usually wholesome and happy, developing their senses and bodies and brains in nature's greatest and best school—the open air of out-of-doors.

The amount of storage which is going on in the young human animal is only just beginning to be appreciated. The principal business of any child's life up to fifteen, yes up to eighteen years of age, is to grow and keep growing and everything that promotes that growth is education, whether it is food or play or sleep, and everything that interferes with that growth is anti-education and anti-rational, whether it be five hours a day in the school room, or whatever it may happen to be.

The great thing to be remembered is that the child is building unto himself all the energy and brain-power of the machine that is going to carry him through the rest of his life. Let him follow his own instincts, to play in the sunlight, among the grass and trees and the rest of the young animals, growing up healthy, happy and vigorous; and you won't have much trouble either with his intellect or his morals, provided he is wellborn, as of course our children always are, and

that we have set him a good example in the meantime.

Making and keeping children happy is the most important thing that any of us grown-ups can ever accomplish here on this earth. There is no finer or better place for children to grow up happy and healthy and wholesome than on the farm. They ought to be given every chance in this respect, just as the colts and other young animals are given the advantage of a natural youth.

The amount of work that is placed upon a child when he is growing is something very easy to overdo, and exceedingly hard to undo. Let him get his full growth and his full strength before he is expected to carry any of the burdens of life.

We used to have an idea that we taught our children to walk. We would hold them up, and let them go and see if they could not stand upon their feet. We have put them into little runabouts to support them, and they could shove these over the floor, instead of letting them go along on all fours in the good old-fashion in which they were born. We never hasten any child in walking by that. The best we produced was an occasional pair of bow-legs. Whenever the child got tired of quadrupedal methods and got ready to stand up on his hind legs, because that was more effective, no matter whether he had been taught or trained, or anything else done to him, the child stood up and walked.

It is the same way with learning to talk. It is very pleasant for grown-ups to say "ootsy-tootsy-wootsy" and all that sort of thing, but if any poor child ever had his intellect stimulated in any degree thereby, I would like it pointed out to me.

I don't object to it, because it seems to have been an inexhaustible source of enjoyment for mothers and nurses in all ages, but as far as having any effect in teaching the child the sounds

of the language he has to speak, it has no more to do with it than the parts of speech. The child comes naturally to the point where he talks. He begins spontaneously and you cannot stop him from learning to talk.

In the same way, the child will read and write and spell if you will only give him a chance to grow to the time when he feels the need of all these things. When he feels the necessity of these things in his relation to his fellows then he will get them, and you could not possibly stop him from doing it.

#### Farm—The Ideal University.

The ideal university for the cultivation and growth of human beings is on the farm and in the open country and they ought to be given that practically by their birthright.

It has got to the point now of course in our cities and towns where there is practically no place left for the child. There is no place where he can go to play, because of the rolling backward and forward of street cars, automobiles and trucks. There is no place where he can watch the carpenter at his work, or the blacksmith in his shop, or the wheelwright repairing a buggy. All those things are done in great factories. They are getting entirely away from the observation of the boy. Our modern civilization has left a place for work, politics, and commerce but it has left no place for the child. The farm is the only place where the child is at home and can really develop and grow as he should. I do not blame our city children for having the same sort of feeling that was expressed by the boy who had lost his birth certificate. In New York, where we cannot build schoolhouses enough to take care of all of our children, we will not take them in until they are six years old and they have to prove it.

They have to go to the health office and get their birth certificates and

identify themselves as the person named in that certificate before we can take them into the school. As the school was beginning, a little chap who had been in the kindergarten the year before the gone to the health office and got his certificate. When the class was called to order, he was missing. The teacher thought he heard a little sob or sound out in the passageway. There he found the little boy sobbing as if his heart would break. Upon being asked, what was the matter with him, his grief was so great that he could not tell. He was told that the class was waiting for him, and that he had better come in. Finally the trouble came out. Between his sobs he whimpered "Please, teacher, I lost my excuse for being born."

#### Flies More Dangerous than Wild Animals.

The next most important and last consideration for health and comfort upon the farm is a question which at first sight may appear to be almost trivial. If anybody were to say that there was any real importance to be attached to that pesky little creature, the housefly, about eight or nine years ago, he would have been in danger of being laughed at. The fly is a very disagreeable thing for walking over our bald head or buzzing around you in your Sunday afternoon nap. It is an awful source of profanity, but it was believed that was about all the evil attaching to the housefly.

We are beginning to find out other than that. We are beginning to find out that the little buzzing, annoying fly is the most dangerous wild animal that infests this or any other country, at present. He kills more human beings than all the lions, tigers, hyenas and snakes put together, and yet he is one of the feeblest of creatures. How does he do it? By crawling upon and eating filth and then coming to eat at the same table with you. We very

often eat at the second table after the fly. He is the most affectionate fellow animal we have. He will follow you to your coffin and sends you there oftener than you suppose. He goes to the discharges from a typhoid, dysentery or yellow fever case, takes a second course of small pox infection, or the sputum of tuberculosis, or dressing from a wound everyone of which he revels in, and then goes straight to the sugar bowl, the cream pitcher, and the baby's mouth. That is the kind of character he is. He lives on and revels in filth. We are beginning to find that a large share of the disease that used to be put down as necessary to the hot weather and produced by the effect of heat upon the nervous system, are due to germs carried by that pesky, nasty little insect, the fly.

The fly in the house is as dangerous as a rattlesnake, and yet there are swarms of them in the greater part of this country. We cannot blame God for the fly, because we made him ourselves. He is the direct product of human dirtiness and human filth and carelessness. He does not live in the open country where no human beings are. I have gone into section after section of our great western country. I have found regions where as most of you know you can take a steer or wether, cut their meat into strips, hang it up in the open air, and it will dry without the slightest taint or putrefaction. There are no flies to carry the germs of putrefaction to that meat. Wherever the fly has come to those same districts, either the house fly or blow fly, inside of 12 hours those strips of meat would be one mass of maggots. That is the kind of work he does. He lives only in our own immediate neighborhood. I don't know whether you have noticed but that is also true to a very considerable degree of those two other insects we dread now, the mosquito that carries malaria, and the one that carries yellow fever. Neither of

them can live, as a rule, more than half a mile from human habitation, either because they require human blood, or human excretions, and dumps furnish the places in which they can breed. They are literally our domestic animals, the yellow fever mosquito, the malaria mosquito and the fly. We can absolutely prevent their further development and propagation by simply cleaning up the places where they can breed. There is no reason at all why there should be flies about a place. It is not necessary that we should be pestered with them in the mornings. It has been suggested by a city man that the habits of early rising that prevail in the country in the summertime are due to the plague of flies that would not let the people sleep. There is a facetious couplet about "early to bed and early to rise, 'tis not a virtue, the answer is—flies."

They can be destroyed by preventing the accumulation of filth in which they breed. Garbage, sweepings from the house, dirt or dust, manure of all sorts from the barnyard, particularly horse manure, are the things they like to breed in. It takes the flies two weeks to come to maturity from the time the eggs are laid in the refuse. By keeping those things cleaned up, every two weeks or where that is not possible, keeping them screened, so flies cannot get at them, or sprinkling them with a little arsenic or carbolic acid, kerosene or something of that description, so as to kill the flies that visit them, in that way you can absolutely keep down the plague of flies. By using preventive measures you can get along without screens. If 100 yards from the house is kept clear of any place where flies can breed, you are less liable to have very much trouble from flies.

Flies are great stay-at-homes. Flies will hardly ever go more than 150 yards from the place where they are hatched. The use of coal oil, kero-

sene or arsenic mixtures is time well spent in the matter of comfort and health in the home.

#### Use of Refrigerator Prevents Sickness.

One other point that I want to touch upon is the importance from a health point of view, of another of the so-called luxuries of civilization, and that is the use of refrigerators. I believe the persistent regular use of ice for the preservation of food has done more to lessen distressing intestinal disturbances and attacks of indigestion, formerly so common in summertime, than almost any other one thing. That and the screening away of flies will not only prevent the waste of a large amount of food, but also prevent putrefaction and fermentation taking place in food which will set up serious disturbances in the body. As you probably know by now, the greatest danger of the hot weather is not from the direct heat of the sun or its effects upon the body. The injurious results of hot weather even in the tropics, are not so much due to the direct effect of the heat upon the body, although that is trying and severe enough, in sunstroke and disturbances of that description, but nine-tenths of them are due to the putrefaction which is set up by the heat in the food or by the insects of different sorts that are bred and hatched in that heat and which carry different contagions like malaria, yellow fever, etc.

Purity of water supply, to cut off typhoid, control of drainage so as to cut off malaria, and protection from the insects that carry disease, refrigeration to prevent the putrefaction of foods will enable us to go through the greater part of the summer, watermelon season and all the rest of it, without any of those distressing afflictions we usually regard as almost a necessary part of the summer season.





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