Senior Class

Theses

of the

University of Minnesota

Northwest School of Agriculture

Crookston

Volume Eighteen

Class of 1933

Northwest School of Agriculture Library
TABLE OF CONTENTS

SENIOR THESES
1932-33

<table>
<thead>
<tr>
<th>Name</th>
<th>Title</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anderson, Arnold</td>
<td>Operating a Creamery</td>
<td>141-148</td>
</tr>
<tr>
<td>Dalager, Esther</td>
<td>Silhouettes</td>
<td>273-278</td>
</tr>
<tr>
<td>Egg, Carman</td>
<td>Early History of Minnesota</td>
<td>186-190</td>
</tr>
<tr>
<td>Eggum, Beatrice</td>
<td>Early Minnesota Indians</td>
<td>216-219</td>
</tr>
<tr>
<td>Erickson, Orville</td>
<td>The Early History of Minnesota</td>
<td>191-195</td>
</tr>
<tr>
<td>Grabowenski, Raymond</td>
<td>Weed Control on the Home Farm</td>
<td>154-160</td>
</tr>
<tr>
<td>Gustafson, Delbert</td>
<td>Spring Wheat in the Red River Valley</td>
<td>72-83</td>
</tr>
<tr>
<td>Hansen, Helen</td>
<td>The History of the Early Settlement of Minnesota</td>
<td>196-200</td>
</tr>
<tr>
<td>Hansen, Paul</td>
<td>How to Plant and Grow an Effective Windbreak on a Prairie Farm</td>
<td>94-97</td>
</tr>
<tr>
<td>Harris, Beulah</td>
<td>The March of Fashion</td>
<td>261-267</td>
</tr>
<tr>
<td>Hesby, Everett</td>
<td>Early History of Minnesota</td>
<td>201-207</td>
</tr>
<tr>
<td>Hollander, Mrs. Roy</td>
<td>A Greeting to the Class of 1933</td>
<td>2-3</td>
</tr>
<tr>
<td>Holmgren, Richard</td>
<td>A Windbreak on the Prairie Farm</td>
<td>84-93</td>
</tr>
<tr>
<td>HoVelsson, Orville</td>
<td>Grain Rations for Egg Production</td>
<td>126-132</td>
</tr>
<tr>
<td>Howard, Nora</td>
<td>Biography of Mark Twain</td>
<td>280-295</td>
</tr>
<tr>
<td>Jacobson, Dorothy</td>
<td>History of the Typewriter and Shorthand</td>
<td>181-184</td>
</tr>
<tr>
<td>Johnson, Alice</td>
<td>The Manufacture of Sugar and Its Use in the Diet</td>
<td>256-260</td>
</tr>
<tr>
<td>Johnson, Orpha</td>
<td>The Minnesota Indians</td>
<td>232-236</td>
</tr>
<tr>
<td>Larson, Oscar</td>
<td>The Effect of the Glaciers on the Soils of Minnesota</td>
<td>162-174</td>
</tr>
<tr>
<td>Larson, Oscar</td>
<td>Class History</td>
<td>4-7</td>
</tr>
<tr>
<td>Lerud, Lester</td>
<td>Response for the Class of 1934</td>
<td>19</td>
</tr>
<tr>
<td>Lindstrom, Rodney</td>
<td>Commencement</td>
<td>20-22</td>
</tr>
<tr>
<td>Martinson, Elmer</td>
<td>Potato Breeding</td>
<td>53-58</td>
</tr>
<tr>
<td>McVeety, Erdman</td>
<td>The Development and Uses of the All Purpose Tractor in Minnesota</td>
<td>109-116</td>
</tr>
<tr>
<td>Mjelde, Nelda</td>
<td>First Aid and Bandaging</td>
<td>280-283</td>
</tr>
<tr>
<td>Naplin, Rose</td>
<td>Personal Grooming</td>
<td>288-272</td>
</tr>
<tr>
<td>Naplin, Rose</td>
<td>Class Prophecy</td>
<td>8-13</td>
</tr>
<tr>
<td>Nelson, Clarence</td>
<td>Different Types of Feed Grinders and Their Uses on the Farm</td>
<td>103-108</td>
</tr>
<tr>
<td>Nelson, Harvey</td>
<td>How to Plant and Grow Effective Windbreaks on Prairie Farms</td>
<td>98-101</td>
</tr>
<tr>
<td>Nisbet, Jean</td>
<td>Business Training</td>
<td>176-180</td>
</tr>
<tr>
<td>Oistad, Cyrus</td>
<td>The Berlin to Bagdad Railroad and the World War</td>
<td>285-289</td>
</tr>
<tr>
<td>Parduhn, Melba</td>
<td>The Minnesota Indians</td>
<td>226-231</td>
</tr>
<tr>
<td>Reese, Llewellyn</td>
<td>Lamb Production in Minnesota</td>
<td>25-33</td>
</tr>
<tr>
<td>Rybak, Yarmila</td>
<td>Bits of Etiquette</td>
<td>250-255</td>
</tr>
<tr>
<td>Rynning, James</td>
<td>Explorations and Settlements in Minnesota Previous to 1850</td>
<td>208-215</td>
</tr>
<tr>
<td>Sargent, Edward</td>
<td>The Business of Producing Purebred Swine</td>
<td>39-45</td>
</tr>
<tr>
<td>Sanden, Arthur</td>
<td>The Production of Lambs from Montana Ewes</td>
<td>34-38</td>
</tr>
<tr>
<td>Severson, Harriet</td>
<td>Food Fancies of the Nations</td>
<td>245-249</td>
</tr>
</tbody>
</table>
Sitko, William
Sitko, William
Stave, Russell
Stromstad, John
Thiel, Elfa
Thieling, Norman
Torkelson, Ethel
Vangsness, Harold
Vilven, Stephen
Weckwerth, Clarence
Weckwerth, Clarence

Grain Rations for Egg Production
Class Will
Feeding Methods for Egg Production
The History of Northern Corn
Dining Table Accessories
History of Minnesota Indians
Community Drama
Communism in Russian Agriculture
Potato Production
Presentation of Key
How New Potato Varieties are Produced by the Minnesota Stations in Coopera-
tion with the U.S.D. A.

133-139
14-17
118-125
47-53
238-244
220-235
149-153
296-301
59-65
18
66-71
# TABLE OF CONTENTS

## CLASS EXERCISES

<table>
<thead>
<tr>
<th>Topic</th>
<th>Presenter</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>A Greeting to the Class of 1933</td>
<td>Mrs. Roy W. Hollander</td>
<td>2-3</td>
</tr>
<tr>
<td>Class History</td>
<td>Oscar Larson</td>
<td>4-7</td>
</tr>
<tr>
<td>Class Prophecy</td>
<td>Rose Naplin</td>
<td>8-13</td>
</tr>
<tr>
<td>Class Will</td>
<td>William Sitko</td>
<td>14-17</td>
</tr>
<tr>
<td>Presentation of Key</td>
<td>Clarence Weckwerth</td>
<td>18-</td>
</tr>
<tr>
<td>Response for the Class of 1934</td>
<td>Lester Lerud</td>
<td>19</td>
</tr>
<tr>
<td>Commencement</td>
<td>Rodney Lindstrom</td>
<td>20-22</td>
</tr>
</tbody>
</table>

## AGRICULTURE

### Animal and Dairy Husbandry

<table>
<thead>
<tr>
<th>Topic</th>
<th>Presenter</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lamb Production in Minnesota</td>
<td>Llewellyn Reese</td>
<td>24-45</td>
</tr>
<tr>
<td>The Production of Lambs from Montana Ewes</td>
<td>Arthur Sanden</td>
<td>34-38</td>
</tr>
<tr>
<td>The Business of Producing Purebred Swine</td>
<td>Edward Sargent</td>
<td>39-45</td>
</tr>
</tbody>
</table>

### Crops

<table>
<thead>
<tr>
<th>Topic</th>
<th>Presenter</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>The History of Northern Corn</td>
<td>John Stromstad</td>
<td>46-101</td>
</tr>
<tr>
<td>Potato Breeding</td>
<td>Elmer Martinson</td>
<td>47-52</td>
</tr>
<tr>
<td>Potato Production</td>
<td>Stephen Vilven</td>
<td>53-58</td>
</tr>
<tr>
<td>How New Potato Varieties are Produced by the Minnesota Stations in Cooperation with the U.S.D.A.</td>
<td>Clarence Weckwerth</td>
<td>66-71</td>
</tr>
<tr>
<td>Spring Wheat in the Red River Valley</td>
<td>Delbert Gustafson</td>
<td>72-83</td>
</tr>
<tr>
<td>A Windbreak on the Prairie Farm</td>
<td>Richard Holmgren</td>
<td>84-93</td>
</tr>
<tr>
<td>How to Plant and Grow an Effective Windbreak on a Prairie Farm</td>
<td>Paul Hansen</td>
<td>94-97</td>
</tr>
<tr>
<td>How to Plant and Grow Effective Windbreaks on Prairie Farms</td>
<td>Harvey Nelson</td>
<td>98-101</td>
</tr>
</tbody>
</table>

### Engineering

<table>
<thead>
<tr>
<th>Topic</th>
<th>Presenter</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Different Types of Feed Grinders and Their Uses on the Farm</td>
<td>Clarence Nelson</td>
<td>102-116</td>
</tr>
<tr>
<td>The Development and Uses of the All Purpose Tractor in Minnesota</td>
<td>Erdman McVeety</td>
<td>109-116</td>
</tr>
</tbody>
</table>
AGRICULTURE

Poultry Husbandry
Feeding Methods for Egg Production
Grain Rations for Egg Production
Grain Rations for Egg Production

Russell Stave 117-139
Orville Hovelson 118-125
William Sitko 126-132

Rural Life Problems
Operating a Creamery
Community Drama
Weed Control on the Home Farm

Annold Anderson 140-160
Ethel Torkelson 141-148
Raymond Grabowenski 149-153

Soils
The Effect of the Glaciers on the Soils of Minnesota

Oscar Larson 161-174

BUSINESS TRAINING

Business Training
History of the Typewriter and Shorthand

Jean Nisbet 176-180
Dorothy Jacobson 181-184

HISTORY

Early History of Minnesota
The Early History of Minnesota
The History of the Early Settlement of Minnesota
Early History of Minnesota
Explorations and Settlements in Minnesota Previous to 1850
Early Minnesota Indians
History of Minnesota Indians
The Minnesota Indians
The Minnesota Indians

Carman Egg 186-190
Orville Erickson 191-195
Helen Hansen 196-200
Everett Hesby 201-207
James Rynning 208-215
Beatrice Eggum 216-219
Norman Thieling 220-225
Melba Parduhn 226-231
Orpha Johnson 232-236

HOME ECONOMICS

Dining Table Accessories
Food Fancies of the Nations
Bits of Etiquette
The Manufacture of Sugar and Its Use in the Diet
The March of Fashion
Personal Grooming
Silhouettes

Elfa Thiel 238-244
Harriet Severson 245-249
Yarmila Rybak 250-255
Alice Johnson 256-260
Beulah Harris 261-267
Rose Naplin 268-272
Esther Dalager 273-278
### PHYSIOLOGY AND PUBLIC HEALTH

First Aid and Bandaging

Nelda Mjelde 280-283

### MISCELLANEOUS SUBJECTS

The Berlin to Bagdad Railroad and the World War

Cyrus Oistad 285-289

Biography of Mark Twain

Nora Howard 290-295

Communism in Russian Agriculture

Harold Vangsness 296-301
CLASS EXERCISES
A GREETING TO THE CLASS OF 1933

Mrs. Roy W. Hollander
Class Adviser

Today is a day of celebration for you, graduating Seniors. It marks the culmination of three years of concentrated study, three years of concern on the part of your parents over your welfare and on the problem of financing your schooling, and three years of associating with fellow students and faculty, which you will cherish always.

There are many parents and interested friends who have gathered in your honor to help you celebrate these achievements. We wish to extend heartiest greetings to them and to welcome them. We hope they will enjoy our fun here this afternoon and the final exercises this evening.

Many of you Seniors will sign with relief when you have crossed this platform this evening and received your diplomas. Most of you, I think, will regret that you are through, that all your activities, your class play, your "aggie", your song contests, and a thousand other little incidents, including several affairs of the heart (although this may be just the beginning of them) and even a few below grade slips - you regret that all this is behind you instead of before you.

Having had the honor of being an adviser since you were Freshmen, I have learned at least a few of your ideas and hopes. Most of these are immature; that is, you will probably change your minds a dozen times before you find the best way to solve the world affairs and find happiness
for our souls. But you should keep changing until you find a solution with which you are satisfied.

All of us are seeking a simple and easy way to happiness. Very few ever actually realize it. Some go through difficult periods of disillusionment to obtain happiness. Some experience brief moments of it in the pursuit of some art such as music, painting, literature. Some find it in religion, in service to others. Some find it in fame.

Your problem is to solve your future, and to try to discover your purpose in life. But do not give up, settle back, and let everything go by you.

That is all the advice I am going to give you. I shall leave the rest to Miss Weinberger.

I regret - now that it is practically finished - that you are through the pleasantest and the crowning year of your school career. But I do not say "goodbye" because we are planning on your return next year. And we hope that whatever position in life you make for yourself, you will receive your full measure of true happiness.
CLASS HISTORY

Oscar Larson, '33
Crookston, Minnesota

On this day, we, the members of the Senior Class, are looking forward to coming years when we will have left this Northwest School Campus - although we regret that this day finishes our work as Seniors. We look back to the day when we enrolled as Freshmen.

When we, the Class of 1933, began our career here in the fall of 1930 on September 29, we were one of the smallest Freshmen classes that had enrolled for several years, with a mere 62 students. We had another distinguishing feature which applied to size, for we had several tiny Freshmen boys. Arthur Sanden, who seemed to regret very much those first weeks, that he had left home, was very hard to entertain. Mr. Mlinar used to give Arthur cards to sort out to keep him occupied, but Arthur was so bright that he usually had them all sorted out before Mr. Mlinar's back was turned. Mrs. Geer used to invite him for breakfast, an honor which he seemed to enjoy a great deal. Now Arthur Sanden, though not very much larger, is our business-like advertising manager and worldly enough to have his appendix out.

On October 5, we held our first meeting as a class when we looked each other over quite carefully for the first time and elected our officers. Paul Ingebretson was our first president. The secretary was Francis Hetland; the treasurer, Glendon Anderson, and the sergeant-at-arms,
Glenn Fisher. Only one of these, Harriet Severson, Vice President, is now back as a member of the Senior Class.

We also elected our class advisers: Miss Hildur Peterson and Mr. Robert Connery. We chose as our class motto, "Better to wear out than to rust out;" our class colors, orange and black, and the class flower, the jonquil.

We were few in number, rather bewildered by our upper classmen, and perplexed by house meetings, dormitory life, and class buildings. But with the help of our advisers, we proceeded to take an active part in school activities. Of course, we could not expect to achieve great honors as Freshmen, but we considered ourselves lucky to win third place in the Interclass Song Contest, Class Basketball, and the Field Meet, which closed our Freshman year. We felt that we had a successful year and looked forward to coming back as Juniors.

However, many of us could not come back in the fall of 1931. Our members were reduced to 42 with only six girls. These girls were protected very carefully lest some mishap befall them, for they were considered rather precious objects of admiration and 42 divided by six meant that each of us fellows had a girl for one night in the week.

We held our first class meeting of the year and elected our class officers: President, Paul Ingebretson; Vice president, Edna Sorenson. Our secretary was Harriet Severson; treasurer, Clarence Weckwerth, and sergeant at arms, was Llewellyn Reese. Two new names appeared as our advisers. Miss Cynthia Weinberger was elected to succeed Mr. Robert H. Connery, and Miss Hildur Peterson had become
Mrs. Roy W. Hollahnder.

When we began practice for the Inter-Class Song Contest, we had only four available girls. This was a decided handicap, but we surprised ourselves by winning first place. This proved to us that continuous effort and class unity and spirit can accomplish much.

In the field meet we took second place and tied for second place in the class basketball contest. An additional and very pleasant feature of our Junior year was the Junior Senior banquet, the crowning social event of the year. We looked forward to entertaining the Seniors and worked hard to prepare something worthwhile. Our theme was in honor of the George Washington Bicentennial. Speeches were given by distinguished individuals such as Alexander Hamilton and John Adams. The program was given by white wigged gentlemen and powdered and costumed ladies.

When we arrived on the Campus last fall, our number was still 43. Some of our old members could not return, but their places were taken by interested and ambitious new members.

In the song contest, we elected Rodney Lindstrom as our student director who has led us admirably through three years of contests, and Harriet Severson, our accomplished accompanist, again assisted us. This year we received a hard won second place.

The Aggie Board began to look for ways and means of producing an Annual that would long be remembered by students of the Northwest School. This being the Silver Anniversary of graduating classes, our theme was the con-
trast between the old and new. Many evenings of racking our brains for ideas, collecting writeups and high pressuring business men to advertise, finally got the book together. The annual was sent to the printer early in March and returned on March 25, our class day. Every senior was dressed like a forty-niner. We even had a covered wagon, Indians, and scouts.

The Inter Class Field Meet was held Saturday, March 25, and we were fortunate enough to win first place. Our Class Play marks the end of our achievements and was held Tuesday and Wednesday evenings, March 28 and 29. The credit of its big success is due to the hard work of Miss Cynthia Weinberger, and the cast's desire to finish their career in a burst of triumph. Tonight you shall see us in our last proud accomplishment, and thus the class of 1933 finishes its history at the Northwest School of Agriculture.
CLASS PROPHECY

Rose Naplin, '33
Wylie, Minnesota

Most Divine Muse of Mystery, I beseech you, I call upon you. Reveal to me what is to be. Spirit of Prophecy, foretell the future, portray the members of this most illustrious Senior Class twenty years hence.

Ne Hibotus Agway Pum
Nimp Deorum Fatiaum
Gorg Givati Tessadun
Give to me a rare vision!

Ah! the crystal substance takes form. I see rich hangings, lounges, thick carpets. It is an exclusive gown shop. The sleek and well dressed manager comes forward -- Dayton Hanson! He motions to his striking mannequins. They parade before me. One trim little figure stands out among all the rest. Her name is revealed to me. It is Esther Dalager!

Now I see mountains, beautiful valleys, vast open spaces. A man, small, alert, sits astride a huge bay horse. King of all her surveys! Arthur T. Sanden, owner of the Cross Bar sheep rance in Montana.

The mountains are becoming level. The valleys change to prairies. The figure on the horse is increasing in size. He is tall and distinguished, but stern and determined. He wears a sheriff's sombrero. It is none other than Camman Egg.

Again the scene changes. Now I see a cottage surrounded by flowers and a neat lawn. Beatrice Eggum sits with five little Beatrices about her. How happy they look!

The scene slowly changes. I see a wide, long, spotlessly white stair case. Can it be the stairway to Heaven?
Looking closer, we see a figure kneeling near the bottom. Rose Naplin. What is this beside her? A scrub brush and pail!

Now everything is confusion. I see running feet. Football? No it is the Olympics in England. In the race gaining on all the rest is Llewellyn Reese, the fleet footed. He is in the lead. He has won! Setting a new world's record in the three mile race.

The crystal now brings to us a shining mahogany desk. Behind it a distinguished looking woman is giving orders with poise and efficiency. We look at the name on the door — Jean Nisbet, Dean of Women at the University of Minnesota.

Again I see a desk. Behind it a man is typing furiously. He has just taken dictation from his employer, Fae Hughbanks. Now he prepares to leave to teach his typing class at the University. Who is this man? Norman Thieling.

The White House is again brought to view. There are many men. They are politicians shaking hands energetically. One important and prominent looking man is noticeable. He is addressed as Congressman Orville Erickson.

Now I see ladies in a parlor. They are congregated about a central figure. Reverend Raymond Grabowenski in long black coat, black flat hat and stiff white collar sits surrounded by the Ladies Aid Society.

Again I see ladies. This time they are in the white, starched uniforms of nurses. Their smiling superintendant is giving them orders. She is Helen Hansen.

We are now taken to an opera house. A man in full dress suit stands with raised hand and baton. His back is to us. He is facing a chorus of men — one hundred — two hundred of them, all in the black and white of full dress suits.
I hear thunderous applause as Director Rodney Lindstrom turns to take his bow.

The opera house remains, but the scene is different. The audience is awaiting a famous pianist. The audience sits spellbound as a beautifully dressed lady comes forward, bows and takes her place at the piano. They are listening to Harrietta Seversonski.

The muse fails me - It fades - No, I hear a voice. "I wish I was single again, for when I was single, my money would jingle. I wish I was single again." "Station WDAY, speaking. You have just heard Elmer Martinson singing cowboy songs. Mr. Martinson accompanies himself on his banjo."

I see fire. Destruction everywhere, falling trees, crumbling walls. A fire engine comes clattering down the street. The man directing its course is Delbert Guatafaon, the fire ace.

Can it be possible the Magic Muse portrays the most beloved member of the Class of 1933 in such a plight? Richard Holmgren sits in a padded cell, shrieking wildly. Insane, alas, from worries over the Aggie.

Erdman McVeety faces the Judge with pale face and nervous manner. The clerk of court announces the case: Mr. Paul Billberg vs Mr. Erdman McVeety - alienation of affections of Mrs. Nelda Billberg.

A name on a brass plate comes into view: Harvey Nelson, dancing instructor at the Northwest School of Agriculture.

I see skyscrapers and crowded streets. It must be New York City. Above the roar of the city, we hear the steady whir of a motor. It comes closer and we look into the cockpit. The man is Harold Vangeness, the flying ace.
The crystal takes us again through streets, subways, elevated trains. The interior of a theatre appears next. On the stage is a beautiful ballet. All the dancers are in shadows but two. They are very noticeable. We recognize them as Nora Howard and Dorothy Jacobson.

Now I see a beautiful room lined from floor to ceiling with books. An eccentric man sits by the fire with his pipe—The millionaire Vilven famous for his invention to start Ford cars in cold weather.

The muse is slow to show the next scene. Slowly it changes. I see a laughing face. The teeth are white and prominent. It is a magazine page out of the Red River post advertising Beodent toothpaste. The face is strangely like John Stromstad's.

Slowly the page turns. On the next page is the Advertising line, "Smartness in men's attire." A photographed figure is that of James Rynning.

The figure changes before my eyes—now it is pacing back and forth in a Northwest School classroom. The man tears his hair and yells, "We want proof." Ah—it is Paul Hansen, debate coach at N.W.S.A.

Now the picture becomes one of a beautiful farm. Modernistic buildings and silos, well kept lawns; a prosperous looking farmer alights from his Roosevelt 16. He is accompanied by a second man. They are discussing heatedly pure seed grains. The owner of the car says, "I think Mr. Larson that I will try your seed. Farming methods have undergone such tremendous changes that it's hard to keep up with them."
"Thanks for the order, Weckwerth. I'll have to be going." He moves to a bright neat monoplane parked on the meadow. But here comes a figure out of the door of the house. Mrs. Weckwerth (nee Alyce Johnson) invites them both to have some coffee on the porch.

The crystal fades again - Spirit of Prophecy, I beseech you, regale to us more of the future. Now something comes. I see many - What is it? - many pigs - thousands of big healthy Chester White hogs. Edward Sargent stands looking at them. What a tall man he is. Six feet four inches at least.

The pigs are vanishing. Mr. Sargent is gone. In his place stands a stocky, heavy set man - he seems to be very ill at ease - he mops his perspiring forehead - he looks down at his new suit which is fast losing its press. He seems quite neglected - forgotten - William Sitko it is. In another room stands an imposing looking woman in white. I understand now his cause for discomfiture. He is waiting for his bride in the church.

Ah - the football game is about to begin. The players are coming from their dressing rooms. The coach is giving last minute instructions and encouragement. The crowd in the huge stadium is hilarious. The coach is very enthused. I recognize him. It is Russell Stave.

Now it is a mining camp - men in rough dress leave the pits for dinner. The overseer in breeches and boots, in a deep bass voice gruffly orders someone to leave his work. It is the voice of Cyrus Oistad.

I see a cozy room - snowflakes are seen through the
window falling slowly and thickly. An air of festivity fills the room. A door quickly opens. A delicious turkey appears on a platter. Beulah Harris puts the finishing touches on the table. Among the guests at the Thanksgiving dinner, we see Uncle Everett Hesby.

The next scene is quite different. Hard looking men, criminals are peeping out behind the bars. A man is locking them in. It is Clarence Nelson, the jailor!

Ah, it is the end! I see no more!

- - - - - - - -
CLASS WILL

William Sitko, '33
Ada, Minnesota

We, the Class of 1933 of the Northwest School of Agriculture, being of sound mind and body, of sensible age and set convictions, and possessing a love for fun and study, do make, publish and declare this, our last will and testament.

To the Class of 1934 we will the responsibility of upholding the dignity of the school as Seniors, and the enjoyment of staying up until 2:00 A.M. publishing an Aggie. We also will our notes on "Feeds and Feeding" and love notes between Rodney Lindstrom and Rose Naplin.

To the Class of 1935 we will our brains in their present exhausted condition, our ability to maintain high scholarship and our unquenchable thirst for knowledge.

To the faculty for whom we always have a soft spot in our heads, we will the purest of love and the deepest of appreciation for their good nature, which is sometimes forced, their kindness, their example of social conduct, and all other instruction given us the past three years.

We also give the faculty permission to refer to our individual and collective traits and accomplishments, modest as they are, as an example to following classes, as we realize the benefits and stimulus derived from an inspiring subject.
Our class advisers, Miss Weinberger and Mrs. Hollande, will to Miss Kingston and Mr. McGenty the task of ushering the Class of 1934 through the trials and tribulations of the graduating year.

Individual behests are as follows:
Arnold Anderson - His little red cap to Torlief Boe.
Esther Dalager wills her platinum hair to Evelyn Vilven.
Carman Eeg wills his hard boiled appearance to Francis Nelson.
Beatrice Eggum - wills her feminine strength to Luella Peterson.
Orville Erickson wills his complete collection of alibis to faculty instructors to Arnold Scott.
Raymond Grabowenski - his magnetic personality to Stanley Alseth.
Delbert Gustafson wills his monkey business to Clarence Widner.
Dayton Hanson wills his height to Ames Holte.
Helen Hansen wills her excellent health to Gladys Quantock.
Paul "Blonde" Hansen, his debating ability to John Olson.
Beulah Harris wills her skill in turkey baking to Helen Krogstad.
Everett Hesby - his cool headedness to Gilbert Gunderson.
Richard Holmgren - his brains to Floyd Tack.
Nora Howard, her slenderness to Karine Opdahl.
Dorothy Jacobson, her natural curls to Paul Billberg.
Alice Johnson wills her attraction to the Aggie Board Business Manager, Clarence Weckwerth, (providing she wishes to part with it) to Agatha Olson.
Oscar Larson, his grain judging ability to Richard Johansen.
Rodney Lindstrom, his president's office to Lester Lerud.
Erdman McVeety wills his silence to Pearl Hanson.
Elmer Martinson wills his banjo to Floyd Conneran.
Nelda Mjelde wills Paul Billberg to Esther Haugo.
Rose Naplin wills her spontaneity to Alvina McKibbin.
Clarence Nelson wills his wrestling ability to Otto Omlid.
Harvey Nelson wills his Sunday night kitchen utensils to
Harold Clow.
Jean Nisbet, her fondness for the Advanced Class orator to
Minna Ross.
Cyrus Oistad, his meekness to Willard Kimmel.
Llewellyn Reese, not wishing to part with his football cap-
tain-elect position, wills his fleet footedness to Arnold
Iverson.
James Rynning, his hermitlike qualities and cuteness to Elbert
Johnson.
Arthur Sanden, his important air to Alvin Modin.
Edward Sargent wills his total cubic dimensions to Noel Hanson.
Harriet Severson wills her piano playing to Helen Carlson.
Yours Truly wills his limousine (air cooled) Franklin to Lois
Sargent.
Russell Stave, his love for chickens (feathered variety) to
Clarence Skaren.
John Stromstad, his grin to Clifford Odegaard.
Norman Thieling, his love for typing to William Johnston.
Ethel Torkelson, her flaming crown of glory to Ralph Sheldon.
Harold Vangsness, his socialistic tendencies to Peter Tandberg.
Stephen Vilven, his ford with many tears and much heart ache to
whomever desires it.
Clarence Weckwerth, his daddy-like supervision of the senior
class to Selmer Johnson.

In Testimony whereof we have subscribed our names
this 30th day of March in the year of our Lord 1933.
Members of the Senior Class.

On this 30th Day of March A.D. 1933, the above named testators, the honorable members of the Senior Class of 1933, subscribed the foregoing manuscript in my presence and declare said testament to be the final will and declaration.

(Signed)

T. M. McCall
Notary Public
Crookston, Minnesota

My commission expires at six o'clock March 30, 1933.
THE CLASS OF 1933

Clarence Weckwerth, '33
Hazel, Minnesota

Miss Chairman, Friends, Parents, and Schoolmates:
I have been given the privilege of representing the Class of 1933 and to present this key to the Class of 1934.

One year ago when we, as Juniors, received the Key of Knowledge, we were on the threshold of our Senior Year, but the door was locked, and it was only with the aid of this key that we were able to unlock it and see what lay in store for us.

This key has served us well and faithfully during the past year, and it has revealed to us the treasures of the Senior Year.

As we crossed the threshold last fall, we thought that this was indeed a wonderful and interesting place, but now after having experienced all that it has to offer, we have realized that the beauty and instruction was far more than we ever imagined.

As we are about to graduate, we must pass this key on to the succeeding class. And now as a representative of the Class of 1933, I wish Lester Lerud, President of the Class of 1934, to come forward and accept this key.

It is with our sincere hope that when you unlock the door to your Senior year, that it will disclose to you all the pleasures and happiness that has been ours. It is our hope that you will find there the things that will lead to your success.
RESPONSE FOR THE CLASS OF 1934

Lester Lerud, '34
Twin Valley, Minnesota

On behalf of the Class of 1934, I accept this key, intrusted to our care by the graduates of 1933. They have made it, in their senior year, a symbol of effort crowned with achievement.

Now this key is ours to use. We Juniors stand today, as newcomers into the Hall of Learning. Behind us down the years, we hear the soft opening of many doors, where the ghosts of yesterdays' classes have turned the key in many locks.

As Seniors in the coming year, we, too, must open still another door. Whatever unknown ordeal may be required of us, beyond that now-closed portal, we firmly pledge ourselves in Wisdom's name to employ this key full-honorably.

- - - - -
Mr. Dowell, faculty, parents, fellow classmates and friends:

This is our Commencement day and we all realize that it marks a step in the education for life. If education does not prepare us for life, it is not education. Our schooling has given us judgment and knowledge, the equipment to help us to meet the problems of this difficult world. The burden of agricultural progress lies on our shoulders.

It will be our business to see that rural life is restored to its rightful happy and prosperous status. The Northwest School has established in our minds what that ideal farm life is, and has taught what we, as citizens, must do to attain it.

On every campus we find two types of students. We find one class that goes to school to get something real and worth while to carry away with them. They appreciate the great sacrifice their parents are making. Then there are those who go to school for the enjoyment with no definite goal in mind and who use their parents' money thoughtlessly. They make no effort to take away all that is offered in education. They overlook the great sacrifices their parents are making for them. We, the class of 1933, hope we belong to the former class.

We wish to express our sincere thanks and appreciation to the faculty and friends who have helped to equip us.
Above all, we wish to thank our parents who have sent us to school when they were hard pressed for money. We realize how hard it was for them and our hope is that we can pay them back by showing them that we have accomplished something worth while and can help better our homes and communities.

To some of us the school days are over and we will go from here into the valley to live the rest of our lives. To others, the school may have just begun our formal educations, and we will have other commencement days.

It is with great pleasure and sadness too that we look back on the three years we have been here. It seems as if we have made a home which is hard to leave. The friendships that we formed here are the finest we shall have. The tie between faculty and students is strong! We shall never forget how often our teachers put us right on things that bothered us and gave us the truth. They have helped us in our school work and prepared us for the best citizenship; they have built in us strength as a result of their training. We feel a little insecure as we leave the protection of our school, but when we think how much more we have with which to meet life, than those who have never gone to school, we feel stronger and more courageous.

Classmates, we are now where our road divides and we must take separate paths. But our hopes and wishes are that we may often cross paths. Above all, our education has done this. It has made us feel the value of association and friendship. Not one of us will shut himself away from the world. Here we have learned to be neighborly.

Juniors, to you we entrust the ideals of this insti-
tution. Keep them, improve them and speak well of the school. When the years pass on, we pledge that our love and loyalty will remain as sincere and deep as it is tonight.

And so, adieu, but not farewell, to teachers, friends, and school!
AGRICULTURE
Animal and Dairy Husbandry
LAMB PRODUCTION IN MINNESOTA

Llewellyn Reese, '33
Park Rapids, Minnesota

Value and Importance of Sheep in Minnesota

Sheep husbandry is one of the most important, as well as one of the oldest of the world's agricultural enterprises. Wool ranks next to cotton in importance among the fibers, and has played probably a more important part than cotton in the spread of civilization. The United States is one of the leading countries in sheep production; yet in 1835 about three hundred million pounds of wool were produced, and our annual consumption of wool is about twice that amount. This is a large amount to be imported annually. There are approximately forty-one million sheep in the United States and approximately six hundred thousand of these are in Minnesota. In other words, about one per cent of all the sheep in the United States are in Minnesota. Comparing the topography, climate, and the type of agricultural production, and the size of Minnesota with the same factors in other leading sheep producing states, it would seem that Minnesota production of sheep population of the country ought to be at least four or five per cent of the total, or about two million head. If Minnesota farmers proceed cautiously and conservatively, more of them will be able to raise sheep successfully.

Profit in Sheep

There is no class of livestock that offers greater
opportunities for investment than sheep. It is estimated that eight head of sheep are equal to one cow in cost, feed, pasture, and equipment, but sheep will give a larger, quicker and more frequent return for the same amount of money invested.

**Sheep as Cleaners**

As weed exterminators, sheep have no equal. Out of approximately six hundred varieties of weeds growing in the region of the Mississippi Valley, sheep will eat 57¢ of them; horses but 83 and cattle only 5¢. The outlook for sheep raising in Minnesota is beginning to look more favorable than at times during the past few years. In 1939 the market on lambs was at one of the highest points, but from 1930-32, the market for sheep was very low. It is supposed that there will be an increase in price in a short time.

**Selecting a Breed**

In selecting a breed, one should be acquainted with the conditions where he is planning to put the flock, and the kind of breed best suited for that condition. Sheep are easily influenced by their surroundings and environment.

Minnesota farmers will want sheep that will produce a good quality of mutton and good quality of wool. In selecting the breeding ewe, we want to select young ewes possessing plenty of vigor and showing the breed characteristics. We should aim to select as nearly as possible perfect conformation and uniformity throughout the body in mutton type. The neck should be neatly joined to the head, and shoulders of medium length and filled out even and smooth with the shoulders. The top of the shoulders should be broad and smooth, not open. The sheep should have a broad deep chest, extending well forward.
The back should be short and strong, with wide loins well fleshev; ribs well sprung, extending far forward, indicating a strong constitution and large capacity; a long smooth rump, low in the twist and carrying a heavy leg of mutton. A thick fleshing over the body is desirable. The leg of mutton should be well filled out and firm fleshed; should be a fine bone rather than coarse heavy bone.

The wool is very important in the breeding flock. One should look for a medium length fleece, compact, with plenty of crimp and free from all black fibers. There should be an even covering of fleece over the body. The skin should be a bright pink, indicating a good health condition.

The breeding flock should be called once a year so as to dispose of all old and broken mouth ewes, ones that are not the best breeding ewes.

**Feeding the Ewes**

Through the fall the ewes should be in good condition. They may be put on stubble fields or second growth clover, corn field or any field that has some feeding value. The ewes should be flushed before breeding season; that is, in a gaining condition.

Winter management has a very important part in relation to the return from the flock. The feeding should be such as will produce the most vigorous lambs: Leguminous hay, such as clover, alfalfa, cow pea, soy beans, or corn fodder. Succulent feed as root crops or silage are desirable in keeping the ewes in good, healthy and vigorous condition. From two to three pounds of silage daily is a sufficient feed.
spoiled, frozen or moldy silage should not be fed. If a little rain is desired in the ration, a mixture of oats, barley and a little oilmeal will bring about good returns. Plenty of fresh water and salt should be kept before the ewes at all times.

Feeding the Young Lamb

As soon as the lambs are old enough to start eating, they should be provided with a lamb creep, where they can have free access to grain and hay at all times. One part pea size oilmeal, two parts ground corn, two parts ground oats, and one part bran is a good ration to start young lambs on. All lambs should be docked and all male lambs castrated when from eight to fourteen days of age.

Preparing the Lambs for Market

After having made a good selection for the best type in of lambs, the next importance is the feeding, care and management of the fattening lambs. The lambs are left with the ewes through the summer on good pasture, this resulting in a rapid growth and they then become strong, healthy lambs. The lambs should have a lamb creep also throughout the summer, giving them a more rapid gain. Lambs to be put on the market should be weaned when about four to five months of age. At this time place them in a fattening lot. Precaution should always be taken to prevent over-feeding. Sickness may be the result and a heavy loss of lambs.

Roughage for Fattening Lambs

Alfalfa hay is an ideal roughage; lambs relish it and keep in more health and vigorous condition. The clovers, such as sweet clover, red clover, alsike clover, soybean hay,
also make good roughages. Timothy and wild grass are not relished and they do not make very good gains, so it is best not to include it in the ration.

**Grain ration for the Fattening Lamb**

Whole grain is better than ground grain in the fattening ration. In trials conducted at the Morris School of Agriculture & Experiment Station, to determine the better method of feeding grain, all lots received alfalfa hay and triple protein supplement made up of equal parts of linseed meal, cottonseed meal and corn gluten meal, fed as ten percent of the grain ration. In both trials, the grinding of grain proved decidedly unprofitable, decreased the rate of gain, and increased feed consumption and cost per hundred weight of gain. The lambs on whole grain became fatter and sold for a higher price. Grinding the grain lowered the daily consumption especially during the latter part of the feeding period. This probably accounts for the slower rate of gain and lack of finish.

In trials, feed shelled corn and ear corn, using alfalfa hay for a roughage, and 0.3 pound linseed meal per head per day. Lambs received shelled corn, made a rapid gain with lower feed consumption and less cost per hundred-weight of gain, and returned a larger net profit per lamb. However, the lambs received ear corn made very satisfactory gains.

**Barley vs Corn**

In trials where barley or corn was fed, the lambs receiving corn made larger daily gains and required less feed per hundred pounds of gain. Barley proved a very good feed,
producing rapid gain and a good finish.

Feeding Oats in the Ration

Feed trials have shown that lambs fattened with oats in the ration have a lower rate of gain than did lambs fed with ration containing some corn, barley, or wheat. Using wheat in the ration brought about a satisfactory gain and a good finish was obtained, but wheat is less palatable and efficient than either shelled corn or ear corn.

The addition of a protein supplement added to a ration gives a decided increase in rate of gain. There are the three protein supplements. The preference is in favor of the linseed meal.

Self Feeders and Hand Feeding

In feeding the lambs, self feeders may be used to good advantage. One can use a variety of feeds in a ration or feed each separately. Precaution should be taken when starting lambs with self feeders, so there will be no overfeeding. Before turning lambs on self-feeders, they should be fed for a week or two first so they will get on full feed.

In two trials conducted at the Norris Station by these methods, each trial had alfalfa hay and triple protein supplement, using ground grain and whole grain. With the whole barley and oats, the results of the two methods of feeding were very close. In trials of the self feed lots, they made a more rapid gain at a lower cost of feed and returned 19 cents more per lamb than the hand fed lots. In the trials with ground grain, both lots made practically the same daily gain. The average of the two trials showed that the self fed lots gained more rapidly, had a lower cost per hundredweight of
gain, were valued at a higher price per pound, and returned a net profit of $1.15 per lamb more than the hand fed lots.

**Feed Requirement for Fattening Lambs**

The average lamb will require from three hundred to four hundred pounds of grain and from seven hundred to nine hundred pounds of hay to produce a one hundred pound gain. The average lamb will eat from 1.9 to 1.35 pounds of hay per day, and will gain from 0.35 to 0.40 pounds per day. Mature sheep will eat from 2 to 2.5 pounds of grain and 3.0 to 3.0 pounds of hay per day, and will gain from 0.35 to 0.5 pound per day.

**Marketing Lambs**

It is best to get lambs on the market as early as possible, for the price is higher and they get into the market before the western lambs come in. When the lambs are ready for market, they should have a deep covering of flesh over their body and weigh from 75 to 90 pounds. Under ordinary conditions of the Corn Belt, lambs should be ready for market from three to five months of age; in Minnesota, from five to seven months of age.

**Diseases of Sheep**

There are numerous diseases and pests of sheep. Some of the worst are the stomach worm, tape worm, module disease, grub in the head, maggot fly, tick, lice, and scab mite, foot rot, goiter, and many others. The stomach worm is one of the worst. The matting of this worm takes place in the abomasum, known as the fourth or true stomach of the sheep where all of the worms live while in the host, except a few which drift over into the duodenum. The eggs, which are
microscopic, are deposited in the abomasum and passes out of
the body in the feces, after being deposited there on the ground
the heat of the sun hastens the time of hatching, which may
occur in a few hours, days, or week according to the tempera-
ture. Soon after hatching, the young larvae crawl up the grass
stem and blades. In this way they get up high enough to be
taken in by the sheep and lambs when grazing. After being
swallowed they continue their development and attain maturity
in two or three weeks. The best way to eradicate the worm is by
carrying pasture every ten or fifteen days. There are different
drenches which may be used to eradicate the worm. There are
gasoline, coal tar, creosote solution, copper sulphate solution.

Ticks, lice and scab mites are other pests which are
a great hindrance to the sheep raising industry, and should be
eradicated every year.

The maggot fly also is a cause of many deaths with
sheep, laying its eggs in wounds and places of gummy wool.

Summary

As for the sheep industry in Minnesota, it is very
door right now, but there is a gradual increase in production,
and Minnesota is capable of handling a good many more. The
climate, conditions and grazing space and kind of feed
produced make it one of the best states for sheep production.
In feeding lambs for market, Minnesota should be able to turn
in a better grade of lambs at a cheaper rate than other states.
BIBLIOGRAPHY

Anderson, P.A.  
Sheep Raising in Minnesota  
Minnesota Experiment Station Bulletin No. 87, 1937. Pages 3, 8, 13, 30.

Joffey, W. J.  
Productive Sheep Husbandry  

Wallace, Henry C.  

Henry & Morrison  
Feeds and Feeding, 1938, Pages 532-568.

Jordan, P.S. & Peters, W.H.  
Fattening Lambs, University of Minnesota Ext. Station, Minn. Bulletin No. 272  
December 1937, Pages 13, 15, 17.

Kinzer, R. J.  
The Industrialist, Kansas State Agr. College, Bulletin No. 4, Pages 156-158, 170-173.

Marshall, F.R. and Killin, R.E.  
Farm Sheep Raising for Beginners  
U.S. Dept. of Agril Farmers' Bulletin No. 840

Weber, A.D. and Loeffel, Wm. J.  
Sheep for Fattening  
Bulletin No. 257, 1931.
THE PRODUCTION OF LAMBS FROM MONTANA EWES

Arthur Sanden, '33
Beaulieu, Minnesota

The J. B. Schermerhorn estate located in Mahnomen County consists of fourteen thousand acres, mostly located in the eastern portion of the county. This estate is divided into ten different farms.

A year ago last spring Schermerhorn Farms took up a contract with Webb Armstrong, a noted sheep grower at Great Falls, Montana. Four thousand ewes were shipped in on the Great Northern Railway to Lengby, Minnesota in August 1931. These ewes were unloaded at this point and driven with the aid of dogs to the Ranch. The twenty miles from Lengby to the Ranch seems rather a long trailing for sheep.

All that fall they were grazed on the timber land that the ranch possesses. These four thousand ewes were bred to forty purebred Hampshire rams that had been purchased from the famous Gardner flock in Montana. The ewes were wintered on alfalfa hay and a heavy grain protein. On this ration the ewes were successfully wintered. At time of lambing, they were in the good physical condition which is necessary to produce a vigorous lamb and furnish sufficient nourishment for the lamb.

The ewes lambed on the Schermerhorn St.Pierre Farm, located seven miles south of Mahnomen. They began lambing around the first part of March and continued through to the middle of April.
The coop method of lambing was used. This is simply the division of all the ewes while they are lambing. Each ewe has a separate pen of her own. When her lamb or lambs are born, she is by herself with her family. There are advantages in this method, more so than in other ways. It prevents the spread of disease from one lamb to another at birth. It also prevents the lambs from losing their mothers, and at the same time teaches them to stay with their mothers. In this method, if a ewe is sick or diseased, she can be given the necessary individual care, instead of running with the rest and either dying or spreading her disease.

Just after the ewe has given birth to her young, she receives a light hay and grain ration. As she strengthens, her ration is increased. The ewe and her lambs stay in the pen until they are strong enough to be removed. This usually takes about forty-eight hours.

After the ewe and lamb have been discharged from this pen, they are taken to a feed lot on the south side of a two hundred foot beef barn. This was an excellent lot for young lambs, as it was always dry and warmed by the spring sunshine.

In order to grow, the lamb must not only eat well, but also must have a dry home and plenty of sunshine. It was interesting to watch the lambs in this lot. About four o'clock in the afternoon, the ewes would be camping in one corner of the lot and the lambs in another. About 5:30 the lambs would get up and run over to the ewes and beg for their supper. After they were filled up, they would jump around and then go over with the ewes to some corner and camp for the night.
The lambs, when about seven to ten days old, were run through one of the barns where they were castrated. The knife method of castrating was used and the hot pincher method for docking. Docking and castrating are two essential operations in lamb raising. The castrating is necessary because, as anyone knows, a buck or ram lamb becomes coarse and does not produce a smooth market finish. The ram lamb is highly discriminated against by both packers and feeders.

Docking, like castrating, is one of equal importance. A lamb that is docked presents a square appearance and is more attractive. When sold on the market, they sell at a higher price than the long-tailed lambs; this higher market value more than pays for the trouble involved.

After all the ewes had lambed, I collected the following interesting figures. The number of twin lambs born were 936, the number of single lambs, 3182, and the number of triplets, 6, or, in other words, two sets. There was one ewe that dropped a lamb weighing eighteen pounds at birth.

The ewes and lambs after about ten or twenty days in the lots were allowed to go on the range and graze. The band numbers one and two were taken back to the ranch and grazed on the timber vegetation, consisting in all of about fourteen thousand acres. The grass and the timber vegetation was at first thought to be insufficient to fatten a lamb, but as the weeks passed by, I noticed that the lambs on this range were making excellent growth. The timber feed was proving to be far better than expected.

Frequently thirty or forty lambs from the various
bands were selected and weighed individually. By doing this, it was possible to find out not only how the lambs were progressing in productive growth, but also how good the pasture was.

During the summer months I made many visits to the various bands of sheep. I observed that the lambs and ewes were satisfied with their food and I also saw that they were not laboring to find their food. The lambs were not weaned; ewes and lambs fed together all summer and were not separated until sent to market. This was profitable because the lamb was always with its mother and never lonesome.

If the lambs had been weaned, it would have been necessary to construct fences to hold the lambs in while on pasture. Lambs are not likely to band or stay together like the ewes, so by leaving them with the ewes, this prevented the lambs from being lost or probably straying away.

The sheep herder's dog is one that cannot be left out. He is, as the sheep herder calls him, his brother. He is a true friend, a willing worker, and is trustworthy. A sheep dog does more than one can imagine. He can be trusted with the sheep at any time, any place. While with the sheep, he will prevent them from "disbanding" or "splitting up." A sheep dog is true to death. If the sheep herder has gone off for a while, the dog will stay there by the sheep until he is obliged to run off to hunt down something to eat.

The matter of selecting a lamb finished for market from a thin lamb is a simple method. To determine the condition of a lamb, the fingers are spread wide apart holding the thumb tips together. Then applying the hands rapidly across the lamb's loin, the amount of fat and how it is laid on can be determined.
Provide beforehand a small pen to hold several lambs. With a
small pen, it is possible/easily catch the lamb wanted in making
the examination for market condition.

General appearance of the lamb is not extremely of
great importance. However, a lamb should have a fairly uniform
body. The leg of lamb is determined by grasping the lamb fairly
high around the leg and feeling how heavy it is with meat. If
the hands are fairly well filled, the lamb can be considered to
have a good leg.

To cull out the finished lambs, we first separated the
ewes from the lambs. Then by driving the lambs into a lot, we
began by running the lambs through the pens and selecting only
the best. We did not discriminate against a lamb slightly de-
formed; if the lamb was in No. 1 condition, it was sent to market.
A lamb that was set high behind and very low in front was consid-
ered a cull and put on feed until it had produced a desirable market
finish.

What a terrible noise the lambs and ewes made after
they were separated. After selecting out the choice lambs, they
were loaded on trucks for the haul to the railroad. The lambs
were taken to the private Schermerhorn stockyards in Mahnomen
and loaded on the stock cars. The largest bunch sold at one
time were shipped to South Saint Paul to Swift & Company. The
records show that out of two thousand lambs shipped, 1,833 sold
for top price. The remainder went for seconds.

This was an instructive piece of livestock work put
on by Schermerhorn Farms last year, and I am looking forward to
just as interesting a time with the sheep next summer.
The Business of Producing Purebred Swine

Edward Sargent, '33
Crookston, Minnesota

The name "Poland" or "Poland-China" has an important history. It can probably be dated back as far as 1860 as some of the herds of the Miami Valley were then called. Probably some of the first founders were Mr. Ayers, Mr. McBreary, D. H. Magie, and A. C. Moore, who termed their hogs as Poland and China. The name "Poland-China" was accepted by the National Swine Breeders' Convention at Indianapolis, Indiana in November, 1872. The Shakers of Union Village in Warren County were most prominent in the improving of the breed. Magie and Moore did much in advertising and bringing the breed before the public.

The color of the Poland-China has undergone something of an evolution. Originally the use of white pigs formed a leading feature in the development of the breed, but the advent of Berkshire blood caused a change to darker types. Thirty years ago white or sandy markings were common on the body. Twenty-five years ago many "spotted" pigs were registered in the "Ohio Poland-China Record," although at this time, black pigs with six white points were receiving special attention. The older breeders were attracted to lighter colors, but the solid black color with white feet, tail, and face, met with show ring favor and attained a popularity which has held up to date, although white elsewhere argues no impurity of blood. This uniform color marking is said to be largely due to the influence of the boar, Tom Jorwin 2nd, 2037.
The sire of the Poland China classes among the largest of breeds as has been shown by the records of this breed at the International Livestock Show. The scale of the Poland China, as has been shown by records, exceeds that of any other breed in all classes.

I first started raising Hampshire hogs in the Four-H Club but could not make fast enough progress to suit me; they did not make fast progress like the Poland Chinas. We had both breeds in the same feed lot, getting the same feed and care, yet the Poland Chinas would grow right away from the Hampshires. In the show ring, I could never get any place with the Hampshire; the larger breeds always ran away with the prizes. It takes a longer time to get Hampshires prepared for market; Poland China pigs are usually ready for market from fifteen to twenty days earlier than the Hampshires. I finally decided I would change to the Poland China.

My grandfather and my father had raised Poland Chinas and both had made a success of it. I thought that I might duplicate at least their success. I have never regretted making the change.

The first thing in producing purebred swine is the selection of a herd sire. The saying, "A good sire is half the herd" still holds true. You may have ever so good a herd, and then to place a poor hog at the head is about the most foolish thing that can be done. It is better not to have any than to spoil what you already have been years in building by using poor sires. To stand and listen to a man arguing about paying a few more dollars for a regis-
tered sire to place at the head of his herd almost makes a person lose his temper. All they can see is the money going out, and not the money a good hog will return. They set a penny before their eyes and cannot see a dollar coming in. Even to place a purebred boar at the head of a grade herd cannot but help improve it under proper care. Of course, if they are not fed, you cannot expect them to do well.

Why do big breeders go out and pay from one to two hundred dollars for a herd sire, that likely has not been tried, if it is not worth while to have a good sire at the head? It is not very often that you see these breeders losing on a good purchase or being sorry that they paid a high price. Their reason for paying so much for one hog is to secure an animal that is well bred and one that will sire improved hogs. If breeders pay that much, the wonder is some men hesitate to pay thirty or forty dollars for a hog. Perhaps their sows are not very good, but by the use of a good boar, the herd can be improved. After a visit to the herds of some men and upon seeing their inferior herd boar, one is led to wonder why they could possibly be satisfied with such a hog; many would be better off to take their hog out in the field and shoot him than to continue using him as the herd sire.

A careful selection of the brood sows is of great help. In order to maintain a certain type and quality of hogs, it takes careful selection and culling. Gilts saved from sows that have large litters and big, strong, healthy type pigs, always improve the herd faster than those coming from litters that are just the reverse. We always select
sows with well developed nipples; if they do not have at least twelve, we do not keep them. We select sows that farrow strong healthy pigs twice a year with at least twelve to fourteen pigs in a litter.

We keep careful record of the breeding of our sows. When we are just using one boar, we take a clipper and clip off one strip of hair on the right side. This is easily seen and the mark lasts for quite a while. If we are using two boars, we clip off from one side for one boar and off from the other side for the other. If more than two, we clip off from the hip or jowl. There is no question then as to which boar a certain sow was bred because the mark is there to show. If a sow is bred the second time, we clip once more on the same side. If a sow comes in heat the third time, she is either disposed of or kept until the next year, which ever is best. After the third period of heat, the pigs will not be born until very late. Late farrowed pigs do not get a fair start with the others. More often sows that fail to get settled in pigs are shipped to market. After breeding, the sows are kept on a protein feed.

The slogan, "Hog Health Means Wealth" is a pretty safe saying. Hogs raised in one field, year after year, have proved to be unprofitable. We have three fields, where we can put our pigs in the spring. One field will be planted to corn to hog off in the fall; a second field is seeded to sweet clover and some grain as a nurse crop; while the third, which has already been seeded to sweet clover the year before is used as a summer pasture, with water and shade for them all the time. In the fall, they are moved to the cornfield.
Thus we rotate the pasture each year, using two of the fields each year and plowing them up in the fall. With this practice there is no fear of any disease bothering as they are plowed under every year.

About two weeks before farrowing time, the hog house is thoroughly cleaned with shovel and broom. Then we scrub it with hot water and lye; this kills any live disease germs. The manure that is cleaned out is hauled to the field right away, and not thrown outside the door to be tracked through, coming to and from the buildin. If the pigs are allowed to walk through the manure, all the time, there is not much use in cleaning the barn.

Before placing the sows in the building, they should be washed. If they can not be washed before being put in the building, they should at least have their udder and legs washed before farrowing because the dirt will be carried into the pig's stomach at the first nursing, thus giving an excellent chance for the start of intestinal worms.

After the sow has farrowed, one must be careful in feeding her because over feeding causes the pigs to get white diarrhea and scours. Right after farrowing, a little bit of water is all that is necessary until the next feeding time.

After the pigs are about four or five days old, we mark them. That is, using a plier shaped implement with a cutting edge the shape of a triangle, and taking a piece out of their ear like a "V"; we take a certain number of "V's" from the top or bottom of the ear or both ears, all pigs in one litter being marked the same way, and these marks recorded
as belonging to a certain sow. Also we note the number of boars and sows born in each litter, and the number raised. When marking the pigs, we are careful to include a piece of cartilage. This mark is a permanent one and can be easily seen as long as the pig lives and is a sure way of identification which can not be disputed by anyone.

When the pigs are about one week old, we raise the gate high enough so that they can go in and out for exercise. After a while, we put whole oats and milk in pans for them. When they get to eating this, ground feed and tankage are added. We have a cement feeding floor which can be fenced in. On warm sunny days in the spring, the pigs are turned onto this platform for exercise. Every morning and night the sows are turned out on the floor to feed and exercise; then they can not step on the pigs while eating. This exercise prevents the sows from getting stiff. This floor is easy to clean and has already paid for itself twice over in the amount of feed saved.

As soon as the pasture has made enough growth to furnish green feed, the pigs and sows are put on the pasture where the pigs remain until they are sold in the fall. When the pigs are about two and one-half months old, a selection is made of the boar pigs that are to be grown out as breeders; the rest are castrated.

In the fall or about the first of September, we turn the hogs in the cornfield, but before doing this, a selection is made of the sows that are to be used for the next year's brood sows. The remaining sows are fattened for
market. When the hogs weigh about 225 to 250 pounds, they are sold as pigs of that weight usually bring the highest prices.

On about the tenth day of November, breeding for spring litters begins. All the sows farrowed in the spring and saved for breeding farrow the following spring. The sows that farrowed a fall litter are also bred three days after the pigs are weaned. Thus, the sows are kept producing and reproducing every year.

We always have found that regular feeding pays. Like most hogs, they will eat twice at a pig's meal time and if they are fed three times a day in the morning and about five at night or vica versa, is not a very profitable way to feed. I think another advantage in the morning at the very start is the house to be fed. A successful breeder never feeds by the aid of a lantern. His hogs have been bed and have gone to bed long before it gets very dark. This is especially true in the winter time. This is especially true in the winter time. The hogs like to be fed before it gets very dark and unless they are, they will go to bed hungry and then the feed will freeze in the trough. After about so much feed has frozen, the hogs will not even eat it, because hogs do not like to eat from a dirty plate.

Thus the wheel turns around and around each year, bringing with it some new experience, causing another spoke to be placed in the wheel, and new difficulties arise to be overcome. Some may prove profitable, others not. Every day brings its worries to the hog raiser as well as to the business man, worries which must be overcome and studied out if one is to become a successful breeder of purebred swine.
THE HISTORY OF NORTHERN CORN

John C. Stromstad, '33
Beltrami, Minnesota

Corn is our only native American cereal and has been one of the most important food products as far back as American history records.

The corn of which we read in the Bible is not the corn we know, but is any cereal grain, probably barley or wheat. The true American corn is the Indian corn or maize. (zeamze) The best authorities hold that maize, commonly called Indian corn, originated from a common American grass called teasente (Euchitaeana miriciana) which grows in a wild state. This is found in Mexico and the south in United States. The Teasente readily crosses with corn, which indicates its close relationship. Corn is therefore of hybrid origin.

Corn developed in Central America whence it spread to both South and North America. When Columbus came to America, corn was commonly cultivated throughout both continents.

 harassberger states that linguistic evidence shows that maize was introduced into the United States from the tribes of Mexico and from the West Indies, but the time can only be conjectured. It is evident from the ancient pueblo ruins and cliff dwellings in southwestern United States and in Mexico that early and widespread cultivation of corn by the Indians had taken place long before the arrival of Columbus.

In 1524 Jacques Cartier, the first European to enter the St. Lawrence River, observed large fields of corn grow-
ing at the present site of Montreal. Champlain in 1604 found it in cultivation at almost every point visited from Nova Scotia to the Upper Ottawa River. The supplies of maize obtained from the Indians by the New England and Virginia colonists are well known. In 1540 to 1542 De Soto and Coronado wrote that the Indians of the Gulf and Pueblo regions relied on maize for food.

The Algonquins and Iroquois dwelling in the territory now included in New York and the New England states cultivated corn. Their methods compared to those of the southern Indians seem to have been quite superior. The Iroquois especially were a very intelligent group and developed a remarkable corn culture. They raised four varieties of soft or starchy corn, four of flint, two of sweet corn, two of pop corn, and one of pod corn. It was here that the New England farmers obtained foundation seed.

According to Mr. Lyman Ayer, whose father was a missionary, the Red Lake Chippewas in Minnesota were growing corn extensively in 1854. Their corn was a small eight-rowed variety, the ear about six inches in length, generally known as squaw corn. The color is blue and white, varying in individual ears from all white to all blue, but usually mixed in the ear. Mr. Ayer thinks they may have obtained corn from the Indians on the Missouri River.

The three tribes on the upper Missouri River were the Hidatsa, the Arikara, and the Mandan. They were practicing a highly developed system of corn culture at the time of the first recorded visit of the white man in 1738. Evidence secured from the Indian remains in this section indicates that corn was being raised in this district three or four hundred years ago.
The Iowans were good cultivators of corn. Their fields were not large from our viewpoint, but when we think of the labor required in clearing and tending them with the rude implements used, the size seems more considerable. The Indian acre or "muhls" was not of any definite size. It consisted of seven rows of corn with a row of beans between each two rows of corn. The length of the rows was not fixed. As near as could be determined, an Indian muhl on the average was equal to a third to a fourth of our acre.

The fields were usually located on the bottom lands and on the higher and drier first bench lands along the Missouri River. In the brushy bottoms, the land was first cleared with a stone axe, a spot usually being selected where there were not more than one or two large trees, which were left standing. After the land was cleared, it was dug up with a heavy pointed ash stick about four feet long and one and one-half to two inches in diameter. This tool was called a digging stick. The hills were about twelve inches in diameter and a long step apart. Corn planting started about the first of May. Every kernel was carefully placed by hand at the rate of seven or eight kernels to the hill.

At the completion of planting, the hoeing began, and usually the field was hoed twice during the season. The hoeing was done with an implement called the mattock with a blade made from the shoulder blade of a buffalo.

When the priest pronounced the corn ripe, the whole village repaired to the fields. The corn was snapped from the stalk, husk and all, and thrown into piles in the field, whence it was carried later in baskets to the drying scaffold in front of the family lodge in the village.
after the corn was all gathered at the scaffold, all the good ears were braided into strings by the husks. This was to be the seed stock for the next year. The poor ears or stubbins were thrown loosely on the scaffold floor to dry, then threshed out on an old robe or tent skin by means of sticks.

When the corn was fairly dry, it was taken down and stored in cache pits. These pits were of a bottle-like shape, five to eight feet deep and from four to six feet in diameter under ground, having a capacity of twenty to forty bushels. They were carefully lined with dried grass before the corn was put into them. When they were full, the corn was covered with grass. A beard was fitted tightly into the neck or narrow entrance, and dirt was filled in and smoothed over to hide the opening.

Some of the explorers who visited these tribes were M. De La Verendrye, a French explorer. He visited them in 1738. His records show that the Indians presented him corn as soon as he reached the village. He states that the Mandans were great eaters and brought him as many as twenty dishes of corn and beans every day, and that when he left the village, he brought with him a supply of corn flour.

Charles Le Page visited the Rees tribe, who lived in what is now Emmons County, North Dakota. He wrote that these Indians raised corn, beans, melons, pumpkins, and tobacco. They also carried on a considerable commerce with these products in the villages of other tribes.

In the winter of 1804 and 1805 the Lewis and Clark expedition visited these tribes and made their headquarters at a place north of the present site of Washburn, North Dakota. It is well known that the expedition was nearly destitute of food
When it reached the territory which now comprises western Dakota, and had they not obtained food, they would have been compelled to retrace their steps and abandon further exploration. History tells us that they obtained enough corn from these Indians to continue their journey.

From these records of exploration, we find that the Indians raised corn in the northwest, as corn was originally a southern product and the Indians were the first to adapt it to our northern soil and climate.

By 1880 the development of Dakota territory as an agricultural region had become a certainty and with the building of railroads, many settlers came from the eastern states and from foreign countries.

Of all the settlers who lived here, few had faith in growing corn. For the most part, they believed only in raising small grains. Two men who did a great deal toward the development of corn in the northwestern region were Oscar H. Will and L. D. Judkins.

Oscar Will of Bismarck, North Dakota in 1883 made his first selection from a small quantity of squaw corn. From this crop he selected all the white kernels, which was the beginning of the present variety of Will's Dakota White Flint. He practiced selection for about ten years before he obtained a perfect color. He selected for a small cob, which produced more shelled corn than a large cob. This variety was first catalogued in 1886 under the name of Pride of Dakota. Mr. Will claims it is the earliest corn in cultivation. It ripens in seventy days. This variety, now known as Dakota White Flint, is the old Mandan corn. It will stand more hardship in the way of heat, frost and
poor cultivation than any other variety.

About this same time, L.C. Judkins raised some Dakota white and crossed it with Mercer Flint. From this cross, he produced the Jehu yellow flint. Thus both Jehu yellow flint and Dakota white flint are of true Iroquois origin.

One of our most popular varieties now is the Northwestern Dent. This corn is of very doubtful origin. There are two theories concerning it: one that it is an old Indian corn, which probably was raised by the Indians of the Ohio valley. The other theory holds that it is a cross between a red flint corn, similar to King Phillip, and a white dent. Its habit of growth and its stalk and leaf characteristics would indicate Indian origin, but there is no evidence to substantiate such a theory.

Another of our most popular varieties is the Minnesota 13. This corn was obtained at the University Farm April 1, 1893 from DeCow & Company, St. Paul. This was just purchased for planting the corn crop for the station. This stock of seed was invoiced as No.13. The variety matured early and yielded well. After several years of selection at the Station, the first distribution of this variety to the farmers of the state was made in 1897.

The part corn has played in the development of our country is of great importance. Many people owe their success and their homes to this plant.

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BIBLIOGRAPHY

Heinemeyer, C.B. When Corn was King Bismark Printing Co. 1914


Will, George F. & Hyde, George E. Corn Among the Indians of the Upper Missouri. William Harvey Ainer Co., Inc. St. Louis No.1917.
POTATO BREEDING

Elmer Martinson, '33
Gary, Minnesota

How New Varieties of Potatoes are Being Produced by the
Minnesota Stations in Cooperation with the United States
Department of Agriculture

The potato crop of the United States is of sufficient
importance to demand a most careful study of the breeding,
and selection of varieties to influence the yield. The deteri­
oration of our cultivated varieties through improper cultural
practices, and diseases makes necessary the improvement of
existing varieties, and the production of new varieties which
possess greater disease resistance and better commercial qual­
ities.

In comparison with cereal crops, very little breeding
has been done with potatoes. Since 1892 no new varieties of
potatoes of consequence have been produced, while in cereal
crops a complete change of varieties has been put on the market
since that time; it is therefore very important that breeding
of potatoes should keep pace with other food crops, since po­
tatoes are used so much as a table food.

The first serious attempt at potato breeding in the
United States was made by Mr. Goodrich in 1840-1847. The
chief reason for his efforts was that the potato blight was
almost ruining the potato crop. His opinion was that the
disease was due to the lessened vigor of plants, induced by
long continued sexual reproduction. He thought the only way
in which to increase the vigor of the potato plants would be
by crossing and growing new seedlings. He secured a number
of South American varieties, and a seedling grown from one of these plants in 1853 was known as Rough Purple Chili. But the most important of Goodrich's work was that he introduced plant breeding into potato production, and another result of his work was the introduction of the Early Rose produced by Albert Reese from one of Goodrich's varieties, the Garnet Chili.

To understand how the potato breeding work is done, it would probably be well to mention how the floral organs of a potato plant are constructed, before explaining the technique of the cross pollination. The structure of the floral organs is somewhat simple. There are two organs immediately concerned in plant breeding; these are the pistil and stamens. The potato plant bears both in the same flower and is therefore called a perfect flower. Each flower has one pistil of which varies in length from one-third to two-thirds of a line. Each flower has five stamens though sometimes it might happen to have four or six. Their filaments are short and thick, with large, fleshy, erect anthers which stand together like a cone in the center of the flower. The halves or lobes of the anthers which are divided by the placenta have small terminal pore openings through which ripe pollen is given off. In many cases, or in many varieties, the anthers have to be slit because they develop so poorly that the pores do not open and therefore the pollen cannot escape. The stamens vary in color; some are pale yellow, while others are of a bright orange yellow, and all the shades between these two colors. As a rule, the stamens having a pale lemon yellow color do not produce pollen and if they do, it is not viable pollen.

The technique of cross-pollinating by hand is compara-
tively simple, but since relatively few of our commercial varieties develop viable pollen, the percentage of success is correspondingly small. Obviously the first step in cross-pollination of the potato, is the selection of the seed bearing plant. Plants of a variety possessing the certain definite characters desired combine with a plant of other desirable characters to form the type desired. The plants selected should be strong and healthy.

The next step is the selection and emasculation of the flowers, and bagging them. The proper stage in which emasculation of the flowers is performed varies somewhat with the variety, but it should be done before the pistil protrudes through the bud, or one or two days before the flowers open. The stamens are removed with a pair of sharp pointed forceps. The operation is not so easily done by an amateur, but if done the right way, it is not so difficult. The lower portion of the calyx is held with the thumb, and forefinger and the corolla is opened back with the forceps. The stamens are then pressed away from the pistils until they snap off at the base. After the mature flowers have been emasculated and the immature flowers removed, the emasculated ones should be enclosed in a paper bag. A one pound bag or paper sack is about the right size. Holes can be punched through the sides of the bags to put strings through in order to tie them on. As much foliage as possible should be enclosed in the bag as this forms a cushion for the emasculated flowers on windy days.

One or two days after emasculation the flowers are ready for pollination. First the pollen must be gathered, and
this is done by gathering the whole flowers from the male plants. These flowers are kept in small paper bags and should be labeled so the breeder can carry a considerable quantity of material with him and still know what plants to pollinate with them. The flower is then selected and the corolla pushed back and the pistil is removed. The anthers are then tapped with the forceps which jars out the pollen. When doing this, the anther should be held in a position right above the thumb nail and when it is tapped, the pollen grains fall on the bare stigmas of the emasculated flowers. In about a week after the application of the pollen to the stigmas, the success or failure can be determined. If the flower has not fallen off and the ovary swollen with the seed balls, the cross has been successful, and in such cases the bags are removed and loose cheese cloth sacks put around the seed balls enclosing them and then tied to the stems of the plant.

The seed balls should be collected after the vines are dead as this insures a larger number of mature seeds, and the seed balls will not be overlooked as easily because they stay green long after the vines are dead. But it should be done before any heavy frost occurs as the seed balls will be seriously injured by frost. The seed balls should be stored in a dry, cool place until they become soft; then the seeds are separated by washing them in several changes of water, then dried and stored until time to plant.

The seeds are sown in rows four inches apart and if it is possible to use a greenhouse, they can be sown in the middle of March. The first seedlings will appear within ten days of the time planted and will keep on coming for five more
days. The seedlings will show great variations of leaves. Some will have two; others will have three, and some even four, and will also have different shades.

About twenty days from the time the seeds are planted, the seedlings should be transplanted, and it will be noticed that even the smallest seedlings have already formed small tubers. When the seedlings are transplanted, they should be kept moist in order to keep them from drying out. The seedlings will show a great variety of types; some will have slender vines; others stocky and profusely bunched. Some fail to develop any tubers at all, while others may have from one to one hundred.

There will be almost all colors of the rainbow among the seedling tubers, depending on the cross. Some may be purpose, others white, some brown, some pink, or white with pink eyes. But the dream color is most dominant as the greatest percentage is of this color. The majority of the seedling tubers can be classified as round or oval forms.

Immediately after the tubers are harvested, they are classified according to their yield, size, color, and condition; decayed, shriveled, diseased, and undesirable tubers are discarded. Very few of the tubers harvested can be saved because most of them are in the discard list and those that are not diseased or decayed may still not be the type the breeder has been working for, so you can easily see, it takes a great many seedlings before the type desired is obtained.

There has been considerable progress made since 1840 when Mr. Goodrich was doing some breeding in potatoes. The "Early Ohio" from Goodrich imported Rough Purple Chili and Burbank have been some of our later varieties introduced, but
even those were started a long time ago and there is still room for a great deal of improvement in our present varieties.

BIBLIOGRAPHY

The Potato by William Stewart.

Irish Potato Breeding - South Carolina Experiment Station, C.C. Newman and L.A. Leonian.
POTATO PRODUCTION

Stephen Vilven, '33
Crookston, Minnesota

The origin of the potato has been a greatly debated subject. One group of scientists claim that Chili was the original home, while another group maintains that it originated in Peru or Bolivia. A Mr. Right states that he has collected the so-called wild specimen, but has found no relation between it and the potato of today. So it is still uncertain as to which part of South America it originated in, but we are sure that the potato came from the South American continent.

In the production of potatoes, the first thing to decide is the variety of potato to use. Where the growing period is fairly short, as it is in the northern part of Minnesota, Irish Cobbler, Triumph and Early Ohio varieties are generally accepted because of their high yielding and early maturing qualities. A few other varieties are of importance to isolated communities.

The Irish Cobbler tuber is roundish to roundish flattened, or slightly oblong flattened; the stem end is usually deeply notched, giving a rather shouldered appearance to the base of the tuber. The eyes are medium in number, varying from shallow to rather deep, particularly in the eye cluster. The skin is usually smooth and is light creamy white in color. The Irish Cobbler is an early potato and is grown in the northern sections as seed stock for the southern planters.
The tubers of the Triumph are roundish to roundish elongated, or flattened with stem ends shouldered. Eyes are medium in number and rather shallow. The skin is solid red generally with pink eyes, and occasionally with splashes of crimson.

The Early Ohio is roundish elongated with numerous eyes and a light pink skin. This variety grows very well on both clay and mineral soils and is the leading, early variety.

The importance of using good seed potatoes can scarcely be over-emphasized. The common practice of using what is left of last year's crop or inferior seed that is diseased or run out must be discontinued if the present quality and yield of the potato is to be materially improved or increased.

William Stuart in his book called "The Potato" says that a good seed may be described as stock that is pure as to variety; that has been produced by healthy, vigorous, heavy yielding plants in favorable conditions. The seed should be uniform in size and shape and firm and strong with the first sprouts beginning to develop at planting time. The most successful plan of having good seed is to plant a seed plot that is perfectly isolated from other fields and planting in this seed plot good certified seed. A seed plot of about one acre is sufficient for about ten acres of commercial planting.

The chemical treatment of seed potatoes is very necessary in the control of tuber diseases, of which scab, rhizoctonia and blackleg are the most common and destructive. These diseases are kept under control by good cultural practices along with good seed treatment. The most popular chemical treatments recommended by the Experiment Stations and generally
adapted by good not to raisers are corrosive sublimate, hot formaldehyde, and acid mercury dip. The seed that is treated should be free from running out disease because the mentioned treatments will not kill it.

The question of the size of the seed piece is one that has engaged the attention of the grower and scientists for over a century and is still not fully answered, but in general the experimental evidence indicates that within reasonable limits, the larger the seed piece the larger the yield and it has been generally agreed that the two or three ounce seed pieces are about right. This size is easy to handle and plant; it requires a fair amount of seed and raises strong plants.

The potato is best adapted to sandy, gravely or shaly loam soils; while a heavy clay or a very light sand should be avoided if possible. Potatoes may be grown on muck or peat soils, for in parts of the United States large quantities of potatoes have been raised on these soils.

Potatoes need lots of plant food and do best in land that is well worked. A cheap source of plant food is barnyard manure or plowing down a green manure crop, such as sweet clover. There are many commercial fertilizers in use on potatoes but superphosphate has in this region given profitable returns.

Generally the deeper the seed bed is prepared, the more finely it is pulverized, the more suitable it is for the production of a large yield. After the field has been manured, fall plowing is desirable at a depth of about seven inches. William Stuart states that in the spring a disc may
be used and also a harrow. If the land is lumpy, roll it with a heavy roller and then harrow it. The soil should now be in a good condition for planting. If commercial fertilizers are used, they should be applied before planting or be applied in the row at the time of planting.

If potatoes are to be grown for the early market, they should be planted as soon as the soil is in good condition and at the proper temperature. Altho A.R.Kohler, formerly of the Division of Horticulture, says that ordinarily it is best to plant the main crop of potatoes before the middle of May if practicable, as in most years early planting will give better results than late planting in this state.

The most common and practical way of planting potatoes is with the mechanically operated potato planter, of which there are many types and sizes on the market.

William Stuart in his bulletin on "How to Grow An Acre of Potatoes" says that in light sandy soils, plant the early crop three to four inches deep. The distance at which potatoes should be planted depends on the variety and the fertility of the soil, but it is generally agreed that thirty to thirty-six inches between rows and with sets spaced ten to fourteen inches have brought best results.

The purpose of cultivation is to kill weeds, create the soil and conserve moisture by keeping the soil from cracking. Cultivation should be started as soon as weeds appear.

When the plants appear above ground, a harrow should be used, preferably dragging crosswise, but the teeth should be slanting backwards or the plants will be hurt.
Cultivate at certain intervals when it is needed until there is danger of killing the plants.

Potatoes fit into many crop rotation plans and do well following a legume. After the potato crop, a grain crop can be raised with excellent results.

The most common potato insects and disease pests attack the leaves of the potato, so fortunately both can be controlled by spraying. There are many insecticides as arsenate of lead, lime and zinc and also Paris Green that are used with good results. Bordeaux mixture is used for blight and also for the insects, such as potato leaf hopper and flea beetles. This should be combined with the arsenical poison making a combination spray.

The Minnesota Experiment Station has shown that the liquid spray applied under high pressure is better than any other form of application. The time of spraying varies with the season and time of planting, but is generally applied about the middle of June when the plants are about ten inches high. This spray should be a combination spray and should be used two or three more at intervals of about nine to ten days.

The time for harvesting varies with the crop. The early market garden crop is dug while the vines are still green. The late crop, however, should not be harvested until a week or ten days after the vines are mature or killed by frost. The danger of bruising is less if the tubers are matured.

Various types of potato diggers are on the market. If the acreage is small, a plow like digger may be used, but for larger acres, the elevator type of digger is used. Tractor drawn,
power driven digers are becoming quite common on the larger
farms but care must be taken to see that the diger is working
correctly; if it is bruising and skinning the potatoes, it
should be immediately adjusted for skinned and bruised potatoes
lower the quality of the product and are more subject to disease
than a sound potato.

Potato grades are necessary in the commercial
handling of potatoes. Grades have been established by the United
States Department of Agriculture and by various states. U.S.
No.1 and the U.S.No.2 and unclassified are the grades. These
grades are recognized by the trader and based on size, simi-
arity of varietal characteristics, freedom of dirt or foreign
matter, growth cracks, cuts, scab, blight, soft rot, dry rot, and
damage caused by insects or mechanical means.

The so-called grading machines are simply sizing
machines. They cannot grade as to quality altho they are
thought to make up the largest part of the specifications. In
a study by the Division of Agricultural Economics on 566 rejected
cars shipped in 1930-31, 81 per cent of the rejections were
for other causes than size. So according to this study, it
pays to grade for quality as well as size.

The storage of potatoes is of great importance
in potato production because the producer has to store his
own seed and generally a part of the field crop. The essen-
tial factors for successful storage are proper temperature,
good aeration and proper humidity. The temperature controls
the freezing and sprouting of potatoes; it also retards the
growth of disease bacteria. The temperature should be kept
between 36 and 40 degrees F. The ventilation must be good so
that it will keep the tubers dry. If the ventilation is not
well, the moisture will cause molds and afford ideal condi-
tions for the growth diseases.

The three most common storage places for potatoes
are the potato pit, the pit with a roof, and the storage cellar.

The pit is made by digging a trench in the ground,
this trench is seeded full of potatoes and covered with straw
about one foot deep, then covered with earth one foot deep,
and the last layer is of straw, or hay about two feet thick.
Several holes are left in the layer of dirt for the ventila-
tion of the potatoes.

The pit with the roof is made like the first but
has a wooden roof over the potatoes, then dirt and hay or
straw. Mr. Kurner says, "The important point in keeping po-
tatoes is to keep them dry." The moisture in the above system
escapes through the hay along the ridge and has therefore met
with great success.

The last method, the storage cellar, is best,
but care must be taken to regulate ventilation and tempera-
ture. The bins must be cleaned every year to prevent diseases
from spreading.

There are many practices of importance in potato
production, but the success comes where there is the proper
co-ordination of such factors as seed selection, seed treat-
ment, soil preparation, and cultural practices. In this paper,
I have endeavored to compile the practicable, profitable, and
successful methods in potato production.
The potato was first introduced into the United States in 1719 from Ireland by some Presbyterian Irish who settled at Londonberry, New Hampshire.

The increasing commercial importance of the Irish potato as an article of human diet and its adaptations to widely varying climatic conditions have served to increase interest in the breeding and producing of new varieties that are adapted to varying climates and soils in the agricultural sections of the United States.

Although the potato crop of the United States ranks sixth in agricultural products, it has by no means assumed the position that its wide use as a table food would seem to justify. Our present production is one-fifth that of Germany. This wide variation may be accounted for by the fact that about fifty per cent of the German crop is used for commercial purposes and less than one per cent of the American crop is used for commercial purposes. Also, the per capita consumption of potatoes in Germany is about two and one-half times as great as it is in the United States.

Present varieties are not ideal in that many are low yielding, poor in shape of tuber and many are susceptible to disease and insect injury.

Our most common varieties all have their faults.
The Early Ohio is low yielding and forms holes and growth cracks when growing conditions vary. The Irish Cooley is irregular in shape and thus causes a great loss in curing. The Triumph, an early variety, is very susceptible to the degenerating virus diseases, such as mosaic. The Green Mountain, Burbank, and Rural New Yorker are late varieties that are not adapted to our climate.

The improvement of potato varieties has not kept pace with other farm crops. The cereals have a new line of varieties about every ten years, which the potato improvement has been almost at a standstill for the last forty years.

The first attempt at potato breeding known to be made in the United States was by the Reverend C.E. Goodrich of Utica, New York. His incentive for this effort was furnished by the potato blight which spread through the country and Europe during the period 1840 to 1847, and the almost total failure of the crop in some seasons.

Mr. Goodrich believed the vigor of the plants was lessened by continual vegetative propagation. He conceived the idea of restoring the vigor of the plant by sexual reproduction or cross pollination.

He secured some promising varieties from South America through the office of the Consul of Panama. One of these seedlings, the Rough Purple Chili, was grown by Mr. Goodrich, from which he took a seed ball and produced the Garnet Chili in 1855. From this, Albert Reese of Hubbardton, Vermont produced the early variety, Early Rose, in 1861. From this Alfred Reese derived the now-common variety Early Ohio in 1871, which was introduced in 1876 by J.J.H. Gregory.
It also is believed that Dr. Goodrich started the cross which resulted in our present Green Mountain, Jr. The Green Mountain is a cross between Sunmore and Excelsior which is believed to be a descendant of early Goodrich. The Green Mountain was self-pollinated which gave us our present Green Mountain, Jr.

Our present Burbank variety is indirectly a result of Dr. Goodrich's work as Luther Burbank secured, from a chance seedling of the early Rose, the Burbank potato in 1881.

Except for the Rural New Yorker produced in 1881, very little potato breeding improvement has taken place until the last few years.

Potatoes are extremely heterozygous and often contain recessive characters which are undesirable; hence, when seedlings are grown from seedballs, they show many different characteristics.

Potato breeders, according to F.A. Krantz, of University Farm, St. Paul, Minnesota, however, have found that one individual self-pollinated for several generations will breed true to certain characteristics and by crossing this with another individual that has certain other desirable characteristics, that the cross would likely produce a variety containing the desired characteristics and having the vigor that is characteristic of all hybrids. As potatoes propagated by vegetative means, the characteristics would remain constant thereafter.

One of the reasons that potato breeding has not progressed as fast as other crops is that they often show a
high degree of sterility which increases the difficulty of producing new varieties by cross pollination. Selection in self-fertilized lines offers the best means of eliminating these undesirable features. As it is normally self-pollinated, artificial crosses can be made easily and quickly and a single cross usually gives numerous seeds.

The floral organs of the potato are of such simple structure as to make cross-pollination comparatively easy. The potato produces perfect flowers, that is each flower contains both pistils and stamens, the male and female organs.

The technique of cross pollination in potatoes by hand is simple, but since so few of our commercial varieties produce fertile pollen, the chances of success are small.

The first step in potato breeding is the selection of seed bearing plants which should be strong and healthy, which have the desired characters that are needed for the combinations wanted.

The next step is the selection and emasculation of the flowers and the bagging of the same. The stage at which this should be performed varies with the varieties or species. It should be done before the pistil protrudes from the bud or a day or two before the opening of the flower.

This operation is easily performed with a pair of forceps. All the immature buds and mature flowers should be removed from the plant before the plant is enclosed in the bag.

The flowers are ready to pollinate one to two days after emasculation, depending upon the stage of maturity.
and upon the condition of the weather at this time.

The pollen is gathered in several ways, but the method most used consists of gathering flowers from the plants that are to be used as male parents. These flowers are taken to the plants that are to be pollinated. The corolla of the pollen plant is opened and the pistil removed from the flower. Then the flower is held in such a way that the anthers are directly above the thumb nail so that when they are tapped with any object handy, the pollen falls on the thumb nail. It is then transported directly to the stigma of the female plant or flower. The bag is again replaced over the pollinated flower enclosing, as much foliage as possible.

The success or failure of the cross can be determined within a week of the time of pollination. If the cross is successful, the seedball will be formed. At this time, if the cross is successful, the paper bag should be removed and the developing seedball is enclosed in loose, cheesecloth sacks, which should be securely tied to the stems of the plant.

A record should be kept of all steps in the cross and each cross labeled with its parentage.

The seedballs should be gathered after the vines are ripe and before a heavy frost as the seeds will be seriously damaged by frost.

The harvested seedballs must be stored in cool, dry place until they become soft, then they are washed in several changes of water to separate seeds from the gelatinous matter. Then the seeds are dried and stored until planting time.

The seeds are started in the greenhouse early in
March and transplanted to the field early in May. The seedlings will show a great variety in vine and tuber types. Those of desirable shapes and types and sizes should be saved for future testing. It is only by the growing of large numbers and the weeding out of poor types that progress is made in the production of new varieties.

The Minnesota Station has, by this method, many desirable seedlings which are now available to cooperatives. Among these are promising seedlings are the Minnesota 51-180, 35-2C, and 22-1C seedlings, which were first selected at the Crookston Station.

The United States Department of Agriculture has produced thousands of seedlings, but it has introduced and named only one, the Kataledin. However, other promising seedlings are Nos. 41672 and 24642. Seedling potatoes in preliminary tests are designated by breeding, record numbers, but when finally introduced, the seedlings are given varietal names.

BIBLIOGRAPHY

Potato Breeding and Selection - U.S.D.A. Bulletin 195.
Irish Potato Breeding - South Carolina Experiment Station, W.C. Newman and L.A. Leonian.
The Potato - William Stuart.
SPRING WHEAT IN THE RED RIVER VALLEY

Delbert Gustafson, '33
Lancaster, Minnesota

The early history of spring wheat in the Red River Valley began as early as 1870. Except for a small acreage of oats and barley, wheat was the only crop grown. As the soil was new and very productive, wheat was grown continuously without careful preparation of the soil. In later years, other crops were introduced, but rotation was not followed for many years afterward. Most of the farmers were one-crop farmers and that one crop was wheat.

Wheat acreage and production increased very rapidly and by 1878 wheat was at its height in the Red River Valley. Eighty per cent of the acreage was in wheat, but in 1889 it had started to decrease. It decreased until 1919 when it increased again due to the World War. The last ten years it has been fluctuating. The acreage in 1928 was only twenty per cent of the total of seeded crops compared with eighty per cent in 1870. This is shown on a graph. It is also shown for ten counties by figures taken for the years 1910-1920-1925 and 1930. These are the ten counties along the Red River. These figures show that both the acreage and production are decreasing.

Acreage and production of spring wheat in ten northwestern counties of Minnesota for the years 1910, 1920, 1925, and 1930:
<table>
<thead>
<tr>
<th>County</th>
<th>1910</th>
<th>1920</th>
<th>1925</th>
<th>1930</th>
</tr>
</thead>
<tbody>
<tr>
<td>Becker</td>
<td>38,857</td>
<td>60,112</td>
<td>19,845</td>
<td>8,000</td>
</tr>
<tr>
<td>Acres</td>
<td>778,353</td>
<td>619,289</td>
<td>619,000</td>
<td>112,000</td>
</tr>
<tr>
<td>Clay</td>
<td>114,607</td>
<td>154,039</td>
<td>65,134</td>
<td>41,000</td>
</tr>
<tr>
<td>Acres</td>
<td>1,545,324</td>
<td>1,556,541</td>
<td>1,360,246</td>
<td>656,000</td>
</tr>
<tr>
<td>Clearwater</td>
<td>4,745</td>
<td>12,261</td>
<td>3,348</td>
<td>1,700</td>
</tr>
<tr>
<td>Acres</td>
<td>73,397</td>
<td>149,123</td>
<td>74,252</td>
<td>25,500</td>
</tr>
<tr>
<td>Kittson</td>
<td>95,621</td>
<td>134,870</td>
<td>49,533</td>
<td>40,000</td>
</tr>
<tr>
<td>Acres</td>
<td>1,477,154</td>
<td>832,817</td>
<td>846,430</td>
<td>600,000</td>
</tr>
<tr>
<td>Mahnomen</td>
<td>4,127</td>
<td>24,394</td>
<td>7,271</td>
<td>4,000</td>
</tr>
<tr>
<td>Acres</td>
<td>52,664</td>
<td>203,913</td>
<td>129,284</td>
<td>68,000</td>
</tr>
<tr>
<td>Marshall</td>
<td>95,561</td>
<td>167,747</td>
<td>85,978</td>
<td>44,000</td>
</tr>
<tr>
<td>Acres</td>
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<td>1,682,206</td>
<td>1,656,316</td>
<td>68,000</td>
</tr>
<tr>
<td>Norman</td>
<td>80,758</td>
<td>124,411</td>
<td>54,211</td>
<td>29,300</td>
</tr>
<tr>
<td>Acres</td>
<td>1,213,075</td>
<td>1,015,741</td>
<td>1,033,335</td>
<td>556,700</td>
</tr>
<tr>
<td>Pennington</td>
<td>21,803</td>
<td>32,341</td>
<td>7,858</td>
<td>3,800</td>
</tr>
<tr>
<td>Acres</td>
<td>331,193</td>
<td>273,697</td>
<td>145,587</td>
<td>45,600</td>
</tr>
<tr>
<td>Polk</td>
<td>164,239</td>
<td>242,610</td>
<td>146,143</td>
<td>100,000</td>
</tr>
<tr>
<td>Acres</td>
<td>2,621,356</td>
<td>2,182,067</td>
<td>2,955,896</td>
<td>1,900,000</td>
</tr>
<tr>
<td>Red Lake</td>
<td>10,279</td>
<td>29,923</td>
<td>9,050</td>
<td>7,800</td>
</tr>
<tr>
<td>Acres</td>
<td>165,963</td>
<td>373,344</td>
<td>191,675</td>
<td>140,400</td>
</tr>
</tbody>
</table>

The problems in wheat production are many. The conservation of moisture is one of the most important. Wheat, like other cereal grains, has a shallow root system and thrives best where plant food is abundant in the upper layers of the soil. A good wheat soil is a soil that contains considerable humus and a heavy clay soil that will hold moisture
Changes in the wheat crop in the Red River valley 1879-1927 by the percentage distribution of total acres of
sowed cropland.
Humus may be added to the soil by many different methods. One is by plowing under crops. Sweet clover is a good crop for this purpose, as it also adds nitrogen to the soil.

Wheat wants a firm and compact seedbed. This prevents the wind from drying out the soil. It also enables water to rise from the subsoil by capillarity. Fall plowing is another way to conserve moisture. When a field is plowed in the fall, the fall rains are taken into the soil and much moisture is conserved.

Weed control is another great problem in the growing of wheat. Weeds can be controlled by very early fall plowing. Fall plowing starts such weeds as wild oats to grow in the fall and they are killed by cultivation and by frost. It also permits some fall tillage which controls the perennial weeds as quack grass and sow thistle. Fall plowing should be done immediately after the crop is taken off. Where perennial weeds are firmly established, a season of summer fallow should go on. The season will have a lot to do with this method. Best results are obtained in a dry season. In any case, it is important that the work be thoroughly and consistently carried on. A disc plow is a very effective quack grass killer in a dry season. We used one a year ago this summer and when I plowed the field, this fall, there was no sign of quack grass.

Weeds can be controlled by seeding legumes with the grain in the spring. The following year you can either cut one crop and plow under the second or plow under the first crop. If in pasture, plow in July or August and keep land black until freezing weather occurs. The following spring, plant a cultivated crop. After the weeds are killed, one should have
sweet clover or a legume in the rotation every three of four years.

Drainage is another problem in the Red River Valley as the natural drainage in this area is poor. The rivers are small and shallow with very few branches. The narrow strips of land that border the streams are the only well drained land here. Most of the land is drained by ditches with outlets into the streams. Tile drainage has been tried in this area at the Northwest Experiment Station. This method is too expensive for most farmers in the Red River Valley. It also is hard to find an outlet close to where land is drained.

Control of diseases is an important factor in wheat production. The major diseases are stem rust, orange leaf rust, bunt and loose smut. All these diseases are caused by specific parasitic fungi. These fungi live on the wheat plant, obtaining their nourishment from the plant sap, and reproducing and spreading by means of spores. They must be controlled in order to get a good quality of wheat, and to obtain high prices.

Stem rust is one of the most destructive diseases in the Red River Valley. It lives over winter in old straw and stubble. It is never carried over in the wheat kernel. In the spring, the rust germinates and is blown to the common barberry bush. There it forms orange spots on the lower parts of the leaf. It is these orange spots that contain spores which infest the wheat. Later in the season, black spores are formed on the wheat stem. This is called black stem rust and causes great loss to the crop. Rust lives over winter in these spores. This disease can be controlled by growing rust resistant varieties and by destroying the common barberry. It also
can be controlled to some extent by early seeding.

The orange leaf rust is something like red rust but it does not live on the barberry. It destroys the leaf and often reduces the yield. The best means of control is to seed resistant varieties.

Bunt or covered smut lives over winter on the kernel as a spore. Wheat containing this disease sells at a discount. Bunt can be controlled by seed treatment. The seed treatments are copper carbonate dust, and the formaldehyde solution made up of one pint of 40 per cent formaldehyde to 40 gallons of water. The seed should not be allowed to dry before seeding.

Loose smut appears in the wheat fields at heading time and the heads are entirely destroyed. Although this disease does not affect the quality of the grain, it does affect the yield. It also lives over winter on the kernel and resumes growth in the spring when seed is sown. Seed treatments are useless for this disease. It can be controlled to some extent by hot water treatment, but this is too slow and tedious a process and is used only on small seed plots. The best way is to get new seed or grow varieties resistant to this disease.

Scab is another destructive disease in the wheat field. It affects the heads and kernels of the wheat plant. It makes the wheat kernel small and shrunken, and may even kill the entire plant. Scab is caused by organisms carried by the seed and may also live in the soil. Durum varieties are especially susceptible. Crop rotation and the growing of resistant varieties are the best means of control.
Wheat, like all other cereal grains, is shallow-rooted and grows best where plant food is in the top layers of the soil. Wheat thrives best on a firm, compact seedbed. Fall plowing should be practiced because it allows snow and fall rains to enter the soil. It also makes possible early seeding. A clay loam soil is a good one for wheat growing because it holds the moisture well. Any soil that will hold moisture well is usually a good wheat soil, but may be lacking in some of the elements necessary for plant growth. The elements that are usually lacking are nitrogen, phosphorus, and potash. Potash is seldom lacking in Minnesota soils. Nitrogen may be added by plowing under sweet clover and by adding barnyard manure. Phosphorus in the form of superphosphate added to Minnesota soils may give good results.

A high acre yield causes a low bushel cost, because of the expense in harvesting and handling a larger crop is not increased proportionally. The net return per acre and the return per hour of labor expended increases as the acre yield increases. Larger yields bring a double profit to the grower, because they give a large number of bushels to be sold and also bring down the production cost per each bushel.

The cost of producing wheat on 17 to 23 farms in the vicinity of Crookston, Polk County, during the three years 1926-1928 was studied by the Division of Farm Management and Agricultural Economics of the University of Minnesota in cooperation with the United States Department of Agriculture. The results are given in the following table:
This table shows that acre yield is the greatest factor influencing the cost of producing a bushel of wheat.

Another problem in wheat growing is the selection of a variety. There are eight botanical classes of wheat, only four of which are grown commercially in the United States: namely, common bread, durum, emmer, and club. Of these four, only two are of great importance in Minnesota. They are common bread wheat and durum or macaroni. Of these two classes, there are many different varieties.

Marquis is a bread wheat and makes the finest quality of bread flour. This variety is awnless and was developed in 1892 by Dr. William Saunders at the Ottawa Station, Canada. It was made by crossing Hard Calcutta and Red Fife. It was first grown in Canada, then introduced in 1912 to the United States, where it became the most important variety of hard Red Spring wheat. It has excellent stiff straw and is a very high yielder when not damaged by diseases. It is
very susceptible to black stem rust and scab. Because of these faults, it is being replaced on many farms by resistant varieties.

Ceres is also a bread wheat. It was developed from a cross between Kota and Marquis. The cross was made by L.R. Waldron of the North Dakota Station in 1926. This variety is somewhat resistant to stem rust, but susceptible to bunt, scab, loose smut, and orange leaf rust. It has yielded better than Marquis but less than Marquillo. It is not entirely satisfactory to the milling trade.

Marquillo was developed at the Minnesota Station. It is a cross between a durum variety called Zumillo and Marquis. It is very resistant to black stem rust and has out-yielded all other bread wheats. Its chief fault is that it makes a slightly yellowish flour which requires more bleaching than Marquis. It was first distributed in 1939.

Reward was also developed by crossing Marquis with a variety called Prelude. This was done at the Ottawa Station, Canada. It matures a few days earlier than Marquis and yields slightly more. It usually has a bushel weight of three or four more pounds than Marquis. It is not on the recommended list. Some grow it because of its earliness and high bushel weight.

Mindum is an amber durum and is the leading variety in the Red River Valley. It has been the highest yielding variety at the Northwest Station for fifteen years. It shows considerable resistance to black stem rust, and makes the highest quality of macaroni. Like other durums, it lodges on summer fallow and potato land. It was developed at the Minnesota Station by a selection from a mixture found in a common bread wheat. It has been distributed throughout Minnesota, North Dakota, and Manitoba.
The average yields of five varieties at the Northwest Experiment Station for four years, 1927-30, are given below:

<table>
<thead>
<tr>
<th>Variety</th>
<th>Acre Yield (Bu.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mindum</td>
<td>31.9</td>
</tr>
<tr>
<td>Marquis</td>
<td>25.1</td>
</tr>
<tr>
<td>Ceres</td>
<td>26.9</td>
</tr>
<tr>
<td>Marquillo</td>
<td>28.9</td>
</tr>
<tr>
<td>Reward</td>
<td>25.4</td>
</tr>
</tbody>
</table>

Comparison and Percentages of Smut found in fields grown from untreated seed and in fields grown from seed treated by various methods. Taken for Polk County two years (1930-1931)

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Durum and Mixed Durum</th>
<th>Ceres</th>
<th>Marquis</th>
<th>Durum, Ceres and Marquis</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
<td>No.</td>
<td>%</td>
</tr>
<tr>
<td>No treatment</td>
<td>28</td>
<td>11.9</td>
<td>24</td>
<td>5.5</td>
</tr>
<tr>
<td>Formaldehyde</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Machine</td>
<td>3</td>
<td>2.6</td>
<td>6</td>
<td>1.0</td>
</tr>
<tr>
<td>Sprinkle</td>
<td>27</td>
<td>4.0</td>
<td>21</td>
<td>1.4</td>
</tr>
<tr>
<td>Spray</td>
<td>1</td>
<td>5.7</td>
<td>--</td>
<td>---</td>
</tr>
<tr>
<td>Dip</td>
<td>3</td>
<td>.6</td>
<td>2</td>
<td>0.0</td>
</tr>
<tr>
<td>Copper Carbonate 20%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Machine</td>
<td>2</td>
<td>.5</td>
<td>5</td>
<td>0.0</td>
</tr>
<tr>
<td>Churn</td>
<td>5</td>
<td>2.5</td>
<td>10</td>
<td>.5</td>
</tr>
<tr>
<td>Shovel mixed</td>
<td>4</td>
<td>1.8</td>
<td>3</td>
<td>.6</td>
</tr>
<tr>
<td>Drill mixed</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Ceresan</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Machine</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>.0</td>
</tr>
<tr>
<td>Churn</td>
<td>2</td>
<td>0.0</td>
<td>1</td>
<td>3.6</td>
</tr>
<tr>
<td>Shovel</td>
<td>2</td>
<td>0.0</td>
<td>3</td>
<td>0.0</td>
</tr>
</tbody>
</table>

Another way of increasing profits in wheat is by getting rid of smut. This can be done very readily by proper seed treatment. As mentioned before, smutty wheat sells at a discount on the cash market. When such a disease can be controlled, control methods should be used.

The table given shows the results from the use of treated and untreated in fields inspected during the seasons 1930
and 1931 in Polk County by fields. This survey was carried on by Dr. R. J. Haskell of the United States Department of Agriculture and Mr. H. R. Sumner of the Northwest Improvement Association. In the 27 durum fields treated with formaldehyde by the sprinkling method, an average of 4 per cent smut was found while in 28 fields from untreated seed, an average of 11.9 per cent smut occurred. This shows that it pays to treat seed for smut.

The use of power machinery in wheat production has had much to do with decreasing production costs. The use of the general purpose tractor has cut down labor costs and increased the acreage that can be grown by one man. With this source of power, a farmer can operate his machinery both day and night with the same machine. All that is needed is a double crew. With tractor drawn machinery, a farmer can get over the land much more rapidly on account of the larger size of tractor machinery. The tractor driven machinery runs much more smoothly than the chain driven. The power binder is run directly from the tractor motor.

A disadvantage of the tractors is the packing of the soil. Then, too, many farmers feel that since a certain number of horses are kept on the farm, they might as well be working as standing idle. In good times most farmers bought tractors and allowed their horses to stand idle, but now they are going back to horses because they lack the cash necessary to purchase fuel and repairs for the tractor. Nevertheless, I think the tractor will always be the leading source of power on the farm, since it has the distinct advantage of greater speed and capacity for doing work.
One of the most important inventions for the wheat farmer was the combine. It has come into use only during the last five or six years. This machine harvests and threshes the grain in one operation. It is also a great labor saving machine. It eliminates the cost of twine and shocking. Two or three men can do all the harvesting, threshing and hauling. The combine reduces the threshing bill since there are less men and teams to pay. It also benefits the land because it spreads the straw back on the field.

If the grain is not evenly ripened or if weeds are present, it is first cut with a windrower, then left to dry for a few days and later picked up by the combine.

The moisture content of grain while in storage should not be more than fourteen per cent. The grain when cut with a combine should be dead ripe if it is to be stored without spoiling or sold without being docked because of excess moisture.

REFERENCES


Schwantzes, A.J. - The Combine Comes to Minnesota Cir.30, 1929.


Wilson, H.K. and Dunham, R.S. - Spring Wheat in Minnesota, Special Bulletin 133, 1930.

A windbreak is any group of native or planted trees which is used for the purpose of deflecting or checking the force of the wind. Windbreaks around a farmstead give protection to man, animals, and crops from the hot, dry winds of summer and the cold, stormy winds of winter. It was proven by E.G. Cheyney (Division of Forestry) that a windbreak checks the velocity of a wind from 12 to 65 per cent, and that it checks the moisture evaporation a considerable extent as well as raises the temperature several degrees in the winter.

A windbreak also is a financial asset to the farm. It is estimated that a one acre windbreak on a quarter section farm increases the value of the land from $5.00 to $15.00 per acre.

One of the first things to be considered for planting a windbreak is its location with reference to the buildings and the lay of the land. In Northwestern Minnesota we are subject to the northwest prevailing wind of the winter and the southwest winds of summer. Under such conditions, it is therefore desirable to locate the windbreak at least on the northwest and southwest sides of the farmstead.

The source of the necessary trees is a factor which will govern the cost to a great extent. If the trees can be secured from a nearby wood lot or forest, they will cost less
than from a nursery. The species to be used will be governed to a great extent by their availability or their desirability for the purpose intended. The ideal windbreak for checking wind currents would have the contour similar to that of an earth dam. To get this contour the tallest growing trees should be planted in the center. Shorter trees with dense foliage should be planted on each side. The native trees, if desirable in type, are generally better for a windbreak than imported species.

The land for the prairie windbreak should be clean and free from noxious weeds. It is generally best to fallow the land for a season or have a cultivated crop precede the planting of the trees. If the land is in a run down state or low in fertility, the soil should be tested and the required fertilizers should be added. The land should be plowed in the fall so that the freezing and thawing of the winter will help make the soil more friable. As soon as the soil is able to be cultivated in the spring, disc and harrow it thoroughly until it is in a good stage of tilth. Then the land is ready for planting.

The plot for the trees should be measured out on a fairly accurate basis as to know approximately how many trees will be needed. If a person lives near a woodlot, where many species of young trees are available, it would be desirable to select a great variety of trees for the windbreak. The larger variety of trees you have, the chance for diseases to kill your trees is so much less. For example, if you had mostly poplar trees and the disease "Poplar canker" broke out, your loss would be very great,
while with many varieties, the risk would be much less. For rapid growing, broad leaf trees and good center trees of a windbreak, cottonwoods, elm, box elder, ash, poplar and maple can be used very successfully. The coniferous trees which make good windbreaks are the white spruce, Norway pine, white pine, jack pine, and Norway spruce.

The trees should be planted in rows running at right angles to the general prevailing winds, and the windbreak should have at least eight rows of trees which should be from 8 to 12 feet apart in a Standard Windbreak (Figure No. II). The windbreak should not be closer than one hundred feet from the important buildings because otherwise there will be the problem of snow piling up too close to the buildings. A snow catch consists of one or two rows of short dense growing trees planted about thirty to fifty feet on the outside of the main windbreak. This is a very important feature in respect to stopping great amounts of snow. See Figure No.II.

Various species of willows, evergreens, such as white spruce and hedge plants like carogana make very good species to use in the snow catch.

Before planting, stake out your field in reference to where every tree should be. Have the trees from six to ten feet apart in the line of row, which will be too close for natural growth, but desirable for young development. The location of the trees in the plot can be ascertained by the use of a tape line and a marker should be set at the place each tree is to be planted. The trees in line of row should be in a staggard system (Figure II).
Plan No. 1

The source of these trees is the native woods. The species and their location should be decided on beforehand so that no time will be lost when you start your planting. A simple way to perform this task is for two men to work together with a team of horses and a low wagon or a motor truck can be used. The tools necessary for digging the trees are spades, grubhoe or an ax. The trees to be taken from the forest should be of small size. Evergreens should be from ten to eighteen inches high and the broad leaf trees should be from one foot to about three and a half feet high. Larger trees can be taken, but the risks are greater.

When digging the trees from the woodlot, take as much dirt with the roots as possible. When the trees are hauled care should be taken to set the trees tight against each other. This reduces injury and keeps the roots from drying out. When a load of trees is ready to plant, one man can go ahead and dig the holes and another can follow and plant the trees. The hole for the trees should be dug a few inches larger than the base of the trees and deep enough so that the tree is set at least two inches deeper into the soil than before. It is a good thing to put some top soil in the bottom of the hole and then place the tree in an upright position.

Great care should be taken to pack the soil around the tree roots carefully and have the soil packed somewhat around the base of the trees. If the soil is very dry about the roots of the trees, water should be added around the soil of the tree after planting. Two men on a short haul
should be able to plant 150 trees per day and do a good job.

The cost of a one acre windbreak of about 500 trees, consisting of native grown species, such as white spruce, willows, poplar, ash, birch, elm, maple, white and jack pine, together with the cost of preparing the soil, labor for planting the trees and other time spent can easily be done for $40.00. Nearly all this work is during the slackest time of the season so a farmer can do all his own work and it will really cost him no cash.

Second Plan

On many prairie farms, trees cannot be gotten from the native woods, but have to be purchased. It is therefore advisable to purchase as many of the most desired varieties as possible and purchase seedlings or young transplanted trees from a reliable nursery. The order for trees should be placed early and the purchase should state the definite time the stock is to be delivered. It is a general time to get the stock about May first. The order should consist of the desired trees like willows, or spruce for the snow catch and trees like spruce, pine, cottonwood, ash or maple, for the main windbreak.

When the date of the arrival of the trees comes, be prepared to plant them immediately for the quicker they are set, the fewer trees will be lost. To plant them, you perform about the same planting practice as in Plan No.1, except to be more careful about the handling and planting of the trees. This should be done because they have no ground around their roots. In setting the trees, the roots should be spread well and the soil should be packed lightly around the roots. The cost of planting one acre plot of about
500 trees in Plan No. 2 will be about the same as in Plan No. 1 except the cash cost of the trees from the nursery will be about $20.

After the trees are planted, they should be cut back a few inches in order to balance up the tops with the roots. A pruning shears or a knife can be used to cut off the ends of the branches or outer buds and trim the tree into a desired shape for future growth. If it should be dry weather for more than two weeks after the trees are planted and the trees begin to suffer, it will become necessary to water them. This can be done easily with a water tank and a hose attachment. A little work in watering trees on dry years generally brings in good returns.

There are various methods open to the prairie farmer to get trees for windbreak planting. The most expensive way is to buy large trees from a nursery of a size ready to be planted in the windbreak. These large nursery grown trees are very expensive and the loss of a tree by death is a large financial loss. The planting of large expensive trees may be justified when a few trees are needed for ornamental planting, but such a practice is unwise for extensive plantings. Another method is to buy the young seedlings from the nursery and plant them in the garden in nursery rows, for one or two years, if they are too small for field planting. When such trees are large enough to be moved into the windbreak, they can be transplanted with less loss than occurs when trees of the same sizes are shipped in for planting. Generally, several seedlings can be purchased for the price of one fair sized tree. Another practical method of getting trees
is to start the trees from seed in nursery rows. Seedlings of broad leafed trees may be from two to four years in the nursery row and then are large enough to be put out in their regular position in the windbreak.

The windbreak should be given a clean cultivation for the first few years or until they shade the ground enough to keep out weeds and grass. The chief loss of trees through death comes the first year; after that, very few trees should die except from some foreign factor such as diseases, insects, or mechanical injuries. All dead trees should be replaced as soon as possible. A good fence is necessary to protect your windbreak from livestock.

The trees should be pruned into the desired shapes while young and later on when they grow toward maturity, very nice trees will develop.

In twelve to fifteen years, broad leafed trees are likely to be too close together so it is then best to do selective eliminating by removing every other tree or the weakest ones so as to let the rest of the trees develop normally. The trees cut out can be utilized for fence posts, rails or fuel depending on the use to which it is best adapted.

This job of planting a windbreak may seem to the farmer like a real job, but after the first year there is very little work to do. Benefits from windbreaks start almost immediately, such as the checking of the drifting snow and as the windbreak develops other benefits are apparent. A windbreak adds a great deal of comfort to the farmstead. Considerable amounts of fuel and other wood can
Location of a Standard Windbreak

Figure No. I
**Planting Plan of Windbreak**

<table>
<thead>
<tr>
<th>Row</th>
<th>Species</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>(Chinese Elm, Willows)</td>
</tr>
<tr>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>(Box elder, Cottonwood, Popular)</td>
</tr>
<tr>
<td>4</td>
<td>(Am. Elm, Ash, Maple, N.W. Poplar)</td>
</tr>
<tr>
<td>5</td>
<td>Same as Row 3</td>
</tr>
<tr>
<td>6</td>
<td>Same as Row 4</td>
</tr>
<tr>
<td>7</td>
<td>(Norway Pine, Scotch Pine, White Pine, Jack Pine)</td>
</tr>
<tr>
<td>8</td>
<td>Same as Row 7</td>
</tr>
<tr>
<td>9</td>
<td>(White Spruce, Norway, Black Hills Spruce, Colorado Blue Spruce)</td>
</tr>
<tr>
<td>10</td>
<td>Same as Row 9</td>
</tr>
</tbody>
</table>

**Figure No. 2 Planting Plan**
be obtained from this windbreak each year. The sale value of the farm will be increasing all the time as the trees grow. Trees make a prairie house a home, and as the years pass, the trees become the home of great multitudes of birds, which are the farmer's friends. The conclusion of the whole matter is that a windbreak is necessary on the prairie farm.
HOW TO PLANT AND RUN AN EFFECTIVE WINDBREAK ON A
PRAIRIE FARM

Paul Hansen, '33
Crookston, Minnesota

The purpose of a windbreak on a prairie farm is to afford protection from every quarter at the best advantage. The windbreak should be about one hundred feet from the buildings, and should not be near any roads or paths used in the winter time. If shade is wanted for the comfort of the occupant, a few scattered trees can be planted in the yard, and there is no danger of snow drifting to any great extent. The North and West should be protected most because many of the winds come from the Northwest on the Minnesota prairie. Trees can also be planted on the south and east side, if wished. The windbreak cannot be too high around the buildings in Northwestern Minnesota, and the largest long-lived trees should be used.

The kinds of trees should be selected first.

A plan should be worked out by which you will have a good, quick windbreak for buildings and for the protection of the smaller trees. The white willow, cottonwood, green ash, white elm, basswood and hackberry are hardy good varieties for this region. The willows or cottonwoods are good trees to afford quick protection. These trees will grow fast.

If you do not want this species of trees in your windbreak, they can be removed when necessary. Back from the windbreak about twenty feet should be planted a snow trap. The purpose of this snow trap is to bank the snow before it gets to the windbreak and thus drifts into the yard. The snow trap can
be made up of a double row of willows or evergreens to stop
the snow. In the spring or summer, there is so that the willows,
being a low bushy tree, stops snow to a great extent. The
evergreen is also low but most of all, they are thick and
branchy. This kind of a snow trap is essential and is one
of the most important steps in a windbreak on a prairie farm.

In planting, the soil must be in the very best
condition. Planting on a prairie soil is much the same as
transplanting in a nursery. The most common successful plan
of planting is to plant in rows and start with seedlings. A
simple way of doing this is to blow a furrow one way and
mark out the other way. Then a person can plant at inter-
sections. A stick or spade is a good tool to make the hole
with. The soil should be packed firmly around the roots. If
the soil is dry, it cannot be packed too firmly. When planting
cuttings, the best size is about fourteen inches. They should
be covered enough so that all but one bud will be under the
ground. The ground should be shaded to keep the sun from
beating down on the little trees. The United States Depart-
ment of Agricultural Forestry recommends planting four by four
feet. This is all right for forests but is not satisfactory
for prairie planting. The branches cause considerable trouble
and conflict in cultivation and sometimes cultivation must be
discontinued. Experience by people on the prairie farms shows
that the best way is to plant the trees two by eight. In this
way cultivation is stopped only when the trees are large enough
to maintain themselves.

The purpose of windbreak on a prairie farm is not
to stop the wind, but to deflect it. Thus, the trees should be
smaller in the back and higher in the front to raise the wind so it will blow over.

The kind of trees are great factors in the planting of a windbreak. One species of trees alone is not satisfactory, for if some insects or pests were to occur, it might destroy the whole windbreak at one time.

In mixed plantings, the ground is more properly shaded and clear of winds. The mixed plantings are beautiful and delightful. They are attractive to the birds and mixed plantings lessen the possibility of destroying the plantings by insects.

The trees should be deciduous and adaptable trees, such as elm, oak, hackberry, boxelder, and such. Other trees can be mixed in such as the Norway spruce, white spruce, and the red cedar. For the high dry prairie soils of northern Minnesota, the cottonwood, white willow, boxelder, and jack pine are the best trees. For conifers the white spruce and red cedar might be used.

The size of a tree varies on different species of trees. The deciduous tree should be about one year old seedlings and sometimes two year olds can be used to an advantage. The seedlings of elm, ash, cottonwood, and willow can be pulled from the river bank. The oak, walnut, and such trees are better started from seeds. In the use of conifers, the one and two-year-old seedlings can be used, if under good cultivation, but if planted in grass, transplanted seedlings should be used. No matter whether you get your stock from a nursery or from natural growth, it should be thrifty, strong stock, free from disease.
Cultivation can begin shortly after planting. There should always be a mulch of about three inches and the ground should never be allowed to become baked or hard. After a rain the cultivation can be in shortly with a regular corn cultivator or a hoe and plow. The cultivation should be discontinued after the first of August. The trees will then ripen their wood earlier. Late in the fall of the first year, the dirt should be thrown up around the trees for protection. As the trees grow, it is necessary to thin them so they will not crowd. If they were not tended to, they would thin themselves, but much to the owner's expense. It sets them back because of the struggle for moisture and being cramped in small spaces. In sandy regions, such as there are around the shores of the past glacial lake, trees should be mulched around with straw on account of blowing. The straw keeps the hot, dry winds from injuring the trees and drying out the soil.

The windbreak for a prairie farm has found main steps. They are securing the trees, planning of the windbreak, the planting of the windbreak, and the cultivation of it. If these steps are carefully followed throughout, a successful windbreak can easily be secured on a prairie farm.
How to Plant and Grow Effective Windbreaks
On Prairie Farls

Harvey Nelson, '33
Orleans, Minnesota

Ever since the prairies of the Northwest were first put under cultivation, the lack of trees and windbreaks has been apparent, and many a prairie farmer has abandoned his farm rather than be subjected to the icy blasts of our northern winters. Many farmers fail to realize that growing a windbreak and shelter is within their power.

A windbreak defined is any body of trees that is planted for the purpose of checking or deflecting the wind to give protection to buildings, animals, or crops.

There are many ways in which windbreaks may give protection to crops, animals, or buildings: first, the wind may be deflected upward, and, second, the windbreak may partially check the wind by reducing its velocity, thus checking of the wind reduces evaporation, raises the temperature, and checks the blowing of soil.

The main windbreak should be planted on three sides of the farm buildings, if possible, depending upon the direction of the prevailing winds. In the Red River Valley the winds vary from south to west and northwest; hence, full rows of trees should be planted on the west, north, and south sides of the farmstead.

At least ten rows of trees will be required on all three sides to give protection, in addition to hedges for snow. A shrub such as the vetch should be planted back and to
the outside of the trees, leaving a snow trap of thirty to sixty feet. The inner part of the windbreak should be back at least one hundred feet from the buildings to allow for the snow that may drift through. A good plan for a prairie windbreak would be to plant elm trees, alternating the rows with stakenate cottonwood, or the offset or stagger system may be used. This way one uses his land to the best advantage and also has the fast growing cottonwoods for protection before the elms have reached sufficient height. This permits the removal of the cottonwoods; when mature, the elms can then be given full use of the land.

Many other good tree combinations can be made, such as Norway pine, Jack pine, and southern pine for an evergreen windbreak, or willows (either golden or cousel leafed), cottonwood, box elder, and green ash for your broad leaf windbreak.

A windbreak for the garden or orchard should be planted on at least three sides particularly stressing the south and west, because most of the summer storms come from these directions. The windbreak should be planted ninety or one hundred feet from the garden or orchard as the snow drifting in the winter will bank up this far in unless the windbreak is exceptionally thick and wide; and one of the main uses of the windbreak is to prevent snow from banking up under trees and shrubs and allowing rodents to eat off bark and twigs.

If one wishes to plant elm or Norway pine, no undergrowth is necessary, but it is an excellent policy to plant several rows of shrubs such as Siberian pea tree or golden willow, to stop the snow.

For a garden windbreak, even a hedge of Siberian pea tree gives sufficient shelter and does not sap the ground
of its moisture any distance in. The vegetable garden windbreak aids growth by checking winds and evaporation.

The trees, if purchased, should be bought from reliable nurseries. Seedling trees cost less than transplanted trees and for the most part are preferable for windbreak planting. The order for trees should be placed early and the nursery notified when you want the trees delivered. The best time to have trees delivered is in the spring when the frost is out of the ground, and the soil is in good working condition.

Trees can be stored temporarily by filling them in; this means to dig a sloping trench that the trees are put into so that the roots and two-thirds of the stem can be covered with earth. Brush or very coarse straw may be thrown over them to protect them from the sun. One should be very careful in working with evergreens not to expose the roots to air, as this is usually fatal. As soon as the soil is in good shape, one may plant the trees; care should be taken in adding the proper amount of water to the soil and in distributing the roots well out through the soil. The soil should be well tamped if it is not too wet.

Trees should be cultivated and weeds kept out of the soil. For several years following this, the soil should be kept loose so that no grass can grow until the trees are large enough to shade the ground and prevent it from becoming sod bound.

Trees should never be planted in solid soil or sod. It would be better before the trees are planted to fallow such land until the sod is subdued.

The material contained in this paper was collected from the following sources: General information; bulletins from the United States Department of Agriculture Nos. 711, 1803, 1405,
1117, also in "Seeding and Planting in the Practice of Forestry" by Touney and "Productive Forestry" by Sears.

For recommended varieties, I consulted "Trees and Shrubs of Minnesota" by Rosendal and Butters, and "Our Trees and How to Grow Them" by Emerson and Wood. I also collected some information from the National Geographic Magazine and a series of articles in "Wallaces' Farmer."
Engineering
DIFFERENT TYPES OF FEED GRINDERS AND THEIR USES ON THE FARM

Clarence Nelson, '33
Twin Valley, Minnesota

I chose this subject because it is of great value on any farm where livestock is kept. There are many kinds and types of feed mills which may be used. The two common kinds of feed grinders are burr and hammer mills.

There are probably more burr mills than hammer mills in use today, because they have been on the market for a greater number of years. There are two different types of burr mills. One type grinds only grain. This was the first type to be used, but is now being replaced by the type that will grind corn cobs and roughages, as well as the grain. This mill consists of a cob crusher or auger which forces the cobs into a breaker cone on the burrs. It also cuts the cobs up somewhat by forcing them through a cutter bar which is located on the side of the auger in the hopper. A concave in the bottom helps to force the grain toward the grinding chamber; this is usually mounted on wooden break pins which will break if some hard obstacle gets into the mill.

The agitator prevents packing or bridging of corn cobs in the hopper. It consists of a moving arm located above or slightly to one side of the auger. The burrs used in these mills consist of one driven and one stationary burr. One burr is usually self-aligning, while the other is bolted solid either to the frame or the main shaft. Some burrs have cutting edges on both sides, which make them reversible. There are various types of cutting or shearing surfaces used to meet the require-
ments for fineness of grinding. These are termed as coarse, medium and fine plates or burrs. The fineness of grinding is also varied by adjusting the tension on the burr adjusting spring. By loosing the spring, the grinding will be coarser, and tightening will make it finer.

Some of these mills are equipped with a quick release lever that will throw the burrs apart if some hard foreign material should get into the grinding chamber.

Hammer mills are a more recent development in the line of feed grinders. The principle of a hammer mill consists of a number of revolving hammers mounted on a shaft, or rotor set centrally through the middle of the chamber or housing. The means of grinding are accomplished by feeding the grain into this chamber, and when the hammers strike the grain, it is crushed. It then falls through a screen, which is usually fastened below the rotor, into the settling chamber. These screens are made in various sizes which determine the fineness of grinding.

All hammer mills have either gravity or positive feed, feed tables. The gravity type consist of a hopper located high enough so the grain will run into the mill by gravity. The force feed has an apron which draws the feed into the mill. This apron is often equipped with a governor to regulate the feed according to the load fed.

There are only three common types of rotors used. These are the rigid hammer, the swinging hammer, and the triple reduction process.

The rigid hammer type consists of straight hammers usually fastened to the main shaft by means of jam nuts. By this means of fastening, the hammers may slip on the shaft, if some
hard material should enter the grinding chamber. The tips on these hammers may be straight, split, or removable. The removable tips may be reversed or replaced when worn out.

The swinging type of hammer is hinged and free to swing. This type of hammer may vary in length and shape according to various mills. The tips of the hammers are either notched or plain, and usually the hammers may be reversed to give four wearing edges or surfaces.

The triple reduction process mill contains, in addition to the hammers, a cutter head. The cutter head is very beneficial when grinding roughages. This consists of two or more knives fastened to the flywheels where the roughage enters the mill. These knives cut up the feed somewhat, before it enters the regular mill. Inside the mill the feed is reduced further by revolving discs and then hammers as on common hammer mills.

The use of a feed mill on the farm depends greatly upon the following: 1, power available; 2, capacity of mill needed, and 3, fineness of grinding. These three facts will be shown on the following pages, graphically.

The figures shown on the two graphs are the average from four burr mills and five hammer mills. These tests were made by the Ohio Agricultural Experiment Station at Wooster, Ohio. They were then published October 1931 in a bulletin called "Ohio State University No. 490."

The tests on capacity and horse power requirements show many interesting figures. It was found that oats were ground faster in hammer mills according to the horse power required.
The Effect of Fineness of Grinding on Power Requirements (average)

From Ohio State Bulletin No. 490
Barley was also ground faster with practically the same horse power needed for both the hammer and burr mills. For grinding shelled corn, the hammer mill required more power and ground only a small amount more per hour.

The last grain tested was ear corn; it showed the same capacity, but required slightly more power for the hammer mill than for the burr mill.

The test on fineness compared with power requirements was practically the same for both type of mills. There was a slight difference in fineness. The hammer mill ground slightly finer with about the same power requirement. The fineness of grinding for hammer mills is determined by size of screen. This shows that by grinding the same degree of fineness, the hammer mill will require less horse power.

BIBLIOGRAPHY

Ohio State University, Bulletin No.490.
Iowa State College Bulletin No.6.
Agricultural Engineering, February 1932 - E. A. Silver.
The modern tractor is a machine driven by an internal combustion motor, which supplies power for drawbar or belt work.

The history of the internal combustion motor dates back to 1878 when the French were experimenting with gun powder and cannons. They found that a certain amount of heat produced a certain amount of power, and also discovered the uses for piston and cylinder. However, nothing of much consequence towards motor construction was developed, because of the lack of a suitable fuel and a practical means of ignition.

The attention of the people was turned towards the external combustion engine because of the recognition of the value of steam for power. Tractors were built, but were very large and hard to operate. However, they would burn practically any type of fuel and were the chief source of power until petroleum was discovered.

About 1855 an important contribution towards the development of the internal combustion motor was made by Beau de Rochas. He developed the theories upon which our present motors are designed.

Although his theories were not used by himself in developing a motor, a successful engine operating on his four cycle principle was later invented by Dr. Otto, a German, in 1776.
A two cycle internal combustion engine was invented by Dr. Clark, an Englishman, in 1878. This engine was different from the four cycle engine in that it produced power every revolution, while the four cycle engine produced power only every other revolution.

Dr. Deisel, a German, was working during this same period on the Deisel type of engine which used the heat of high compression to explode the gas mixture. He invented the first successful engine of this kind in 1893.

At the beginning of the twentieth century, steam tractors were used on threshing machines throughout this country. These tractors were very cumbersome and although they were a good source of belt power, they were poorly adapted for use in the field. They required at least three men to operate them in the field; one man to supply fuel and watch the water, another to guide the machine, and another to ride and operate the implement. Therefore, engineers turned their attention towards the internal combustion type of tractor, realizing the value of a gas tractor in field operations. These tractors could go for a whole day on one filling of fuel and required very little water. They were comparatively light in weight and easy to handle. One man with a gas outfit was able to do the work of three men with a steam outfit.

The first tractors of this type appeared in South Dakota in 1892. Later in the nineties, other machines of this type appeared and in 1905 the Hart Parr Company began manufacturing tractors for the market. These early tractors were powered with one cylinder motors which were on a huge frame. The rear transmission gears were exposed to dirt and weather.
In spite of their large heavy construction, they wore out rapidly, due to the grinding effect of the dirt. Farmers, who operated these tractors, were inexperienced and this fact also contributed to the tractor's short life.

In 1910 the engineers realized the value of a lighter tractor for field work and their attention was directed towards that type of a machine. Most of these new tractors were composed of two to four cylinders. New tractor companies were formed; there was a great deal of variation in the types of machine produced, and competition was keen. By 1915, there were 150 different models of tractors, many of freak design. Many proved unsuccessful and by 1917, nearly all but those of the more standard four-wheel had disappeared from the market.

The World War, however, had a very pronounced effect on the tractor industry. As there was a scarcity of labor and what labor could be secured demanded high wages, smaller tractors were developed and formed a very enthusiastic market. Many of these tractors used a four cylinder motor and were of the four-wheel rear drive type. Manufacturers had also learned that enclosing all moving parts and supplying them with an oil bath added materially to the tractor's life. Also, by this time, due to the use of the automobiles on the farm, most farmers were becoming more mechanically minded and understood the new machines. Most of the tractors purchased proved successful. In spite of the agricultural depression following the World War, the number of tractors doubled from 1920 to 1925, but because of the keen competition, many of the firms disappeared from the market. The ones that remained standardized the design of the machine and improved it so as to
The more progressive tractor manufacturers realized that if the tractor was to be of the greatest value to the farmer, it should be adapted in design to care for row crops as well as to all general field work. A few tractors of this all-purpose type were sold from 1817 to 1821 but proved unsuccessful. The Farmall tractor manufactured in 1926 by the International Harvester Company was the first successful all-purpose tractor. Since that time all of the tractor firms have added all-purpose types of machines to their lines.

The All-Purpose Tractors

The majority of these tractors were of the wheel type usually having the two front wheels very close together and the back wheels far apart, forming the triangle type, although another type with both rear and front wheels straddling one row is manufactured. This type is called the narrow tread type.

These tractors have ten to eighteen horse power on the drawbar and eighteen to twenty-seven on the belt. They weigh from 3700 to 5000 pounds, with the majority weighing around 4200 pounds.

Most of these tractors are very speedy, traveling four miles in high, 3.35 in intermediate, and 2.5 in low. The size load that they will pull to advantage depends on the kind of soil, location and topography. It is sufficient to say that they must be loaded to capacity in order to operate efficiently.

The clearance is secured through one of two methods: either the stub axle, or high wheels are used. The stub axle method used a stub axle and two bull gears. The clearance of most tractors is 34 inches.
The J. L. Case Company put out the Case Model CC. This model is just the general purpose tractor with wider housings on in back and a pivot in front forming the triangle type. For plowing, the rear wheels may be set down to 48 inches, eliminating side draft and awkward hitching. For cultivating, the rear wheels may be set 60-72 or 84 inches. These widths will take care of practically all the row crops. The clearance is obtained by high wheels.

The Model CC weighs 4000 pounds and uses two or four-row equipment.

The International Harvester Company of Chicago manufactures the Farmall line of all-purpose tractors.

The newest Farmall is the "F" or the one plow size which costs about $500 and pulls a two-row cultivator.

Last summer a large three plow tractor was made. This tractor weighs 3300 pounds with a reead 77½ to 85½ inches. This tractor will handle two or four-row equipment.

The Farmall two-plow tractor was the first made and the most used of all-purpose tractors. It will handle either two or four-row equipment. The clearance is secured by the stub axle method and are of the tricycle type.

The John Deere Company of Waterloo, Iowa manufactures a narrow and tricycle tread.

The narrow tread is used in the wide rows of the corn belt, with a tread of 49 5/8 inches and weighs 3800 pounds. The tricycle type with a tread of 76 inches is used in the cotton fields. Clearance is secured by the stub axle and these tractors are provided with a two cylinder motor.

The Oliver Plow Company makes the Row-Crop tractor.
The rear wheels on this tractor are very high, giving it its high clearance; they are adjustable on the axle, giving a possible tread of iron 60 to 74 inches. The wheels have no rim, but merely a tire of iron 5/16 of an inch thick placed edgewise to which lugs are bolted. The purpose of this construction is to allow the wheels to penetrate down to firm footing.

The Massey Harris Company manufactures a four wheel drive tractor with a clearance of 30 inches and a tread of 76 inches. The Massey Harris weighs 3860 pounds and the clearance is secured by the stub axle method.

The Minneapolis Moline Company of Minneapolis manufactures the KT Twin City tractor. This tractor has a tread of 50 inches, and clearance is secured by the stub axle method. A tricycle type of tractor also is manufactured by this company.

The Caterpillar Company of Peoria, Illinois makes a track, type high clearance, narrow tread, all-purpose tractor. This tractor has a tread of 37 inches and a clearance of 22 inches. It may be used to a very good advantage in the beet fields of Minnesota.

All of the above makes of machines are adaptable for use on the farms of Minnesota. Since a considerable amount of detail would be necessary to discuss all the tractors mentioned, the Farmall will be used as an example in discussing the uses of the all-purpose tractor in Minnesota.

**Summer Fallowing**

Pulls a standard 2 bottom 14 inch plow, but in order to operate to the best ability, the hitch must be offset. Pulls a 6-7 or 8 foot disk harrow at the rate of 30-35 acres a day.
The Farmall pulls a 4-3 section peg tooth harrow at the rate of 70-100 acres a day and is proportionately fast in other tillage operations.

**Potato Crop**

A special hitch for the McCormick Deering planter enables the grower to plant one or two rows at a time. In cultivating, 15-20 acres a day can be covered with a two-row cultivator and thus enable one to cultivate as often as necessary. In digging the potatoes, the speed of the elevator can be changed without varying the speed of the tractor. This is especially suitable for certified seed growers.

**Corn Crop**

May be secured with either two or four-row equipment, but if you wish to use a four row cultivator you must have a four row planter. There are two types of planters, the Side Connected and the Pull type. Either of these will plant the standard widths.

You can cultivate sixty acres a day with a four-row cultivator and thirty acres with a two-row. There are several types of cultivators; the two or four-row shifting frame type and the disk type. Any of these cultivators may be used in standard width rows.

There is now manufactured a machine which cuts the corn into size for silo right in the field and from there, it is hauled home and blown into the silo.

**Hay Crops**

The Farmall 7 foot mower will cut 33 acres and with trailer attachment will cut 60 acres. Power is supplied to the mower on the tractor through the power take-off and the
trailer is pulled by a special attachment. Square corners can be turned without backing or circling.

**Bean and Beet Crops**

Farmall recently introduced into the beet fields of Minnesota for cultivating a new beet type tractor. The corn planter may be used to plant beans. The crop is cultivated by a special cultivator and harvested by a special attachment for the cultivator.

**Small Trains**

On a 14 foot drill, you can plant 50 acres or 30 acres with a 10 foot, and you can harvest 28 acres with an 8 foot binder.

The tendency of the tractor equipment is towards the direct hitching of the implement and tractor, thus making the implement a part of the tractor. An example of this is the tractor cultivator which is used in orchards.

The improvements which have been taking place during the last few years indicate that the manufacturers must have faith in their project. The number of all-purpose tractors in the United States has been increasing with leaps and bounds, showing that all-purpose tractors are necessary.

The manufacturers of all-purpose tractors have conceived the idea of putting low pressure rubber tires on their machines. These reduce the slippage and lessen the packing of the soil. This is an indication of what we may expect in the tractor world in the future.

**BIBLIOGRAPHY**

Jones - Gas Engines and Tractors
Farm Implement News for October 1932, and Various Advertisements sent out by different companies.
Poultry Husbandry
FEEDING METHODS FOR EGG PRODUCTION

Russell Stave, '33
Bagley, Minnesota

Feeding methods for egg production was experimented on at the Northwest Experiment Station. This project was started November 1, 1931 and continued for ten months until August 31, 1932. This experiment was to compare the relative value of feeding grains to laying hens, in the form of whole grains, ground grains, a mixture of whole and ground grains, and feeding in a relative value of the deep litter, with the use of feeding hoppers.

Three hundred white Leghorn pullets were divided into four pens of 75 birds each. Considerable care was taken in housing these birds so as to get as close an average of all birds in each pen as possible. All pens received the same ration of two parts wheat, one part corn, one part barley, and one-half part oats. All other supplements were fed in separate hoppers.

**Feeding Methods**

Pen 2 was fed an all grain ration as a scratch grain in a deep litter of straw.

Pen 3 was fed an all grain ration, as a whole grain. This pen was hopper fed and had grain in front of them at all times.

Pen 4 was fed an all grain ration in a ground form. This pen was also hopper fed, having mash in front of them at all times. A moist mash was also fed at noon.

Pen 5 was fed an all grain ration consisting of both whole and ground grains. This pen was fed both forms of...
grains in hoppers and had feed in front of them at all times, and
a moist mash was fed at noon.

All pens received their supplements of meat meal, oyster shell, and grit in separate hoppers. Settermilk was fed to all pens. A moist mash was fed to the pens receiving grains in the form of mash. A green feed (mangles) was fed each pen daily and also cod liver oil.

Feeding Programs

A feeding program was followed at the Northwest Experiment Station, so that feeding was done at regular times during the day. I will not give the amount of feed that should be fed at each feeding period, because this is up to the feeder to know the amounts to be fed. Different feeders get different results from feeding the same amounts of grain. The biggest part of feeding is to be on time when the feeding should be done. I will not show in a diagram the feeds fed at different periods.

Morning feeding 3:00 A.M.
Green feeding 8:00 A.M.
Moist mash and cod liver oil 11:00 A.M.
Evening feeding 3:00 P.M.

Hen Weights

Ten hens were weighed from each pen at the beginning of every month so as to see if the hens were gaining or losing in weight. This would give the feeder an idea of whether he was over feeding or under feeding. The average hen weights for each pen during the ten months are as follows:

Pen 2
Average lbs. 3.34 lbs.

Pen 3
3.78

Pen 4
3.67

Pen 5
3.75

Egg Weights

The average weight of eggs were taken from each pen at the beginning of every month. The average egg weights
for the year will be shown below. (Ounces per dozen).

<table>
<thead>
<tr>
<th>Pen 2</th>
<th>Pen 3</th>
<th>Pen 4</th>
<th>Pen 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average wts.</td>
<td>20.88</td>
<td>22.33</td>
<td>21.83</td>
</tr>
</tbody>
</table>

The hen and egg weights are very interesting. The pens with the lowest average body weights laid the smallest eggs while the highest body weights laid the largest average eggs.

**Mortality**

The mortality was not very high during this period. The flock was in good health and vigor throughout this period and no disease entered the flock to cause mortality. Occasionally a bird would die of some individual trouble. The total mortality for the ten months and also the percent of mortality will be shown below:

<table>
<thead>
<tr>
<th>Pen 2</th>
<th>Pen 3</th>
<th>Pen 4</th>
<th>Pen 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of birds</td>
<td>75</td>
<td>75</td>
<td>75</td>
</tr>
<tr>
<td>Total Mortality</td>
<td>11</td>
<td>8</td>
<td>11</td>
</tr>
<tr>
<td>% Mortality</td>
<td>14.66</td>
<td>10.66</td>
<td>14.66</td>
</tr>
</tbody>
</table>

The mortality showed a little in favor of Pen 3, but it was not enough difference to prove in favor of Pen 3.

The total amounts of feed including grain, grit, oyster shell, meat meal, and buttermilk fed during the ten months are as follows:

<table>
<thead>
<tr>
<th>Pen 2</th>
<th>Pen 3</th>
<th>Pen 4</th>
<th>Pen 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total wts in lbs.</td>
<td>12,732.25</td>
<td>13,417</td>
<td>13,388.75</td>
</tr>
<tr>
<td>Total cost of feed</td>
<td>$31.84</td>
<td>$34.59</td>
<td>$36.96</td>
</tr>
</tbody>
</table>

The figures above are in favor of Pen 2; although this pen ate more feed than Pen 4, the cost was cheaper. This pen was fed whole grain in a deep litter. The next cheapest pen was Pen 3 fed a whole grain ration in feed hoppers.

Pen 4 cost a little more than Pen 3. Pen 4 was fed
an all mash ration in a hopper. Pen 5 had an extremely high feed cost. This pen was fed both whole and ground grains. The feed cost is one factor that influences the profit for the poultry raisers.

**Feeding Meat Meal**

The four pens were fed meat meal in separate self feeders. The balancing of the rations was left to the hens as far as the amount of meat meal used. There was a wide range in the amount consumed by each pen. The amount of meat meal and the cost will be shown below.

<table>
<thead>
<tr>
<th>Pen 3</th>
<th>Pen 3</th>
<th>Pen 4</th>
<th>Pen 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pounds of meat meal used</td>
<td>198.75</td>
<td>263</td>
<td>106.75</td>
</tr>
<tr>
<td>Cost</td>
<td>$1.99</td>
<td>$3.63</td>
<td>$1.07</td>
</tr>
</tbody>
</table>

**Percentage of Egg Production**

The percentage of production was based on the number of hen days during the ten month period. The hen day of a hen is the total number of days a hen is in the pen, as one hen in a pen one day equals one hen day. The percent of production for the ten months will be shown below:

<table>
<thead>
<tr>
<th>Pen 2</th>
<th>Pen 3</th>
<th>Pen 4</th>
<th>Pen 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Hen Days</td>
<td>20264</td>
<td>21579</td>
<td>21194</td>
</tr>
<tr>
<td>Total Eggs</td>
<td>11285</td>
<td>11925</td>
<td>11288</td>
</tr>
<tr>
<td>Percent Production</td>
<td>55.68</td>
<td>55.28</td>
<td>53.26</td>
</tr>
</tbody>
</table>

The production during the ten months was very interesting. Although the percent of production varied some in each pen during the different months. Each pen made their high and low points of production at the same time. The highest production in all pens was during March, April and May. A diagram of the percentage of production is as follows:
<table>
<thead>
<tr>
<th>Pen 2</th>
<th>(%)</th>
<th>Pen 3</th>
<th>(%)</th>
<th>Pen 4</th>
<th>(%)</th>
<th>Pen 5</th>
<th>(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>November</td>
<td>49.7</td>
<td>48.0</td>
<td>47.31</td>
<td>47.11</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>December</td>
<td>29.68</td>
<td>31.38</td>
<td>30.44</td>
<td>32.79</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>January</td>
<td>39.72</td>
<td>40.03</td>
<td>37.92</td>
<td>35.39</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>February</td>
<td>59.95</td>
<td>54.72</td>
<td>54.18</td>
<td>47.12</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>March</td>
<td>72.88</td>
<td>71.95</td>
<td>70.73</td>
<td>64.23</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>April</td>
<td>71.02</td>
<td>70.77</td>
<td>69.70</td>
<td>62.73</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>May</td>
<td>68.34</td>
<td>70.54</td>
<td>68.16</td>
<td>61.40</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>June</td>
<td>64.83</td>
<td>64.89</td>
<td>58.14</td>
<td>54.03</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>July</td>
<td>55.30</td>
<td>55.41</td>
<td>54.87</td>
<td>47.78</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>August</td>
<td>50.18</td>
<td>48.37</td>
<td>43.14</td>
<td>40.30</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average %</td>
<td>55.88</td>
<td>55.28</td>
<td>53.28</td>
<td>49.03</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Feed Costs per Dozen Eggs**

The feed cost per dozen eggs will be shown below:

<table>
<thead>
<tr>
<th>Cost of Feed</th>
<th>Dozen Eggs Produced</th>
<th>Cost per Dozen</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lot No. 2</td>
<td>$31.84</td>
<td>940.5</td>
</tr>
<tr>
<td>3</td>
<td>34.59</td>
<td>994</td>
</tr>
<tr>
<td>4</td>
<td>36.96</td>
<td>940.75</td>
</tr>
<tr>
<td>5</td>
<td>45.54</td>
<td>834</td>
</tr>
</tbody>
</table>

The cost of feed was much cheaper at this time than it had been for a long period of years. The cost of feeds per cwt. were as follows:

- Oats: 62¢
- Grit: 72¢
- Oyster shell: $1.20
- Lett meal: 1.25
- Buttermilk: 1.00

These prices along with high egg production make the cost of producing a dozen eggs very cheap. The two factors that influence the cost of producing a dozen eggs are the feed cost, and the number of eggs produced.

**Eggs Used for Hatching**

During the hatching season, all eggs were marked with a pencil, putting the pen number, hen number, house number, and
date the egg was laid. This was marked on the large end of the egg so it may be read while in the hatching trays without disturbing the eggs. The eggs from each pen were kept separate. Every five days the incubator was set and no eggs over five days old were used for hatching. Only No. 1 eggs were used; that is, eggs of a perfect shape and weighing over 24 oz. per dozen.

The hatching results were quite poor from these four pens. There was a high per cent of infertile eggs, besides embryonic mortality. The percentage of infertile eggs was as follows:

<table>
<thead>
<tr>
<th>Pen 2</th>
<th>Pen 3</th>
<th>Pen 4</th>
<th>Pen 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>31.81</td>
<td>35.98</td>
<td>25.0</td>
<td>25.75</td>
</tr>
</tbody>
</table>

The percentage of infertile eggs was somewhat lower in Pen 4 and Pen 5 than Pens 2 and 3.

The embryonic mortality was in favor of Pen 2, which was probably due to the more exercise this pen got from being fed in deep litter. The percentage was as follows:

<table>
<thead>
<tr>
<th>Pen 2</th>
<th>Pen 3</th>
<th>Pen 4</th>
<th>Pen 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>17.22</td>
<td>42.01</td>
<td>28.28</td>
<td>27.55</td>
</tr>
</tbody>
</table>

The percent of hatch of fertile eggs are also in favor of Pen 2, although this pen had a high percentage of infertile eggs. The percent of hatch will be shown below:

<table>
<thead>
<tr>
<th>Pen 2</th>
<th>Pen 3</th>
<th>Pen 4</th>
<th>Pen 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>82.77</td>
<td>57.98</td>
<td>71.71</td>
<td>72.44</td>
</tr>
</tbody>
</table>

The percent of hatch of all eggs were also in favor of Pen 2. The percent hatch of all eggs are as follows:

<table>
<thead>
<tr>
<th>Pen 2</th>
<th>Pen 3</th>
<th>Pen 4</th>
<th>Pen 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>56.43</td>
<td>37.12</td>
<td>53.78</td>
<td>53.78</td>
</tr>
</tbody>
</table>

This shows the hatchability of the eggs in the four Pens in favor of Pen 2 fed a whole grain ration in a deep litter, while the poorest hatching results were from Pen 3, fed a whole grain ration in a hopper.
The Recent Production during the 15 Months Period from Nov 1 to Apr 1.
Monthly coal production by months from Nov. to Aug.
GRAIN RATIONS FOR EGG PRODUCTION

Orville Hovelson, '33

Gary, Minnesota

In appreciation of the interest and valuable information given, I dedicate this research paper to Mr. A. M. Pilkey.

Foreword

My purpose in writing this research paper is to give a fair idea on the feeding of the home grown farm grains for the production of market eggs.

I chose this subject for my senior research paper because I thought that it might be of some value to determine which kind of a ration would be the most economical for the average poultryman.

Of all the problems that arise in poultry management, feeding is the most important item that a poultryman should consider. The three most important reasons are:

1. It is the largest single cost in the production of market eggs.

2. It not only affects the quality of eggs, but even the size.

3. It may even mean as much as the difference between profit and loss; however, this is more true with the egg producing type, to which I am confining my discussion, than the meat producing type.

Professor A.M. Pilkey of the Northwest School and Experiment Station has carried on a number of feeding trials with the idea of bringing forth some interesting figures that
would determine the most profitable method of feeding poultry.

The trials were carried on for ten months of the year, leaving out September and October, which were the months of culling. In those two months, the flock is being thoroughly culled so they cannot be considered in a feeding trial.

These experiments are carried on with the station flock which consists of 450 White Leghorn pullets of the same age, and uniformity, and which are divided into six pens of 75 birds each.

The grains used were the ordinary home grown farm grains of corn, wheat, barley, and oats. Two of the above grains were used in combination in each pen, and the same two were ground in the mash.

The various combinations were as follows:

Pen 1 . . . . . . . Wheat and barley
Pen 2 . . . . . . . Wheat and Oats
Pen 3 . . . . . . . Wheat and Corn
Pen 4 . . . . . . . Barley and Corn
Pen 5 . . . . . . . Barley and Oats
Pen 6 . . . . . . . Corn and Oats

The mash was identically the same for all pens. It consisted of the same two grains that were used in the grain combination except that they were well ground and the following feeds were added to make a well balanced mash: 20% meat meal, 2 oz. charcoal, 1% cod liver oil, and ½ of 1% iodized salt.

The grain prices on July 1, 1931 were as follows:

<table>
<thead>
<tr>
<th></th>
<th>Price per bushel</th>
<th>Price per cwt.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corn</td>
<td>75¢</td>
<td>$1.34</td>
</tr>
<tr>
<td>Wheat</td>
<td>67¢</td>
<td>1.12</td>
</tr>
<tr>
<td>Barley</td>
<td>39¢</td>
<td>.70</td>
</tr>
<tr>
<td>Oats</td>
<td>27¢</td>
<td>.79</td>
</tr>
</tbody>
</table>

The above prices cover the cost for the single grains only.

Now let us turn and see what the prices were when we combined the grains and mash as follows:
<table>
<thead>
<tr>
<th>Grain Combination</th>
<th>Scratch Grain per cwt</th>
<th>Mashes per cwt</th>
<th>Mash &amp; Grains per cwt</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wheat and Barley</td>
<td>$.91</td>
<td>$1.31</td>
<td>$2.22</td>
</tr>
<tr>
<td>Wheat and Oats</td>
<td>$.95</td>
<td>1.35</td>
<td>2.30</td>
</tr>
<tr>
<td>Wheat and Corn</td>
<td>1.23</td>
<td>1.57</td>
<td>2.60</td>
</tr>
<tr>
<td>Barley and Corn</td>
<td>1.02</td>
<td>1.40</td>
<td>2.42</td>
</tr>
<tr>
<td>Barley and Oats</td>
<td>.74</td>
<td>1.18</td>
<td>1.92</td>
</tr>
<tr>
<td>Corn and Oats</td>
<td>1.06</td>
<td>1.44</td>
<td>2.50</td>
</tr>
</tbody>
</table>

It will be noticed that the barley and oats combination was the lowest priced feed with the total cost of $1.93, grain and mash combined, while we notice that wheat and corn was the highest priced grain and mash combination with a total cost of $2.80 per cwt, which is a difference of 93¢ per cwt.

However, the costs cannot always be considered as the deciding factor in egg production. We must consider many factors before we can come to a definite conclusion as to which is the best ration and the most economical feed.

One of the most deciding factors is the number of eggs produced per pound of feed consumed, which is shown as follows:

<table>
<thead>
<tr>
<th>Lot Numbers</th>
<th>Number of Eggs per pound of feed</th>
<th>Feed Combination</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>2.48</td>
<td>Barley and Corn</td>
</tr>
<tr>
<td>1</td>
<td>2.45</td>
<td>Wheat and Barley</td>
</tr>
<tr>
<td>3</td>
<td>2.40</td>
<td>Wheat and Oats</td>
</tr>
<tr>
<td>8</td>
<td>2.38</td>
<td>Corn and Oats</td>
</tr>
<tr>
<td>5</td>
<td>2.23</td>
<td>Barley and Oats</td>
</tr>
<tr>
<td>3</td>
<td>2.10</td>
<td>Wheat and Corn</td>
</tr>
</tbody>
</table>

It will be noticed that the barley and corn combination produced the most eggs per pound of feed. The startling thing about these figures is the fact that the highest priced combination of wheat and corn should produce the least number of eggs per pound of feed; in fact, almost one-half egg less than the wheat and barley combination.

From these figures we can readily see that the highest priced feed is not always the best. Another surprising thing
is the high efficiency of the barley and oats combination, a feed that many farmers would not even think of feeding. But the success with this combination is due to the fact that the oats was not light in weight. Heavy oats should be fed so you won't get too much fiber in your ration.

Barley and oats not only gave satisfactory results in egg production per pound of feed, but it was also the cheapest ration. Therefore, we may very easily expect it to be the most profitable ration.

To determine which ration is the most profitable we must find out how much grain each lot consumed and its cost. We must also know the production of each grain combination.

What the farmers are most interested in is the kind of a ration that will yield the largest net profit. After calculating the figures of the station records, I find the following results:

Lot I which was fed wheat and barley produced 735 dozen eggs, and the average price of eggs for the year 1930-31 was 21¢ per dozen, making the total receipts of $159.18 minus the feed cost of $42.39 leaving a net profit of $116.79.

Lot II, which was fed wheat and oats, produced 728.5 dozen eggs with a total income of $152.88 minus the feed cost of $40.55, leaving a net profit of $112.33.

Lot III, which was fed wheat and corn, produced 704.3 dozen eggs, with a total income of $147.84 minus the feed cost of $53.71, leaving a net profit of $94.13.

Lot IV was fed barley and corn, which produced 719.7 dozen eggs, with a total income of $150.99 and a feed cost of $45.72, leaving a net profit of $105.27.
Lot V was fed barley and oats and produced 727.8 dozen eggs with a total income of $152.67 minus the feed cost of only $35.79 leaving a net profit of $116.88, which is a trifle higher than that of the lot fed wheat and barley.

Lot VI was fed corn and oats and produced 730.5 dozen eggs with a total income of $153.30 minus the feed cost of $46.11 leaving a net profit of $106.19.

The interesting thing about these figures is that the feed combination that produced the highest number of eggs is not always the most profitable, on account of the higher cost of production.

Another very important item in poultry management is the percentage of hatchable eggs. However, the kind of feed has no direct effect upon the percentage of fertile eggs, although it is of interest to know that the barley and oats combination compares quite favorably with the other grains in the hatchability of the eggs, which is shown as follows:

<table>
<thead>
<tr>
<th>Lots</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grains</td>
<td>B &amp; W</td>
<td>W &amp; O</td>
<td>W &amp; C</td>
<td>B &amp; C</td>
<td>B &amp; O</td>
<td>C &amp; O</td>
</tr>
<tr>
<td>% Hatch.</td>
<td>75.31</td>
<td>72.41</td>
<td>64.60</td>
<td>65.00</td>
<td>61.53</td>
<td>67.26</td>
</tr>
</tbody>
</table>

It is noticed that the wheat and barley combination had the highest percentage of hatchable eggs, with 75.31%, while the barley and oats combination had the lowest percentage with 61.53%. It was interesting to note that the wheat and corn lot was just slightly above the barley and oats combination, being only 3.07% higher.

Therefore, it is easy to conclude that oats and barley, when fed together, or in combination with another grain, will prove very favorable in the hatchability of the eggs.

It was also found that barley and oats ranked quite well
in respect to the mortality of the laying hens. In fact, it was better than the lot fed wheat and corn, which had a mortality of 16%, while barley and oats had a mortality of only 9.33%. However, one can not say that the grains are a deciding factor in the percentage of hatchable eggs, or the rate of mortality. The most important factors in hatching are sanitation and the care of the birds.

In this research paper, I have tried to bring out the most important things to be considered in a good egg producing ration. I can safely state that there is no ration that is better than another. The best ration is the one that is most easily obtained, and the one that will fit into the feeding program the most satisfactorily.

The prices of the various grains is the most important thing to determine which is the best ration to feed. The one that will bring the largest net profit should be considered the best ration. For instance, in years when egg prices are high, the higher priced grains might bring the largest profit. But when the price of eggs are low, the lower priced feeds are more certain to bring the largest profit, because of the lower cost of production.

It is, therefore, easily concluded that when the above rations are all fed with the same protein supplement of 20% meat meal, 2% charcoal, 1% cod liver oil, and 1/4 of 1% iodized salt, that the protein supplement for each feed has no effect upon the variations in the price of the different rations.

The main thing to be considered in the selection of the ration is the one that will return the largest net profit.

In order that a man may be successful in the poultry
enterprise, he must find the most economical and profitable ration; second, he must provide a sanitary place for his birds; third, he must be a good manager.

BIBLIOGRAPHY

The Station records from the Northwest Experiment Station.

Poultry records and feeding trials carried on during the year 1930-31.
GRAIN RATIONS FOR EGG PRODUCTION

William Sitko, '33
Ada, Minnesota

In computing a ration for egg production, I would say that there is no "best" ration. In making up a ration, there are certain requirements in the composition of grains which determine what kinds to use.

The fibre content must be from 3.5 to 5 per cent, which is necessary to absorb moisture and make the feed not too pasty. The protein in the feed must be from 12 to 15 per cent, of which four to five per cent is animal protein. In the ration, I will discuss, it is supplied mainly by meat meal. The carbohydrates in the feed should be from 70 to 75 per cent. This is necessary for producing heat and energy in the chicken's body.

There are other factors which certain feeds possess that should be considered with respect to their effect on birds. They are palatability, variety, wholesomeness, mechanical condition, effect on quality of product, availability, and cost.

Feeding trials were conducted at the Northwest Experiment Station from November 1, 1930 to September 1, 1931. Many interesting facts were gathered from these trials. The purpose was to determine the value of combinations of the common farm grains from the egg production standpoint.

In the trials, 450 White Leghorn pullets were used. These birds were all in healthy condition when the feeding trials began. They were divided into six pens of 75 birds in each pen.

The grains used in this trial were wheat, corn,
barley, and oats. They were fed in a litter of straw, and also in a mash form fed in a mash hopper. There were other parts in the ration, though the same in all rations. Below I will list the complete rations and the cost of each.

Wheat and Barley: Pen 1:

*Scratch grain* - equal parts of wheat and barley. 91¢ cwt.

*Mash* - equal parts of wheat and barley ground; 20 per cent meat meal, 2 per cent charcoal, 1 per cent cod liver oil, ½ of 1 per cent iodized salt. $1.31 cwt.

Wheat and Oats - Pen 2:

*Scratch Grain* - equal parts of wheat and oats. 95¢ cwt.

*Mash* - equal parts of wheat and oats ground, 20 per cent meat meal, 2 per cent charcoal, 1 per cent cod liver oil, ½ of 1 per cent iodized salt. $1.35.

Wheat and Corn - Pen 3:

*Scratch grain* - equal parts of wheat and corn. $1.23 cwt.

*Mash* - equal parts of wheat and corn ground, 20 per cent meat meal, 2 per cent cod liver oil, ½ of 1 per cent iodized salt. $1.56 cwt.

Barley and Corn - Pen 4:

*Scratch Grain* - equal parts of barley and corn. $1.02.

*Mash* - equal parts of barley and corn ground, 20% meat meal, 2% cod liver oil, ½ of 1% iodized salt. $1.40.

Barley and Oats - Pen 5:

*Scratch Grain* - equal parts of barley and oats - 74¢.

*Mash* - equal parts of barley and oats ground, 20% meat meal, 2% charcoal, 1% cod liver oil and ½ of 1% iodized salt - $1.18.

Corn and Oats - Pen 6:

*Scratch Grain* - equal parts of corn and oats - $1.06.

*Mash* - equal parts of corn and oats ground, 20% meat meal, 2% char-
coal, 1/2 of 1% iodized salt. $1.44.

The feeds used in this trial were bought at standard market prices of 1930-31. The rest of the ration was also bought at standard prices. Only the best grade of feeds were used. The grains were well filled out and oats and barley were in good condition.

Records were carefully kept of the monthly egg production. The trends of production can be noticed by looking these over. In the first few months, the production was the lowest. In the spring the production went way up. The increases and the decreases varied little between pens. The monthly records were also taken of the mortality of each pen.

The amount of feed also varied in much the same way as the egg production. The most feed was consumed during the periods of the lowest egg production. In the fall when the birds were getting ready for heavy laying, most feed was consumed.

The yearly feed records showed that the total amounts of grains fed were very much the same ranging around 100 pounds difference. The greatest difference found was in the wheat and corn pen, where feed was about 250 pounds more than the rest. The average feed consumption was in the wheat and barley pen. They used 2390 pounds of feed during the year.

The wheat and barley pen had a yearly feed cost of $20.78 for the scratch grain. It was next to the lowest in the yearly consumption of scratch grains. In the amount of total feed fed, it was the fourth from the top. The figures on the mash showed that they consumed the most mash for the year, having eaten 1654 pounds. The cost of the mash was $21.61
in comparison, the third from the highest. The total feed cost was $42.39 compared with the others; it was fourth from the highest. In the per cent of egg production, it had the highest score with a yearly average of 55.37%.

In the wheat and oats pen, the cost of the scratch feed was $21.40. Comparing it with the others, it ranked third from the lowest. In mash, however, it was down to $19.15 or second to the cheapest mash. The total feed cost for this pen was $40.55, the second to the cheapest. In the percentage of egg production, 52.30% was the year figure, which was the third from the highest of all the pens.

The wheat and corn pen had a scratch feed cost of $31.04 the most expensive of all. In mash, it also was the most expensive with a cost of $22.67. The total cost of feed in this pen was $53.71, which was the most expensive. Even though the cost of feeds was the highest in this pen, the egg production was not the greatest. The per cent egg production was third from the lowest with 52.04% as an average.

The corn and barley pen was quite high in the cost of feeds with $23.12 for scratch grains and $22.38 for mash. The total feed cost was $45.50, which was the third from the most expensive. The per cent production of eggs was $51.02, or the lowest of all the pens.

The pen that was fed barley and oats proved better than naturally expected from such fibrous feeds. The cost of the feeds was the lowest of all the pens. The scratch grains cost $17.35 and the mash, $18.43. The total was the lowest at $35.78. The per cent of egg production was not the lowest, but was second to the lowest with a per cent of 51.52.
The pen fed oats and corn had a cost of $25.05 for the scratch grain. The cost of the mash was $21.06. This was also quite an expensive pen with a total cost of $46.00 for the year. In comparing the cost of feeds with the other pens, it was next to the most expensive. The per cent of egg production was next to the highest with a per cent of 52.36.

It will be noticed that whenever corn was added in the ration, it raised the cost of the feed, even though it did not raise the egg percentage.

Besides the cost of the rations and the percentage egg production, there are other things which are of quite great importance. These also are influenced quite largely by the feeds used. The hatchability of the eggs and the mortality of the birds are the most important. Though the variations may seem quite great, they cannot all be blamed on the feed, although it is the main factor. The number of the pens and the hatchability varied quite a bit. It was found that the lowest per cent hatch was from the pen that was fed oats and barley. Whenever barley was used, the poorest hatching resulted. Wheat on the other hand seemed to raise the per cent of the hatch.

Another thing of great importance is the mortality occurring during the year. If the mortality is great, the egg production is greatly lowered. This will be checked for each pen and the different grains in the ration will account for the variations. The rates of mortality for the year are given below:

<table>
<thead>
<tr>
<th>Per</th>
<th>W &amp; B</th>
<th>W &amp; O</th>
<th>W &amp; O</th>
<th>B &amp; C</th>
<th>O &amp; B</th>
<th>O &amp; C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cent</td>
<td>Pen 1</td>
<td>Pen 2</td>
<td>Pen 3</td>
<td>Pen 4</td>
<td>Pen 5</td>
<td>Pen 6</td>
</tr>
<tr>
<td>%</td>
<td>12</td>
<td>9.33</td>
<td>16</td>
<td>8</td>
<td>9.33</td>
<td>10.66</td>
</tr>
</tbody>
</table>

It is noticed by the figures that wherever corn was in the ration
with wheat and oats, the mortality was high. The wheat and barley pen had a high mortality rate also.

In making comparisons of the different pens, it must be remembered that the pen that had the most costly production was not necessarily fed the most feed. Some of the rations were more expensive than the others. Below is shown the feed necessary to produce one dozen eggs:

<table>
<thead>
<tr>
<th>Pen</th>
<th>W &amp; B</th>
<th>W &amp; O</th>
<th>W &amp; C</th>
<th>E &amp; O</th>
<th>O &amp; B</th>
<th>O &amp; C</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5.19</td>
<td>5.06</td>
<td>5.64</td>
<td>5.40</td>
<td>5.38</td>
<td>5.34</td>
</tr>
</tbody>
</table>

In determining the cost of production, the easiest way is to find the cost to produce a dozen eggs. Compare this with the selling price and the profit or loss is easily figured. As may be suspected, the cheapest feeds usually have the lowest cost. Below is the cost of producing the dozen eggs in the various pens:

<table>
<thead>
<tr>
<th>Pen</th>
<th>Pen 1</th>
<th>Pen 2</th>
<th>Pen 3</th>
<th>Pen 4</th>
<th>Pen 5</th>
<th>Pen 6</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>5.58¢</td>
<td>5.58¢</td>
<td>7.62¢</td>
<td>6.32¢</td>
<td>4.91¢</td>
<td>6.31¢</td>
</tr>
</tbody>
</table>

By the figures, it will be noticed that the wheat and corn pen (Pen 3) was quite a bit higher than the others. These were the most expensive feeds and also the feeds that had the greatest consumption. The barley and corn and the corn and oats pens (4 & 6) were very nearly the same, while the wheat and barley and wheat and oats pens (1 & 3) were the same. The barley and oats (5) pen was far ahead of the rest in economy in cost of production.

After having read this discussion on the different rations, it might still be hard to decide which ration to use. Most likely the average person, after looking over this paper,
would say that he will use oats and barley. If using oats and barley, it should be remembered that the requirements given at the beginning are necessary. If the oats is not well filled out and the barley is also light, the fibre content will be way too high and consequently trouble will occur. Figuring, however, on the basis of good feeds, it is noticeable that the oats and barley are the cheapest. In times when egg prices are not high and the cost of production must be minimized, this combination would prove very satisfactory. However, on the other hand, when prices are high, and a high production is wanted, when the cost of production is not so important, then the wheat and barley combination would be the best.

My opinion as to the choice of rations would be to use the wheat and barley ration. Although the barley and oats ration was the cheapest, yet the increased production from the wheat and barley made the net income very much the same. At the same time, the hatchability of the eggs from the wheat and barley ration was the best. I, therefore, conclude that the wheat and barley ration, if used and fed right, will prove very efficient.
Rural Life Problems
OPERATING A CREAMERY

Arnold Anderson
Greenbush, Minnesota

The Farmer and His Creamery

The farmers are interested in any creamery because it offers him a market for his dairy product. He is doubly interested in a cooperative creamery since its success depends upon his management of it, either directly or through his representative agent, the creamery operator.

Before a cooperative creamery can or should be organized, a true cooperative spirit should prevail in the community where it is to be established. Enough butterfat should be available to permit a low overhead cost, and efficient, competent directors and operators should be secured. If a cooperative creamery has these three requisites, it can be made to succeed very nicely.

The competent, efficient directors and operators, having the cooperative support of the farmers concerned, will be in a position to obtain, manufacture, and sell a high grade product at prices profitable to all concerned. Although it is an easy matter to name the factors making for success, it is often a difficult problem to maintain and correlate them in such a way as to insure continued or permanent success. The problems constantly arising are demanding solutions necessitate careful, efficient service from the directors and the plant operators. There is not a rule of thumb method that can be prescribed. The good judgment of men must constantly shape the policy and enforce efficient management.
Minnesota has been and is fortunate in its co-operative creamery effort largely because it has the proper co-operative spirit and has selected capable men to direct it. The belief has become more or less general that a successful creamery should draw from at least one hundred patrons, one thousand cows, have $10,000 capital, and make annually approximately 300,000 pounds of good butter.

The farmer can aid himself and his creamery materially by producing on his farm clean cream, keeping it cold, and delivering it at least twice per week to his creamery. This can be done easily if utensils, separator, and cream cans are kept clean and dry when not actually in use.

The creamery operator can, through proper methods of manufacture, if he receives good cream, make a butter which will command the highest market price. By carefully and regularly controlling the composition of the butter made, the operator will make the maximum amount of good butter from a definite quantity of butterfat. Most of the creameries in Minnesota render such service.

Of the 170 million pounds of butter produced in Minnesota, approximately 83 per cent of it is made in co-operative creameries, ten per cent in independent creameries, and 24 per cent in centralized creameries. Each group of creameries renders a great service to the farmer producer, if efficiently and honestly directed. There are some localities in which each appears to be best adapted to give this service. The number of creameries in each group varies slightly from year to year. In 1908 there were 535 cooperatives and 171 independents and centralizers, while in 1927, there were 75 per cent of the creameries
in Minnesota were cooperatives. These creameries are relatively small, manufacturing on the average about 400,000 pounds of butter a year. The cost of manufacturing butter is inversely proportional of the volume of butter manufactured.

The farmer should constantly strive to improve his cows by improved feeding, selection, and breeding, if he expects to receive greater returns through his creamery for his dairy product.' It has been estimated that the average dairy cow in this country produces yearly about 4000 pounds of milk containing about 150 pounds of butterfat. Feeding, selection, and breeding could double this low average. The farmer and his creamery can best be aided by increasing the production of the individual cow, thus reducing the overhead expenses, not only of production but in manufacturing.

The receiving of cream is a very important thing, because it contains a great many more clauses which refer more particularly to the quality and grading of cream and butter. One of the most important amendments was passed in 1918 which required that all creameries and cream stations grade the cream received from patrons and base the purchase price upon such grades. It is also provided that all creameries and cream stations, and all graders, and testers of cream must take out a license issued upon suitable examination.

The fault of the patrons is that poor care was taken of the cream as some patrons furnished clean, pure flavored cream all the time; some furnished cream varying in flavor from good to poor, and others furnished cream which was invariably of a poor, disagreeable flavor. Considerable local interest was aroused among the patrons of the creamery, when they learned that
their cream was being graded and in a number of cases there was a complete change in the quality of the cream supplied, showing that in these cases at least the reason for the poor quality of cream was to be found in the patrons.

The grades of cream are as follows: Land O' Lakes, which is sweet, clean flavor, and uniform consistency, or the Land O' Lakes is the best grade of cream. Their grade No. 1 would be sour cream or cream which wouldn't come under the Land O'Lakes cream and it can be a raw material cream.

For testing cream, the Babcock method is the best in modern times. It is the easiest method used. The following equipment is used and is necessary for testing: 1, Babcock tester; 2, cream bottles; 3, cream measure; 4, acid measure; 5, cream scales.

Making a Babcock Test

The different steps are indicated as follows:

1. Thoroughly mix the sample.

2. Immediately after mixing, put the right amount of cream in the cream bottles.

3. Empty the cream into the bottle in the manner by putting the pipette to the neck of the cream bottle, and stoutly letting the finger of the pipette till you have 18 grams of cream in the bottle.

4. Add the acid in the manner in which the cream was emptied into the bottle by using 17.5cc of acid, this acid having a specific gravity of 1.82 to 1.83.

5. Mix the acid with the cream by giving the bottle a slow rotary motion.

6. Allow mixture to stand a few minutes.
7. Shake or mix again and then add hot water to the neck of the bottle or about 1 inch from the neck of the bottle down so it can easily be mixed; then place the bottle in the tester.

8. Run tester for five minutes at the proper speed.

9. Add moderately hot water until contents come to the 45 mark on the bottle.

10. Whirl for five minutes again. Leave tester open a few minutes, and then read test.

**How to Read Test**

The butterfat is formed in the neck of the bottle. You add .05 per cent red on top of the fat. The way you can get a better reading is by using a divider. Hold the divider and take one point at the 6 number, and in this way you can get the right amount or correct per cent of butterfat.

**Pasteurization**

The sweet cream shall be properly pasteurized at the temperature of not less than 145 degrees F and shall then be cooled to 46 degrees F or lower and held three hours before churning.

**Churning**

The sweet cream shall be churned under condition, and at a temperature insuring the required body and texture. The vat test shall not be less than 30 per cent butterfat.

The sweet cream butter shall have a mild, sweet and pleasing flavor characteristic of fresh sweet cream.

The sweet cream butter shall be a light straw color, approaching the color between A and B on nafis color rod. It shall be free from all streaks and mottles.
The sweet cream butter shall be firm and waxy, well worked, and the salt and moisture well incorporated.

Sweet cream butter has a very delicate sweet flavor, which should not be lessened by an excessive salt content. In order to reach some uniformity as to the percentage of salt in the sweet cream butter, the following range is permissible: Minimum of salt 2 per cent; maximum of salt 2.5 per cent.

Sweet cream butter containing more than 2.5 per cent of salt shall not be sold under Land O' Lakes Association's sweet cream brand, but be placed in a lower grade. The salt shall be so incorporated that there shall be no grittiness in the butter.

In selling of sweet cream butter, the appearance of the tubs and boxes add to the value of the shipment. It, therefore, is necessary to pack sweet cream butter in containers that are at all times uniform in size, appearance and quality.

Sweet cream butter to bear the Land O' Lakes brand, shall be packed only in standard spruce tubs containing 63 pounds net. Spruce tubs shall not be rinsed, soaked, or steamed, but paraffined when dry. Spruce tubs shall be lined with 30 pound stock parchment paper, overlapping one inch on top and bottom. Spruce tubs shall be finished off neatly and uniformly by placing cloth circle on top of butter, and a parchment circle on top of the cloth circle. No salt is to be used on the bottom nor on the top, nor on the paraffinned side surface.

The covers shall be fastened on with four universal tins, nailed one-half inch from the edge of the cover and extending down over the side of the tub. Tins shall be bailed in opposite line with the grain of the cover.
One tub out of each churning will be opened and inspected by the official grader. He will examine the butter as to flavor, body, salt and color, and place the shipment in its respective grade. The butter will be classified as to the following, commercial grades:

Sweet cream butter (94-95) score association's specifications.

Likely rinsed cream butter (Score 93-93 association's specifications).

91 score butter.
90 score butter.
89 score butter.
88 score butter.

A certain number of tubs will then be stripped and carefully weighed. If net weight marked on the tubs is wrong, it will be corrected, allowing eight ounces for shrinkage in transit. In testing butter for net weight in the market, the association will recognize only tests to half pounds.

In the marketing of any product, standardization as to quality and package is of utmost importance. Minnesota enjoys the distinction of producing more fine butter than any other state, but even at that the butter lacks uniformity as to flavor, texture, salt, color and package. Minnesota's butter is so that it may be branded and a consumer's demand created for it.
BIBLIOGRAPHY


COMMUNITY DRAMA

Ethel Torkelson, '33
Crookston, Minnesota

From 1815 on there have been many successful little theatres. Those responsible for the early successes are: Mrs. Lyman Gale, Maurice Browne and Ellen Van Volkenburg, Winthrop Ames, Misses Irene and Alice Lewisohn, Mr. Walker, Sam Kume, Hilmar Brown, and Mr. Frederic McConnell.

Rural communities need dramas to meet the needs for constructive recreation. Rural people have nothing to get together for, and there isn't a social feeling between them when they don't get together. Farm folks need recreation as badly as city folks. They need a good laugh every once in a while or they get terribly discouraged.

Rural dramatics would challenge rural folks who have talent not only to get a start on the stage, but to write plays. Some of the plays which are written about home life should be presented to show the beauty of home life, which would be sort of an inspiration to farm folks to be contented and happy in their home life.

In order to stage a play, you must have cooperation. If you have cooperation on one thing, you are more apt to have cooperation in all of the other things you try to do.

People who read and see and hear plays develop character and personality. It quickens the sympathy through emotion for different kinds of people about whom they know nothing. It makes people want to use better language even
in their everyday life because they hear either better or worse language than they use. If it is worse, it is an incentive to use better language. If it is better, it is always natural to copy.

There are a few states that are doing something about dramatics. Those doing the most are Wisconsin, Carolina and North Dakota.

In Wisconsin they have drawn up the Dramatic Guild. This organization held its first meeting on July 6, 1928. Its central office is Bureau of Dramatic Activities, University Extension Division, Box 175, Bascom Hall, Office 406, Madison, Wisconsin. They have drawn up a constitution which might well be an example for other dramatic clubs and organizations.

The officers for the organization are a president, a vice president, and a secretary-treasurer. The president and vice president are elected at the annual meeting of the Guild. The secretary-treasurer of the Guild is a member of the staff of Dramatic Activities of the University of Wisconsin and is named by the University Extension Division.

All correspondence has to go through the secretary-treasurer's office. The executive committee consists of the president, the vice president, the secretary-treasurer, and the Dean of the Extension Division.

Any organized group or any individual interested in the drama may become a member of the Guild. There is an annual meeting arranged by the executive committee. All clubs who have a membership in the Guild may participate in the annual meeting where the tournament is held.
The tournament is held at the time of the annual meeting. At this tournament any dramatic group who is a member may join. Each group who intends to enter must get ready to stage a play. All of the groups compete and the one staging a play the best, according to the opinion of the judges, is declared the champion group.

In North Dakota they have done something similar, but it is not as well known as that which is done in Wisconsin and Carolina.

In New York the Cornell University has done a lot toward starting little theatres and toward staging plays in similar circumstances as that of the rural community. In Cornell University there is a group of players called the Cornell Players. These players have presented all sorts of plays, but most of them have been about ordinary home life.

In 1918 in Ithaca, New York during fair time, they constructed a crude stage in a barn-like building and staged plays with people went miles to see. The building was packed and there was a horse race going on near by. This example shows that people will go to see plays and willingly pay to see them.

The best plays for use in a rural community are those which have a bearing on the things those people see and do. These sort of plays are easier to stage because costumes are generally modern and the stage setting generally simple. The language and ideas of the people coincide and there is a deeper feeling connected with people like themselves than with those whom they have no ideas as to how they live.
Following are some short plays which might be used for presentation on a rural community platform:

"Blackberrin!" by Howard Smith; "The Olod" by Lewis Beach; "Fingerbolls and Araminta" by Harry Hamilton; "Joint Owners in Spain" by Alice Brown; "Just Women" by C.C. Clements; "Marriages are Made in Heaven" by Graham Price; "Martha's Mourning" by Phoebe Hoffman; "Neighbors" by Zona Gale; "The Old Peabody Pew" by Kate Douglas Wiggin; "The Rag Carpet Bee" by Elizabeth Gale; "Spreading the News" by Lady Gregory; "The Workhouse Ward" by Lady Gregory.

In every club there should be a recent magazine such as, by which to guide them. / The Drama Magazine, 502 Van Buren Street, Chicago, Illinois and the Theatre Arts Monthly, 7 East 42nd Street, New York City.

Along with drama goes music. In every drama club there are some who have musical talent. Music is good to have between acts. Some music publishers are Oliver Ditson, 178 Tremont Street, Boston, Massachusetts; G. Schirmer, 3 East 43rd Street, New York City; Witmark Music Library, 1650 Broadway, Witmark Building, New York City.

When you need information concerning dramatics, you can send to the University of Wisconsin Extension Division, Bureau of Dramatic Activities.

Between acts, readings and orations can be used. Some sources of this sort of literature are Columbia College of Expression list, 130 E. Pearson Street, Chicago, Illinois; Ivan-Eloois-Hardin, 3806 Cottage Grove Avenue, Des Moines, Iowa; The Woman's Press, 600 Lexington Avenue, New York City.

Oftentimes religious plays are wanted. Samuel French is a publisher of a great many religious plays and others.
The following plays may be secured through Samuel French: "The Gift" by Marie Foley; "The Star in the East" by Anna Hornwell.

To organize a dramatic club, there should be a meeting where by-laws and regulations of the group would be drawn up in a sort of constitution. A president, vice president and secretary-treasurer would be elected. These persons would fill their duties at every meeting after that.

The group should meet every month or so until they start to work on a play; then they should meet more often to learn their parts and cues and to produce the whole play. The cast should be chosen by the dramatic leader. There should be a production staff. This staff should have charge of all costumes, stage equipment and lighting. Stage setting need not be elaborate to be effective. It should merely convey the spirit.

The charge for a play need not be much if the settings are simple and cheap. Any one will pay to see a good play. People are interested in that work which is done by rural people. There are some people who will laugh at a dramatic club, but they will go to see the play and pay to do it.
Weed control on the home farm

Raymond J. Grabowenski, ’33
St. Paul, Minnesota

Weeds are persistent plants of undesirable characteristics, which adapt themselves to the soil and climate and are detrimental to crops. The most troublesome weeds found on our farm are the sow thistle, quack grass, Canadian Thistle, wild rose, mustard, French weed, pigeon grass, and wild oats. These weeds are more persistent on some fields than on others.

Our farm is located in Marshall County, Warrenton Township, in the east half of Section 6. It is five miles north and two miles east of the village of Warren.

This farm is divided into four fields, each having its own weed problem.

Field A contains approximately 140 acres. The soil is a fine sandy loam. This field is infested with small, but numerous patches of quack grass. It is sprinkled with mustard, French weed, and wild rose.

Field B contains 100 acres. It has a medium clay loam texture. The most serious weed problem is the control of sow thistle. Canada thistles are found in a few large patches, while wild oats, mustard, pigeon grass, and wild rose are scattered over the field.

The Northwest forty (Field C) is of medium clay loam texture. It is infested with quack grass in two small patches and has a very small amount of pigeon grass.
The farm buildings are on the east end of Field D. This field is used only for hay and pasture on account of a coulee that winds through it.

The farm is equipped with a Fordson tractor and a two-bottom tractor gang plow, six horses and a two bottom gang plow, an eight foot disc, a one-row corn cultivator, a twenty-six foot iron drag, a sulky plow, and a six foot mower complete the equipment.

The first problem in weed control is the elimination of weeds from the seed grain. This can be accomplished by the use of a good fanning mill. In operating a fanning mill, care should be taken to use the correct screens for the different grains. The speed should be well regulated, slow and even. The grain should be fed slowly to the screens. The wind should be regulated to blow the chaff out of the grain. One should be sure the screens are kept clean. Fanning twice should insure good seed grain.

The second problem is to get rid of the weeds in bedding and feed. Care should be taken when making hay that is badly infested with weeds that it is cut when the weeds are in bloom. In quack grass, hay which has been cut after the seeds are ripe, viable weed seeds are apt to occur because live stock cannot digest these weed seeds thoroughly. The spreading of weeds can be prevented by bedding the animals with clean bedding and piling up the manure for a few weeks to let it rot and heat. This kills the germ in the weed seed and they will cause no trouble when the manure is spread on the fields.

The annual weeds such as wild oats, Russian thistle, mustard, French weed and pigeon grass are easily eradicated by
the same process. The first thing to do after the seed bed is prepared is to seed clean seed of a variety that matures early. After harvest, plow as soon as possible and rather shallow. Cultivate as many times as is necessary to keep the field black until the ground freezes. The edges of the fields and roads should be moved before the seeds are ripe. A woven wire fence around the farm will keep out such weeds as tumbling mustard and Russian thistle, also roving cattle which are likely to spread weeds.

Everybody should know what perennial sow thistles look like. It does not look much like the common roadside thistle, but is like wild lettuce. The leaves and flowers resemble the dandelion. It stands from one to five feet in height. It has a green stem that oozes a milky juice when broken. The flower clusters are branched like flax. The seeds are dark brown, oblong, about one-eighth inch long, with many fine ridges. The white silky whiskers at the top act as a parachute to carry the seed on the wind.

Small patches of sow thistles should be dug up and all the branching roots removed and burned. On grain fields, seeding an early maturing crop like early oats or barley and plowing down the stubble as early as possible in the fall, then cultivating until the ground freezes will obtain satisfactory results.

Although expensive bare fallow will eradicate sow thistles, this means losing a crop for one season and it is doubtful whether it will pay unless practiced in order to prepare a bed for alfalfa. The success of bare fallow depends largely on three things: first, plowing when the weeds are in
bloom. This is the weakest time of their life. Plow down as well as possible or they will start trouble again. Second, by starving the roots of the weed by not leaving the leaves form and by cultivating often, and, third, the roots of the sow thistle are brittle and do not pull up like quack grass; therefore, a duckfoot cultivator is better than a spring tooth cultivator, as it cuts the plant off just below the surface of the soil. The most economical and best method of control for this weed is crop rotation.

Quack grass is one of the most serious weeds farmers have to contend with, when it once gets started. In general appearance, quack grass resembles a thin headed variety of wheat. The head is a long slender spike; about as long and half as wide as a head of wheat. The seeds are arranged flat-wise to the stem rather than edgewise. At the base of the young leaf is a pair of small yellow claws which nearly encircle the stem. A pinched appearance near the end of the leaf tip is another characteristic feature of quack grass, which is an elaborate system of creeping underground stems, commonly miscalled roots.

The problem of eradicating quack grass is the prevention of seed and the spreading by underground rootstalks. The most economic method of eradicating small patches is by the use of sodium chlorate at the rate of 5-6 gallons (1 lb. sodium chlorate for each gallon of water solution to each square rod). This kills quack grass completely and prevents growth of other weeds from one to two years. Livestock should be kept away from treated patches because of danger in poisoning them.

It is practical to dig out small areas with a fork
and remove all underground rootstalks and burn them. It should be repeated if any plants reappear.

On badly infested fields, the whole field is worked to eradicate this weed. There is no easy way to destroy quack grass on large areas. The farming practices and climatic conditions may differ, but the principles remain the same. The underground parts of the plant, the rootstalks must be starved, dried out, or as in ordinary practice, both starved and dried out.

The disc tiller is becoming an important implement in the eradication of quack grass. It costs less to operate compared with a plow, because more ground is covered and the work is more thoroughly done. On a pastured quack grass field, a one-way disc tiller is used. This tiller cuts up the roots and plows the ground in one operation.

In a rotation of crops after the legume is cut and removed, a one-way disc tiller is used and is followed by a spring tooth cultivator and the ground kept black until it freezes in the fall. One good cultivation on a hot July or August day is worth two or three in May or September.

Canadian thistle is a perennial plant which spreads by a horizontal root system, which enables a single plant or a group of plants to extend several feet each year in all directions in cultivated land. Canada thistle resembles sow thistle except that it has barbed leaves and the flower is brush shape and purple in color. Canada thistle can be eradicated by cutting the weed in full bloom and following with clean cultivation until the ground freezes.

It can be eradicated by the use of sodium chlorate at the rate of one pound to one gallon of water, applying one
gallon to a square rod. It should be applied with two or three applications during July and August.

It can be eradicated after a legume is cut by plowing during the latter part of July and cultivating at regular intervals of six to ten days for the rest of the season.

A good crop management system that will control both annual and perennial weeds on this farm is as follows: Plow early in the fall. The first year grow barley or wheat and seed down with sweet clover or another legume. The second year, cut the legume for hay or for seed. It is a good practice also to pasture it. If cut for hay, plow down the second crop with a one-way disc tiller or plow and cultivate until the ground freezes. The third year a cultivated crop like corn, beets, or potatoes, should be grown. The fourth and fifth years, grow a grain crop which may be wheat, oats, barley, or flax. This system will increase the productivity of the soil and eliminate most of the weeds.

**BIBLIOGRAPHY**


Dunham, R.S. Perennial Sow Thistle, N.W.S.A. Cir.26. 1928.


Clarke, G. and Fletcher, James, Farm Weeds of Canada

Kings Printers, Ottawa, 1923.


Oswald, W.L. and Boss, A. Minnesota Weeds, Descriptions, Identi-

Soils
Most of Minnesota has been covered by glaciers at one time or another. Five glaciers melted on Minnesota soils ten thousand to fifty thousand years ago, which is comparatively recent in geological time.

There were five great ice ages during which glaciers invaded Minnesota. Some of the ice sheets covered all the state. The five ice ages are known as Pre-Kansan, Kansan, Towason, Illinoisan, and Wisconsin. The Minnesota soils were covered mostly by the late Wisconsin ice sheets.

Before considering what the glaciers did, let us consider how they were formed. A glacier is fed mainly by snow and it is depleted by melting and evaporation. If more snow falls upon the land in winter than melts in the summer, it will have a tendency to build up in time. This is what happens when a glacier forms.

There is an International Glacier Commission, which collects measurements of the glaciers and their movements. They tell us that a glacier is capable of moving forward or backward, downhill or uphill, but that it always moves in one direction. It is pulled down hill by the force of gravity and pushed and pulled by other forces. The average movement of a glacier is about eight inches a day or from one hundred to five hundred feet a year. There is
one glacier in Greenland that has been known to move one hundred feet a day, but this is exceptional speed for a glacier.

Three glaciers came into Minnesota during the Wisconsin ice age. They came at comparatively the same time and yet they did not cover the whole area of Minnesota. They were long, narrow "tongues" or branches from three ice centers in Canada. One which came from west of Hudson Bay, from the province of Keewatin, is spoken of as the Keewatin glacier. One which came from Labrador is spoken of as the Labrador glacier. One which came from north of Lake Superior, from the old province of Patricia, is called the Patrician glacier.

The Keewatin ice lobe came up the valley of the Red River of the North, down the valley of the Minnesota, and into the Des Moines valley as far south as Des Moines. This glacier spread eastward into Minnesota and westward into North Dakota. It carried and pushed boulders, pebbles, and soil of many kinds, including limestone from Manitoba, all of which was left spread over the land when the glacier melted away. This is known as the gray drift. The glacier melted faster on the sides and ends than it advanced. Several ranges of hills show that it advanced several times to push gravel and boulders up into moraines.

The Labrador glacier pushed through the Lake Superior basin and westward into Minnesota to McGrath and McGregor, in what is now Aitkin County. It brought a pinkish or bright red drift without limestone over the area which it covered. Between McGregor and Lawler, the edge of the gray drift from the northwest (Keewatin) overlaps onto the red
drift from the east. This shows that the Labrador glacier reached its widest extent and began its retreat before the Keewatin glacier reached its widest extent. It also left a succession of moraines showing that this glacier advanced several times during its retreat or melting away.

The Patrician glacier came from north of the basin of Lake Superior and pushed across northeastern Minnesota towards Minneapolis. It reached south as far as what is now Belle Plain, New Prague, Lonsdale, Lakeville, Langdon, and Afton. It brought a lavender colored drift from Patricia, but after crossing the iron ranges in Minnesota, this drift is red with iron, although not as bright red as the Labrador drift in Minnesota. The Patrician drift is described in Minnesota geological reports as the "red drift." The moraines of the Patrician drift north of St. Paul are rough, stony, rolling belts. Even when the Keewatin and Labrador glaciers rode over them, they remained as rolling belts. The Patrician glacier was back near the Canadian border at Hunter's Island when the end of the Labrador ice sheet was at Carleton, and the Keewatin glacier was at its greatest extension at Des Moines. This glacier developed many gravely outwash plains. Examples are Harnline Prairie in St. Paul, Rosemount Prairie in Dakota county, and the sandy and gravely plain east of the Mississippi River from Sauk Rapids to Little Falls.

The color of the glacial drift is a simple matter, but is often confused. Humus has formed on the top of the drift deposits so the top soil is dark in color. Under the surface
soil, there is a rusted or oxidized brown layer of two to four feet. The rusty or oxidized top of the gray drift is brownish red in color. The oxidized top of the Patrician red drift has a yellowish red or iron rust color. This is also the color of the Labrador red drift in Minnesota.

The actions of glaciers on hills and rock ledges were quite destructive. When a hummock or hill chanced to lie in the path of the glacier and was too large to be broken off or rutted out of place, it would be surrounded by ice and overflowed and after the glacier had passed, it would be combed and rasped by the ice and pieces of rock carried under it. The ice moved in a general way down hill and from the north towards the south.

We got a valuable deposit of limestone from Canada, from what is now known as the province of Manitoba. This limestone was ground into fine flour by the glaciers and mixed with our soils. This one of the reasons why wheat growing is profitable. It was a most valuable ingredient.

Moraines are fragments of earth, stone and other material that has been pushed along by the glacier. When the ice melted, it left the earth in irregular heaps. These are known as moraines. The rear of the glacier stands still when melting occurs, but the front and sides recede. When it has finally melted, there are large heaps of broken stones, earth, and soil left in heaps, formed in irregular ridges. Such a formation is called a terminal moraine, because it is formed at the end or terminal of the glacier.

At the sides of the glaciers, stone and soil gather from the grinding of ice against hillsides. This material is left in long ridges called lateral moraines.
The material ground into powder and pushed into hollows by the ice sheet is called a ground moraine.

If the glacier melts faster than it advances, it leaves a pile of boulders and soil, where it stood. Then it may not melt for awhile, but may advance and build this ridge higher. It usually forms many such ridges. Sometimes these moraines are strewn thickly with boulders. Sometimes no pebble larger than a toy marpole can be found. It all depends upon the material the glacier has picked up.

Till plains are the materials left under the glacier when it melts away. They are left in the form of broadly rolling or gently undulating plains. These are the ground moraines of the continental glaciers. The material of which they are made is known as till. These till deposits or ground moraine make up the greater part of the prairies of the northwestern states. The material consists of rock fragments and rock from ledges that broke off as the glacier passed. These materials were ground up and mixed by the ice. The finest material is known as clay. The next finest is rock flour or silt. All sizes from clay and silt to gravel and boulders are included. These plains are often strewn with large boulders and are frequently spoken of as boulder plains.

Outwash plains are formed by streams caused by the melting of the glacier. These torrents pour out from underneath the ice sheets. Such streams carried much silt and gravel. Deposits from glacial rivers extended for many miles and left silt, gravel, and boulders on level plains. These are known as outwash plains. The Northern Pacific Railway crosses such a plain from Anoka to St. Cloud and another from Little Falls to Brainerd.
Streams made hollows in the land under the glaciers and formed gravel beds. When the glacier retreated, it filled some of these up and covered them over with drift. They are known as Esker. That is the source of most of our gravel of today.

Minnesota contains parts of two great glacial lakes: Lake Duluth, which occupied the western part of the Superior Basin and Lake Agassiz, which occupied the Red River basin. Lake Duluth covered a narrow strip along the shore of Lake Superior into eastern Carlton County in Minnesota. Its highest stages were about five hundred feet above the present surface of Lake Superior. Lake Agassiz extended as far south as Lake Traverse, where it discharged past Brown Valley to Minnesota. Its border is only from twenty to thirty miles east of the North Dakota-Minnesota line from Lake Traverse northward to Polk County, about twenty miles east, southeast of Crookston. It then makes an abrupt turn and continues eastward past the south side of Red Lake and across Koochiching County into St. Louis county as far as the Valley of Little Fork River. It then turns northward and enters Canada from northeastern St. Louis County. It was about seven hundred miles long or just as big as our five present Great Lakes.

The most important features of these lakes are beaches or ridges of sand and gravel washed up along their shores. The shores of Lake Agassiz stand high and dry above the flat parts of the lake. They generally stand five to ten feet above the bordering plains and occasionally fifteen to twenty feet.

Soil is weathering fragments of rock mixed with organic matter. Soils are naturally rich, because they are made up of a mixture of many kinds of broken rock, with age long accumulation of decayed organic matter.
All soils are composed of sand, and clay with a varying admixture of pebbles and larger rock fragments. To this has been added organic matter or humus from the decay of plant or animal life. The texture of the soils depend on how much silt, sand or clay they contain and the amount of organic matter.

The finest soil particles are clay; the next in size is silt, which is rock ground to flour. Then follows sand, fine and coarser, and then the gravel. Following this graduation in fineness of rock particles, the classes of soils make up the following lists: clay, clay loam, silt, silt loam, loam, sandy loam, and gravelly loam. Any one of these soils may contain a quantity of stone, in which case the word stony is prefixed, as stony clay, stony loam, and stony sandy loam.

In the southeastern part of the state, embracing Houston and the eastern part of Winona counties, the glaciers never came. This is a part of the driftless area of the Upper Mississippi Valley. There is no till or other deposits of the glaciers in this district. The bed-rock is of limestone and a residual clay soil has been formed from its weathering. A windblown silt loam known as loess caps the higher lands and covers the gentler slopes. Beneath the loess soil, there is a deeper clay subsoil, which is the same except that it contains no humus.

In the southwestern Minnesota, there is an area of old gray drift of the later (Wisconsin) glaciation. It includes Rock county, the southeastern part of Pipestone and western Nobles counties. Over this old drift, there is a deposit of loess several feet in thickness. The soil partakes of the nature of the
loess rather than the deeper till. It is a silt loam. They have not been leached as much as the soils in southeastern Minnesota due largely to less rain. This soil is very fertile and is one of the finest farming sections of the state.

The south central part of Minnesota is mostly a large plain, which the Keewatin Glacier passed over. The plain is largely prairie, and the soil is a rich black loam on its level portions, and a brown or chocolate colored loam on the moraines. The glaciers left silt there and the soil is of a fine grained quality.

The Lake Agassiz plain is a vast region in northwestern and northern Minnesota that was covered by the waters of the Glacial Lake Agassiz. The five counties of Red Lake, Pennington, Marshall, Kittson and Roseau are entirely included in this area, and portions of the following twelve counties were covered by its waters: Traverse, Stevens, Grant, Otter Tail, Wilkin, Clay, Norman, Polk, Clearwater, Beltrami, Koochiching, and St. Louis. There have been four types or classes of soils formed from these lake deposits. They are:

(1) Lacustrine or lake clay soils, formed from fine sediments deposited in the deeper waters of the lakes.

(2) Sandy soils formed from washed and assorted sediments in the shallower parts of the lake.

(3) Soils formed from lake washed till on which only a thin deposit of lake sediment was made.

(4) Swamps, including deep peat and muck soils.

A soil and its productiveness depends largely upon the drainage conditions. A soil of clay or clay loam over gravel
or loose sand suffers in time of deficient rainfall, while a soil resting upon heavy clay may be drowned out unless surface drainage is perfectly adjusted. A soil underlaid by limestone, by loess, or by a till consisting of a light clay, or a heavy loam will stand great variation in rainfall and still be highly productive, because the rain water will not drain down nearly as fast into the subsoil. In the driftless area, the drainage is complete, because every acre slopes toward some drainage line.

The condition of the soil depends to some degree upon the character of the vegetation that grows on it. In the prairie the weathering agencies are more uniform than in the forested districts and consequently a more uniform soil is developed on a given deposit. On the whole the leaching of lime seems to be less rapid on prairies than in forests. Thus, in the newer drift limestones are often present at the surface in prairies, but in the forested areas, limestones usually have been dissolved out to a depth of some inches and often to some feet. The rate of erosion and removal of soil is more uniform in the prairie than in the forested tracts. It takes more force to dislodge the trees than the grassy vegetation on a hillside. The erosion in forests is likely to become concentrated in occasional gullies, whereas many small channels may be developed on every hillside which serve to break it down rapidly. On the whole, leaching is less in the prairie and more in the forest, but there is more erosion on the prairie.
PRAIRIE and FOREST
EIBLIOGRAPHY


Leverett, Frank and Pursell, U.G.


BUSINESS TRAINING
BUSINESS TRAINING

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The two important arts of business training are typewriting and shorthand.

Shorthand is the art of writing legibly, by means of brief signs at a sufficiently rapid rate of speed.

The earliest record there is of an organized system of shorthand dates from the year 63 B.C. in Rome. At that time Marcus Tiro invented a system of shorthand for recording the speeches of Cicero, and others of the Roman senate. Tiro's system abounded in the use of initials, following the abbreviating formula commonly used by the Romans.

After the fall of the Roman Empire, the use of the Tironian system survived for several centuries. It was used for recording public documents, deeds, names of officials, and other government work, but the chief demand was for recording the exact utterance or words of the religious leaders of the day.

England was the birth place of the modern shorthand. This new system was called orthographic because they followed the spelling of the word but often omitted a silent letter and sometimes a vowel. William Tiffin introduced the first system of phonetic shorthand in 1750. The first shorthand book published on the new system of phonetics or sounds was "The Stenographic Sound Hand" by Isaac Pitman in 1837. Besides classifying the sounds of the language scientifically, he also introduced simple forms of abbreviations for rapidity.
Just as Pitman objected to the orthographic system, so another group of authors discarded the use of geometrical signs.

In 1888 John Robert Gregg published a Light-Line phonography. Gregg adopted the phonetic principle and added a scientific type of handwriting. He brought his method to America soon after its publication in England and at present, it is taught in more schools and used by more stenographers in the United States than any other system. Some changes have been made since 1888, but the principles have remained the same.

Expert writing of shorthand has been recognized in some states as a profession. Records have been established of two hundred and eighty words a minute on court testimony and 359 words a minute on judge's charge.

Typewriting is the second art of business training. The typewriter is a machine which prints characters in sequence, performing the work of writing at a speed far greater than is possible with the pen.

The first record of an attempt to invent a typewriter is found in the records of a British patent office. This record shows that a patent was granted to Henry Mill on January 7, 1714 for an artificial machine or method for the impressing or transcribing of letters either singly or progressively.

The first practical typewriter was invented in 1868 by a Milwaukee resident. This machine could write well at a rate of speed far exceeding the pen, but it was still a very crude machine. It lacked the present typewriter carriage with its paper cylinder and the keyboard in its present form. Many improvements were made and finally E. Remington & Sons, gunmakers of Ilion, New York, got the contract for the develop-
ment and manufacture of the Sholes and Glidden machine.

The first typewriter had no shift key mechanism; it wrote capital letters only, but the problem of printing both capital and small letters without increasing the number of keys was solved by placing the capital and the small-faced letter on the same bar and so this introduced the shift key. The shift key typewriter appeared on the market in 1878. But soon after there was another solution of the same problem; this was called the double keyboard machine, which contained twice the regular number of keys - one key for each of the small letters, capitals, and numbers.

There have been many recent major developments made on the typewriting machine, and the most recent improvement is the noiseless machine. The typewriter has been one of the greatest transforming factors of modern business.

Typewriting and shorthand have been widely known as the twin arts of business as they run hand in hand. Most people do not make use of the shorthand notes unless they transcribe them on a typewriter. Many people do not realize the real value of a good business training. If they happen to see one of the lower classes of stenographers who sits on the desk and chews gum when her employer isn't around, or who uses his time for something outside of the office, they compare all others to her. This is unjust to the majority of stenographers who have had a good business training. Many stenographers who have government positions receive a larger salary than do some of the government officials, but they deserve this, as they have spent much time and money in preparing themselves to be worthy of a good position.
There are nine important factors in business training; the most important of these is accuracy. This means that when an employer asks his secretary to file material, she files them under the correct headings; she does not lose papers; her notes and references can be relied upon, and she is accurate in proof reading and in the transcribing of her notes.

The next important factor that runs hand in hand with accuracy is responsibility. A responsible secretary is interested in the business of her employer. She listens very attentively to his suggestions but does not tell others outside of the office that she has heard. She helps without being told to do so.

Do you think a secretary could be successful without intelligence? No. She must not have to be told to do things repeatedly, but should get the idea with only a mere suggestion, and she should do everything in her power to improve the office routine. She should be quick and alert to make decisions on her own understanding.

Courtesy to others is another very important factor in business training. Courtesy is thoughtfulness of others and it enables one to meet people and make them feel at ease. Its seed is imbedded within our hearts and minds, but like the most tender flower, it must be cultivated and watered constantly to make it bloom.

Another important factor is initiative. Do you do things that have to be done when it ought to be done? That is initiative. This is valued very highly in the business world because the secretary who has it does not wait to be told when
and how to do things, but works them out for herself.

Judgment enables a secretary to bring work up in the order of its importance, and to recognize matters which are important to her employer's business. But you must have experience to have judgment.

Tact means doing things in the nicest way possible and taking into consideration other people's point of view. Personal pleasantness goes along with tact.

These are some of the most important traits of a successful private secretary. The development comes within; it is the result of effort directed toward a definite goal.

In analyzing personalities, you will find that people who are successful in any field of progress must have these factors to advance to their particular goal with success.

REFERENCES

Encyclopedia Britannica

Smith and Corona Speed Tests on Personality
HISTORY OF THE TYPEWRITER AND SHORTHAND

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Shorthand is the art of writing legibly by means of brief signs at a rate of speed sufficiently rapid to record speech. It is used in recording court trials, meetings of parliament and legislative bodies, but mainly for taking dictation in business offices.

In B.C. Marcus Tiro originated a system of shorthand to be used in recording speeches of the Roman Senate. This system was taught in the schools and remained in use for a number of centuries after the fall of the Roman Empire. The rise of the Christian Church increased the demand for shorthand, because a method was needed whereby the speeches of the religious teachers could be recorded.

In 1888 in England, Timothy Bright originated a new system of shorthand. This new system followed the spelling of the words quite closely, but omitted silent letters, and in some cases, the vowels. The first book Bright published was called: "Characterie, The Art of Short, Swift, and Secret Writing by Character." Bright is often called "The Father of English Shorthand."

There are many systems of shorthand: namely, Phonetic, Pitman, Script, and Gregg. The latter system is the most common and is the standard system in America.

The most important use of shorthand is made in business offices. The business manager dictates letters and his
stenographer takes the dictation down in shorthand, and later writes it out in longhand. It saves much time as otherwise the business manager would have to write all the letters himself. If we didn't have any system of shorthand, we would not be able to record court trials, or important meetings of legislative bodies because it could not be written fast enough in longhand.

The Gregg system was first published in 1888 in a paper covered pamphlet. Five years later, it was put in book form and published.

The study of shorthand not only teaches us the principles of writing; it, but also broadens the mind and increases the concentrative power. In taking dictation, the mind must be on the work to record the speech correctly, and, therefore, concentration is necessary.

The typewriter is a machine which prints characters, performing the work of writing at a much greater speed than is possible by the pen.

In 1714 Henry Hills, an Englishman, received a patent, but his machine was never manufactured. In 1843 a patent was granted to Charles Thurber of Massachusetts. In this machine, letter spacing was effected by a longitudinal movement of a cylinder. This machine was exhibited at the Centennial Exposition in Philadelphia in 1876. It was very clumsy and wrote only capital letters. Some of its features became standard: namely, the paper cylinder, line spacer, and carriage return mechanisms, the arrangement of type bars, printing through an inked ribbon, and the position of keys on the keyboard. The first shift key typewriter was put on the market in 1878. All typewriters have standard keyboards;
that is, the position of the letters on the keyboard is the same.

We learn to type by the touch system; that is, by feeling for the keys and not looking at the keyboard. To be a good typist, one must have accuracy and speed, and to obtain these, we must have rhythm. Therefore, rhythm is one of the essentials of typing and should be worked for first. When good rhythm is obtained, one may work for more speed.

The typewriter should be cleaned and dusted often. When not in use, it should always be covered. New ribbons should be inserted whenever needed or the print will not be plain.

Shorthand and typing are called the "twin arts" because shorthand did not become widely used until the typewriter was invented.

Before typing and shorthand were practiced, women's activities were confined almost entirely to teaching, nursing, and home making. Now many women are employed as typists and stenographers in business offices. Stenography is one of the main factors in the so-called "emancipation of women" in the twentieth century. Shorthand and the typewriter have become two of the essentials of modern business.

The parts of the typewriter are as follows: the carriage on the top, which moves when the carriage release is pressed down. The paper release lever, when pressed down on, releases the paper so it can be pulled out. The paper fingers hold the paper in position. The platen is the round paper cylinder upon which the paper rests. The platen knobs, one on each side, turn the paper cylinder. The tabulator stops control the margin and can be set at any number wished. The number of spaces between lines is regulated by turning the line
space regulator. There are two ribbon spools, one on each side, which are inked. The letters are printed through this ribbon. The shift key, when pressed, prints capital letters. The margin release key releases the margin, so more letters can be printed without shifting the carriage. The line space lever moves the carriage and at the same time moves the paper up one space. The back space lever moves the carriage back one space each time it is pressed. The space bar moves the carriage one space ahead and is used to separate words. The decimal tabulator key is for writing decimals.

The most widely used typewriters are: L.C. Smith, Royal, Remington, Underwood, and Woodstock. These machines all have standard keyboards but differ in the position of the other parts. Some typewriters are noiseless; that is, the keys make only a slight sound when pressed. Noiseless typewriters are usually the favorites in offices where they are used often. The continuous noise of the keys becomes very monotonous to the typist.

In some offices, shorthand has been replaced by the dictaphone. This is a machine something like the phonograph. Speeches are given over a record in a machine like the one used to make phonograph records. Later the record is played and the stenographer writes it out in longhand. In this way shorthand is not used at all. During this time of depression, the dictaphone causes more unemployment, as not so many stenographers are needed. The dictaphone is very expensive and few offices can afford to have one.
I chose this topic for my senior research paper because I thought that it would be very interesting, and all of us should know something about our state's history. The first Europeans to come to the present site of Minnesota were the Frenchmen. Soon after the opening of the seventeenth century, a company of French merchants founded a colony. Champlain was the leader of this band of people who were out to settle the new world.

Two of the French explorers of this time were Joliet and Marquette. On May 17, 1673 these two men and five voyagers embarked from Mackinac in two birch bark canoes. They coasted to the head of Green Bay, then up the Fox River and, after four days of travel, they reached the Mississippi River. They drifted down the Mississippi, trying to find the mouth. They drifted down as far as Arkansas and then came to the conclusion that it could not empty into any other place than the Gulf of Mexico.

Two other men who came to the present site of Minnesota were Groseilliers and Radisson. They are said by some historians to be the first to come to Minnesota, but some historians say that this is not so. They landed in the area of Minnesota in the spring of 1655. Radisson wrote a narrative, which said, "We arrived, some 150 of us,
men and women, to a river side where we stayed three weeks making boats. We went up the river eight days till we came to a nation called Pontansatenich and Matonенach; that is, 'the scratched.' There we got some Indian meal and corn from those two nations till we came to the first landing isle. There we were well received again." They do not know where these men and their party settled permanently.

A new character comes into the story at this time, Sieur de La Salle, a man of much confidence and courage. His occupation was to explore the Mississippi River upstream and down. Late in the fall of 1678 his expedition left Fort Frontenac. After much discouragement he found himself intrenched in a fort on the Illinois River. As circumstances rendered a long delay, he decided to send a small party northward to trace the great river upstream as far as possible. As the leader of this party, he chose Michael Accault.

At Fort Crevecoeur, two days after his departure for Montreal, LaSalle saw his little part of explorers lauded with the very little ceremony. After nineteen days' navigation, the party made a landing a short distance below the falls of St. Anthony. After a few more months, the party finally discovered the mouth of the Mississippi River and LaSalle received much praise and honor.

One of the first settlements of Minnesota was at Fort Snelling located where the city of Minneapolis now stands. In 1819 Colonel Leavenworth came here with a detachment of troops and founded it. During the winter months, great numbers of the soldiers died from hunger and disease.
The following spring Colonel Snelling came with more troops and called this place Fort Anthony. A while later, General Scott inspected the fort and changed the name to Fort Snelling in honor of the new man who was in command.

It may be well to mention at this time how the territory of Minnesota came into existence.

The territory of which Minnesota was a part once belonged to France. In the year 1802 President Jefferson was very much interested in having control of the west. He offered to pay Napoleon $14,500,000 for this territory. This was in 1803 and Napoleon was at war at the time, and as he needed money, he accepted this offer. We can be thankful for this purchase because Minnesota is a state that was partly included in the territory. After the Louisiana Purchase, Jefferson made this statement, "We had lived long; but this is the noblest work of our lives. From this day the United States takes their place among the powers of first rank."

Another great influence on the history of Minnesota was the northern boundary of our state. This territory was ceded to us in the year 1818 by Great Britain.

The first town in Minnesota was St. Paul. It was founded by a young Catholic priest in 1840. This young priest built a chapel and named it Saint Paul; this is how St. Paul received its name.

The first school in Minnesota was founded at St. Paul in 1847. The first teacher was Miss Harriet Bishop. This school was made very crudely out of logs as it had been a
blacksmith shop in former days and it was also very small and uncomfortable.

The first early Indian mission was located at Madelene Island. The preacher of this mission was Lyman M. Warren. He also established a school at this place. It was not until the summer of 1830 that he made a good start in his work, when he induced a young American teacher in the Mackinac school to come and assist him in his work.

Another missionary was the Reverend William Thurston Bontwell, who accompanied schoolcraft on his expedition to Lake Itasca in 1832. The schoolcraft party returning from the source of the Mississippi reached La Pointe on August 6, 1832. Here Bontwell detached himself and remained for the next year, assisting his fellow missionary, Hall.

One of the first settlements of this country was the Hudson Bay Company by Lord Selkirk. He acquired a tract of land about 160,000 square miles west and south of Lake Winnipeg and the Winnipeg River. The northern part of the state of North Dakota and Minnesota was included. In 1814 bands of colonists, for the most part Scotch Highlanders, numbering about two hundred, reached the new settlement. Another very important settlement in the Red River Valley was Fort Douglas.

In 1846 a representative from Wisconsin, Morgan L. Martin, brought up the bill that Minnesota should be made a territory. The bill was given to a committee and from there it was sent to the House. It passed the House, but when it was brought before the Senate, it was defeated.

After some years Douglas started to work again to make Minnesota a territory. After a while, the people of
Minnesota drew up a petition and sent it to Congress. It passed both houses by a large majority and, therefore, Minnesota was made a territory in 1849. The first governor of this territory was Alexander Ramsey. The capitol was located at St. Paul and the people of the southern part of the state wanted it at St. Peter, but the bill was never passed.

In 1857 there was a bill brought before Congress stating that Minnesota should be admitted into the Union as a state. Slavery was a very big problem at this time. When the bill came up before the House, it passed by a large majority, but when it came before the Senate, it did not pass because the people of the South thought that it would become non-slavery. The second time the bill was brought up, it was passed in both houses by a very large majority. The bill was given back to the president who signed it and Minnesota was admitted into the Union as a state in 1858.

The territorial governor at this time was Gorman. He called a special meeting and told them that Minnesota had been admitted as a state. On July 1, the first election was held and Sibley was elected governor.

Minnesota was the thirty-second state to be admitted into the Union. Minnesota is eleventh in size and its seal was adapted in 1858.

We can be very proud to be living in a state like Minnesota. It ranks first in the output of iron ore, and is a very important state for its lumbering industry.

This concludes my summary of the early history of Minnesota.

BIBLIOGRAPHY

A History of Minnesota - Folwell.
Minnesota Historical Society Collection, Vol.I.
The American People - Muzzy.
THE EARLY HISTORY OF MINNESOTA

Orville Erickson '33
Hawley, Minnesota

The word "Minnesota" was the Dakota Indian tribes' name for a considerable tributary of the Mississippi which begins at Big Stone Lake, flows southward to Mankato, turns there at a right angle, and runs on to Fort Snelling, where it empties into the Great River. It is composed of "Mini" meaning water, and "sota", garnet blue or sky colored. The name was given to this territory as established by act of Congress on March 3, 1849 and was retained by the state with its diminished area.

Minnesota has many relics of historical importance. Of these the Kensington Rune Stone is the most precious. The stone was found on Section 14, Salem Township, Douglas County, about three miles northeast of Kensington on November 8, 1898, by Olaf Odman. It was found while grubbing timberland under a large ash tree which was around forty years old.

This relic soon became and still is a topic of worldwide discussion. The stone is thirty-six inches long, sixteen inches wide, six inches thick and weighs about 230 pounds. It is gray wackle of dark gray color evidently rifted by some big boulder of the glacial drift.

On the face of the stone is a peculiar inscription in strange characters. These have proven to be runic letters used several centuries ago by the Scandinavian people. It was examined by Mr. O. Haland, a scholar of history and literature and translated thus:
"Eight Swedes and twenty-two Norwegians on an exploring journey very far west. We had a camp by two rocks in the water one day's journey north from this stone. We were out fishing one day; when we returned we found ten men red with blood and dead. A.V.M. (Ave Maria) Save us from evil. We had ten men by the sea to look after our vessel 14 (41) days' journey from this island. Year 1362."

This should be proof enough, if the stone is genuine, that the Norsemen were here before Columbus discovered America. If the tree was forty years old, as it was said to be, the stone was in that position at least since 1860. At that time no white settlers were within one hundred miles of the place and no railroad within four hundred miles.

The journey itself of those daring Norsemen into Minnesota is not at all impossible, but as it remains today, it is a mystery which will probably never be solved.

It is said by Castle that the Omaha Indians and their kindred descended into the Ohio Valley and then divided, some going down the Mississippi and others, up the river. The movement of this tribe can be traced fairly well. Their habitat west of the Mississippi can be told approximately. The nation thus scattered became known as the Dakotas and embraced the Isantas of Minnesota and all the other Minnesota branches of the Sioux, the Sisseton, the Trenton, the Hidatse, the Mandan, and the Blackfeet with their numerous sub-tribes. These are all related linguistically and are declared to be of the same fundamental tongue as the Cherokee.

We do not, nor may we ever know, what tribes first
occupied Minnesota. At the coming of the white man, the Dakotas held all of it except the extreme northern part where the Crees and the Monsonis appeared to predominate. The earliest inhabitants lived in earthen wigwams. The Sioux (Dakotas) exterminated the Hedstsis, who were of large stature but very cowardly.

If the Dakotas were the mound builders distinctively of Minnesota, they had also occupied the Rainy River and the Winnipeg Valley. They must have had trade with the north shore of Lake Superior, for copper is found in the Rainy River mounds. It is quite certain that the Iowans were driven out of Minnesota by the Dakotas before the coming of the whites. It has been stated by great historians, but it is not certain, that Indians called the Assiniboines once dwelt along the banks of the Mississippi in Goodhue county. These Indians in the early time associated mostly with the Winnebagoes and together they controlled the southeastern part of Minnesota, while the Omahas lived in the southwestern part of the state.

However, with our theory of the "Rune Stone" yet unproven, we will have to say that the first white men to set foot on the soil of Minnesota were Sieur des Groseilliers and his brother-in-law, Pierre d'Esprit Radisson, or Sieur des Radisson. Records show that these Frenchmen were in Minnesota in 1655. They went beyond Lake Michigan and Superior and penetrated into what is now Minnesota. These men have the distinction of being the first white men to reach the Upper Mississippi River.

Then in 1680 Father Louis Hennepin and his men, while exploring the Mississippi, were taken captive by the Indians
and while on an excursion with the Indians, discovered the St. Anthony Falls.

The first settlement in Minnesota was established in 1819 when Lieutenant Colonel Henry Leavenworth started a settlement at the present site of Fort Snelling. They built a fort and a few rough cabins. They suffered terribly that winter; many died of sickness, cold and starvation, as food and supplies were very scarce. In the spring there were only a few settlers left. More settlers came in the spring and thus enlarged the settlement. Soon a large colony was formed within a radius of about twenty miles.

The number of pioneers was very small until about 1832 when the larger part of the immigration started. St. Paul, the first town in Minnesota, was started in 1844 when a postoffice was established by Joseph R. Brown.

During the decade from 1830 to 1840 a group of remarkable men settled in what, to them, was but a mere landscape, but to us is Minnesota. They were Norman W. Kittson and Henry H. Sibley in 1834; William Forbes, Franklin Steele, Henry M. Rice, and William Halcomb in 1838.

The Lake Superior region was settled at an early date of 1830 by William Atkins, the Morrises and others. These gentlemen later moved to the city of St. Paul and became well known residents, both in political and social affairs. In 1803 part of Minnesota became property of the United States through the Louisiana Purchase. The 1819 treaty with England established the northern boundary of Minnesota at the 49° latitude.

On March 3, 1849 President James K. Polk signed the
bill which established the territory of Minnesota. This region was a wilderness and a vast waste of timber land with a white population hardly exceeding one thousand inhabitants; nearly all these resided in the villages of St. Paul, St. Anthony, Stillwater, and Mendota or at Fort Snelling. There were only small farming patches to be found throughout the territory, ranging from six acres to small garden patches.

All food, except the vegetables they could raise, came from Illinois, and not a newspaper was published north of Dubuque, Iowa and not a railroad west of Chicago.

In 1858 Minnesota was admitted as a state, naming St. Paul as its capital. The lady slipper was chosen as its state flower and the young state was given the nickname of the "Gopher State."

BIBLIOGRAPHY

The Early History of Minnesota - William Watts Folwell
101 Best Short Stories of Minnesota by Merle Potter
The History of Minnesota by Henry Castle
The History of the Early Settlement of Minnesota

The establishing of a military post known as Fort Snelling in the year of 1819, where the Mississippi and the Minnesota rivers meet, constituted the first permanent American occupation in Minnesota and was an important influential event in the state history.

At the time of this event, the country became known, though slightly, to America but for many years almost no Americans inhabited it. The only people in this large territory were Englishmen and Frenchmen. All of the valuable fur trade, not only of Minnesota but of the entire northwest, was controlled by English corporations known as the Hudson Bay Company and the Northwest Fur Company.

Lake Minnetonka was discovered by white people in 1822. Joseph R. Brown, a soldier from Fort Snelling, and Joseph Snelling, the colonel's son, followed Minnehaha creek along its crooked bed from the falls to the lake. The trip took three days. These were the first white men to visit and report upon the now noted lake, although it received little enthusiasm at that time.

At the beginning of the summer of 1835, many epidemics raged throughout the settlements of Indians. In February and March, severe blizzards followed a snowfall of two and three feet on the level. These hardships caused much suffering and death among the Indians. On one occasion, seventy Upper Sioux Indians were overtaken by a snow storm and blizzard.
on the prairie which is now called Swift County. The storm completely snowed them in and their provisions became exhausted. At last some of the stronger men started for the trading post at Lake Traverse. Traveling was so hard that it took them more than a week to travel the eighty miles. When a relief party finally reached the scene of disaster, they found many dead bodies lying around unburied and the remaining people eating the flesh of the dead.

The year 1829 there was a terrible drought and famine everywhere. For ten months the average precipitation of rain and snow was one inch.

At the beginning of the nineteenth century, the Earl of Selkirk, a wealthy and generous Scotch nobleman, wrote several pamphlets urging the colonization of the British people in England's possessions in North America. In 1811 Lord Selkirk obtained a large tract of land for colonization purposes in the lower region of the Red River of the North, in what is now Manitoba, Canada, from the Hudson Bay Company.

The first immigrants came from Scotland. They settled on the Red River and were called the Red River colonists. They began erecting houses in which to live, but the Northwest Fur Company, which thought Minnesota should not be settled because it would only drive out the beaver, made the colonists captives and compelled them to march to Pembina, which is now in North Dakota just across the Northern Minnesota boundary.

In the summer of 1815 over two hundred Scotch colonists settled at the mouth of the Red and Assinboine rivers. Again the Northwest Company attacked the white settlement. They drove off the horses and cattle and threatened the colonists
with death if they stayed in the country.

These Highlanders were simple folk, not well informed in geography or real estate and it was easy to deceive them about the land they were to settle. The people as a whole were very poor. There came a time when the true worth of the land became known even in the Highlands and immigrants became exceedingly hard to secure.

A Kentuckian by the name of Hardin Perkins erected a saw mill in the Chippewa valley on the banks of a small creek. The mill was nearly completed when the stream suddenly overflowed its banks and swept away the entire mill. Mr. Perkins was forced to return to Prairie du Chien. Colonel Snelling was very much opposed to the rebuilding of the mill and vowed that if it was rebuilt, he would tear it down. This retarded the lumbering industry for some time. Not until 1839 was another mill erected. This was the beginning of the lumbering industry.

On the Missouri river in September 1830, two men were found murdered and their mules and possessions stolen. This was only the beginning of the Indian atrocities. The Sioux occasionally murdered travelers from Pembina. No one traveled in complete safety.

In the spring of 1833 two brothers came to the north country as self-appointed missionaries. They had a very hard time with the Indians and the few settlers. Two years later an ordained minister erected mission buildings on the western shore of Lake Harriet near where the pavilion stood in recent years. Several years later more missionaries came and they, too, established mission houses.

Many treaties were signed by the Indians. The
one of most interest to us is the Treaty of Pembina. On the second of October 1863, a treaty was signed at the old crossing of the Red Lake river about twelve miles northeast of Crookston. The place is now called Louisville or Huot. This treaty gave all of the Red River Valley in Minnesota and Dakota, except a small portion already ceded, estimated at about 11,000,000 acres, to the white people at a purchase price agreed upon.

The plan for the organization of Minnesota was conceived by Mr. Joseph R. Brown. In September 1845, Morgan L. Martin, delegate from Wisconsin territory, asked leave to introduce a bill establishing the territorial government of Minnesota. On December 23 he introduced the bill. There was much argument over whether the territory should be called Minnesota or Itasca. Then the name Chippewa was suggested. After much discussion and time spent, the land was finally admitted as an organized territory. However, this did not take place until 1848.

John Morgan took an enumeration of all the inhabitants, except Indians, within the territory. This was done in the year 1849. It was discovered that there were approximately 4700 settlers scattered through the territory. Most of them were living along the Minnesota, Mississippi, and Red Rivers.

The first legislative assembly consisted of nine councilors and eighteen representatives of Minnesota. The legislature convened November 1, 1849. The most important acts were passed during the session and approved by the Governor. The territory was divided into nine large counties.

The real estate speculation started in Minnesota as early as 1852. Every where, every thing was crying land!
Money! Saw Hills! Town Lots! And so on. During the next few years roads were built, towns sprang up overnight and farms were started in the wilderness. The panic of 1857 found these people in an exceedingly prosperous condition. When the effect of the money panic was felt, banking house after banking house closed its doors. There was a great scarcity of money. Money that had been useful before now became worthless and the paper money could not be exchanged for silver.

Thus ended the period of Minnesota's history as an organized territory. The great losses by real estate speculation served to retard the development and progress.

BIBLIOGRAPHY

Minnesota in Three Centuries - Volume II.
Minnesota in Three Centuries - Volume III.
A History of Minnesota - Volume II.
 EARLY HISTORY OF MINNESOTA

Everett Hesby '33
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I chose this topic because I thought it would be interesting; besides, we, as citizens of Minnesota, should know a little about our state history.

There was a stone found in Douglas county. On this stone was carved the date of 1362 and words saying that there had been a camp with eight Swedes and twenty-two Norwegians. One day they had gone out fishing; when they were returning they found ten dead men all covered with blood. There were also ten men by the sea watching their vessels. This story is just a belief of some people that the Norsemen had been up into this territory which we now call Minnesota.

Some of our history books state that the first white men that came to Minnesota were Radisson and Groseilliers. They were two French fur traders and came in 1655.

Joliet and Marquette who came into Minnesota in the year 1673 were French missionaries. They came more for mission work than as explorers, altho as missionaries, they explored a large territory. They started out at Mackinac in two birch bark canoes and came down into Green Bay, then worked up the Fox River. They had to carry their baggage a few miles before they came to the Wisconsin River, and then to the Mississippi River. In one of their canoes they had gifts for the Indians. Following this trip,
Marquette went to Illinois and established a mission there. Joliet went on up into Quebec.

Sieur de la Salle was a man who had lots of self confidence and courage. He explored up and down the Mississippi River. He landing in Minnesota was below St. Anthony Falls. Later he went down and discovered the mouth of the Mississippi River.

The first settlement in Minnesota was at Fort Snelling. The land which Fort Snelling is one was received by Pike for military purposes. In 1819 Colonel Leavenworth and a few troops came here. They built a few small cabins and a fort. Many of the men died that winter from cold, hunger, and sickness. They had no doctors and very few supplies. When spring came, Colonel Snelling brought more men and took command of the fort. Shortly after this, settlers started to come. In a short time there were settlers within a radius of twenty miles from the fort, most of them living on small farms.

St. Paul was the first town in Minnesota. It was founded in 1840. It was started by Father Lucian Galtier who had been ministering to a small group of settlers and Indians at Mendota, and then extended his care to the small colony. Two farmers gave him some land on which he built a rude log chapel in the month of October 1841. The first day of November he blessed and dedicated it to Saint Paul, the apostle of nations. Soon the settlement became known as St. Paul's "landing, which later became St. Paul. A post-office was established on April 7, 1846.
St. Paul was not only known for down river business, but for the Old Red River ox-cart trade which came from the north. The ox-cart was a two-wheeled affair, which was drawn by an ox. These carts were loaded with furs. It was an interesting sight to see hundreds of these carts in a caravan on the old ox-cart trails. The Great Northern railroad long afterwards located on one of these trails.

In 1811 there was a settlement started in the north, known as Pembina. A Scotch earl of Selkirk, having secured controlling interest in the Hudson Bay Company, acquired about 118,000 acres of land west and south of Lake Winnipeg and the Winnipeg River. In 1817 Lord Selkirk came here himself and brought more settlers. In 1823 Major Long was ordered out by the war department. He was to go up the Minnesota and Red River to what is now the Canadian boundary. Near the Canadian boundary, he found this settlement and that is how it became known. The people in the Pembina settlement were known for their good farming and hunting. They were Scotch Highlanders.

France at one time owned part of the territory of Minnesota. In the year of 1803 United States made the Louisiana Purchase from Napoleon for $14,500,000. In this purchase, part of Minnesota was included. There was a little area in the northern part of Minnesota owned by Great Britain which was ceded to the United States in 1818. Since 1818 the United States has owned the territory which is now Minnesota. Before this time, two Indian nations occupied the territory. The northwestern part was occupied by the Sioux and the rest by the Chippewas. It is believed that
the Sioux held possession of this entire area at one time.

Most of the people that came to Minnesota were from the East, New England and Atlantic states. Most of them were hard workers and were used to farming, and a few had been working in factories and so forth. Their reason for moving westward was that they were getting crowded out of the east. The rougher class of people went to Texas and California where it was wild and not yet settled.

As the settlers came into Minnesota, they had many hardships to contend with. The Indians would attack them; they also had very hard winters to face without very many supplies. The Pembina settlement was attacked by grasshoppers which did much damage to their crops.

Education started in Minnesota in 1847. The first school was founded in St. Paul. The first teacher was Miss Harriet Bishop. The school she taught in was quite different from our schools today. It had first been used as a blacksmith shop and was constructed of logs which were covered with bark and chinked with mud. It was ten feet wide and twelve feet long, with pegs driven into the wall and planks placed on them for seats. These seats were around three walls. At one time, it was stated that a hen was setting on some eggs in one corner, where she was left undisturbed until the eggs had hatched.

The first early Indian mission was located at Madeline Island. The preacher of this mission was Lyman M. Warren. He also established a school here, but it was not until 1830 that he had a good start in his work. He also induced a young American teacher in the Mackinac school to come to La Pointe.
Another missionary establishment was at Lake Itasca in 1832 by William Bartwell.

Minnesota had not been made a territory yet, so in 1846 a representative from Wisconsin, Morgan L. Martin, brought up a bill that Minnesota should be made a territory. The bill was referred to the committee on territories, of which S. A. Douglas was chairman. The bill passed the committee; then it was handed over to the Senate, but there it was laid on the table. Douglas at once started to work to get Minnesota as a territory. Finally, however, the people became interested and drew up a petition and sent it to Congress. It passed the House by a large majority, and also passed the Senate. Minnesota became a territory in 1849, and Alexander Ramsey was the first territorial Governor.

Minnesota could not hold a state election until after her admission to the Union and then her state legislature had no rights to legislate. An offer was made by the senators from Georgia that Minnesota should be allowed two representatives. They kept on debating over the question of Minnesota being added to the Union. They also found objections against its state constitution. Minnesota had to change its constitution a little. In 1858 it was passed by a large majority. Minnesota was admitted to the Union in 1858 and became a state. It was the thirty-second state added to the union. It is eleventh in size.

The state seal was adopted by Congress in 1858. On this seal there is a picture of a pioneer plowing, his rifle is leaning against a stump a short distance from him. There is an Indian riding his horse, which represents
the disappearance of the Indians before the white men. In the background is Saint Anthony Falls.

Minnesota's motto is "L'Etoile du Nord". This means "The Star of the North." This fits in well because Minnesota is the farthest north of all the states. Some people object to having French words on the state seal, but they are there in honor of the two French explorers who were the first white men to leave any records.

The slavery question was no problem in Minnesota because they were so far north and far away from the slave territory. The people drew up their own laws concerning slavery in their state constitution.

When the Civil War broke out, Minnesota fought for the north. There were regiments from the following places: two companies from St. Paul, and one company from the following: Minneapolis, St. Anthony, Stillwater, Red Wing, Hastings, Wabasha and Winona. The regiments were first sent to Washington, then to Virginia. The first battle they fought in was the Battle of Bull Run.

Minnesota is now called the state of "ten thousand lakes" and has many beautiful places which the citizens should be proud of. These lakes furnish sports for the people such as fishing and hunting wild game. There are also a few natural forests.

At one time Minnesota ranked third in production of lumber, but due to carelessness the lumber industry has dropped down to eighteenth place. Now they are trying to rebuild the forests once more. In 1919 Minnesota's output of iron was 90% of the nation's iron. In 1924 to 1925 it ranked fifth in agriculture. Minnesota is also noted for the output
of flour. It has its big flour mills at Minneapolis. There are two national forest reserves and two state forest reserves, so the citizens of Minnesota have a state to feel proud of.

BIBLIOGRAPHY

History of Minnesota by W.W. Folwell, Volume I.
History of Minnesota by W.W. Folwell, Volume II.
Minnesota Historical Society Collection, Volume I.
The American People by Buzzev.

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EXPLORATIONS AND SETTLEMENTS IN MINNESOTA
PREVIOUS TO 1850

James Rynning, '33
Kennedy, Minnesota

Foreword

In this writing, I have attempted to cover a period before any white man set foot on this soil and to the date of about 1850 when this territory had its capital and leaders; from that date and on, it has been a constant rush of settling and improving of every kind. This gives the reader an idea of the work and hardships it took to make the state of Minnesota.

The first people to visit this territory were Frenchmen. French fishermen were taking cod and mackerel off the banks of Newfoundland only a dozen years after Columbus's first voyage. The French King, Francis I, who ruled from 1515 to 1547, did not want to let the Spaniards, Portuguese, and English do all of the exploring of the New World, so he sent out Frenchmen. The important personage in these expeditions is Samuel de Champlain because it was through his explorations that it was possible for men later to reach this territory. There can be little doubt that the north shores of the Great Lakes were coasted by the middle of the eighteenth century and that the great rivers were examined for ores.

There are two men of importance to Minnesota: Midard Chauart, better known as Sieur des Groseillier, and D'Esprit as Sieur de Radisson. Both men were born in France.
Groseillier, the elder, came to Canada about 1641 when he was twenty years old. Radisson arrived in Canada in 1651 when he was only fifteen or sixteen years old. In 1652 Radisson was made a captive by the Iroquois who held him on the Mohawk River about a year. He escaped to New Amsterdam by the way of Albany and then he got a passage to Holland and then back into France. In 1654 he was back again on the St. Laurence with Groseillier who had married Radisson's sister.

The two men set out on an expedition to the far West. They took a canoe route by the way of the Ottawa River and then through different places until they finally reached Lake Superior, so there is no doubt that Groseillier and Radisson were the first white men to tread the soil of Minnesota. Their story seems to tell that they were into the heart of Minnesota as far as Shakopee and, possibly, New Ulm.

We do not think that Groseillier and Radisson recognized the Mississippi River. If they had recognized this river, they certainly would have mentioned it. That distinction must go to the intrepid Louis Jolliet and his companion, the daring priest, Father Jacques Marquette, priest of a Jesuit Mission at the northern end of Lake Superior, discovered the Mississippi by the way of the Fox and Wisconsin rivers and descended the stream as far as the mouth of the Arkansas. Here they became convinced that this great river emptied into the Gulf of Mexico and not into the 'South Sea' and turned their canoes back to the Lakes.

Thomas Jefferson was president of the United States and was very anxious to explore and make trading posts west
of the Mississippi as well as along the Mississippi. Thomas
Jefferson now heard that Napoleon Bonaparte had induced Spain
to cede to him the entire western basin of the Mississippi,
called Louisiana. Jefferson knew that as long as Spain had
this territory, it was not in such strong hands, but when
France got it, it changed the situation greatly. About three-
eighths of the United States commerce passed through this river,
so it meant that if some country blocked this river for us, they
could whip us in war. We paid France 80 million francs, or
about $14,300,000, of which $11,250,000 was paid to Napoleon,
and the remainder to citizens to satisfy their claims on
France for damages to their trade. On May 2, 1803 this
territory became ours. This was the most important event in
American history in the first half of the nineteenth century.
It doubled the area of the United States and brought under
our rule one of the most valuable tracts of land in the world,
extending from the Gulf of Mexico to the Canadian border and
from the Mississippi to the Rockies.

In 1818 we made a treaty with Great Britain, running
the boundary between Canada and the United States from the
Lake of the Woods along the forty-ninth parallel of latitude
to the Rocky Mountains and then on to the coast. This gave
us the northern part of Minnesota.

General James Wilkinson was commanding at St. Louis
at this time and issued his orders to First Lieutenant
Zebulon M. Pike of the United States Army to proceed up the
Mississippi.

His brief instructions were to record his observations in his diary; to note the population and residence of
the Indians; to spare no pains to make friends with them; to look for a position suitable for a military post; and to follow the Mississippi to its source. Of the above orders, the erection of a military post interests the Minnesotans the most. The party got permission to erect a post at the mouth of the St. Pierre River, near the Falls of St. Anthony. So it was Lieutenant Z. H. Pike who made the treaty with the Indians for the land, where Fort Snelling now stands, in 1895, September 23. A rapids in the Mississippi bears his name as well as Pikes Lake in honor of his work in this territory.

Up to the time of the ratification of the treaties of 1837, there were no lands in the area of Minnesota open for settlement. All of it was Indian country. Pike's purchase of the Fort was for military purposes only. The white settlers did not come from the south but from the north.

Earl of Selkirk had secured a controlling interest in the Hudson Bay Company. He had received 116,000 square miles of land west and south of Lake Winnipeg and the Winnipeg River. This land comprised roughly the province of Manitoba and the northern part of the states of North Dakota and Minnesota. It was Selkirk's purpose to establish Scotch peasants on this land. In 1812 to 1914 bands of Scotch Highlanders came here to settle; about two hundred reached the new settlement. There were great troubles between the Hudson Bay Company and the Northwest Companies and in 1812 the war broke out that seemed to end the settling.

Before Lord Selkirk's death in 1821, he sent agents to get Swiss mechanics and tradesmen to try their luck in this
territory. These people found that the things were not as great as they had been pictured to them before they came, so they were quite dissatisfied. In the year of 1820 Lord Selkirk's superintendent bought three hundred bushels of wheat, oats and peas at Prairie du Chien. This he loaded into his heelf-boats, which he navigated up to the mouth of the Minnesota, and onward by way of that river to Big Stone Lake; from different points he helped the Swiss families with feed and seed. These families found a great deal of hardship even though they were helped at times. There was great hardship due to the cold, drought, grasshoppers, and mice. So in the spring of 1826, 243 Swiss families left Pembina in one body. All of these came to Fort Snelling. Here many of them got outfits for farming and many continued down the Mississippi to settle about Galena. Many of those that stayed around Fort Snelling were the earliest settlers in the oldest towns of the state within a radius of twenty miles of Fort Snelling.

After a period of years the commanding officers at Fort Snelling found that the timber on their land was not as plentiful as they had thought, so they sent in a request to Washington to get permission to outline their right of the land which belonged to Fort Snelling; to this request the government officials gave orders to the settlers to move off the land which belonged to this government military post. This caused a great deal of trouble for the settlers who had made their homes here after so much hardship. There was also a great deal of trouble concerning the settlers who made and sold whisky to the soldiers and Indians. Major J. Plympton seemed to be unable to handle these whisky sellers at first,
but soon the orders became so hard that anyone that settled on this land was run off by these government officials, who set fire to their log cabins. These settlers now moved across the river to where St. Paul now stands.

Father Lucian Bautier, who was the priest for this colony, started a rude log chapel which he blessed and dedicated to Saint Paul, the apostle of nations. This little settlement was soon called St. Paul which is the name today. This took place about 1850.

St. Paul had a larger trade from the settlers along the rivers who came to the city on these waterways. Transportation was also done by the Red River cart which was built entirely of wood and was pulled by one ox and carried nearly a half ton. As no grease was used for the wheels, it could be heard for miles. The downward traffic loads consisted mostly of furs and the return loads consisted of merchandise. The St. Croix river forms part of the old canoe route from the Mississippi to the head of Lake Superior. Without doubt the white men navigated these beautiful streams between 1680 and 1832. None of them could have failed to notice the pine forests which bordered its sides. In about 1844, lumber manufacturing started at Stillwater. Many people believed that this city would be the greatest city of the state because of its closeness to pine forests and its convenience in handling the logs.

A man by the name of Franklin Steele built a saw mill on St. Anthony Falls where Minneapolis now stands which drew people that way. This was the first permanent settlement at the Falls.

As we reach 1849 the close of the period under observation, we find the major part of the white people on
Minnesota soil in the villages of St. Paul, Stillwater, and St. Anthony. The first was the commercial river port, and the other two were lumbering towns.

The other places of importance were Fort Snelling and Fort Gaines, at Mendota and other trading posts. We must not forget the people at Pembina. These were more or less permanently on the American side of the international line. Of the rural settlements, this was the beginning. The farming was not carried out on a very great scale. There were gardens raised and wild game killed, but most of the supplies were brought into St. Paul by boats.

The organization of the Minnesota territory carries a long story which must be condensed into as few words as possible in order not to overrun the set number of words for this thesis.

Joseph Renshaw Brown is one of the important men in helping to organize the Minnesota territory, as well as being Minnesota's pioneer farmer who broke up land in 1829 at Minnehaha Falls.

On January 9, 1840 the county of St. Croix was established and Brown was made a member of it, where he served for two terms. On December 23, 1846 a bill was introduced to the House of Representatives to organize a "Minnesota" territory which was refused due to the fact that the population was too sparse. On February 3, 1848, Senator Douglas introduced a bill to establish the Minnesota territory and this time Congress adjourned without taking it into consideration.

Now the people of this territory presented a new situation. They said that they had no way of taking care of
their criminals, debts or performing marriage after Wisconsin was admitted as a state May 29, 1848, which left this territory without any kind of law, so some time in January 1849 our Minnesota territory was organized.

Alexander Ramsey of German blood became our first governor. Previous to this, Ramsey had been chief clerk of the Pennsylvania assembly, as well as having had a long experience as a lawyer.

Our first legislative assembly was held September 3, 1849 at St. Paul. At this assembly Governor Ramsey was most concerned about the danger of Indian wars. He emphasized the need of a strong military force at Fort Snelling and also a few marches through the country in order to let the Indians know about the strength of the white people.

The three greatest centers at this time still remain the greatest. It was decided that the capitol should be at St. Paul, the prison at Stillwater, and the University at St. Anthony, which is now Minneapolis.

**BIBLIOGRAPHY**

A History of Minnesota
The American People

Folwell
Muzzey
We sometimes think of white people as being the first settlers in Minnesota, but they were not. The Indians were the first settlers and the white people bought the land from them or traded for the land occupied by the Indians.

There were different tribes in different sections of Minnesota. The Ojibways ranged through the northern part of the state and the Sioux in the southern part. Some of the Ojibways are still living on reservations in the north. Some other tribes that were living temporarily in Minnesota were the Hurons, Ottawas, Crees, and Winnebagoes.

The occupation of the different tribes was just a little agriculture, consisting principally in the raising of corn or maize. They also traded with the fur traders or the white men. They made stone implements to work their soils with and also for war weapons and many other uses.

The Indians never stayed in one place for any length of time. They would be out fighting with different tribes or they would move to what they thought was a better place.

The Minnesota Indians feared the Iroquois tribe who were on the east and extending to New York. This was the largest tribe in the country. They captured seven small Minnesota tribes, as the Mohawks, Oneidas, Cayugas, and the Onondagas, all located on the eastern border of Minnesota. Many tribes feared them, but they did not fight with the Sioux or Ojibways.

The Sioux, located in southern Minnesota, was one
of the largest tribes in Minnesota. Their real name was Nadeousioux, standing for Nation of the Beef, and meaning snakes and enemies. This tribe was always fighting with some different tribe until they had raided all of Southern Minnesota, making the other tribes move out of Minnesota into Dakota. The Minnesota Sioux were called the Sioux of the western prairies to distinguish them from the different tribes of Sioux in Dakota and other states. They raised tobacco and a little corn or maize. They did not like their name so they changed it to the Dakotas. They battled with the Hurons and Ottawas; they did not want their land but they just enjoyed to fight, and they even attacked the largest tribe, the Ojibways, but did not succeed.

The Ojibways located in northern Minnesota were the largest tribe in this state. They drove the Sioux southward out of the forest and wooded land and the Red River Valley.

The Ottawa tribe came northward along the Mississippi River from Iowa, and they found a nice place right on the river bank close to what is now St. Paul, but they had the warlike Sioux on the west and the Iroquois on the east.

The Ottawas feared the Iroquois so they fled southward again. They were not satisfied so they moved northward again. They did not have firearms for protection, but they had knives of stone. The Ottawas took the Hurons with them and attacked the Sioux on the west. They were defeated, however, and driven back. In 1688 the Ottawas had worked themselves north again, but the Sioux chased them south again, and the Ottawas finally moved east to Lake Huron.
The Crees Indian tribe was located north of the Sioux. They extend west from Lake Superior, then north to Lake Winnipeg and on into Saskatchewan, Canada. The Crees were next to the largest tribe in Minnesota. There were two kinds of Crees, the Wood Crees, generally living in the forest land, and the Plain Crees, living on the prairies. This tribe preferred living near water and they were often seen on lakes and rivers in little canoes so small they held only one or two. The Plain Crees were friends with the Sioux and they tried to make peace between the Sioux and Ojibways. The French fur traders helped to make the Ojibways and Sioux friends also.

The best means the Indians had of getting food was by fishing and hunting. They would hunt animals like the deer, wolf, wild turkey, and many others in the woods. They would also fish with crude nets mostly in the rivers. They would stretch the net across the river and they would catch fish in great numbers when they did their fishing in that manner. They also gathered wild fruit like apples, plums, the different kinds of berries, and cherries, wild rice, roots, and nuts.

The best agricultural product was corn or maize. They had to destroy the leaves of the trees so the sun could shine on their crop, so they would strip the bark from the trees and that would make the leaves die.

The Indians would scratch into the ground with diggers made of stone; then they would drop the seed into the crude furrows. After sowing the corn, the crop would take care of itself. They would let it hand for weeks after
it had ripened. It then would be so ripe that they could pick the kernels off easily. They did not bother to thresh their crop.

The Hurons planted the largest crops of maize and they also raised some tobacco. The Ojibways planted the largest variety of agricultural products in Minnesota. They raised about fifty acres of corn, a few acres of potatoes, some pumpkins, and squash.

The Sioux in southern Minnesota raised wild rice and turnips. The turnips were first raised along the Pomme de Terre river in western Minnesota by some other Indians, but the Sioux raised a larger quantity of them in the south. The turnips were dried and then ground or crushed into powder and the Indians used it as flour.

If it had not been for the Indians, the first white settlers would probably have died of starvation, because they received corn as a gift from the Indians, or they traded or stole the corn from them when they were short of food.

The Indians stored their corn so they would have a food supply for one or two years in case of crop failure.

Thus, we are indebted to the Minnesota Indians for their aid to the early white settlers and also for the new agricultural products which they introduced to our ancestors.

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BIBLIOGRAPHY

In Minnesota the history of the Indians has been traced to about 1650 by the French explorers. It is thought that perhaps many centuries ago the Dakotas lived in the region north of Lake Superior and had some acquaintance with the Esquisnaux tribe, and other Arctic tribes. It is supposed that the Sioux real tribe name was Nedouessaus and the name Sioux derived from the French.

One division of the Dakotas in the west was the Titonwans, known as the "plundering Arabs" of America. These Titonwans are divided into seven sub-tribes and these into bands.

The Sisitonwans are known also as the Ongasketon Indians and the Wahpetonwans, and they concluded with the United States at Traverse des Sioux a treaty on July 23, 1851, in which they ceded all the lands east of the Sioux River and Lake Traverse to the United States. In a second treaty on August 5, 1851, they ceded practically the same land to the United States at Traverse des Sioux and was signed at Mendota.

There were also the Whapehates and the M'dewakantowans. These sub-tribes were the first division of the Dakotas that the early French traders had traded with a little distance below the St. Croix River, and it was these traders who showed the Dakota Indians how to plant corn to supplement the use of wild rice.

These sub-tribes were divided up into many small bands with a chief as their leader. These chiefs, and many of the Indians and also the band they belonged to, had names that
meant or represented something; for example, if an Indian or a chief was a fast runner or was fast in walking, he may be called "Light Foot" or "Swift Foot" and the same with their bands for some certain characteristic.

Their language is very difficult to understand and their vocabulary is very harsh or meagre, in comparing it with civilized nations. They were also different in their ideas.

The Dakotas believe in many different gods, demons, spirits, and many other strange beliefs. To please these spirits, they would go through many actions such as sacred dances, fastings, sacrifices, and prayers, or otherwise they believed they would be severely punished in some way.

They also have their medicine man who believes he can drive out the bad demons and enter the good spirits. These medicine men were looked upon as great persons who had power given to them by the spirits and, therefore, were very much feared by their tribes. They are also looked upon as a species of demi-god who can work miracles among their people.

The Dakota Indians obtained their wives by going to the girl's parents and making a trade or purchase which may be with guns, horses, or some other article he may want very much and, therefore, trade his daughter for it. Some of the chiefs had two or three wives, and a woman must always be faithful to her husband or else she may be cruelly punished in some way.

They had many different sports, but their main sport was ball playing or "shinny" and was played on a smooth ground or frozen river or lake. On each side they may have up to several hundred men and boys, and their real object was
to see who could get the ball across the opposite line by hitting it with curved clubs. This was somewhat like the game hockey.

The Indians were very dirty in their living. They had no certain time for eating; they may eat from one to seven meals a day, and nearly any time of the twenty-four hours. They would sleep any time they felt like sleeping, either during the day or night.

The woman's life was considered worse than a dog's life. They did all the work, while the man lay around smoking and talking and taking it easy while she had to carry water, cut the wood, cook meals, tan hides and do numerous other things. If her husband was not satisfied with her work or was drunk, he may flog or beat her.

The Dakota Indians had a great fondness for war; a child's first plaything may be a bow and arrows, and when he has killed his first enemy and taken the scalp, he then became a warrior. They had very little respect for a woman, especially if she belonged to one of the enemy tribes, and they may treat her the same as the men.

Many of the Dakota Indians had become good farmers and just before the outbreak occurred August 15, 1862 or practically that same year, they had wonderful crops and were expecting their money in return for the crops they had harvested and sold to the government. However, this never came until after the outbreak of the Dakota Indians in Minnesota. Other facts that caused the Sioux uprising was that they could not do some of the things they wanted to do, such as going on the warpath against the Chippewa Indians who had been causing the
Dakota Indians much trouble. Another reason was the enforcement of paying their debts to the traders by the soldiers. They were also much abused by the traders and soldiers. The Dakota Indians had heard and thought that since the Civil War was going on, it would be a good time to take back their lands along the Mississippi and adjoining territories.

Many of the old chiefs knew that they would be defeated in the end and tried to show the younger warriors the foolishness of starting a war, but they would not listen to their advice.

It is said that the outbreak was started by four young warriors who were foolishly quarreling over a nest of hen eggs they had found, which belonged to the nearby farmer. They were calling each other cowards and decided to see who was brave enough to go to the farmhouse and kill the owner of the farm. As soon as the report of this killing went around, all the Dakota blood was up and ready for war. They started massacring and plundering the following morning on the settlers near the lower Sioux agency, near the Minnesota River about six miles below the mouth of the Redwood River.

They then heard that a party of men led by Captain Marsh was coming against them. They immediately ambushed the army at Redwood Ferry and nearly annihilated the whole group of white men. Next they went against New Ulm but were not very successful. They then tried to take Fort Ridgely, but were again turned back after harassing the fort for several days. They then tried to take New Ulm a second time and caused greater damage to the whites, but did not take the town. They figured if they could take Fort Ridgely and New Ulm, they would
a good chance to get back their lands. After the second battle at Fort Ridgely, they heard that General Sibley was marching against them with a large army. General Sibley fought the Indians at Birch Coulee, a very poor place for a camp in hostile territory. After several days of fighting, the Indians were at last compelled to retreat by reinforcements that came to relieve Sibley's men. The Indians were then chased out of the ravines and woods into the wide prairie and scattered in wild disorder.

It was not long after this battle that the Indians surrendered to General Sibley and the captives of the Indians were turned over to General Sibley. The main leaders that led the Indians were tried and convicted, and hanged at Mankato. Three hundred murderous Indians were to have been hanged at Mankato, but the final decision of President Lincoln pardoned all but thirty-eight. The day of the execution was Friday, the twenty-sixth day of December, 1862.

Out outbreak lasted only twelve days and the estimated loss of white people was around five hundred, including the soldiers, while the Indians lost about the same number, or a little less.

Little Crow, the main chief of the Dakota Indians, was killed on one of his horse stealing trips, also his son, and the Indians accompanying him. Otherwise, he would have undoubtedly been hanged at Mankato with the other main chiefs that helped start the outbreak in Minnesota.

One of the first treaties signed in Minnesota was at Prairie des Chiens on July 15, 1830 in which the Dakota Indians ceded to the United States a neutral ground in Iowa. The Indians received $3000 a year for ten years and also received
a large amount of goods by ratifying the treaty.

It was not long after this treaty that the first schools were introduced in Minnesota, but soon closed their doors on account of very few pupils. When the first traders came to Minnesota, very little was done for the education of Indians. In later years, when the Indians knew more about civilized life, a few schools sprang up and thrived. They were known as the manual labor schools which did much in civilizing and teaching the Indians agriculture.

Their chief occupation was farming and some lumbering. In 1852 they raised 40,256 bushels of rutabagas, corn, potatoes, grain and different crops, while in 1869 there were about 250,000 feet of lumber sawed during the year.

Their reservations are located in quite a number of different places in Minnesota, the largest being White Earth Reservation in Mahnomen County. Some of the other reservations are Red Lake, Leech Lake, Lake Winnibigoshish.

In the 1928 census there were 15,310 Indians living on reservations in Minnesota. The White Earth reservation leads all the other reservations in size.

BIBLIOGRAPHY

Minnesota Historical Society Collections, published in 1933.

Minnesota in Three Centuries by Lusius F. Hubbard and Return I. Holcombe.

Aborigines of Minnesota by Hill, Lewis, Brower and Winchell, published by the Minnesota Historical Society.
THE MINNESOTA INDIANS

Helba Parduhn
Cedar Bend, Minnesota

I think perhaps the thing that makes Minnesota the most interesting, as well as the most beautiful state in the Union, is the idea that years before any white man came here, its land was the home of the red men. The traces and memories of these first men will never die out in Minnesota, because they have given us so many reminders of themselves in places, in names, and in stories which they have handed down and which make us see what kind of people they were.

The native people are called Indians all over America because when Columbus, the first man from Europe to write about them, saw them, he thought he had gotten to India, the place he was looking for.

People do not agree as to the way these Indians came to Minnesota. Some think they came from the East, and others from the West, while a few believe that they came down from the North, but at any rate, here they are.

Our Minnesota Indians were like all the other Indians in the United States in some things and different from any others in other ways. They were all wild, roving, uncivilized, without education, and the ones in Minnesota were especially fierce and revengeful.

There were two families of Indians in what is today Minnesota and the Mississippi Valley. One group called by the French the "people of the Lakes" called themselves the Dakotas, which means a "union of many."
The first Indians are commonly called Sioux, a nickname given by the traders for a much longer one, "Nadowaysioux." The Chippewas always called them this name which means "hated enemy" just as the Greeks call their foes, barbarians.

The Sioux, as we shall call them, lived very early about Lille Lac, which they called Spirit Lake, because they believed that the great spirit protected them there. They spread all over what is now Western and Southern Minnesota, and built the mounds which are scattered here and there along the Mississippi Valley. They wandered over the country, gathering berries in the summer, wild rice in the late autumn, and had plenty of game and fish from the woods and lakes, around which there were no other people than themselves. In November, the whole tribe went on a yearly buffalo hunt to get meat for the winter.

The teepees, which were their houses, were carried by the women, or squaws, from place to place on long marches, often lasting many days. In the summer time, they ate and lived almost entirely out of doors, but in the winter time, they lived inside the teepee which had no windows and no light but the fire. The Sioux had no regular time for sleep or for eating, and while they often feasted for many days and nights at a time, they were often cold and hungry.

The Sioux were a very cruel people. They had never been taught any better and when tracking an enemy, they skulked along in the woods or crept low on the prairie until he was caught unawares. Then the Indian scalped him with a tomahawk (a short circular knife set on a handle) and took the scalp home with him in triumph. This was not
were cruelty, but for proof that he had killed him, as it was
the only proof that could not be contradicted.

All people who progress at all settle down
as soon as they learn to farm and the Indians, who at first
wandered from place to place, gradually settled down for a
part of the year in the same place, and all the little Indian
villages had near them many patches of corn.

All the people who lived in a village belonged
to the same band, which means that they were related or
connected with one another like one great family. There
were at least ten Indian villages where the city of St. Paul
is today, but one by one they were deserted, as the wandering
spirit took the people away or their enemies frightened them
off.

The other tribe in Minnesota was the Ojibway,
which the white men called Chippewas. We shall see these
people after the white man came instead of earlier as we did
the Sioux. They live today on the reservations of Red Lake,
Leech Lake, Pigeon River, Nett Lake, and White Earth, and
also at Cass Lake, Winnibigoshish, and at Mille Lac, where
they settled after they had driven away their enemies, the
Sioux. They are still called fish Indians because they would
rather eat fish than anything else. The Ojibway was tall
and muscular (often six feet four inches tall), had beautiful
hands, and walked with a springing step. These were also known
as the blanket Indians, though as soon as they learned dress
from the white men, they wore cotton shirts and leggings,
though they never could be induced to give up their moccasins.

These Indians were very curious about all that happened and
instead of being silent and morose like the Sioux, were very cheerful and talkative and laughed a great deal. They loved to tell stories of early days, among them, stories of the moose and elk herding together by the hundred, and of killing them off with axes.

The Chippewa language is very beautiful, soft and full of fanciful expressions, but it is very hard to learn.

Red Lake is the present home of many of the Ojibways who live along the shores on their reservations. Most of these Indians are now christians and are the most thrifty of all Indians.

Although the white man did not always treat the Indian fair, he at least let him know that the first right of the land was his. So in order to get the land from them, we made many treaties as they were called.

The first treaty that we hear of was said to have been made by Jonathan Carver who said that the Sioux deeded to him all the land near the city of St. Paul and whose heirs, many years later, claimed the property for miles up and down the river, including what is called Carver's Cave and Daytons Bluff. The claim was not made until years after he died.

The second treaty was made in 1805 by Lieutenant Zebulon Pike who made a treaty with the Dakotas by which he obtained for the United States the grant of land nine miles on each side of the river. For this he gave them two thousand dollars in gold which seemed a great bargain to the Indians at that time.

The greatest treaty ever made was in 1851. In this treaty the United States purchased all the land stretch-
ing from the Mississippi far away to the West. This treaty
made the Indians promise to be at perpetual peace with the
white man. It also set aside a large tract of land which
was for a long time the "Yellow Medicine Indian Reservation",
ten miles on each side of the Minnesota River from the Yellow
Medicine River to Lake Traverse. The treaty promised enough
money to move all their household goods and thirty thousand
dollars for schools, mills, blacksmith shops and other things
to help them in settled homes, besides a sum of money or
"annuity" each year for fifty years to come.

The Indian too will always be remembered because
of the names of many places in our state. First of all the
name Minnesota was given the river by the Sioux Indians and
means "Sky-tinted water," from which the state was later named.

Winona was a name given by the Sioux to an eldest
daughter.

Red Wing was a name from several chiefs of the
Dakotas, who lived near the present city of Red Wing.

Kasota which means "cleared off" is a name from
the limestone quarries which were all about there. This is a
beautiful pinkish yellow, and the halls, stairways, and
floors of the state house are all made from this stone.

Minneapolis is half Sioux and half Greek:
Minne meaning "water" and Polis meaning "city."

Shakopee was the name of a chief who lived there,
and translated, means "Six."

St. Paul means "white cliff." And so on, although
the Indian is almost unknown in his haunts, we keep and always
shall the name and words which they have given us.
Little by little both of the tribes were pushed farther west by the white man until, except for a scattering few here and there, they were gathered on reservations of which I have already mentioned and located. This land was given them by the United States along with some live stock, stoves, etc. and little by little, they have taken up the customs and habits of the white man.
THE MINNESOTA INDIANS

Orpha Johnson, '32
Hawley, Minnesota

I have chosen for my senior research paper a topic on the Minnesota Indians, which I think is an interesting one since the Redman is the one real native American. The Indians have given names to cities and rivers in Minnesota, and we first learned to make tools and grow potatoes and corn from them.

Our American Indian, no doubt, is of the yellow race. Back ten or fifteen thousand years, he, the Japanese, the Chinese, the Hindu, the Eskimo, the Laplander were all brothers, but we know that this Red Skin has lived in North America for at least six thousand or perhaps even ten thousand years, away from his brothers of his race, so in that time he has changed and resembles them little except in size of skull, in skin texture, and stature somewhat.

Apparenty he came here from Asia when the two continents were still connected. Many think he may have crossed from Europe by the way of Greenland. Quartz chips polished and shaped for weapons have been found in various parts of Minnesota, especially, at Little Falls. These are found in the glacial formations and prove without question that man lived here at that time.

They began to make simple tools of stone, bone and other material found on this earth. It was from them that the white people learned to make the knife and the hammer.

It was thought by the people long ago that the Mounds
of Ohio and Mississippi valleys were built by the Ancient people, which were further advanced in agriculture and arts of civilization. They were evidently driven southward by the Indians but in reality these mounds belong to the early Indians. In these mounds are found skeletons and tools, which very much resemble the work of the later Sioux tribe.

One of the finest groups of Indian Mounds in Minnesota is now guarded and preserved in the city park of St. Paul for all coming time, and tells of the vanished Red people, once owners of this region. This ancient red man, who put his dead into mounds, was as different from the present day Indians as the primitive cave man found in Great Britain is from us, but he was our present day Indians' ancestor.

Indians were found by Radesson and Grossilieis in Minnesota in 1655, when they explored the Great Lakes region, and came out from Quebec and Montreal in a big expedition.

The two principal tribes of Minnesota were the Ojibways, ranging through our northern forest region, and still living there on reservations, and the Sioux, inhabiting mainly the southern and western prairie portion of the state. Bands from four other tribes, which have lived here, are the Hurons, Ottawas, Winnebagoes, and Cress.

I shall consider the two tribes, the Ojibway and the Sioux especially. The word Ojibway means "to roast till puckered up," or referring to the torture of prisoners taken in war. They have always been enemies of the Sioux. It is due to wars between tribes, as well as the white man's coming, that
the tribe numbers less than ten thousand, where once it was probably one of the greatest tribes in North America.

The Sioux word means "nation of beef or buffalo."

They were great fur traders during the seventeenth century, when the white men first found them.

In Radesson's account, he speaks of the people that dwelt about salt water. They lived upon corn and other grains, and fishing and hunting, which was plentiful. It is the Sioux tribe that inhabited the whole Northwest.

All the later Indians have similar habits and customs. By continual wars, the tribes have become greatly mixed.

In addition to the food supplies obtained by hunting and fishing, wild fruits, berries, and nuts, edible roots, and wild rice. The Indians of our region relied in a great degree on their cultivation of food plants. We may, therefore, well extend our view beyond the state limits to consider briefly the attainments of the American or Red race in agriculture, the oldest of the industrial arts, that lead from savagery toward civilization.

The Indians introduced to the world the most important food resources. The following are the most important: potatoes, tomatoes, the most common species and varieties of beans, the pumpkin, squashes, pineapple, and maize, or Indian corn.

Only a few words have been adopted into common use in our language from the original American languages of the Red men. Some words, which come directly from Indian life, are
squaw, papoose, succotash, canoe, toboggan, and moccasin.

Several of our animals have received their names from the Indians—the moose, coyote, racoon, skunk, woodchuck, and chipmunk.

Among species of plants first known in Minnesota, a considerable number have Indian names, as maize, potato, tomato, squash, hickory, tamarack, and tobacco. All over America, from the Arctic Sea to Patagonia, many aboriginal names are preserved by brooks, creeks, rivers, lakes, hills, mountains, and by the white man's villages, cities, counties, and states.

Minnesota receives its name from the largest river, which lies wholly within this state, excepting only its sources above Big Stone Lake. The aboriginal Sioux name Minnesota means sky-tinted water. There were several names suggested when the territory was being named, among them being Chippway, Jackson, and Washington. The final choice of the name Minnesota was virtually decided in the convention held at Stillwater on August 26, 1848, which petitioned to Congress for territorial organization.

The word Mississippi means Great River.

From the Ojibways we receive the name of Lake Bemidji, meaning Cross Lake, because the head stream of the Mississippi crosses it.

From the Sioux language, in addition to the name of the Minnesota river, and of this state, we have the following geographic names:

Anoka, meaning on both sides.

Dakota, meaning an alliance or league.
Kasota, meaning clear or cleared off.
Mankato, meaning blue earth.
Minneapolis, meaning water city, a name half Sioux and half Greek, adopted in 1852.
Minnehaha, meaning literally a waterfall, or speaking poetically, laughing water.

The Indians not only have given names to cities and rivers, but they have also left legends and folklore. All the memorials preserved in our history by the Indians will always remain.
DINING TABLE ACCESSORIES

Elfa Thiel
Ada, Minnesota

The place in which we eat must be cheerful and hospitable. In summer, we like to have our meals out of doors on the porch. In winter, we may have supper before a cheerful fire in the living room, or breakfast in the warmth of the kitchen.

One of our popular adaptations today is the breakfast nook in the kitchen with the pullman style of table and built intrench seats.

The dining room is usually adjoined to the living room and harmonizes with the other rooms. Sunlight and air should be considered in locating the dining room.

If the room is sunny, softer tones in grays or greens will be a wise choice for decorating. There should be no extra furniture or ornaments; everything should have its own special use. In addition to the table and chairs, there is usually a buffet. There may also be a smaller serving table on a tea wagon. You should have a large rug on the floor, if any, for the smaller ones roll up and get in the way when meals are served.

When the dining room is not in use, it should be well aired, cleaned, and freed from dust. It is best to air the room before each meal. Then to brighten the living room up a little it may have a few vases of bright coloring by way of lending touches of striking contrast. Flowers potted in gay containers are always an attractive addition.
to the dining room.

By dining table accessories, we mean the linen, silver, china, and glassware, that we use in serving our meals. Just as there are costumes, that are suitable for various occasions, so also are the dining table accessories that are used at various meals, luncheons, formal dinners, informal teas, or buffet suppers.

In choosing a covering for your table, linen stands first of course, both from a standpoint of beauty of material, as well as durability and ease in removing stains. We have a wide choice of table linen today, ranging from the gay colored cloth for the breakfast nook, the beautiful lace cloths, or heavy damask cloths for very formal use.

Linen damask used in the United States comes from Ireland, Scotland, France, Belgium, and Germany. Irish linens are used extensively and come in various qualities. Scotch linens are grass bleached and give long wear at a reasonable cost. French linens come only in the best grade and are expensive; German linens are cheapest, but give good service. Flax with the proper qualities is transported from Europe. The best linen damask comes from Europe.

There are two kinds of table linen damask: the double damask woven with a double thread in the filling, and single damask woven with a single thread in the filling. The double is a better grade and more expensive. The pattern shows better on it than on the single thread. In telling the quality of damask, buyers count the threads to an inch; in a good double damask of medium quality, there should be one hundred and eighty warp and two hundred and eighty filling threads.
In purchasing table damask, it may be unbleached, silver bleached, or bleached. The bleached is the most expensive process. Heavily starched damask should be avoided when buying, because the starch is added to cover up defects in the cloth. It will wash out when laundered leaving a material of poor quality.

Tablecloths are sold by the yard, having the border along the sides only, or as "pattern cloths." Pattern cloths come in various sizes and colors. Napkins are made to match tablecloths and when a tablecloth and napkins are bought to match, this is called a set. Dinner napkins are larger than luncheon napkins. Napkins may be purchased ready made with hemstitched hems or may be finished with machine-made scallops or hems. Luncheon napkins are sometimes finished with fringe.

Fashion in table linen changes. Sometimes large patterns are preferred, while at other times small designs are the vogue. There are certain patterns always on the market which never go out of style, such as the snowdrop, the shamrock, or the fleur delis patterns. Small all-over designs without wide stripes on large figures in satin weave, give the best service since the long threads thrown on the top of the cloth to produce the larger designs are apt to pull and break in laundering.

The best time to buy linens is during the January sales. Colored linens sets are sometimes preferable and reasonable in price.

Cotton damask looks like linen sometimes before laundering. Cotton damask is extensively used because it is much less expensive than linen damask. The term "union" is
applied to a half cotton and half linen material.

Luncheon sets are used more than table cloths now, because they are easier to launder and iron. They are usually made of linen, cretonne, Japanese toweling, Indian head, or oilcloth.

Doilies may be round or rectangular in shape and large enough to cover the space on the table needed for the dishes used in serving one person, when they are called "place doilies."

Luncheon tea cloths are small square cloths coming in several sizes, the most used size being 36 inches by 36. Buffet or sideboard scarfs and tray cloths are usually made of art linen. A buffet scarf should cover only the top of the buffet and should not hang over the ends, because the wood in a good buffet is more pleasing in appearance than the scarf ends.

Linen covered asbestos pads of different sizes for placing under hot dishes on a dining table, are a necessity. The covers should be made so they slip off easily for laundering.

Table linen should never be used when soiled, since no table can appear well set when the linen is not clean. Table linen is the most difficult thing to buy successfully, and it requires good care to keep it in the best condition.

Our first spoons were made of wood. Some of the higher class were carved out of slate, wood, and ivory, which are preserved as relics from Ancient Egypt. We do not know how old they are.

The first knives were made out of flint, stone,
and other suitable materials. Some were made out of bronze, then iron, and later, steel, as knowledge progressed. The fork was used first as a weapon. Italy is the country given credit for the introduction of the fork.

The knives, forks, and spoons are called silverware. Solid silver is called sterling silver and is made of 925 parts of silver combined with 75 parts of copper. It will outwear the best plated silver.

Table knives, forks, and spoons are sold in sets usually. In selecting flat silver, you should get the plainest there is to get. Silver should be carefully sorted and handled to prevent scratching. If washed as soon as used, it will need less frequent polishing. Tarnished silver may be cleaned in two ways. (1) A silver paste and soft cloth may be used for polishing. The paste should be removed afterward by washing in soapsuds and rinsed. (2) To boil the silver in an aluminum pan with salt and soda or in an enamel pan with salt, soda and small piece of aluminum.

Our glassware is made from lime and lead. Lime glass is very brittle, while lead glass is tough and wears well. Glassware is very pretty when decorated. It may be decorated several ways: (1) by etching with acids; (2) by cutting with emery wheels, known as cut glass; (3) by painting or enameling; (4) by engraving with small revolving copper discs to the edges of which are applied emery powder.

Pressed glassware is usually a cheaper kind of glassware. Our real good cut glassware comes from flint glass. Every table needs at least a little glassware to give it a sparkle.
Styles in glassware come and go, but the clear crystal type is always conservative; it may be plain or etched. The things needed in glassware are tumblers or goblets, stem glasses for fruit cocktail or dessert, punch cups, salt shakers, dessert dishes, finger bowls, and candlesticks.

Glassware should be washed in clear, warm, soapy water, rinsed by dipping into clear hot water and wiped on towels that are free from dirt. The most expensive china is bone china, such as the Royal Doulton.

We get our novelty wares mostly from China and Japan. American china has only recently succeeded in competing with the wares of foreign counties. Syracuse china is the best known and cheaper in America. Lennox is a high grade standard in America.

Dishes which are to be used for all purposes should be chosen with great care. Some foods that are served have a lot of color. Then you don't want your dishes to have much all-over floral designs.

When getting china, you should have them all set out so you can see how it looks on a table. Dishes are sold in sets, and just about any kind of pretty pattern. In buying dishes, avoid odd shapes, sizes, and patterns. A high price is no guarantee of tastefulness. Very tasteful china may be bought at reasonable prices. China with little decoration can be used any time and still go with different dishes you have. A gold band is one of the best decorations for china. Elaborately decorated sets of dishes become very tiring and do not harmonize well with odd dishes that may be used with them.
A wise selection of things at first may mean saving of money in the future.

BIBLIOGRAPHY

Dining Rooms with the Right Atmosphere - Chas. Alma Ryers.
The House and Its Care - Mary Lockwood Mathews.
The History of the Spoon, Knife and Fork - Reed & Barton.
Everyday Foods - Harris and Lacey.

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FOOD FANCIES OF THE NATIONS

Harriet Severson, '33
Clearbrook, Minnesota

The story of food fancies follows the development of each particular nation. We find that our foods and the methods of their preparation change with the changing civilization of the times. Cook stoves have made it possible for us to have foods quite different from those served about the open fire in the days of our forefathers.

The different nations all have characteristic foods which we always associate with that particular country. Some examples of these are the spaghetti of the Italians, the rice dishes of the Orientals, the sauerkraut of the Germans, the Lutefisk and lefse of the Scandinavians, to say nothing of the plum puddings and mutton stews of the English.

However, you do not need to go to the different nations to taste their characteristic dishes, for in cosmopolitan New York you may have them for the asking.

For almost fifty years, New Yorkers who love good food have been finding it at Luchow's, which is a German restaurant. Here the Viennese orchestra plays soft music at dinner time, but at luncheon there is nothing whatever to distract attention from the foods and conversation. No jazz is ever played there, as the manager says it does not belong with good food and then young people, who like jazz, do not want to eat.

Luchow's has many dishes on their menus with German names, but there are always plenty of dishes with
familiar names also. This restaurant is famous for its cooking of meats and game. They serve a number of meats with special sauces, which have individual flavors. Their soups are delicious and an enormous amount of beef is made into soup every day. Their oysters are always the best obtainable and their vegetables unusually well prepared. Cheese cakes and apple pancakes are often served as desserts.

Always remember that if you ever visit a German eating place, bring your appetite with you, as they have good food and lots of it.

The Irish also have their favorite haunts in this great city of New York. Their favorite dish seems to be oysters. An oyster bar is always found in front of one of the large rooms of an Irish restaurant. There, as many oysters as the plante can hold, is called a serving.

Often times, the Irish have what is known as a beef steak party. On such an occasion, they serve Oysters Casino (oysters baked on the half shell and seasoned with minced bacon and green peppers) as an appetizer. Next comes the main dish which is beefsteak in large quantities. Celery and Saratoga potatoes are also served with the steak. Last of all comes the dessert which is lamb chops and coffee. You may wonder why they serve such a dessert, but they say that lamb chops is a sweet meat and should therefore, be used as that part of the meal.

One of the more recent favorites of the Irish is the tomato juice cocktail, which is often used as an appetizer. They use vegetables quite extensively when they are in season. Desserts have not found as much popularity
among the Irish as the main dishes have. However, they use such desserts as rice pudding, baked apples, caramel custard and pie.

In New York, San Francisco, and also other large cities, a Chinese section may be found where their characteristic dishes are served. Some examples of these are the chop suey and the chow mein which are the Americanized versions of the original Chinese. Tea is also used extensively in these Chinest districts.

As we wander on, we come to the Italian restaurants, where still different foods are served. The Italians love vegetables, especially the green leafy ones. We always associate garlic, of course, with the Italians. They eat dates and figs quite a lot.

Farther on, we find the French eating places. The French have always been noted for their good cooks. More of the excellent men cooks in America are French than any other nationality. Their breads and pastries are widely popular the world over. They fix their meats in many tasty, delicious ways. A large part of their diet is made up of split pea and onion soup.

No city of any great size would be complete without a place to get some good old Scandinavian foods. I know they are no novelty to you as you are either Scandinavian or their friends. We all like the Scandinavian breads, such as flatbread, lefse and many foods which are fried in fat, but all have Scandinavian names. At Christmas time, you may find Lutefisk on their menu almost any time.

Although the English are not especially noted for
their cooking, they do have restaurants in some of the larger cities. Their meals are rather heavy and not always the best for one's health. They prepare meat in many different ways. The English are especially fond of kidney stew, kidney pie, and beefsteak pie. We are all familiar with the English plum pudding, which is also a great favorite.

In the summer time, we would like to travel southward from New York, along the coast. The attractive inns and eating places of Cape Cod readily catch our eye. Every traveler should plan to have lunch there, because there is never a time that you cannot find a really typical food of Cape Cod. The signs along the roadside of "duck sandwiches", "clam cakes," "clam chowder," and "Lobster Rolls" instead of the hot dog signs farther down in Massachusetts and Rhode Island show that they are characteristic dishes. Oysters are also relished by these people. As a dessert, they prefer apple or mince pie. In the fall and winter, mince pie is used extensively. Roast duck and lobster are the most popular for the main course. They prepare a peculiar dish called Popcorn Custard and also Scootin'-Long-the-Shore which is an appetizing combination of potatoes and onions.

The next place on your way South, which I would like to have you stop at, is Boston. In this city, traditions live long and food customs are no exception to the rule. Where, but in Boston, are doughnuts served regularly for breakfast? The serving of baked beans and brown bread is fervently celebrated on Saturday. They always serve ice cream with Indian Pudding and Apple Pandowdy. At any time you may have oysters, large, small, raw, stewed, or fried. Little neck clams are served also, but the soft clams fried
in a batter or in crumbs, are more popular. Home made pies, such as apple, squash, and mince, are special favorites. They are also fond of home made ice creams.

We are traveling on southward and I am now going to take you through Virginia. As for that state, the thought of cookery brings us a vision of tables groaning under the weight of many good foods. Game, fish, oysters, chicken done to a turn, shrimp gumbo, hot breads, and syllabubs are just a few traditional dishes of Virginia.

The Virginia cookery was developed to a high extent by the negro help. The game, fish and oysters from the nearby bay, and the native fruits and vegetables furnish the basis of their cookery. At most places the food was prepared in the outside kitchen and from there, slaves would carry the steaming platters and dishes of food to the table.

As we proceed on our way, we find that their foods are somewhat the same. However, when we get as far as Mexico, we see some special foods prepared. Some examples of these are the Chili Con Carne and the Hot Tamales which are the most popular.

It is not necessary for me to take you any farther as I would practically be repeating what I have said before. I will leave it to you to decide whether or not your own food customs are best or whether you would like to join any of these other nations. Whatever your choice may be, I know you will be satisfied, because as a whole, the people of these different nations are all good cooks.

BIBLIOGRAPHY

Series of Articles by Edith Barber in the Better Homes and Gardens Magazine.
"Etiquette is the name given to the rules of society; and society is the game that all men play. If you play it well, you win; if you play it ill, you lost. The prize is a certain sort of satisfaction throughout, which no human being is ever quite satisfied."

And so in order that we may win that prize, we have established for ourselves a few rules to guide us in our game of life. Some of these, I am going to pass on to you.

Probably, as important as any of the rules, are those which govern introductions.

In introducing your friends to your parents; for example, your girl friend, you should say: "Mother or Father, this is Marie Bauer." If you have your friends in the living room and your Mother or Father comes in, you should introduce your guests and then ask your parents to join you in whatever you are doing, and give them comfortable chairs.

If you are having a boy friend as your guest and your father comes in, he should be introduced by your saying, "Father, this is Virgil Dyer, a friend of mine. Virgil, this is my father."

You should always remember to present young people to older people; less privileged people to more
privileged. "Miss Larson, may I introduce my friend, Verna
Overly?" After the introduction, you should add a word of
explanation or a subject of conversation in which both are
interested, such as, "Miss Hall, this is my friend who was in
a car accident with me."

If you have a guest, and a friend comes in, you should
ask them if they have met. If not, be sure you introduce them.

Maybe your friend has forgotten to introduce you to her
friend. If so, you should introduce yourself when you meet her
by saying, "You are Carol Williams, are you not?" "I am
Violet's friend, Vivian Swanson."

Another thing that improves our way of living a great
deal is our manners at the table.

When eating at the table, you should be able to handle
your silver as your neighbor; in doing that, you are unnoticed
at the table. You can dine without embarrassment, and your
hostess will always be glad to invite you to her dinners.

You should follow some rules that are very important
to your hostess. First of all, be at your meals on time. The
boys and men should always allow the ladies to enter the
door first. Then when you come to your table, remain stand-
ing until your hostess, or mother makes the motion for sitting.
It is very good manners for the gentleman to pull back the
chair for the lady next to him, and then push it in toward the
chair for her as she sits down.

No one should begin to eat until all have been served.
When you eat any of your food, be sure you are using the
right silver. For desserts, you usually use a fork unless
it is too thin, as, for instance, ice cream; then use a spoon.
Your salad should always be eaten with a fork.

While eating, eat as noiselessly as possible. Never suck your soup or ice cream, but eat it, for then there is no embarrassment for you or your neighbor.

The conversation at the table should always be pleasant where all can take part in it. Take heed you don't say unpleasant things; for instance, something about an operation, or any disease, or you will spoil the people's appetites.

If at the table you happen to upset your cup or drop a your silver, set it picked up, and start in on different conversation to get away from the accident.

When you are through eating, remain seated until your hostess gives the signal to leave. Then leave as quietly as possible.

If you practise these rules at home everyday, you can always be prepared to eat with any of your neighbors without embarrassment.

In school you usually have an assembly where all the boys and girls assemble to attend lectures, plays, and different programs. Here in the public auditorium is a good place to practice manners which should be used in all auditoriums.

The student body as a whole should have good manners in assembly. The manners, if not good, will be embarrassing to the faculty and visitors. When going to assembly, start early in order that you need not rush and push everybody to get to your seat, and always go in from the side closest to your seat so as not to disturb more people than necessary.

Do not change your seat unless asked to, and when doing so, do it quietly. Always be ready to be asked to stand or be seated.
When anyone is speaking, be quiet and keep from reading or cleaning your finger nails. Always listen and, at least, try to look interested even if you sometimes cannot hear.

If someone comes in after assembly has started, keep from turning to see who it is, for then all the people's attention is given to seeing that person.

Never leave the assembly until it is over, unless necessary, or if you get a coughing spell which you cannot stop; then leave quietly so as not to disturb other people.

The classroom is a place to study and recite, not to disturb people, so when you come to the classroom, go to the right, and leave a passage way at your left. In this way, people going out will have room too.

Be as noiseless as possible and go at once to your own seat; be sure you have all your books and never borrow paper, books, or pencils unless you have asked the owner.

The teacher's desk is only for the teacher; the papers, books, pencils, and other equipment on her desk does not belong to you. Leave them alone. Don't sit in her chair or read any of her papers unless you have permission from her. It is her private property.

Always put your waste paper in the waste basket, and don't throw it all over the floor, for it looks untidy and shows you are careless. When the teacher calls on you to recite, do it without half sleeping, or lying down in your chair. Give her your attention and speak loudly enough for everybody to hear.
If a pupil makes a mistake, don't laugh so as to make him feel ill at ease. A little laugh is all right, but don't make it a habit.

At the end of the period, do not get ready to go as if ready to fly when the bell rings, but wait for the bell and then leave quietly without shuffling or slamming doors.

All people have their own property, which they not only want to call their own private property, but have it that way as well. Property is like mail, for both are private to that one person to whom it is addressed. Never open another person's letter even if you think the person would not care. It might contain personal material which is intended only for that one person. Also remember never to read another person's letters after they are opened unless that person has given you permission, for otherwise it is dishonest.

Another rule we should all remember is not to borrow unless in an emergency. Borrowing soon becomes a habit. Never borrow unless you have asked the person, for that is like stealing. If you do borrow books or stationery and other articles, be sure they are the same when returned, clean and not torn.

Some articles people should never lend nor borrow are hair brushes, combs, glasses, and other personal equipment, for the germs will be transmitted easily that way.

What is the telephone's use? Each person should think of that before calling up somebody, and sitting there for half an hour talking to one person. The telephone is a business article for getting information, and should be used for business talk, not for some nonsense. You never know if
the person on the other end of the line is busy or not. You perhaps aren't and the other person will never say so, but he might have a lot of work to do. You should never call people up during meal time or late in the evening, unless absolutely necessary, for how would you like to leave your dinner to get cold for half an hour, or how would you like to get out of bed to answer a call for someone else? When calling, ask right away for whom you want, and always be courteous to the operator. She is doing her best for you; do your best for her.

If you will keep this in mind of what to do for your everyday manners, you can be at ease any place, and practice them in your everyday life, not only once a week or month, but always.

BIBLIOGRAPHY

- Etiquette - By Emily Post
- Everyday Manners - By Faculty of the South Philadelphia High School
THE MANUFACTURE OF SUGAR AND ITS USE IN THE DIET

Alice Johnson, '33
Newfolden, Minnesota

Sugar is a sweet crystalline substance which is a pure carbohydrate or energy-giving food. It is one of the cheapest fuel foods. About two tablespoons of granulated sugar, two and three-fourths tablespoons of powdered sugar, about three tablespoons of brown sugar, or four ordinary sized pieces of loaf sugar will amount to one hundred calories. The sugars are the most easily digested of all the carbohydrates and in their process of digestion, all carbohydrates are changed to sugar. Therefore, sugars are easily digested as they do not have to be changed but only dissolved before being digested by the body.

There are several varieties of sugar in our diet, but they may be divided into two groups: one the sucrases or the cane sugar, beet sugar, maple sugar, malt sugar (maltose), and the milk sugar (lactose); and the second group, the glucoses or grape sugar (dextrose), fruit sugar (laevulose) and invert sugar or honey.

The most important of these varieties of sugars that we will consider is cane sugar, which is the oldest and most familiar of all sugars. It can be found in small amounts in plants and fruits, but its chief source is the sugar cane plant which resembles the Indian corn plant. Its native home was India but when merchants began to trade in the Indies, it was brought westward to Syria, Palestine, Sicily, and Spain. People said that the wonderful reed yielded a sweeter juice than
honey, but were suspicious of this new product as they thought it was bad for the lungs and very heating. As it was an un-naturally forced invention, they also believed honey to be much more wholesome as it was a natural product. Later, the Spaniards brought the sugar cane to the new world and now the countries which lead in the production of sugar from cane are British India, Cuba, Java, and the United States, including Porto Rico, Hawaii, and the Philippine Islands.

The beet sugar which is extracted from the sugar beets was discovered in Berlin in 1747, but the percentage of sugar in the beets was only six per cent and it was very difficult to separate the impurities from the sugar juice so this product did not begin to grow until in 1810 when by careful testing and seed used, beets were produced which had sixteen to eighteen per cent sugar. Then the industry grew rapidly and in 1912 and 1913 Germany, Austria, Russia, France and the United States produced sugar from beets.

The chief source of maple sugar is the sugar maple of North America and each tree yields only about four pounds of sugar in a season, so it is used mostly as a luxury and for its agreeable taste.

In the glucose group of sugars, we have the grape sugar which is separated from the grapes when they are dried to form raisins. This sugar is mostly used for icings and fondants in confectionery.

The fruit sugar is found in most fruits. This sugar will hardly crystallize. Invert sugar is a mixture of grape and fruit sugar and is also impossible to crystal-
Honey is the oldest kind of sweetening material ever used. It is a mixture of sugars gathered from flowers and changed into honey by the honey bee. It is the only sugar that contains more fruit sugar than grape sugar.

The compositions of the sugar cane juice and sugar beet juice differ as there is more water, ash and nitrogenous matter in the beet sugar than there is in the cane sugar, but much less invert sugar (a mixture of grape and fruit sugar) and this is important to know for the difference in manufacture.

Beet sugar is the only sugar raised here in our territory and also manufactured at the large sugar beet factory at East Grand Forks, Minnesota.

I will briefly explain the different processes of the manufacture of sugar beets. After the beets have been dug, the green tops removed, and the beets hauled to the factory, they are first washed thoroughly, then passed over knives which cut them into fine triangular slices. Now they are conveyed to the diffusion battery, which consists of ten to fourteen vessels or cells containing water at eighty degrees Centigrade. In the cells, the juice passes from one to another and when it leaves the last diffusion, it passes to a measuring tank and is then pumped to the carbonation tank. In this tank, lime is added, stirred well into the mixture and carbon dioxide gas is let in from the bottom of the tank and bubbles through until this mixture contains only one per cent lime. Then the clear juice is pumped through filter pressure where more impurities are taken out, but still the filtered juice is passed through a second carbonation tank, also a filter press and last through
a sulphur dioxide gas process to bleach it. Now the water is evaporated from the juice and the juice or syrup passes through filters which separate the liquid from the sugar. This liquid is what we call molasses. Then the sugar passes through an aid dryer and on to the sacking department.

The processes of the manufacture of the cane sugar are very much alike the beet sugar, after the juice has been crushed out of the cane sugar stalks.

Just because sugar is so easily dissolved and digested, we must not eat this food in large quantities or in place of other fuel foods. We must remember all surplus calories of sweets means pounds of surplus body weight built rapidly. Therefore, we would improve the diet by reducing the sugar consumption to one-half. If we eat sugar in excess, there is so much dissolved sugar for the organs of digestion to take care of that the stomach and small intestines become irritated, especially when candy is eaten between meals when the stomach is empty. Just because it is such a rich fuel food, it spoils the appetite for other foods and should be eaten with a meal or at the end of the meal. Sugar may ferment in the stomach and intestines and produce digestive disturbances, but when it is mixed with other foods, it is diluted and is not so apt to cause distress.

Sugar is a pure carbohydrate, so it is an extremely one-sided food, but molasses contains minerals as lime and iron and may be used in place of sugar for children, especially, as they need minerals. Fruits, too, either fresh or dried, can be used in place of sugar. Dried fruits have less water than fresh fruits, but have more ash and iron.
While remembering that sugar is a pure energy-giving food, we must also remember that it is an unwholesome food when eaten in excess.

BIBLIOGRAPHY

Food and Dietetics . . . . . . . Hutchinson
Food Products . . . . . . . . . Sherman
Everyday Foods . . . . . . . Harris and Lacey

...
THE MARCH OF FASHION

Beulah Harris, '33
Crookston, Minnesota

Everybody talks about fashion. What is it anyway? Why does it have so much effect on everyone? Is it the way we are planning our decoration in the house, or is it the style of everything we have around us?

No. It is the style of dress that the people accept and wear throughout the nation. What an effect it has on our people.

Charlotte Perkins Gilman says, "Religion may be forgotten, law is only flouted, parental authority has become a butt of ridicule, while social traditions such as decorum and gentle breeding are sneeringly discarded, but 'the dictates of fashion' are still meekly obeyed."

We say our styles are superior, ours are hygienic, comfortable, beautiful and free. But are they? Were the long trailing skirts hygienic, comfortable and free? Were the short boyish skirts becoming to women? Were the tight-fitting dresses comfortable? Were the tall hats of long ago comfortable? Are the small hats of today of any use to us, except as an ornament, and as an ornament, are they really beautiful? I could name many more that seem ridiculous to wear if we are looking at them from the standpoint of hygiene, comfort, beauty, and freedom. Then why do we accept such fashions so easily.

Charlotte Gilman again compares us with sheep; if one starts, we all follow. No matter what people are wearing, we wear
it in spite of how we look in it. A college girl was heard to say she didn't like the hair nets when they were "in" and she was glad when they went "out." She wore them. Why? Because everyone else wore them.

A garment may be beautiful in itself; its fabric, color, design, and decoration may make it beautiful, but when it is put on a person, it may become very unattractive. A dress should correspond to the shape, size and action of the body, and the ease, comfort, and health of the individual. It should be suited to the occupation of the wearer, to the occasion, and to the season in which it is worn. After all, there is a fashion by which we can all look attractive. If we only try, we can find that fashion.

There have been beautiful fashions. The ancient Greek costume is still agreed to have been the most beautiful costume ever worn. Why did it not stay? Is it because we tire of looking at the same thing, or does it give the designers a job? The Chinese have a fixed and settled fashion, and also many other countries. Peasant classes in every country have had the same type of costume for centuries.

More than seven billion dollars is spent yearly on American women's ready-to-wear, and neither the women nor the men who pay the bills are consulted about the colors, the fabrics, or the silhouettes of these garments. All that has been decided in Paris, the final, the unquestionable, the highest authority on the art of women's dress. Patriotic appeals from the distressed cotton growers of the South are ignored, but a hint sent from Washington to French officials in Paris
leads designers to discover the hidden charm in cotton. American women soon find that even their most formal moments must be enhanced with gowns of pique and gingham when sanctioned by Paris.

It is interesting to note that practically all of the designers of women's clothing are men. It was an Englishman, Charles Frederick Worth, who revolutionized Paris dressmaking and started it toward its present status of the courtier who tells women what to wear. At the age of 21 in 1846, with neither friends nor capital, Worth went to Paris to work in a wholesale silk shop. Twelve years later, he opened his own salon, with a Swede named Dobergh as a partner and his wife as a model. Empress Eugénie, wife of Napoleon III, no doubt helped Worth to renown when she became disgusted with the way in which her gowns were copied. She curtly dismissed her women dressmakers and changed to Worth. She was so well pleased with his creations that soon a bill for $20,000 was sent to her husband.

The house of Worth reigned supreme for more than thirty years. Worth's two sons were naturalized Frenchmen and down to the present day, the name carries with it the guarantee of creations world-famous for their conservative, but excellent good taste.

Other designers have followed the route laid out by Worth and have established their houses along the boulevards of Paris. Prominent in this list are Jean Patou, Lucien Lelong, Paul Poiret, Chanel, Lanvin, Drecoll, and Molyneaux. Each house has a distinct personality impressed upon it by the dominating figure or influence in the estab-
When a designer is ready to launch a new style, usually at the beginning of each season, they send out invitations to a formal showing in their salon. Representatives from all large manufacturing companies for women's apparel are always among those present, sending word to their company of the styles shown and how they were received by the people who were present. The success of each company will depend upon how quickly they can get this style on the market.

If a designer can get the favor of some noted lady and plan her wardrobe for her, this will also serve as a big advertisement for his house.

From time to time, cities with reputations otherwise established, blandly announce that henceforth they will be the style centers of the world. Vienna, Berlin, London, New York, and Hollywood have all had their fling.

The world recalls how Chanel accepted the invitation of Samuel Goldwyn to be the film capital's czarina of fashion. Her visit was not particularly successful, and Hollywood failed to establish itself as a fashion center.

The supremacy of Paris as a style center has been continued by the genuine skill, good taste, and originality of the artists who have chosen dressmaking as their vocation. The gigantic enterprise provides livelihood for millions and is backed by American and French capital. Silk, cotton, wool manufacturers unite and startling changes are brought about. We hear the same story each year. "Dress this year/to be individual. It will be more flattering and becoming."
It is suggested that last year's styles were not quite so kind as they might have been, but this year women's natural charm, grace and beauty are to have the perfect setting. Hats are tilted to the right of the eye, over one ear, to the back, until in 1933 the idea of wearing a hat straight is smart, new and just a trifle daring.

Fashions also have a great effect on industries. There is a fashion in women's clothes and it has an effect on other things. When Princess Elizabeth appeared in Hyde Park dressed in yellow, the last week in April, the following Monday at Patterson, New Jersey, a silk mill sent ten thousand pieces of gray goods to the dyers to be dyed yellow, and about the same time this took place, an automobile manufacturer in Detroit ordered that yellow enamel be sprayed on every fifth sports model.

Fashion is applied to radiators, stoves, furnaces, plumbing fixtures, kitchen utensils, beverages and package foods.

A Catsup manufacturer was using bottles familiar to two generations, and was losing business. The advertising agent advised them to change the bottle. The agent designed a modernistically designed bottle, put on a new label, and the first sales jumped ahead one-third almost immediately.

In kitchen utensils manufacturers point out to the housewife that she should have "ensemble effect" and advises her to throw her old paring knife away (which has a colorless handle) and to get a bright colored one to match her color scheme of decoration. So out it goes, and she gets a new one.
Many years ago when women wore high hats that were about two to three feet high, it affected the architecture. The doorways had to be made higher so the women could get through them, without knocking their hats off.

In the nineties, multi-millionaires had diamonds set in their own and their dog's front teeth. But articles of worth are continually spreading among all people. The demand for diamonds has been seriously affected by the increased demand for fashionable costume jewelry.

This is the way fashions continually lead from one thing to another. They keep changing. Designers are continually putting out new styles, and this causes other things to change.

Here is an article that a critic of fashion published some time ago in one of his writeups:

"Slowly, surely, subtly, over a period of three years, forces have been at work to pry from women's clutch, without causing too loud an outcry, those fashions of the past decade which she has found so sane and comfortable.

And then, overnight, as it were, fashions suddenly trumpets her triumph. Long skirts, trains, corsets, large hats, eleven yards to the gown instead of four or five, long gloves, long hair. Organization against the oligarchy of industries is all that can save women from the predicament that is about to send her backsliding. 'Down with the corset and up with the hemline' should be the slogan of every woman."

A story told of a salesman runs as follows:

"Long ago when women bought dress material, there was so much to carry home, they had to have it delivered."
When they wore such short skirts, two or three years back, a woman bought dress material for a dress, and when the salesman asked if he should have it delivered, he was much embarrassed when she replied, 'No, I can just put it in my purse.'

In spite of what the fashions are, if a girl or a woman wishes always to appear well dressed, she will not plan her wardrobe entirely on the principles of what "they" are wearing, but will study her individual style, the lines of her figure, and her coloring, so that she may in a sense set her own fashion. No one wishes to look really "out of style." The most satisfactory plan is to avoid conspicuously fashionable clothes, and to select instead conservative and beautiful lines and color which reflect the tendencies of the prevailing mode, and at the same time express the individual

BIBLIOGRAPHY


"Who Sets Fashions and How" - Franklin S. Clark, Review of Reviews, January 1930.

"Fashion, Beauty and Brains" - Charlotte Gilman, Outlook and Independent, August 7, 1929
PERSONAL GROOMING

Rose Naplin, '33
Wylie, Minnesota

A famous designer of women's clothes once said that after years of experience he had decided that there were no really homely women in the world, that every woman had at least one quality which, if properly brought out, could be enthroned and all other qualities become handmaidens to her command of charm. First, let us define the word "charm." Charm is an inner quality and could be defined as a graciousness from within which finds expression without. It is the grace which compels a desired response from others, and because it is a "from within" quality, every woman may possess it and every woman, by cultivating charm, may become beautiful.

There are important factors in personal grooming and the first one of these is cleanliness. This cannot be stressed too much because it is very important in personal appearance. The first item we will take up under cleanliness is the care of the skin. A bath should be taken every day. Bathing means more than cleanliness. It means the opening of more than three thousand pores, outlets of impurities. Stimulating and sedative effects may also be had from baths. After having taken a bath, always give yourself a brisk rubdown, for it opens the clogged canals and stimulates circulation so that the skin is made a more efficient avenue of waste elimination. Very cold or hot
baths are not to be indulged in. After you have taken your bath every day, you need not use water on your face again that day because too much water is not good for the skin. Cold cream should be used to remove the dirt and makeup.

You may use any brand of cold cream that you wish, but remember the following rules in applying it. Cold cream your face with the tips of your fingers, which should be entirely clean, putting dabs on the forehead, cheeks and chin. Every pat should be upward and outward. Pat it into the skin and be sure to clean in the creases and around the nose. Then remove with a tissue and you are ready for your astringent. The purpose of an astringent is to stimulate the skin and start the blood working. Ice water is often applied to the face as an astringent. The face is covered with absorbent cotton which has been moistened in ice water mixed with Witch Hazel or some other astringent.

The second factor is elimination. Nothing has as much of a beneficial effect upon a woman's appearance as the proper elimination of body poisons. Waste is eliminated through the pores and excessive perspiration should be prevented. There are deodorants to be used, among them being Odorono and Non-Spi. Another way waste is eliminated is through the bowels. Constipation should be avoided and this can be done through correct diet and exercise. There are four classes of exercises, each suited to a different purpose and all necessary.

First, Stimulating exercises: twisting and bending the trunk to stimulate the internal organs.

Second, Corrective exercises: such as the bicycle
exercise. Lie on back, hips up, hands under hips, work the
feet and legs as if you were treading a bicycle. This
exercise strengthens the back muscles and corrects a
tendency to a hollow back.

Third, Developing exercises: such as relaxing and
stretching. Kicking may be used to reduce the calf of the
leg.

Fourth: Setting Up Exercises: a routine which
will bring all the muscles of the body into play should
be taken daily before an open window. If all these exer-
cises are practiced, constipation is not likely to occur.

To begin one's beauty treatment for the day, the
first thing in the morning drink two glasses of water, and
during the day two more quarts of water should be taken. The
diet should contain little meat, but plenty of green vege-
tables and fresh fruit.

That we get the required amount of sleep is very
important. Eight hours of sleep should be had every night.
Everyone should assume a good position before settling down
to sleep. The face should rest on the pillow so the mus-
cles are in place rather than pulled down. The hand must never
be in front of the face. There should be plenty of fresh air
in the sleeping room as this will purify the blood and bring
color to the skin.

There is no part of the body, with the exception of
the face, that is so expressive of a woman's character as
her hands. The hands must be kept clean. Wash them thoroly
with pure soap; scrub with a brush that is not too hard; use
a pumice stone to remove stains; rinse thoroly with warm and
cold water; wipe each hand carefully and rub on a good lotion. Camphor ice rubbed into the hands nightly will keep them smooth and soft.

We must not forget the nails as a part of the hands because they are very important and add much to the appearance. Nails should not be clipped; it is much better to shape them with an emory board. They should be shaped to correspond with the shape of the fingers. Very pointed finger nails are not attractive because they are not natural. To clean underneath the nail, an orange stick wrapped in a little cotton should be used. A sharp instrument such as a nail file is not good because it will scrape the nail and make it rough. The cuticle at the base of the nail should be pushed back so that the half moon will not become eclipsed. Here the flat end of the orange stick is used. The fingers should be wet during this process. In using polish on the nails, be sure it is the correct kind. A dull polish is always correct, but shiny polish is poor taste. If you wish to use nail white, the nail white pencil or the nail white cream are easily available. Every night before you go to bed, dip your fingers up and down in a piece of absorbent cotton saturated with olive oil. This prevents the nails from becoming brittle.

Hair is referred to as woman's crowning glory, but to fulfill this saying, it must be polished and clean. Ordinarily, the hair should be washed not more than twice a month and if it is not subject to dust, once a month would be better. Castile soap and soft water should be used for shampooing, if possible. It should not be dried with artificial heat, but out of doors, if possible. To look polished, the hair must
be brushed. One hundred and fifty strokes with a good firm brush every night will take care of this.

In dressing the hair, there are many points to consider. Some types of hairdress are not particularly pleasing to all persons. No matter what is the latest style in hairdressing, proportion should be observed. The head should never appear too large or too small for the body. The hairline must be clearly defined and in hairdressing, as in all other art, simplicity is the most necessary element of beauty.

Many a beautiful woman has ruined her appearance by smiling. Teeth that are not white and well taken care of will ruin what many hours of careful work has done. Here are some very simple rules to follow in caring for your teeth:

1. Brush the teeth with clear water on rising, and with paste or powder after each meal.

2. After meals, clean between the teeth with dental floss.

3. Rinse the mouth with lime water until it foams.

If all these factors are religiously carried out, beauty and charm will be the possession of every woman.

BIBLIOGRAPHY

"Individuality and Clothes" by Margaret Storry.

"Types of Hairdress" Article by Miss Cooke, Delineator, January 10, 1933.

"Hands and Their Care" - McCall's Magazine, May 1933.
SILHOUETTES
Esther Dalager, '33
Pelican Rapids, Minnesota

Are you a rounded question mark
Ungraceful, lacking vim
Or a living exclamation point
Alert, courageous, trim?

Why is it some girls look lovely whether they are dressed
in a plain gingam dress or in a party frock? This question is
asked quite often because so many girls spend a lot of money in
obtaining beautiful clothes only to find the effect spoiled by
a poor silhouette.

The defects of a silhouette can, to some extent, be
covered by proper line in a dress and by the type of decoration
used. Although being tall or short should not be classed as a
defect, a tall person may be made to appear shorter if she wears
dresses with lines of a horizontal nature, while a short person
should choose dresses with vertical lines. A round shouldered
person could cover this fault to a certain extend by avoiding
cape collars and any decoration across the shoulders that would
emphasize this fact. Also a person with unusually large hips
should avoid decoration that would emphasize the hipline such as
jackets and peplums ending at the hipline.

In order to wear a dress or costume to the best advan-
tage, the wearer must have a good silhouette. The styles this
year call especially for a perfectly proportioned, well tailored
body.

A good silhouette means first of all good posture and
by posture is meant poise. "Well poised" connotes physical and mental balance.

A good silhouette is of great value to its possessor. These values may be classed as hygienic, economic, and social.

**Hygienic** - In an upright position, the lungs and important organs of the body get the room that they should have for the proper performance of their functions. In a bad posture the lungs are cramped, the heart gets little room, the stomach and liver are crowded, the muscles of the abdomen sag, thus interfering with the functions of all the internal organs, putting the individual physically below par. A good posture is essential for the best performance of the vital organs.

**Economic** - Posture and bearing which express dignity and poise suggest latent power, which a would-be employer notes as confidence in one's ability. It is true that in applying for a job in person one may walk oneself right out of the job in six or eight steps. Of course, an employer wants employes who can hold their heads up and lift their feet when walking.

**Social** - Attractiveness is measured more by the splendid carriage of the body than by pretty clothes. The posture of a person tells what he is. A relaxed posture implies a mental relaxation as well. A strong erect posture expresses strength of will, alertness, and the joy of living. Thus, an erect posture may be said to be the result of the attitude taken toward life.

**Spiritual** - The spirit is uplifted with the uplift of the body. The glory of the rising sun and other beauties of
nature can not be seen by people who walk along with heads down and dragging feet.

Neglecting the posture and the health habits will act as a telltale of one's age. Today everybody wants to stay young as long as possible, and one good way to guard against early old age is to watch one's posture.

So far only the values of a good silhouette have been mentioned, but in order to have a good silhouette, one must know just what a good silhouette means. Remember beautiful figures and perfect postures are not acquired by good resolutions made after you are tucked in bed at night.

When beautiful posture has become automatic, study your walking. Few people walk correctly. Walking is said to be an art, almost a lost art, it being practiced so little now as compared with years ago. Very fast walking is never graceful. To get the most benefit from walking, the body must be erect, and flexible. The leg should swing from the hips with as little motion at the knee as possible. The weight of the body should be carried on the outer side of the feet, pointing the toes straight forward. In toeing out, the weight of the body is thrown on the inside of the foot and produces arch trouble.

Standing is very tiresome and fatigues one more than walking. This is due to the slowing of the circulation in the legs. The fatigue can be lessened somewhat if the posture is correct. Balance the body on the balls of the feet with the weight on the outer side. The head should be held up, the chin in and the abdomen in, chest out. In other words, stand tall, but do not stretch. The body should be in such a position that when an imaginary line is drawn from the ear
to the heel of the foot, it should pass through the shoulder, hip and knee.

Occupations of the present day require more sitting than ever before in history and much bad sitting has resulted in abnormalities of the trunk itself. One should sit in a chair so that the trunk is straight. To sit tall is as essential as to stand tall. Do not sit on the edge of the chair and lean backward. Sit back in the chair. Any leaning forward should occur at the hip joints.

A good silhouette can only be obtained by careful, patient, and steady practice. Nearly every one of us was born with the essentials of good posture. But as we grew up, we unconsciously picked up bad figure habits. The first steps to obtain a good silhouette should not be left until a person is full grown. It is best to start when the child is quite young. The pre-school child's posture should be watched and if any defect is noticed, it should be corrected at once. The small child usually gets enough exercise for his legs and arms, but the muscles of the trunk are usually not exercised. Therefore, he should be allowed to creep and roll so as to develop his trunk muscles and not be encouraged to walk at an early age. The defects in posture are easier corrected in young children than if left until one grows up. Giving the children interesting exercises is one help. After the child is sent to school, he should be taught the correct ways of sitting at his desk and correct ways of standing. Most schools now teach some exercises for good posture.

Correct eating habits also enter into the development of our bodies into desirable silhouettes. Eating regularly and watching the amount of protein taken make for proper development
of muscles. The child needs protein foods such as milk and eggs to build strong bones.

Sleeping is another contributing factor to a good silhouette. For most people eight hours of sleep each night is required, while young children need more. The sleeping rooms should be well ventilated. The windows should be opened at the top so as to prevent a draft in the room. The body should be in a relaxed position. Do not curl up in a little ball; this makes for poor circulation and you will not be as rested as you would be if you lay straight. It is also agreed that sleeping on one's side is better than lying on the back. Sleeping without a pillow is best, but a small pillow is all right if it is desired.

Clothing may seem far removed from posture, but it also plays its part in a good silhouette. Ill fitting shoes will have a bad effect on one's walking, or standing. High heels are most unattractive when walking. Tight clothing is uncomfortable and does not give the body the circulation of blood which it normally should have. Young children's clothing should have no undue strain or pressure on the body. Clothing should hang from the shoulders as much as possible and fit the body easily.

The skeleton may develop deformities due to improper posture, lack of sufficient food of the proper kind, or unusual loads on the bony parts or as an after effect of a disease. The most common relate to the spine and feet.

Stooped shoulders is one of the most common deformities. It has many causes, such as leaning forward at a desk or over one's work, or standing and walking with the head carried too forward and other similar positions.
Shoulder braces should not be worn to correct this as they do the work the muscles should do, making them still weaker. Arm swinging exercises are good for the correction of this.

Curvature of the spine is another defect which is quite common. The curvature is either abnormally from front to back or from side to side. Forward curvature of the spine is known as "Lardosis"; curvature from side to side is known as "scoliosis," and is caused by muscular weakness on one side or over development of the other.

The best way of preventing curvature of the spine and rounded shoulders is by developing the heavy trunk muscles by exercises so that they will support the spine properly. Exercises for the correction of a curved spine include deep breathing, spine relaxing, posture training, back exercises, abdominal exercises, and general exercises for strengthening muscles in a corrected position.

Since posture is so necessary in our daily lives for health, and good appearance, we should all strive toward acquiring good habits of walking, sitting, and standing.

BIBLIOGRAPHY

Lillian Curtis Drew
Lillian Curtis Drew
Jesse Feiring Williams, A.B.
Mildred Neff
Ethel M. Hendriksen
Dorothy Nye

Individual Gymnastics
Adapted Group Gymnastics
Personal Hygiene Applied "Girls' Life"
"Correct Posture for the Growing Child" Woman's World, June 1929
"Fashioned Figures" McCall's Dec. 1932.
PHYSIOLOGY AND PUBLIC HEALTH
First aid and bandaging are two of the most necessary things in every day life. A person that has knowledge in these two subjects need not worry about dying because he did not know how to treat a wound. There are many ways and many good ways to treat a wound.

In First Aid, one of the first things to think about is the equipment. No one can do a great deal without equipment. There is cabinet equipment that must be had and then there is also emergency equipment. The equipment necessary in a cabin is first aid for wounds, burn dressings, gauze, adhesive tape, cotton roller bandages, one turniquet, two packages safety pins, wooden splints, one pair scissors, mercuriochrome. Of course there are other things that can be put in, but this is almost all that is necessary. It is always nice to have an emergency room for your equipment, but of course every family cannot have that.

There are many things that can be helped by first aid. First of all, there is sun stroke. In sun stroke, there is a slow and full pulse, labored breathing, a dry and hot skin, red face and unconsciousness. Move the patient to a shady place, raise his head and upper part of body. Pour cold water over his head and face. Rub his face a little.

Fainting and shock resemble each other very much. Shock usually follows severe injuries, is permanent and serious. Fainting is temporary. It usually requires little
treatment.

In sprains there is usually some twisting and tearing of the ligaments at or near the joint, causing a rupture and internal bleeding, and may be relieved by the application of cold or heat by pressure or proper placing. Strains are the wrenching or tearing of the muscle. Alternate hot and cold applications are necessary and very effective. In dislocations do not touch the dislocated part of the body but send for the doctor at once. Try to let the patient lie somewhere, so he will not feel so much of the pain.

Foreign bodies often occur in the eye, ear, nose, and throat. Accidents of this kind are complicated and at times very serious. There are many substances that can get in the eye; for instance, cinders, dust, sand, and small objects. All these objects can be removed by simple means. One of the worst things you can do when you have something in your eye is to rub it. When removing objects, be sure you do not touch the eye with dirty fingers or an unclean cloth.

When getting foreign bodies out of the nose, try blowing your nose. This tickles your nose to make you sneeze and in most cases, you can remove the foreign matter.

Unskilled efforts to remove foreign bodies in the ear are dangerous to the patient. Never insert wire needs or pins into the ear to aid in removing foreign bodies. The safest rule possible is to send the patient to a physician promptly.

When any foreign particle gets into the throat, summon a physician promptly.
Accidents often occur in places where it becomes necessary to carry the injured person to his home or to a hospital. Great care should be taken that the patient does not receive any further injury during the transportation.

Serious cases should be carried on a stretcher, which, in emergencies, may be improvised. In absence of a stretcher, various methods of transportation have been devised. The four-handed seat made by two persons clasping each other's wrists is a very good method of transportation.

When an injured or sick person is to be removed to a private house instead of a hospital, preparations should be made, if possible, before the patient is brought in.

Two kinds of bandages are available for first aid work. They are known as the roller bandage and the triangular or handkerchief bandage. Both of these may be purchased at drug stores, or in an emergency, they may be made on the spot. These bandages as purchased are made of surgical gauze or of muslin.

The bandages made of surgical gauze are absorbent, thin and very pliable. They are most suitable for placing next to a wound or as agents for the application to the part. Cotton or muslin roller bandages are much stronger than those which are made of gauze, and are therefore more suitable where pressure or support is desired. In an emergency, however, these bandages are interchangeable.

The triangular bandage is made by cutting a piece of cloth thirty-six inches square into two pieces diagonally. Such a bandage can easily be improvised, but can also be obtained from druggists. The triangular bandage has proven
of the greatest value in emergencies upon the field of battle and elsewhere. It is simple, efficient, and of wide usage. It is probable that no other article used in wound dressing can accomplish so much, and in such reliable manner as this triangular bandage in rendering first aid. This bandage may be used either as a broad or narrow bandage. This bandage may be used for the scalp, forehead, cheek, eye, side of head, neck, shoulder, chest, wrist, hand, hip and many other various places. "The fate of an injured man depends on the care first given to his injury."

Roller bandages as supplied by druggists are made of muslin, cloth, known as cotton roller bandages, and of surgical gauze cloth, known as gauze bandages.

The roller bandage is easily applied and while experience is necessary, with a little practice, any layman may make an application that will answer in any emergency.

To apply a roller bandage, begin by holding the extremity at the point at which it is to start with, the thumb and index finger of the left hand. Hold the roll of bandage in the direction taken by the hands of the clock, unrolling the bandage and at the same time turning it around the part to be enclosed. Make the first turn with the right, after which the first hand being freed by the overlapping may alternate with it. Roller bandages may be used for almost any part of the body.

When bandages are applied correctly, they relieve the pain of the patient very much.

REFERENCES

Johnson's First Aid Manual by Johnson and Johnson.
Teachers' First Aid Manual by Minnesota Public Health Assn.
Work Supervised by Miss Lydia Dahlen, School Nurse.
MISCELLANEOUS SUBJECTS
Many attempts were made to establish the Berlin to Bagdad railroad. The first attempt was made by England and Russia about 1894. This was checked by the Turks. Later Germany began the construction of this important trunk highway through the near East to the Persian Gulf. The Kaiser first thought of the railroad when he was on his way to visit the Holy Land. He secured an oral promise from the Sultan for the construction of the so-called Berlin to Bagdad railroad, which was to extend through the Near East to the Persian Gulf with branches toward the Caucasus, toward the holy cities of Islam, Meccina and Mecca, with a land terminal at Bagdad and a part on the Red Sea.

The object of the Berlin to Bagdad railroad was to shorten the present route from Constantinople to Bagdad; that is, to make Bagdad five hours instead of fifty-five days distant from Constantinople; to enable the Turks to convey troops rapidly to their most distant frontiers. In other words, to consolidate the Turkish Ottoman empire; to quicken the present route to India. The Suez Canal was to lose much of its importance. This affects England as she has control of the Suez Canal. It enables Turkey to ship her products to Germany and it enables Germany to ship her products to Turkey and elsewhere. Egypt will be endangered because Turkey will be in so close contact and Germany will be able to send troops to Turkey to help her fight in Egypt against England, and England will not
be able to stop Germany's trade because England's power is on the sea.

If Germany could get control of this railroad, she would be one of the World's most powerful nations. It is in Europe and Asia that most the World's inhabitants live. Communication up to this time had been mostly by water. Of these water routes there were two. The one was a long route which went down to the south of Africa, then up toward India and China; this route was mostly under English control because she held India, South Africa and other numerous stations on the way. The better and shorter route was through the Mediterranean Sea; this also was under British control as she held Gibraltar and the Suez Canal. Railroads furnish better and quicker transportation than water. If Germany could control the railroad lines leading down from her own northern parts across Austria-Hungary to Constantinople and connect them to the Bagdad Railroad, she would control the shortest route between Europe and Asia, and perhaps in time gain part of the world trade. If a branch of this railroad led nearly down to Egypt, it would be a threat to England; and at the Persian Gulf, they could send troops to attack India before England could send reinforcements. In short, Germany believed that she would in time be mistress of the world.

Germany wanted both the glory and benefits of this railroad. England, France, and Russia were opposers of Germany because they wanted it to be an international affair.

The Kaiser's arguments with the Sultan are, briefly, as follows:

First - Russia agreed not to oppose the scheme and even link up the railroad with her small Persian lines.
Second, he said, "Help me build the Bagdad Railroad through the Persian Gulf and I will have over to you, North Persia and as much of this land as you want."

Third, after Russia realized that she was beaten, he said, "Now that I have beaten you, will you not make a bargain? Let us virtually partition Persia between us, shutting out the British, and while we are about it, let us have a friendly understanding all around. I will not attack you in any quarter, if you will not attack me." Such methods are very crude, as they have been since Bismarck's day.

Rahrbach points out how the railroads will help or enable the Sublime Porte to bring up its Anatolian troops quickly to Bosphorus. The prosperity of Mesopotamía and Asia Minor will survive, stimulated as it would be by the immigration of great numbers of Germans. Both in financial and military affairs, Turkey would be able to resist her undoubted enemy, Russia. Germany's original plan was to extend the Bagdad railroad to the Persian Gulf. This the British government would not permit because it would enable Turkey and Germany to send troops quickly to Persia and a farther extension of the line would threaten India. This plan of Germany's appeared clearly in the years of 1908-10.

The first section between Constantinople and Sabanja in Asia Minor was completed in 1904, and further extensions were made the following year. In 1912 the last section was begun, which was to enter the city of Baghdad. It was at this time that England realized her danger most.

There now was a clear way from Hamburg to the Persian Gulf, if only a hold or control could be obtained over the
interfering countries. Turkey was one of these. The Kaiser sent German officers to drill the Turkish army. "Abdul the Damned" of Turkey was driven off the throne. During this time, Austria, who was an ally of Germany, got control of Bosnia and Herzegovina. When Russia was going to interfere, she was reminded of her promise and that she was to be an ally of Germany and Austria. The son of "Abdul the Damned" was put on the throne but the Turkish government was so weak that she soon fell under German control.

Both ends were now clear, but between Bosnia and Turkey there was a long neck of land which has always been in a state of unrest to the eyes of Germany. Servia, Bulgaria and Greece determined to take advantage of this unsettled question. These countries started to fight between themselves, and while they were fighting in this manner and weakening themselves, the Turks under Germany recaptured part of this land.

In early 1904 the Berlin to Bagdad railroad was almost entirely under German control. It ran through Austria-Hungary, Bosnia, Servia, Bulgaria, Turkey, and Asia Minor. The only country which remained independent as far as the railway is concerned was Servia. Germany realized that this railroad would never be secure, if part of it remained under Servia's control. Therefore, she determined that she would have to use arms. An excuse was easily found and Austria was sent to fight. This task was not so easily accomplished as it seemed, because Austria was forced to retreat twice before they put up a more organized army.

As a result of this, England and France became both threatened and jealous and therefore wanted to stop the Kaiser's
ambitions. It was too late as the Kaiser's ambitions had extended so far that he was determined to capture his nearest enemy, France, first, and add the French army to his original force, and therefore have a stronger force when attacking the other enemies.
In 1835 John Clemens and his family traveled from eastern Tennessee to eastern Missouri in an old twophorse barouche. It was in a small house in Missouri that Mark Twain was born on November 30, 1835. He was feeble and not very welcome in the crowded household. They called him Samuel after his grandfather, and Langhorne was added for an old friend. He was usually called Sam or Sammy because it was shorter.

John Clemens was a lawyer and had a very good education. He had been born in Virginia but had grown up in Kentucky.

During his childhood, Sam did not have very many white playmates. Most of them were negroes, but that didn't make any difference to Sam. He liked his negro playmates and did not like to see them hurt or in need.

The evenings were usually spent in listening to the two negro slaves, Uncle Ned and Jennie tell stories. Sam learned a lot from these stories, which later helped him in writing his books.

In August 1839, Margaret, Sammy's sister, died. About two months after her death, the Clemens family moved to Hannibal, a Mississippi river town, where Sammy grew to manhood. He remembered it as the "white town drowsing in the sunshine of morning." Around the town were hills, a distance below was a cave, and out in the river was an island. Sam
often swam to this island together with his companions, as you will find out if you read some of the books he wrote on his life on the Mississippi River.

Mark Twain was very noisy as a child in the house, and when he was outside, there was danger that he would be brought back dead. He was always being brought back with a broken limb or half drowned. When he was five years old, he started school. Mrs. Horr, his first teacher, was paid 25¢ a week. The next year Sammy couldn't go to school, but he learned botany, natural history, and swimming at home. Later he went to Mr. Cross's school. Sammy did not like school but he was a good speller and many medals were awarded him by Mr. Cross.

Mark Twain was not attractive as a lad. He was small with a head that seemed much too large for the rest of his body. He had blue eyes, light hair, and a delicate complexion. He did not talk very much, but when he did talk, his words seemed to be of importance.

In March, 1847, John Clemens died at the age of forty-nine years. Mark was only twelve years old at that time, and the family was in need. He found work with a printer by the name of Amint. Sammy soon became a very neat and capable workman.

One day as he was coming home from work, he saw a piece of paper flying in front of him. It looked attractive. He picked it up and found that it was about Joan of Arc. He wanted to find out more about this person and started to read books and study Latin and Greek.
When Samuel was eighteen, he thought that he was no longer needed in Hannibal. He went to Saint Louis where he visited with his sister, and worked in a printer's office. When he had enough money saved, he went to New York where he found work with the firm of John A. Gray and Green, the general printers on Cliff Street. After staying away fifteen months, he returned to his own home.

He wanted to take a trip to the Amazon River. He went to Saint Louis where he worked until he had enough money saved to make the trip. From there he sailed on the "Paul Jones," a Mississippi steamer, to New Orleans. Sammy had always loved the river and while he was on this steamer, he went into the pilot's office. He asked the pilot, whose name was Bixby, if he could learn to manage and steer his boat. Bixby finally consented to let him learn providing he paid five hundred dollars. Sammuel became a very good pilot and learned to know the river from one end to the other. When he received his license as a Mississippi pilot from New Orleans to Saint Louis, he went into partnership with Bixby.

When the Civil War broke out, Samuel was in the South and Bixby was in the North. He went north on another boat as a visitor. When he reached Hannibal, he found that an army had been organized by his old friends. They met secretly at night and Samuel was chosen to be the leader. They got their supplies and started out. While they were in their camp by Salt River, the river rose and camps were flooded. Samuel developed a severe boil and had to be carried to the nearest place so that he could get food and shelter.
After returning home, he went to Carson with his brother; while he was there, he studied natural history; that is, he studied nature. Many were finding gold and silver mines. He thought he could find one too. He went into partnership with W.H. Clagget. They searched for mines, but were unsuccessful.

In 1862 Samuel found work with J.T. Goodman who published the Territorial Enterprise, a Virginia city paper. He received a salary of $25.00 a week.

In 1863 Samuel took up a new course, the study of the political nature of the frontier. He wrote many political articles for the papers. At first he made many errors and the people laughed at him, but he did not lose courage, but kept on until he had made a success of it. He learned all about the political affairs and was known from coast to coast, and even in foreign countries, as a great writer.

Samuel wanted another name that he could be recognized by and which was brief and strong. He chose an old river name that meant twelve feet, and safe waters, Mark Twain.

Mark Twain was chosen governor of the third house. He had become a famous man through his work; he gave many speeches, and there was always a large crowd there to listen to them. For one of his speeches given at the third house, he was presented with a gold watch, on the back of which was inscribed "To the Governor."

On June 8, 1867 Mark Twain went on an excursion to the Holy Land. He sailed on the "Quaker City." He traveled five months and during this time met many other famous writers
who gave him a lot of valuable information. During this time Mark Twain had written fifty-two letters for the Alta, California paper, and six to the New York Tribune. When he returned home, he wrote a book about his trip, "The Innocents Abroad."

About this time, a change took place. On February 4, 1869 Samuel Clemens was engaged to Olivia Lewis Langdon. A year later they were married at the Langdon home by Reverend Thomas Beecher. As a wedding present, Mr. Langdon gave them a house on Main Street in the city of Buffalo. The house was well furnished with all the modern and convenient things that were in any way necessary.

His wife had a good taste for literature and became a great helpmate to him in his work. Shortly after he was married, he published the book, "Roughing It". This book was a great success, and is even today considered a very good book. Many copies were sold.

A few years later Mr. Langdon died. To Mark Twain and his wife, it seemed like the happy days were over. On November 1870, a child was born to brighten their life. In March 1872 a second child was born. It was a little girl, and was named Susy. Three months later, the older child died.

In August Mark Twain went to Europe where he was going to gather material on the English life and customs for a book. The English people were very friendly toward him and took him into society where great men were gathered. The winter after he returned from England, he wrote "The Gilded Age."

In June 1903 he was summoned west to receive the degree of L.L.D. from the University of his own home land. Large
crowds had gathered to welcome him and shower him with flowers, when he arrived in the depot in Columbia.

June 5, 1903 Mark Twain's wife died. She had been very sick and when she was better, he took her to Italy where she seemed to improve. She died in Italy and her body was taken to the United States to be buried. A few days after this, Mark Twain received a message saying that his daughter Susy was dead. He was very discouraged and did not feel like writing any more.

"Tom Sawyer" is one of his famous books which is read all over the land. In this book we read about all the pranks he played, and how he would get into mischief. This is a book he has written about his young days in Hannibal. He was very clever too, as, for instance, when his aunt was going to punish him by making him whitewash the fence on Saturday. He started but when the other boys came along, they wanted to do it. At first he refused but consented to let them if they gave him something. All he had to do was to watch them work.

Some of the other books Mark Twain wrote are "The Prince and the Pauper", "A Connecticut Yankee", "King Arthur's Court" and "The Life on the Mississippi." Most of these stories are stories he has written about himself and his travels. Two other popular stories are "Huckleberry Finn" and the "Jumping Frog of Calaveras County."

Mark Twain had been born in the year that Halley's comet appeared, and it was his belief that he would die when it again appeared in 1910. This was indeed a true prophecy because on April 21, 1910 he died. He had won a name that was famous, and honored all over the world.
Russia is a land of wonderful natural resources. Most of the land is new and with a few modern machines can be made a wonderful agricultural country.

Most of the farming in Russia is done in the western, southern and central portions. Farther north the land is very poor for farming, but it contains large coal deposits and also iron. The little farming that is carried on in the northern portion is mostly stock raising, in which they raise reindeer and some cattle. The region they live in is called the tundra region, which is grassy plains and swamps. This is very good for deer and cattle, and the grass is of excellent quality. In the winter, however, it is a very poor place to live on account of the snow and cold winds that sweep across the open plains. The houses are made of sod and grass and are sometimes very cold. However, the people are very strong and are adapted to these conditions, and their lives are much like the Eskimos. In the summer it is also an ordeal for these people because of the mosquitoes and insects that infest the swamps.

The people in the tundra region are very backward and live hardly better than the Indians did live. In the summer, they live in goatskin and deerskin tents which sometimes become very unclean. In the winter time, the sod
houses are also very unsanitary because of the poor ventilation and poor light. A man who visited this region said on entering one of these hunts, "You can see nothing on account of the blackness within. After you have been there a while, you begin to feel cold and you can smell the strong odor of hides and damp earth. The water is dripping from the roof and forms little puddles on the floor in which the children are playing."

The natives of these parts are not affected by these conditions, but a person moving in could not live more than a few months without getting some sort of disease.

In the central portions of Russia, we find the larger cities and towns. Farming is done on a small scale. Here the people are more against the collective system than in any other section. They are on the verge of revolution most of the time, but the government keeps them in check quite well. In this section they raise a little wheat, but the main production is vegetables and a few fruits which can be raised quite easily.

In the southern part of Russia, the farmers are better equipped with machines and can raise better crops. The soil is rich and contains most of the necessary elements. They have some timber and also level plains that make cultivation a very simple matter. These people have good living conditions compared to what they had fourteen years ago, and are developing rapidly. Still they are not satisfied because of the collective system, and they still think the government is robbing them of their land and crops. Many people believe this will pass away in future years, but the sense of private
ownership is stamped deep on these people and they hate to give it up. The larger farms have new buildings and all of them have good wells or water systems; this has cut down the death rate a great deal.

A person coming into a rural village in Russia will see old tumbled-down buildings, such as poor farms and houses, but looking towards the outskirts of town, he would see a large, white, clean looking school building, where they have nurseries for the country children.

The Russian farmer today is not a bit different from the one of the Czar's reign in his ways and tendencies, but he has a lot more machines to speed up production of wheat and other crops. He has the tractor, binder, drills and seeders which only could be secured under a communistic system. The communists have made it possible to have all their machines by the system under which they now live. The communists say that tractors used under these conditions are more profitable than the ones used under a capitalistic system. They mean by this that the machines and tractors are used for the benefit of all the people, while in this country it is for the benefit of the people that own them. Most of the tractors bear labels of the Fordson, the International Harvester, and Case, which are all American companies. Most of their machines are imported but they have begun to manufacture some of their own in the last year.

The system of farming in Russia is called the collective system. They have large farms and many people work together on them. These farms run from one to ten sections of land. All the farms are not collective. It is
only those who want to join that really belong to this system. If a farmer wants to join, he must give up all his private property and also give the biggest part of his crop. This seems strange and impossible, but Russia seems to be prospering under such a system just the same. A reporter from the United States once asked a Russian farmer why he did not join the collective organization. The farmer replied, "Why join the collective? They only leave us enough to live on." After all, what more does a person want? The Russian farmer has everything he needs. He doesn't starve or freeze, and he also has most of the modern farm machines.

The standard of living is much lower in Russia than in the United States. The people in the country have nice buildings and homes and also very modern equipment. An economist once said, "This is due to our climb through the last two centuries." In Russia, the people have been brought two centuries ahead in the last fourteen years. They have not been able to develop their homes and standards the way the people in the United States have. Many people think Russia will come out all right in their experiment.

Altho Russia's standard of living is lowered by communism, marketing is bettered. Marketing in Russia is a very simple thing. There is no middleman profiteering from the farmers, because the people own all their own processing works, factories and shipping organizations. If people own all these, it reduces the cost of shipping and storing so the good are sold at a higher price. The farmer, however, does not get the money that his goods are sold for. He is left what he needs to live from and no more. All this is brought about by the collective system. A farmer is checked on all
through the growing season, and when he harvests and threshes, a government official is there and checks the grain. The biggest portion goes to the government because it owns the land and farm. The smallest portion goes to the farmer for his private use. These products he may sell or keep, depending upon himself. He does not really sell his products, but trades them among his neighbors.

Russian surplus of wheat has steadily been decreasing the last year and many people demand to know what is the cause of this. Even the Commessariat for agriculture does not know. An American economist believes that the people are just raising enough for their own use and not a surplus over that amount to sell or give to the state.

The Russian farmer is easily discouraged because of this system. For a while, they killed their own cattle and burned their crops so the state could not get them. If the farmer would help by raising large crops, it would make the people so much richer.

It is hard for a farmer in Russia to adapt himself to this communistic government after living under an almost absolute monarchy for so many years. He has a lot of responsibility to carry and also is dependent upon very much by the government to raise a crop large enough to leave a good surplus over what the country needs. This makes many farmers bitter toward the system, but they really live better than they have ever lived before. Most of the farms have electric lights, tractors, binders, and other farm machinery. This, of course, is all owned by the government and is used for the profit of all the people and not a few.
The Russian farmer has everything to his advantage and if he used it that way, he will go ahead, but as long as he refuses to cooperate, he will be the most backward person on the earth. He fights against the government, refuses to raise crops and kills his stock. Under this system, he is not hurting anyone else, but he is hurting himself. He is part of the government and unless he does his part, the rest may not survive. The main reason for this is that the government of fourteen years ago did not let him think of anything, but to live, which made him dependent upon the government. This made him very ignorant about everything around him and helped bring about his present predicament.

I hope the United States will soon recognize Russia and give them a chance to prove to the world what they have started. It is just a theory but if the experiment comes out right, it will become a fact.