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7-1922

# The County Agent's Handbook

C. Larsen

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Common diseases and control

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**Extension Circular No. 25**  
**(Reprint)**

**Revised July 1922**

# **The County Agent's Handbook**

Compiled by  
**I. B. Johnson, Former County Agent Leader**

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**Extension Service,  
South Dakota State College of  
Agriculture and Mechanic Arts,  
and U. S. Department of Agri-  
culture cooperating.**

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Issued in furtherance of Acts of Con-  
gress of May 8 and June 30, 1914.

**W. F. KUMLIEN, Director.**

## INTRODUCTION

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In the daily work of the county agricultural agent, the agricultural extension worker, the farmer, or anyone interested in agriculture, questions arise, whose answers involve much detailed information. Workers have frequently realized the value of a ready reference of pocket size from which such information might be obtained. It is hoped that this handbook may fulfill such a requirement.

The material enclosed is of special application to the agricultural conditions of South Dakota, yet so much of it is of general application that the handbook will be found useful by any agricultural worker. The loose leaf plan enables anyone to add whatever other facts may be deemed essential for conditions in any particular community. Furthermore, any of the facts now contained that are not essential in any community can be quickly removed. The system of classification and keying employed is the same as that recommended by the Department of Agriculture for the filing of bulletins in Circular 2—Extension North and West.

In compiling the handbook much aid has been received from the county agents of South Dakota, the members of the State Extension Division and the Agronomy, Animal Husbandry, Dairy, Entomology and Veterinary Departments of South Dakota State College, and special thanks and acknowledgements are due these workers and departments.

I. B. JOHNSON.



## **1. GENERAL**

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Directory of Experiment Stations

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Temperature map of South Dakota

**DIRECTORY OF DIVISIONS OF U. S. DEPARTMENT OF AGRICULTURE**

Secretary of Agriculture, Henry C. Wallace.  
Bureau of Animal Industry, J. R. Mohler, Chief.  
Bureau of Biological Survey, E. W. Nelson, Chief.  
Bureau of Chemistry, W. G. Campbell, Acting Chief.  
Bureau of Entomology, L. O. Howard, Chief.  
Bureau of Markets and Crop Estimates, H. C. Taylor, Chief.  
Bureau of Plant Industry, Wm. A. Taylor, Chief.  
Bureau of Public Roads, Thomas H. MacDonald, Chief.  
Bureau of Soils, Milton Whitney, Chief.  
Division of Publications, John L. Cobbs, Jr., Chief.  
Federal Horticultural Board, C. L. Marlatt, Chairman.  
Forest Service, W. B. Greeley, Forester.  
Insecticide and Fungicide Board, J. K. Haywood, Chairman.  
Office of Farm Management and Farm Economics, G. W. Forster, Acting Chief.  
States Relations Service, A. C. True, Director.  
Weather Bureau, Chas. F. Marvin, Chief.

# **DIRECTORY OF THE AGRICULTURAL EXPERIMENT STATIONS AND NAMES OF DIRECTORS**

## **Alabama—**

College Station: Auburn; D. T. Gray.

Canebrake Station: Uniontown;

Tuskegee Station: Tuskegee Institute; G. W. Carver

## **Alaska—**

Sitka: C. C. Georgeson, Agronomist in charge.

## **Arizona—**

Tucson: J. J. Thornber.

## **Arkansas—**

Fayetteville: B. Knapp.

## **California—**

Berkeley: C. M. Haring.

## **Colorado—**

Fort Collins: C. P. Gillette

## **Connecticut—**

State Station; New Haven, E. H. Jenkins

Storrs Station: Storrs, E. H. Jenkins

## **Delaware—**

Newark: C. A. McCue.

## **Florida—**

Gainesville: Wilmon Newell.

## **Georgia—**

Experiment. H. P. Stuckey.

Costal Plain Station, Tifton: S H. Starr.

## **Guam—**

Island of Guam: C. W. Edwards, Animal Husbandman in charge.

## **Hawaii—**

Federal Station: Honolulu; J. M. Westgate, Agronomist in charge.

Sugar Planters' Station: Honolulu; H. P. Agee

## **Idaho—**

Moscow: E. J. Iddings

## **Illinois—**

Urbana: E. Davenport

## **Indiana—**

Lafayette: G. I. Christie.

## **Iowa—**

Ames, C. F. Curtiss

## **Kansas—**

Manhattan: F. D. Farrell

## **Kentucky—**

Lexington: T. P. Cooper

## **Louisiana—**

State Station: Baton Rouge; Sugar Station: Audubon Park, New Orleans; North La. Station: Calhoun; Rice Station: Crowley; Fruit and Truck Station: Hammond; W. R. Dodson.

- Maine—  
     Orono: W. J. Morse.
- Maryland—  
     College Park: H. J. Patterson
- Massachusetts—  
     Amherst: S. B. Haskell.
- Michigan—  
     East Lansing: R. S. Shaw
- Minnesota—  
     University Farm, St. Paul: W. C. Coffey.
- Mississippi—  
     Agricultural College: J. R. Ricks.
- Missouri—  
     College Station: Columbia; F. B. Mumford  
     Fruit Station: Mountain Grove; F. W. Faurot
- Montana—  
     Bozeman: F. B. Linfield
- Nebraska—  
     Lincoln: E. A. Burnett
- Nevada—  
     Reno: S. B. Doten
- New Hampshire—  
     Durham: J. C. Kendall
- New Jersey—  
     New Brunswick: J. G. Lipman
- New Mexico—  
     State College: Fabian Garcia
- New York—  
     State Station: Geneva; R. W. Thatcher  
     Cornell Station: Ithaca; A. R. Mann
- North Carolina—  
     State College Station, Raleigh: B. W. Kilgore
- North Dakota—  
     Agricultural College: P. F. Trowbridge
- Ohio—  
     Wooster: C. G. Williams
- Oklahoma—  
     Stillwater: C. T. Dowell
- Oregon—  
     Corvallis: J. T. Jardine
- Pennsylvania—  
     State College: R. L. Watts  
     State College: Institute of Animal Nutrition;
- Porto-Rico—  
     Federal Station: Mayaguez; D. W. May, Agronomist in charge.  
     Insular Station: Rio Piedras; E. D. Colon
- Rhode Island—  
     Kingston: B. L. Hartwell
- South Carolina—  
     Clemson College: H. W. Barre
- South Dakota—  
     Brookings: J. W. Wilson

## 1.1

Tennessee—

Knoxville: H. A. Morgan

Texas—

College Station: B. Youngblood

Utah—

Logan: Wm. Peterson

Vermont—

Burlington: J. L. Hills

Virginia—

Blacksburg: A. W. Drinkard, Jr.

Norfolk: Truck Station; T. C. Johnson

Virgin Islands, U. S. A.—

St. Croix: J. B. Thompson, Agronomist in charge.

Washington—

Pullman: E. C. Johnson

West Virginia—

Morgantown: H. G. Knight

Wisconsin—

Madison: H. L. Russell

Wyoming—

Laramie: A. D. Faville

## DIRECTORY OF STATE COLLEGE DEPARTMENTS

**Willis E. Johnson, President, S. D. State College**

### AGRICULTURE—

Agronomy .....	A. N. Hume
Animal Husbandry.....	J. W. Wilson
Dairy .....	
Education .....	J. A. Williams
Entomology.....	H. C. Severin
Experiment Station.....	J. W. Wilson
Extension.....	W. F. Kumlien
Home Economics.....	Edith Pierson
Horticulture.....	N. E. Hansen
Journalism.....	Paul W. Kieser
Poultry Husbandry.....	G. L. Stevenson
School of Agriculture.....	J. A. Williams
Veterinary .....	Dr. C. C. Lipp

### ENGINEERING—

Electrical Engineering....	B. B. Brackett
Civil Engineering.....	D. L. Snader
Mechanical Engineering.....	H. C. Solberg

### SCIENCE—

Art.....	Ada B. Caldwell
Botany.....	E. J. Petry
Chemistry.....	B. A. Dunbar
Commerce.....	E. O. Prather
English.....	Jane Mullenbach
History.....	A. S. Harding
Mathematics.....	G. L. Brown
Music.....	Carl Christensen
Music.....	W. A. Petersen
Pharmacy.....	E. Serles
Physics.....	H. B. Mathews
Preparatory Department.....	R. B. Forsee
Zoology.....	E. C. O'Roke



# PARLIAMENTARY MOTIONS IN

Parliamentary Motions in Order of Rank (A)	Must it be Seconded?	What Majority for Passage?	Is it Debatable?	Does it Open Question to Debate?	Can it be Amended?	Can it be Committed?	Can it be Postponed?
1. To Adjourn (3)	Yes	Majority	No	No	No	No	No
2. Question of Privilege	No	Majority	Yes	No	Yes	Yes	Yes
3. Orders of the Day (Special)	No	Two-thirds	No	No	No	No	No
4. Appeal from Decision of Chair, Questions of Order	Yes	Majority	Yes - each member may speak once	No	No	No	No
5. To Withdraw Motion	No	Majority	No	No	No	No	No
6. To Suspend a Rule (4)	Yes	Two-thirds	No	No	No	No	No
7. To Reconsider (5) (B)	Yes	Majority	Yes, if main question is	Yes	No	No	No
8. To Lay on the Table (7) To Take from the Table	Yes	Majority	No	No	No	No	No
9. Previous Question (6)	Yes	Two-thirds	No	No	No	No	No
10. To Postpone to Certain Time	Yes	Majority	Yes - as to time	No	Yes - as to time	No	No
11. To Commit, Refer or Re-commit (8)	Yes	Majority	Yes	Yes	Yes	No	No
12. To Amend (9)	Yes	Majority	Yes, if main question is	No	Yes, not an amendment	Yes - takes principal motion	Yes - postpones main question
13. To Postpone Indefinitely (11)	Yes	Majority	Yes	Yes	No	Yes	Yes
14. The Principal Motion	Yes	Majority	Yes	Yes	Yes	Yes	Yes

(A) Motions are arranged in the order of their rank (except Reconsider). Each can supersede one of lower order - none, except amend, can supersede one of higher order

# THE ORDER OF THEIR RANK

Is it subject to Previous question?	Can it be Reconsidered?	Can it be Laid on the Table?	Can it be re-nued?	How does it Affect Main Question?	(1) An affirmative vote on the order of the day removes the main question from consideration; a negative vote dispenses with the business set for special time.
No	No	No	Yes, after other business in order next	Main question first in order next	(2) When the previous question is moved or an amendment, and adopted; debate is closed on the amendment only.
Yes	Yes	Yes	Yes	Merely suspends action on main question	(3) Quorum not necessary to adjourn
No	Yes	No	No	See note (1)	(4) Cannot suspend Constitution or By-Laws.
Yes	Yes	Yes - sustains chr. if carried.	No	Merely suspends action on main question.	(5) Must be made by one who voted on prevailing side on main question.
No	Yes		Yes	Does not affect it.	(6) The previous question applies only to debatable questions
No	No	No	No	No effect	(7) Motions once tabled must be removed by motion to take from the table.
Yes, affects only reconsideration	No	Yes, does not table main question	Yes	No effect	(8) Motion to commit cannot be made after previous question has been ordered.
No	No neg. vote. Yes affirm. vote	No	Yes	Tables main question & all secondary to it	(9) To amend Constitution or By-Laws requires two-thirds vote. Motion to amend not in order after previous question, postpone, or lay on the table has been ordered.
No	Yes	Yes, tables entire subject	Yes	Compels immediate vote on main question (2)	(10) Motions, as a general rule can be renewed after any other motion altering the state of affairs has intervened.
Yes, does not apply to main question	Yes	Yes	Yes	Postpones entire subject to time specified.	(11) Postpone indefinitely yields to all secondary questions except amend.
Yes, forces vote at once	Yes	Yes, tables entire subject	Yes	Commits main question and all secondary to it	
Yes, forces vote at once	No	Yes, tables entire subject.	No	See note	
Yes, does not affect main question	Yes	Yes	Yes	Removes main question from session	
Yes	Yes	Yes	Yes		

(15) Reconsider usually classed as "miscellaneous" motion. It is in order at any time. Can be applied to every other question except adjourn and suspend rules, and affirmative vote on lay on the table.

Courtesy University Wisconsin Extension Division.

## DIRECTORY OF STATE EXTENSION WORKERS

Director.....	W. F. Kumlien
County Agent Leader.....	E. W. Hall
Assistant County Agent Leader .....	A. J. Dexter
Assistant County Agent Leader .....	C. L. Starr
State Home Demonstration Leader .....	Susan Z. Wilder
State Club Leader.....	Paul J. Scarbro
Assistant State Club Leader..	May Kiethline
Assistant State Club Leader	Geo. H. Valentine
Specialists—	
Agricultural Editor.....	Paul W. Kieser
Agricultural Engineering.....	R. L. Patty
Animal Diseases.....	G. S. Weaver
Agronomy.....	R. E. Johnston
Clothing.....	Azalea Linfield
Dairying.....	H. M. Jones
Entomology.....	A. L. Ford
Farm Management.....	H. D. McCullough
Foods.....	Mary A. Dolve
Livestock.....	J. C. Holmes
	P. P. Banker
Poultry.....	Clara M. Sutter

## OUTLINE HISTORY OF COUNTY EXTENSION WORK

### 1904

Fifteen men took up work of controlling cotton boll weevil in Texas, confining their work to no political unit.

### 1906

1. These same men were each stationed in a county and called county agents; their work consisted mainly in demonstrating methods of preventing the ravages of the boll weevil.
2. The general education board appropriated money for the teaching of improved farm practices through county-agent demonstrative methods, in Arkansas and Louisiana.
3. The legislature of one of the southern states also passed a law permitting the counties and towns to make appropriations in support of county agent work.
4. Boys' and Girls' Club Work started in an organized way in Wright County, Iowa, through the efforts of O. H. Benson, now in charge of the Boys' and Girls' Club Work throughout the country.

### 1910

1. County agent work was first discussed in the northern states particularly with reference to putting an agent in Broome county, New York.
2. Women county agents were established in the southern states especially for supervising girls' club work.

### 1911

The first county agent in the northern states began work in Broome county, New York.

### 1912

Organized boys' and girls' club work was started in the states of Indiana, Iowa and Washington.

### 1913

Organized home demonstration work started in the northern states late in the year.

### 1915

The first county club leader was employed by Hampden county, Massachusetts. The year around club program was adopted and the demonstration team idea promoted.

### 1917

Congress provided funds as a War Emergency measure for the employment of a county agent in every agricultural county in the United States.

# **DIRECTORY OF SOUTH DAKOTA COUNTY AGRICULTURAL AGENTS**

County	Name	Address
Beadle.....	Lewallen, Dick.....	Huron
Bon Homme.....	Monroe, M. O.....	Tyndall
Brookings.....	Boyts, H. J.....	Brookings
Brown.....	Boardman, W. C.....	Aberdeen
Butte.....	Ellison, A. D.....	Belle Fourche
Campbell— McPherson.....	Broich, W. F.....	Eureka
Clark.....	Basart, V. D.....	Clark
Clay.....	Griggs, W. D.....	Vermillion
Codington.....	Ausman, L. V.....	Watertown
Corson.....	Osborne, O. M.....	McIntosh
Day.....	Gunning, John A.....	Webster
Deuel.....	Parish, W. G.....	Clear Lake
Dewey.....	Hermstad, Oscar.....	Timber Lake
Douglas.....	Kennard, George B.....	Armour
Edmunds.....	Laney, J. Carl.....	Ipswich
Fall River.....	Sloan, Sam L.....	Hot Springs
Faulk.....	Gilbert, Chas. J.....	Faulkton
Grant.....	Smith, R. E.....	Milbank
Haakon.....	Mills, Oscar.....	Philip
Hamlin.....	Tompkins, A. W.....	Hayti
Hand.....	Aicher, E. H.....	Miller
Hughes.....	Nelson, N. F.....	Pierre
Jackson.....	Johnson, Ira S.....	Kadoka
Jerauld.....	Austin, Guy W. Wessington Spgs.	
Jones.....	Gamble, W. P.....	Murdo
Kingsbury.....	Jones, D. C.....	DeSmet
Lake.....	Morrison, J. D.....	Madison
Lawrence.....	Hall, Evan W.....	Spearfish
Lincoln.....	Palm, A. W.....	Canton
Lyman.....	Sayler, Chas. D.....	Reliance
Marshall.....	Browning, J. M.....	Britton
McCook.....		Salem
Mellette.....	Gray, A. S.....	White River
Miner.....	Swanson, R. O.....	Howard
Minnehaha.....	Hamilton, J. H.....	Sioux Falls
Moody.....	Davis, Sumner E.....	Flandreau
Pennington.....	Ladd, Leonard L.....	Rapid City
Perkins.....	Eberle, A. M.....	Bison
Potter.....	Hansen, George S.....	Gettysburg
Roberts.....	Buchanan, R. R.....	Sisseton
Spink.....	Smith, Percy T.....	Redfield
Stanley.....	Davis, Deane G.....	Ft. Pierre
Sully.....	Woodruff, L. M.....	Onida
Tripp.....	Lange, F. E.....	Winner
Union.....	Putnam, H. O.....	Elk Point
Walworth.....	Lippert, L. C.....	Selby
Yankton.....	Brander, J. M.....	Yankton

## SOURCES OF AGRICULTURAL FILMS, SLIDES, CHARTS, ETC.

### FILMS:

States Relations Service, U. S. D. A. . .  
 . . . . . Washington, D. C.  
 National Crop Improvement Committee  
 . . . . . Chicago, Ill.  
 The Devry Corporation . . . . .  
 . . . . . 1266 Marinina St., Chicago, Ill.  
 The Curtis Publishing Co. . . . .  
 . . . . . Philadelphia, Pa.  
 Percival K. Frawert Co., Inc. . . . .  
 . . . . . 151 West 42nd St., New York City  
 Hoover Suction Sweeper Co. . . . .  
 . . . . . North Canton, Ohio

### SLIDES:

Agricultural Extension Division . . . . .  
 . . . . . Brookings, S. Dak.  
 States Relations Service, U. S. D. A. . . . .  
 . . . . . Washington, D. C.  
 National Crop: Improvement Committee  
 . . . . . Chicago, Ill.  
 International Harvester Co. . . . . Chicago, Ill.  
 Portland Cement Co. . . . . Chicago, Ill.  
 Victor Animatograph Co. . . . . Davenport, Ia.  
 McIntosh Stereopticon Co. . . . . Chicago, Ill.

### CHARTS:

Agricultural Extension Division . . . . .  
 . . . . . Brookings, S. D.  
 International Harvester Co. . . . . Chicago, Ill.



**REQUIREMENTS OF STANDARD CLUB****Recommendations Made by Conference of  
Club Leaders, Boys' and Girls' Club  
Work, North and West**

1. A standard club shall have a membership of at least 5, working on the same project.
2. There shall be a local club leader in charge during the club year.
3. There shall be a local club organization with the necessary officers and duties.
4. There shall be a definite club year program of work.
5. There shall be held at least six regular club meetings during the club year. The secretary shall be required to keep definite record of these meetings and also of the progress of each member.
6. A local exhibit shall be held annually.
7. There shall be a demonstration team which must give at least one public demonstration in its community.
8. At least 60% of the members must complete the project and file a final report with the State club leader.
9. A judging team shall be chosen by competition between the members.
10. An achievement day shall be held during the club year.
11. The club shall hold a membership in the farm bureau or other county club organization.
12. When the first four requirements have been met, it will be recommended that a standard club charter be issued. When all requirements have been met, a National Seal of Achievement will be recommended.

**VALUE OF AN EDUCATION ON THE FARM**

The U. S. Department of Agriculture some time ago made a careful analysis of the yearly income of corn belt farmers who had no schooling, those who went to common school, those who went to high school, and those who went to college. The results showed the value of an education to be as follows:

	Value of each day spent in education	Total value of education
Common school education..	1.16	\$ 1,850
High school education.....	18.25	15,500
College education.....	30.70	25,000

## PRESERVING SPECIMENS FOR EXHIBIT OR DISPLAY

### FRUITS:

In preparing these fruits, it is desirable to use distilled water. Specimens are not edible. The fluids are good preservatives for fruits as suggested.

Fluid No. 1	Fluid No. 2	Fluid No. 3
Grapes (black)	Apples (red)	Apples (green
Currants	Plums	and russet)
Strawberries	Tomatoes	

### Fluid No. 1—Formaldehyde

Formaldehyde (formalin)..... 1 part  
 Alcohol ..... 5 parts  
 Water, to make .....50 parts

To prepare one gallon of the fluid  $3\frac{1}{2}$  ounces of formaldehyde and 16 ounces of alcohol will be required, the remainder of the gallon to be made up with water.

The addition of a volume of hydrogen peroxide equal to that of the formaldehyde has been found to somewhat enhance the value of this fluid for red fruits.

### Fluid No. 2—Boric Acid

Boric (boracic) acid ..... 1 part  
 Alcohol ..... 5 parts  
 Water, to make .....50 parts

For one gallon,  $3\frac{1}{2}$  ounces of boric acid and 16 ounces of alcohol will be required.

The powdered form of boric acid is the most convenient to use. There is no necessity to employ hot water, but stirring should be continued until complete solution is effected.

### Fluid No. 3—Zinc Chloride

Zinc chloride ..... 3 parts  
 Alcohol ..... 10 parts  
 Water, to make .....100 parts

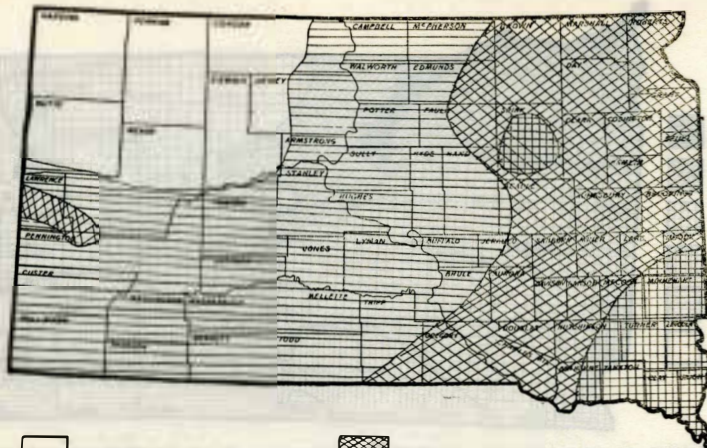
For one gallon of fluid, 5 ounces of zinc chloride and 16 ounces of alcohol will be required.

Zinc chloride, of good quality, passes readily into solution; any white, flocculent precipitate that may appear is allowed to settle out, and the clear fluid decanted.

Frank T. Shutt, Exp. Farm, Ottawa, 1911

# **NORMAL ANNUAL PRECIPITATION**

(Based on Records of U. S. Weather Bureau Covering Periods Ranging from 8 to 44 yrs.)



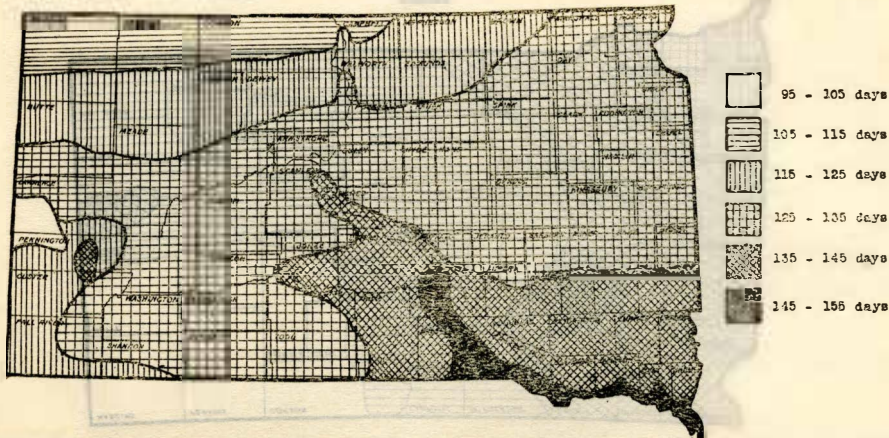
Less than 15 inches



From 20 to 25 inches

# AREAS SHOWING APPROXIMATE LENGTH OF GROWING SEASON (Based on Records of U. S. Weather Bureau for Period 1900 to 1918.)

13



PRINTED BY RECORDS OF U. S. WEATHER BUREAU, COMMISSIONER OF LAND AND MINES, DEPT. OF THE INTERIOR, WASHINGTON, D. C.

## **2. RURAL ECONOMICS**

### **2.1 Farm Management**

Features of South Dakota "Rural Credit Law."

Depreciation table for farm equipment

Weights and measures table

Capacities of tanks; board measure

Determining capacities of cribs, bins, etc.

Measuring hay in stacks

Cost of producing field crops

Labor on crops

### **2.2 Cooperation**

Features of State Law on "Cooperative Associations"

Farmers' organizations with names and addresses of secretaries

Essentials in forming a cooperative organization

### **2.3 Marketing**

Essentials of a successful livestock shipping association

Market curves for hogs, cattle and sheep

Market price of potatoes in relation to yield

Directory of Commission firms

Type statistics for agricultural advertising



## FEATURES OF SOUTH DAKOTA RURAL CREDIT LAW

### Requirements For a Loan

1. The applicant must be the owner or prospective owner of farm land offered as security for loan, loans to be made on first mortgage only running to the state.
2. The applicant must be a person who is at the time, or shortly to become, engaged in the cultivation and development of the farm land mortgaged.
3. A loan to the extent of 70 per cent the appraised value of the land plus an additional amount of 40 % of the insured value of its improvements, provided the improvements do not exceed 50 per cent the value of the land, nor an amount of \$5,000, and provided further that the total loan made shall not be in excess of the average assessed valuation for the three preceding years.
4. The money borrowed must be applied to certain definite uses, as follows:
  - (a) To provide for the purchase of farm lands;
  - (b) To provide for the purchase of equipment, fertilizers and livestock necessary for the proper and reasonable operation of the mortgaged land;
  - (c) To provide for buildings and other improvements on farm lands;
  - (d) To liquidate the indebtedness of the owner of the land mortgaged existing at the time of the organization of said Board, or indebtedness subsequently incurred for the purposes mentioned.
5. The smallest amount of loan which may be made is Five Thousand Dollars, the largest amount of loan which may be made is \$10,000.00. Interest is  $5\frac{1}{2}\%$ .

### Time of Loans.

1. Loans will be made for periods varying from 5 to 30 years, payable in fixed annual installments.
2. Loans may be paid up in whole or in part in any multiple of \$100 at any interest paying date after five years.
3. The following table shows the annual payments required to pay off interest and principal on a \$1,000 loan in from 10 to 30 years at  $5\frac{1}{2}\%$  percent interest:

10	years.....	\$132.67
15	years.....	99.63
20	years.....	83.68
25	years.....	74.55
30	years.....	68.81

## DEPRECIATION TABLES FOR FARM EQUIPMENT

(Wear, tear and exposure plus carelessness)  
Percent  
Annually

### Farm Buildings

Barn .....	3- 4%
Cattle Shed .....	5-10%
Corn crib, permanent .....	3- 6%
Corn Crib, movable .....	5-10%
Corn Crib, wire, slat, etc. ....	10-25%
Granary .....	3- 6%
Hen House, permanent wood....	3- 5%
Hen House, movable .....	4- 6%
Hog House, permanent .....	3- 5%
Hog House, movable .....	5-10%
Machine Shed .....	3- 7%

### Fences

Field woven wire, good quality, corner posts properly anchored	6-10%
Barb Wire .....	8-12%
Yards, woven wire .....	8-15%
Yards, board .....	10-15%

### Machinery

Automobile .....	12-40%
Bob Sled .....	5-10%
Buggy .....	6-12%
Corn Implements .....	7-16%
Cream Separator .....	7-14%
Disc .....	7-14%
Fanning Mill .....	6-10%
Feed Grinder .....	7-12%
Gas Engine .....	8-25%
Grain Binder .....	7-15%
Grain Drill .....	8-15%
Harrow, wood frame, spike tooth	8-14%
Harrow, steel frame, spike tooth	6-10%
Harrow, spring tooth .....	7-14%
Hay Rack .....	8-20%
Rake .....	6-10%
Stacker .....	8-15%
Sweep Rake .....	10-14%
Tedder .....	8-15%
Manure Spreader .....	7-18%
Mower .....	7-12%
Plows .....	6-15%
Potato Digger .....	9-14%
Planter .....	8-14%
Sprayer .....	7-14%
Silage Cutter .....	8-16%
Thresh Machine .....	7-25%
Tractor .....	12-30%
Truck .....	12-30%
Wagon, gear .....	8-12%
Box .....	8-15%
Work Harness .....	7-15%

**AMERICAN WEIGHTS AND MEASURES****AVOIRDUPOIS: (Partial)**

27 11/32 grains.....	1 dram
16 drams.....	1 ounce
16 ounces.....	1 pound

**APOTHECARIES:****Weight**

20 grains.....	1 scruple
3 scruples.....	1 dram
8 drams.....	1 ounce
12 ounces.....	1 pound

**Fluid**

60 minims.....	1 fluid dram
8 fluid drams.....	1 ounce
16 fluid ounces.....	1 pint
8 pints.....	1 gallon
1 teaspoonful.....	1/6 oz
1 tablespoonful.....	1/2 oz

**DRY AND LIQUID**

8 quarts.....	1 peck
31 1/2 gallons.....	1 barrel
2 barrels.....	1 hogshead

**Equivalents of American measures in metric terms:****LENGTH**

1 inch is	2.54 centimeters.
1 yard is	.9144 of a meter.
1 rod is	5.029 meters.
1 mile is	1609.3 meters.

**BULK**

1 liquid pint is	.473 of a liter.
1 liquid gallon is	3.785 liters.
1 bushel is	35.24 liters.

## NUMBER OF GALLONS IN CIRCULAR TANKS AND WELLS

To find the contents in gallons of circular tanks, square the diameter in feet, multiply by the depth, and then multiply by 5.875.

## NUMBER OF GALLONS IN SQUARE TANKS

To find the number of gallons in any square or oblong tank, multiply the number of cubic feet it contains by 7.4805.

## BOARD MEASURE

The unit of measure is the board foot, which is a board one inch thick and one foot square. Lumber is always sold on the basis of 1000 feet board measure. (B. M.)

Formula: To find B. M. multiply the length in feet by the width and thickness in inches and divided the product by 12.

## DETERMINING CAPACITIES OF BINS, CRIBS, ETC., IN BUSHELS OF PRODUCTS

One bushel of shelled corn, grain, potatoes, apples, etc., occupies  $1\frac{1}{4}$  cubic feet of space. Ear corn requires 2.5 cu. ft. per bushel.

Square or oblong bins—Volume equals length  $\times$  width  $\times$  heighth.

Cylindrical bins—Volume equals  $3.1416 \times$  radius squared  $\times$  heighth.

## MEASURING HAY IN STACKS

### SOUTH DAKOTA METHOD:

South Dakota's law for measuring hay in stacks applies in all cases where no special agreement for measuring was made between the contracting parties as stated in Chapter 209 of the 1915 Session Laws.

(The overthrow is the distance in linear feet and inches from the ground on one side of the stack, directly over and opposite to the ground on the other side of the stack.)

#### **Rick Stack**

Obtain the number of cubic feet by subtracting the width from the overthrow, dividing the result by 2, multiplying this result by the width and this product by the length.

#### **Round Stack**

Obtain the number of cubic feet by multiplying the circumference (taken at base of stack) by itself and the product by the height and divide by 25.

The number of cubic feet of hay in a ton varies according to how long the stack has settled and the nature of the grass in the stack. Unless otherwise agreed upon the law specifies the following:

Nature of Hay	Cubic ft. of hay in a ton	
	Settled 30 to 60 days	Settled more than 60 days
Clean alfalfa .....	512	422
Clean timothy and clover .....	512	422
Clean native blue, joint, alkali or salt grass or wheat grass or mixed .....	422	343

### QUARTERMASTER METHOD:

Add the width of the stack to the overthrow, divide by 4, multiply the result obtained by itself and the product by the length which gives the number of cubic feet in the stack.

### DEPARTMENT OF AGRICULTURE METHOD:

This method is fully described in circular 67 of the Office of the Secretary of Agriculture. On account of the diagrams and formulas presented for a more accurate determination of the volume of haystacks, it is best to refer directly to this circular.

**COST OF PRODUCING FIELD CROPS, 1913-1917****2.1****Compared With Five-Year Period, 1908-1912.****(Norman and Wright Counties, Minn.)**

Crop	Cost per acre		Increase per acre over 1908-1912
	1913-1917	1908-1912	
Wheat, fall-plowed, stack-threshed .....	\$16.33	\$11.68	\$ 4.65
Oats, fall-plowed, stack-threshed .....	16.54	12.92	3.62
Barley, fall-plowed, stack-threshed .....	15.81	12.06	3.75
Rye, fall-plowed, shock-threshed .....	15.28	11.73	3.55
Corn, cut, shocked, and hauled from field .....	19.03	15.65	3.38
Corn, husked from standing stalks .....	19.28	15.42	3.86
Corn, cut, shocked, and husked from shocks .....	21.50	18.60	2.90
Corn, cut, shocked, and shredded .....	22.25	17.85	4.40
Fodder corn, cut, shocked and hauled .....	18.04	15.74	2.30
Silage, siloed .....	23.53	20.39	3.14
Potatoes, machine production .....	45.37	33.08	12.29
Hay, clover and timothy, first crop.....	11.22	7.51	3.71
Hay, millet .....	17.34	13.38	3.96
Hay, wild .....	8.67	7.30	1.37
Timothy seed .....	7.54	6.80	0.74
Clover seed .....	9.61	8.35	1.26

Minnesota Agr. Experiment Station Bul. 179.



# LABOR ON CROPS

(Average annual hours of labor per acre required in producing Field Crops, Rice, Lyon and Norman Counties, Minnesota, 1902-1912).

CROP	Hours per acre	
	Man	Horse
Wheat, shock threshed ....	12.3	29.9
Oats, shock threshed .....	13.5	28.9
Barley, shock threshed ....	12.8	29.9
Fall rye, shock threshed...	10.3	27.2
Flax, stack threshed .....	13.7	33.8
Corn, husked .....	26.2	54.2
Fodder corn, cut shocked and stacked .....	30.4	52.6
Ensilage corn .....	32.6	59.8
Potatoes, machine production	44.4	75.0
Mangels .....	180.7	99.3
Hay, timothy and clover, first crop .....	12.3	13.
Hay, timothy and clover,, two cuttings .....	20.7	21.5
Hay, wild.....	12.2	16.9
Timothy, cut for seed.....	5.1	7.1
Clover, cut for seed .....	9.2	12.3
Hay, Millet .....	17.3	39.1
Hemp .....	14.3	27.4

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## FEATURES OF STATE LAW ON "CO- OPERATIVE ASSOCIATIONS"

1. It shall be unlawful for any person or organization to adopt or use the word "cooperative" as a part of its title or business name, unless it has complied with the provisions of the state law on "Cooperative Associations." Any violation of this is punishable by a fine of not more than \$1,000.00.

2. **Organization**—Any number of persons, not less than 5, may associate themselves together as a cooperative association. No member is entitled to more than one vote and if capital stock is issued, can not hold more than \$1000.00 par value of same.

3. **Articles of Incorporation**—Must set forth the name of the association, the names and residences of the persons forming it, the purposes and business of the association, the name of the town where its business is to be conducted, the amount of capital stock with number of shares it is divided into and par value of each share. The Articles should then be signed by all members and forwarded to the Secretary of State.

4. **Directors and Officers**—There shall not be less than 5 directors. The regular officers are elected by and from among the directors.

5. **Amendments**—When made to the Articles must be recorded with Secretary of State.

6. **Division of Profits**—Shall be apportioned by directors as follows:

(1) By paying not to exceed 10% interest on paid up capital.

(2) Then setting aside 10% net profits annually in a reserve fund until said fund is equal to paid up capital stock.

(3) Then setting aside an amount of from 1 to 5% net profits as an educational fund.

(4) The balance of net earnings shall be apportioned among patrons as provided in association's by laws, being apportioned as to amount of business transacted between Association and its patrons.

A non-stockholder contributing to such net earnings shall be credited with his proportionate share of such earnings until the amount of such proportionate share shall equal the book value of a share of stock. The association shall then issue and deliver to said non-stockholder, a share of stock.

# FARMERS' ORGANIZATIONS WITH NAMES AND ADDRESSES OF SECRETARIES

Name of Organization

Secretary

Address

NATIONAL:

22

STATE:

COUNTY:

## **ESSENTIALS IN FORMING A COOPERATIVE ORGANIZATION**

1. Secure sufficient number farmers interested in the business of the proposed organization.
2. Call a meeting of those interested and transact necessary business as
  - (1) Election of temporary chairman and secretary.
  - (2) Appointment of committees on constitution and by-laws, capital stock and shares, membership, etc.
  - (3) Committee reports.
  - (4) Adoption of constitution and by-laws.
  - (5) Filling out and signing of articles of incorporation.
3. File articles of incorporation with Secretary of State.
4. Sell necessary shares of capital stock.
5. General meeting of stockholders to—
  - (1) Elect Board of Directors.
  - (2) Proceed with business of organization.

## **SUGGESTED OUTLINE FORM FOR CONSTITUTION AND BY-LAWS OF ANY ORGANIZATION**

**CONSTITUTION:** (signed by members)

Name  
 Objects or purposes  
 Membership or capital stock  
 Location  
 Officers and Directors:  
 (enumeration and election)  
 Quorum  
 Amendments

**BY-LAWS:**

Meetings (when and where)  
 Officers and directors (duties)  
 Committees  
 Rules of Procedure  
 Vacancies  
 Withdrawals  
 Amendments

## ESSENTIALS OF A SUCCESSFUL LIVE-STOCK SHIPPING ASSOCIATION

### 1. ORGANIZATION

It may be on the basis of a \$1.00 annual membership fee.

A corporation may be formed, Chapter 170 of the 1921-1922 Session Laws gives the essentials for incorporation.

Board of Directors to be elected by the members or stock holders.

No capital stock is necessary unless association is incorporated.

Manager's duty is to prorate the receipts, expenditures and shrinkage of each shipment.

The manager should be compensated according to the work involved.

Reserve fund is necessary for reimbursing those who lose animals from death or injury in transit. One or two cents per hundred pounds is usually sufficient to cover loss.

### 2. MARKING STOCK FOR SHIPMENT

By clipping Roman numerals with scissors on some conspicuous part of the animal.

By the use of paint that contains about 25 per cent varnish.

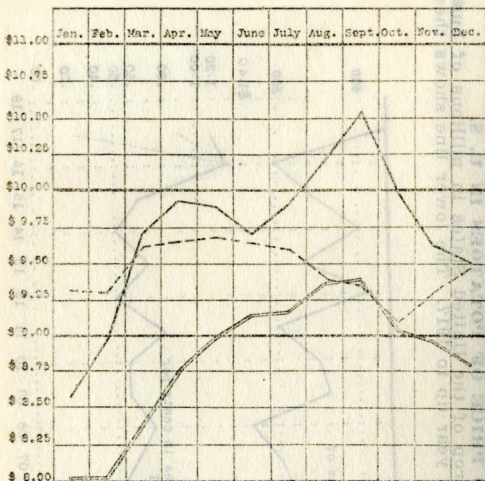
By use of numbered ear tags.

### 3. TIME OF SHIPPING

Certain days of the week may be set aside for the shipment of stock to market.

Assessments may be made on members for non-delivery of stock on date specified by them.

MARKET CURVES FOR CATTLE, HOGS AND SHEEP  
Chicago Market ---- 1909 to 1913



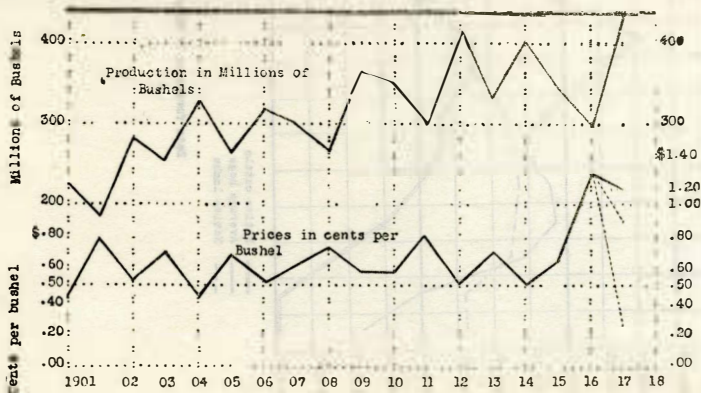
— Native cattle  
- - - Average hogs  
... Native lambs

Data furnished by Wallace's Farm

# PRODUCTION AND PRICE OF POTATOES IN U. S.

2.3

The upper line shows the total crop of the United States in millions of bushels for the year 1900 and for each succeeding year up to 1917. The lower line shows the average farm price of potatoes, December 1.







## TYPE STATISTICS FOR AGRICULTURAL ADVERTISING

Newspaper columns are 2 1/6 inches wide.

Farm paper and magazine columns vary in width, from 2 1/8 to 2 1/4 inches.

Estimate 40 to 50 words of copy to a column inch, depending on average length of words.

Engravings for newspaper use should not be ordered more than 100 lines fine. Some papers do better work with 65 to 80 line screen.

Advertising space may be figured by the inch or by the line. A line is an arbitrary unit of measurement, being 1/14 of an inch. Where line rates are quoted, multiply the rate by 14 to get the inch rate.

To determine the number of words that will go into advertising space, follow the following approximate estimates:

Size of Type	Words per Sq. In.
6 point solid.....	47
6 point leaded.....	34
8 point solid.....	32
8 point leaded.....	23
10 point solid.....	21
10 point leaded.....	16
12 point solid.....	14
12 point leaded.....	11

Type is usually set leaded.

In submitting news or advertising to a farm paper, ascertain when forms close, and send copy before that date. A week or ten days before date of issue is the rule for farm papers in this district.

## **8. HOME ECONOMICS**

Preservation of Eggs

Meat Cuts

Formulas for Curing Meats

Sanitation facts

H  
Ec

## **PRESERVATION OF EGGS**

### **WATERGLASS METHOD**

#### **Proportions**

9 quarts soft water boiled and cooled, to which add 1 quart waterglass; stir thoroughly. Sufficient for 15 dozen eggs; use 6 gallon crock. Scald crock before using.

#### **Method**

Place eggs in solution allowing at least two inches of solution over eggs at all times.

Place crock containing preserved eggs in a cool, dry place, well covered to prevent evaporation. Waxed paper tied over top of jar will answer the purpose.

### **LIME WATER METHOD**

#### **Proportions**

2 or 3 pounds unslacked lime and 5 gallons water boiled and cooled.

#### **Method**

Pour water over the lime and allow to stand until mixture settles and the liquid is clear. Place clean, fresh eggs in a clean crock or jar and pour clear lime water over eggs. Allow two inches of liquid over top of eggs.

CUT	CHARACTERISTICS	METHODS OF COOKING
<b>FORE QUARTER</b>		
Fore Shank	Upper part has little bone, solid meat, good flavor. Lower part tough with tendon and bone.	Three fairly good steaks or small pot roast. Remainder stews, hamburger, steak, sausage and soup.
Brisket	Layer of juicy, well flavored meat over fat and bone.	Corned beef, soup, pot roast and stew.
Plate	Layers of fat and lean with bones in upper part.	Corned beef, pot roast and soup.
Neck	Bony, tough, well flavored.	Mince meat, stews and soup.
Chuck	Bottom part and hind end solid meat with comparatively little bone. More bone towards neck. Well flavored, some parts fairly tender.	Roasts or steaks (near ribs). Pot roasts, stews, casserole dishes and spiced beef.
Rib	Choice part of fore quarter. Contains 12 ribs and end of shoulder blade. 9th and 10th ribs choice portion. Lean muscle is large, solid and tender.	Oven roasts.

## BEEF CUTS

CUT	CHARACTERISTICS	METHODS OF COOKING
<b>HIND QUARTER</b>		
Flank	Practically boneless, coarse grained, fine flavored, no waste.	Flank steak, braized, pot pie, boiled and stewed.
Loin	Meat lean with fat on edges. Contains the choicest steaks, sirloin, pinbone and porterhouse.	Steaks and choice roasts.
Rump	Solid meat, somewhat coarse grained but fine flavored and juicy.	Steaks, corning braizing and pot roasts. Remove large bone, stuff and roast.
Round	Top round, solid piece of juicy, fairly tender meat. Bottom round separated from top by thick piece of fat, similar to top but tougher and streaked with gristle.	Steaks, fifth cut considered best. Roasts, hamburg and braized.
Hind Shank	Juicy but tough and full of tendons. Fine flavor.	Soup and stews.

## FORMULAS FOR CURING MEAT

### CAUTIONS—

1. Kill and dress carefully.
2. Cool thoroughly before curing.
3. Do not cure or can meat when frozen or tainted.
4. Have vessels for curing tight and clean.

### CORNING BEEF

Select the cheaper cuts of beef; plate, rump, brisket, etc., preferably of fat animals. Cut into convenient sized pieces. Use 8 pounds of salt to 100 pounds of beef. Sprinkle  $\frac{1}{4}$  in. of salt over the bottom of barrel. Pack meat 5 or 6 inches in thickness over this. Alternate salt and meat layers, keeping a layer of salt for the top. Let stand over night and add 4 pounds of sugar, 2 ounces of baking soda and 4 ounces of saltpeter dissolved in 1 gallon of tepid water.

Three gallons more of water should be sufficient to cover this quantity. Weigh down so meat will be entirely under the brine. Meat should be in brine from 28 to 40 days to secure thorough corning.

Keep in a cool place to avoid fermentation.

If brine becomes ropy, turn off, wash meat and add fresh brine.

### DRIED BEEF

Round is usually used, the inside being considered the choice cut. Cut the round lengthwise of the grain so that the muscle fibres may be cut crosswise when sliced for table use.

Proportions:

100 pounds of beef, 5 pounds of salt, 3 pounds of granulated sugar, and 2 ounces of saltpeter. Mix thoroughly together.

Rub meat on all surfaces with a third of the mixture and pack it in the jar. Allow to remain for three days. Take out and rub with another third of the mixture putting top pieces on the bottom. Allow to remain three days and rub on remaining mixture and let stand three days. Do not remove liquid but repack in the liquid each time.

Remove from pickle, smoke and hang in dry attic or near the kitchen fire. Use any time after smoking.

### BRINE-CURED SALT PORK

Rub each piece of pork with fine salt and pack closely in a barrel. Let stand over night.

Make brine using 8 pounds of salt,  $2\frac{1}{2}$  lbs.

of sugar, 2 ounces of saltpeter and 4 gallons of boiling water for each 100 pounds of meat. Pour over meat when cold. Weigh down to keep under brine. Allow 4 days cure for each pound in hams and shoulders and 3 days for bacon and small pieces. When cured take out, wash in luke warm water and hang in smoke house.

### DRY-CURED PORK

For 100 pounds of meat use:

8 pounds of salt.

2½ lbs. molasses or sirup warmed slightly

2 ounces of saltpeter

3 ounces black pepper.

2 ounces red pepper.

Mix the ingredients well. Rub the mixture over the meat thoroly and pack it away in a barrel, box or on a table. About the third day break the bulk and repack to insure thorough contact with the cure mixture, then allow the meat to remain until the cure is completed. This will take two days in cure for each pound that the individual pieces of meat weigh; for example a ten-pound ham will take twenty days. After the meat is cured, hang in smokehouse without washing. When the meat is packed in tight barrels the liquid formed will aid in curing the heavier pieces of meat, which should be at the bottom.

Curing pork and meat to be smoked:

7 lbs. salt

3 lbs. sugar

2 ounces black pepper

2 ounces red pepper

Mix ingredients and rub onto meat; pack and leave for 6 to 7 weeks, then smoke.

### PORK SAUSAGE

40 pounds of pork

10 pounds of beef

1 pound of salt

3 ounces of pepper

5 ounces of sage

5 pounds of water.

Grind meat through the coarse plate. Spread out on table and spread on the seasoning. Put through fine plate and add water and mix as bread dough until water is completely absorbed.

References:—F. B. 913, "Killing Hogs and Curing Pork."; F. B. 183, "Meat on the Farm, Butchering, Curing and Keeping."

## SANITATION FACTS

1. Pure air is one of the essentials to health. Stoves, kerosene, and gas lamps consume large quantities of oxygen and give off carbon dioxide. Therefore, when these are used special provision should be made for ventilation.

If no provision is made for ventilation the windows should be lowered and the house aired at least twice during the day and before going to bed. Bedroom windows should be open at night. Rooms should be kept clean and dust removed, not scattered.

2. Water carries many disease germs. Clear water is not necessarily pure water. If there is a question about the purity of water it should be boiled before being used.

3. Food should not be left exposed to dust. Meat, milk and eggs and other protein foods are very susceptible to the action of bacteria and special care should be taken to see that they do not spoil. Special care should be taken of milk that is fed to children.

### 4. Disposal of Waste.

(a) Sewage disposal. The sanitary disposal of sewage is one of our greatest needs. If the outside toilet must be used the vault should be abandoned for all time. In its place establish a metal receptacle which should be disinfected by lime or dry earth immediately after use. The metal receptacle should be emptied weekly during warm weather and contents disinfected and buried.

"The unsanitary privy has been in use so long that those used to it overlook its obvious dangers."

(b) Garbage. Garbage that can be used for feed should be kept by itself, disposed of frequently and the container washed and scalded. Garbage not fit for feed should be burned.

(c) Waste Water. Dispose of thru a drain if possible. If it must be thrown out, do so at some distance from the house and do not allow the ground to become wet and soggy.

(d) Tin Cans. Crush so that they will not hold water and become breeding places for mosquitoes. Dispose of at some distance from the house.

### 5. House Hold Pests.

(1) Flies. Flies carry filth and disease germs. Their favorite breeding place is manure and human excreta. To eliminate the fly:



- (a) Clean up breeding places.
- (b) Screen manure pits and out-door toilets.
- (c) Screen doors and windows.
- (d) Trap and kill any flies that may breed.

(2) Bedbugs. Eliminate by filling cracks and crevices and fumigating with sulphur or (H C N) hydrocyanic acid gas, the latter gas being very poisonous. Heating house to 150 degrees F for 2 hours is effective.

(3) House Ants. Eliminate by placing sodium arsenite solution about in small dishes or saturating a sponge with solution and placing in a jar with perforated cover. The solution is made by dissolving 3 grams sodium arsenite in a little water and adding it to a sweetened syrup of 2 lbs. sugar dissolved in  $\frac{3}{4}$  pint of water. If sodium arsenite cannot be obtained, use white arsenic instead.

The poison is slow acting and enables ants to carry it away to their nests where it is fed to young ants and the queen, thus destroying the whole colony.

(4) Clothes Moths. Store woolen goods and furs in cedar chests. Moth balls or flaked naphthalene added to stored woolen goods or furs tend to keep clothes moths away. Hang out clothes in sunshine and brush thoroughly before storing. If clothes are infested either take them out into the sunshine and brush thoroughly or fumigate house with sulphur or H C N gas or heat house to 150 degrees F for 2 hours.

(5) Weevils and other insects in flour, breakfast foods, etc. Heat material containing insects to 150° F. for 2 hours. Flour bins and other receptacles should be emptied and thoroughly treated with boiling water.

(6) Mosquitoes. Drain or fill in all water holes which are liable to breed mosquitoes. If this cannot be done, oil water or provide water with surface feeding fish.

## **4. FARM ENGINEERING**

### **4.1 Farm Buildings**

Lighting suggestions for barns  
Ventilation suggestions for barns  
Dimensions of stalls and pens  
Facts about the septic tank  
Facts about the ice house

### **4.2 Farm Machinery**

Tractor studies  
Threshing machine tests

### **4.3 Concrete**

Mixtures  
Proportioning mixtures

### **4.4 Drainage**

Five good rules of drainage  
Size of tile, fall required and capacities  
Preliminary estimate of tiling  
Capacity of car load lots of tile

### **4.5 Fences**

Longevity fence posts, treated vs. untreated

### **4.6 Roads**

Good roads facts

## LIGHTING SUGGESTIONS FOR BARNs

1. Sunshine is one of the best disinfectants.

2. A building located north and south can be lighted more effectively.

3. In practical building a barn should be so lighted that a newspaper may be read in any part.

4. Better lighting is secured when the longest dimension of the window is vertical rather than horizontal.

5. Not less than 3 square feet of window space for each animal is necessary for efficient lighting; in dairy barns allow one square foot of window space for each 20 square feet of floor space.

6. Skylights have been tried and found practical and highly satisfactory in hog houses.

## VENTILATION SUGGESTIONS FOR BARNs

1. One of the best indications of an improperly ventilated barn is the condensation of moisture on the walls, ceilings and floors.

2. Ample ventilation is indispensable for maintaining the animal's power of disease resistance. A cow needs to be supplied with twice the weight of pure air that she does of food and water.

3. The essential parts of an effective ventilating system are:

(1) The inlets for fresh air—the total sum of their area should equal or exceed by 10% the area of the outlets.

(2) The outlets for foul air—these should be so constructed that their sides are air tight and afford complete insulation so that air within flue will not be cooled too rapidly.

(3) The aerator on top of the barn—so constructed that the action of the wind exerts a suction on the air in the outlet flue.

4. Rate of supply of air to barns to provide pure air for classes of livestock.

	Cu. Ft. Per Head Per Hour
Horses .....	4924
Cows .....	3953
Hogs .....	1510
Sheep .....	929
Hens .....	37

5. The following amount of out-take flue is required to keep the air in the building sufficiently pure for livestock.

	Head
Horses—1 sq. ft. cross-sectional area for	5
Cattle—1 sq. ft. cross-sectional area for	6
Hogs—1 sq. ft. cross-sectional area for	18
Sheep—1 sq. ft. cross-sectional area for	24
Hens—1 sq. ft. cross-sectional area for	400

### DIMENSIONS OF STALLS AND PENS

Kind	Box Stalls or pens (feet)	Tie Stalls	
		Length (feet)	Width (feet)
Horse			
Single .....	12x12	7*	5
Double .....		7	9
Cattle			
Beef (double) .....	10x12	5	8
Dairy average.....		5	(3½ with partition)
large .....		5½	(3 without partition)
small .....		4	
Sheep (ewe) .....	4x4		
Hogs (brood sow) .....	6x8		

\*Allow 15 feet from front of manger to back of litter alley. All floors in stalls should slope back toward gutter or drain not less than 1-4 to 1-3 inch to each foot.

For cattle the gutter should be 16 inches wide and at least 4 inches deep on alley side and 8 inches on stall side.

## FACTS ABOUT THE SEPTIC TANK

The simple septic tank is endorsed for disposal of farm home sewerage.

### DEPTH—

The depth of sewerage in the tank should be not less than 5 feet.

### CAPACITY—

The capacity of the sludge chamber should provide 10 gallons for each member of the household.

### LEACHING CAPACITY OF TILE—

When no open outlet can be had and blind tile lines are provided for taking care of the liquid effluent, 50 feet of tile should be provided per person in clay soil.

### SEWER PIPE—

Sewer pipe must always be used from the house to the tank. 4 inch tile is best. 4 inch drain tile is recommended for outlet to tank.

(Plans available)

## FACTS ABOUT THE ICE HOUSE

### CAPACITY—

The capacity of the ice house for refrigerator and milk should be 24 to 30 tons for the average.

### SHAPE—

The shape of the house should be as nearly cubical as possible.

### INSULATION—

From 12 in. to 18 in. of insulation around outside is recommended. Sawdust is best for insulation. Flax straw is better than other straws for insulation.

### TYPE—

The cheaper types of building for the ice house will probably prove more practical from the farm management standpoint. Expensively insulated walls are alright if the expenditure is desired. The semi basement house is giving good results.

### VENTILATION—

The ice house must be ventilated at the roof.

(Plan of house available)

# **COST PER HOUR OF OPERATING TRACTOR\***

Size of Tractor	Cost of Tractor	COST PER HOUR						Acres plowed per hour	Cost of plowing per acre
		Dep.	Labor	Fuel and oil	Interest	Repairs	Total		
Two-plow .....	\$ 900	\$0.22	\$0.35	\$0.25	\$0.06	\$0.06	\$0.94	0.6	\$1.58
Three-plow ....	1,450	0.36	0.35	0.33	0.10	0.10	1.24	0.8	1.55
Four-plow .....	1,950	0.49	0.35	0.40	0.14	0.14	1.52	1.0	1.52
Six-plow .....	2,600	0.65	0.60	0.52	0.18	0.18	2.13	1.3	1.63

\*This does not include depreciation, interest, and repairs on plows or other machines operated by the tractor.

The above table is based on an average life of 8 years for the tractor, and 50 ten-hour days, or 500 hours per year. Kerosene is charged at 11 cents per gallon and oil at 45 cents per gallon. The figures do not include any charge for interest, depreciation, and repairs on the plow. This is estimated to be about 10 cents per hour or 12 cents per acre for a 3-bottom plow.

Minn. Agri. Extension Div., Special Bul. 31.

# REDUCTION IN NUMBER OF HORSES NEEDED BY USE OF TRACTOR

Size of Tractor	Number of farms	Number of horses before purchasing	Number of horses after purchasing	Additional acres farmed
Two 14-inch plow .....	30	8	6	7
Three 14-inch plow .....	87	8	6	39
Four 14-inch plow .....	10	9	8	32

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## BLANKET TEST FOR GRAIN THRESHING

To make a "blanket test," secure a sheet of canvas, or any other suitable cloth about 18x24 feet in area. Secure a coarse screen from 24 to 36 inches in diameter. Spread the sheet on the ground, convenient to the stacker of the thrashing machine and station a man on the top of the machine near the weighing device. Immediately after a trip of the weigher, drop the hood so that all the straw, etc., passes on to the sheet and allow the straw to deposit thereon until the weighing device trips five complete times, indicating that the machine has thrashed  $2\frac{1}{2}$  bushels. Use a fork to winnow off the straw from the canvas, shaking out as much as possible of any wheat therein. This leaves a mass of small particles of straw and chaff and wheat on the sheet. Use the screen to sift off the small particles of straw and put through a fanning mill to blow out the chaff, leaving the quantity of wheat that has been wasted. Measure this in pint measure and figure the percentage according to the following table:

Grain on blanket during five trips of weighing device, or $2\frac{1}{2}$ bu.		Per Cent Loss	
1	pint.....	Less than 1	%
2	pints .....	$1\frac{1}{4}$	%
3	pints .....	2	%
5	pints .....	3	%
$6\frac{1}{2}$	pints .....	4	%
8	pints .....	5	%
2	gallons .....	10	%

One pint in this operation might be considered unavoidable waste; two pints poor operation, to be corrected at the earliest opportunity; and three pints or more might be considered wasteful practice and the machine closed down until improvement is indicated.

## CONCRETE MIXTURES

The proportions of materials which have been found to produce satisfactory results under average conditions are one part cement, two parts of sand and four parts of coarse aggregate (expressed 1:2:4) for most classes of construction. The following table gives the proportions recommended for various classes of work:

1:2:3 mixture for:

One-course concrete highway, street, and barnyard pavements; one-course floors and walks; roofs; fence posts and for sills and lintels without mortar surface; water troughs and tanks.

1:2:4 mixture for:

Reinforced concrete floors, beams and columns; large engine foundations; work subject to vibration; building walls above foundation; silo walls.

1:2½:4 mixture for:

Base of two-course street and highway pavements. Backing of concrete block and similar cement products.

1:3:5 mixture for:

Supporting walls and foundations; small engine foundations; base of sidewalks and two-course floors; mass concrete footings, etc.

## MORTAR

(Cement and Sand)

1:1½ mixture for:

Wearing course of two-course floors.

1:2 mixture for:

Scratch coat of exterior plaster; facing blocks and similar cement products; wearing course of two-course walks, street, and highway pavements.

1:2½ mixture for:

Finish coat of exterior plaster; fence-posts when coarse aggregate is not used.

1:3 mixture for:

Concrete blocks when coarse aggregate is not used. Cement drain tile when coarse aggregate is not used.

4.3

**PROPORTIONING MIXTURES**  
 Showing Quantities of Materials and the Resulting Amount of Concrete for Two Bag  
 Batch  
 Cement, Sand, Stone or Gravel

Kind of Concrete Mixture	Proportions by Parts			Two-Bag Batch						
	Cement	Sand	Stone or Gravel	Materials			Concrete (Cu. Ft.)	Size of Measuring Boxes. Inside Measurements.		Water in Gallons for Medium Wet Mixture
				Cement (Bags)	Sand (Cu. Ft.)	Stone or Gravel (Cu. Ft.)		Sand	Stone or Gravel	
1:2:4 Concrete ...	1	2	4	2	4	8	9	2'x2'x12"	2'x4'x12"	10
1:2½:5 Concrete ..	1	2½	5	2	5	10	10.8	2'x2½'x12"	2'x5'x12"	12½

**Cement and Natural Mixture of Bank Sand and Gravel**

		Natural Mixture		Natural Mixture Cu. Ft.			
1:2:4 Concrete ....	1	4	2	8	9	2'x4'x11½"	10
1:2½:5 Concrete ...	1	5	2	10	10.8	2'x5'x11½"	12½

## DRAINAGE

### FIVE GOOD RULES OF DRAINAGE—

1. Use dense, hard-burned tile, round tile best.
2. Avoid tile smaller than five inches.
3. An even grade is essential.
4. Depth in heavy clay, two or three feet; in loam and sandy loam, three to four feet.
5. Carefully construct and protect the outlet.

### SIZE OF TILE, FALL REQUIRED AND CAPACITIES—

Size of Tile Required Depend Upon

- (a) The fall for the tile
- (b) The size of the basin to be drained.
- (c) The amount of rain fall
- (d) The nature of the soil.

Fall Required in Tile (minimum)

Small tile .15 percent up to 7 in. tile.

Large tile .10 percent above 7 in. tile.

Open ditch 3 feet to the mile.

**CAPACITY OF MAIN DRAINS AND LIMITS OF GRADIENT AND LENGTH 4.4**  
**(Removing  $\frac{1}{4}$  inch water in 24 hours.)**

Diameter	Fall in Feet per 100 Feet						Minimum	Limit of Length
	.1	.2	.3	.4	.5	.6	Gradient per 100 feet	
Inches	Acres of Land Drained						Feet	Feet
5	15	18	22	24	28	30	.15	1500
6	24	30	35	42	47	50	.15	2000
8	32	42	50	59	67	75	.10	2300
10	50	60	72	84	94	105	.10	2500
12	60	78	100	115	130	145	.10	3000
14	80	110	130	150	170	190	.10	4000
16	140	170	200	230	260	290	.10	5300
18	200	250	300	340	390	430		
20	230	280	330	380	430	480		
	260	340	420	480	530	580		
	320	440	540	640	740	840		
	480	590	700	810	920	1030		

## PRELIMINARY ESTIMATE OF TILING:

Preliminary Estimate of Feet of Tile  
Required to Drain an Acre.

Laterals	Acre Requirement
50 feet apart.....	872 feet
100 feet apart.....	436 feet
150 feet apart.....	291 feet
200 feet apart.....	218 feet

The number of feet of drains per acre as shown does not include any intercepting main which may be necessary to make the work complete. For instance, should it be necessary to locate a main through the centre of a field, its length must be divided by the number of acres in the field, and the result added to the number which is found in the table above, opposite the number in the column indicating the distance apart which it is proposed to lay the drains. C. G. Elliott.

Cost of Laterals per Acre Drained—approximately \$35.00 for 1919.

CAPACITIES OF AVERAGE CAR LOAD OF  
TILE

Diameter tile (inches)	Pounds per foot	Capacity Car Load	
		Feet	Rods
5	8	5,000	300
6	11	4,000	240
7	14	3,000	180
8	18	2,400	144
10	25	1,600	96
12	33	1,000	60
14	43	800	48
15	50	600	36
16	53	500	30
18	70	400	24
20	83	330	20
22	100	320	19
24	112	300	18
27	150	240	15
30	192	160	10

## ANNUAL COST AND LONGEVITY OF FENCE POSTS

4.5

## Treated and Untreated Woods

Kind of Post			Initial Cost Per Post	Cost of Creosoting	Annual Cost Per Post	Estimate yrs. Posts Will Last
Ash	Untreated	....	\$ .10	\$ .085	\$ .0408	6
	Creosoted	....	.08			
Aspen	Untreated	....	.06	.135	.0551	3
	Creosoted	....	.04			
Boxelder	Untreated	....	.06	.135	.0434	4
	Creosoted	....	.04			
Mossy Ash Oak	Untreated	....	.18	.085	.0216	12
	Creosoted	....	.16			
Catalpa	Untreated	....	.20	.085	.0323	18
	Creosoted	....	.17			

Cottonwood				
Untreated	....	.07		3
Creosoted	....	.05	.135	27
Red Cedar				
Untreated	....	.40		30
Creosoted	....	.30	.085	37
Black Hills Pine				
Untreated	....	.15		6
*Creosoted	....	.12	.17	25
Soft Maple				
Untreated	....	.07		4
Treated	.....	.05	.135	27
White Cedar				
Untreated	....	.22		14
Creosoted	....	.18	.085	30
White Elm				
Untreated	....	.08		4
Creosoted	....	.06	.085	25
Willow				
Untreated	....	.06		4
Creosoted	....	.04	.135	27

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The cost of creosote is figured at 15c per gallon. Untreated posts figured on a diameter of six inches and seven feet long. Creosoted posts figured on a diameter of 4½ inches and 7 feet long.

\*Figures obtained from Forest Service Black Hills, Deadwood, 1919.



## GOOD ROAD FACTS

### CROWN FOR DIRT AND GRAVEL ROADS

Minimum crown 1 inch per running foot.

Maximum crown  $1\frac{1}{2}$  inch per running foot.

Road bed—22 to 24 feet wide—3 to 1 slope to ditch on both sides of road bed.

### CULVERTS

Culverts should be placed on permanent grade. Size of culverts should be figured by an engineer with big factor of safety considered in size. State Highway Commission furnishes standard plans.

### GRADING ROADS—

Slip scraper—used for 100 ft. and under, Est. cost 45 to 50c per yd.

Fresno scraper—used for 100 ft. to 300 ft.—Est. cost 35 to 40c per yd.

Wheel scraper—used for 300 ft. to 500 ft.—Est. cost 35 to 40c per yd.

Dump wagon—used for 500 ft. to 1000 ft.—Est. cost 35 to 40c per yd.

### SHAPING ROADS

Blade Grader—Est. cost of moving dirt 12 to 15c per yd.

Elevating grader—Est. cost of moving dirt 8 to 10c per yd.

Cost of shaping dirt roads with grader \$50 to \$200 per mile.

Cost of gravelling roads—\$3,000 to \$5,000 per mile.

# **FORCE REQUIRED TO DRAW A LOAD ON DIFFERENT KINDS OF ROADS**

	Force Required to Draw a Gross Load of 2240 Pounds	Steepest Grade (rise per 100 ft) on which Vehicle will not Roll Back
	Pounds	Feet
Earth road .....	200	8.9
Gravel road .....	143 $\frac{1}{2}$	6.4
Macadam road ...	65	2.9
Telford road .....	46	2.0
Plank road .....	41	1.8
Stone trackway ..	12 $\frac{1}{2}$	.5

## **5. SOILS**

### **5.1 Compositions**

Fertility content of some South Dakota soils

Experimental results with fertilizers in South Dakota

### **5.2 Rotations**

Suggested crop rotations for South Dakota conditions.

So

### **5.3 Fertility**

Amount manure produced by livestock.

Fertility losses by leaching

Fertility content of crops, crop residues and manures

Conversion table for elements of fertility.

### FERTILITY CONTENT OF SOME SOUTH DAKOTA SOILS

(Pounds fertility in two million lbs. of surface soil or amount in an acre of soil 6 2/3 inches deep.)

	Nitrogen	Phosphorus	Potassium
Brookings Experiment Station			
Brown Sandy Loam .....	6,335	1,324	27,089
Cottonwood Experiment Station			
Pierre Clay .....	2,298	1,260	
Highmore Experiment Station			
Brown Sandy Loam .....	3,252	1,143	
Brown County			
Lake Dakota Silt .....	6,057	1,226	

### VALUE OF MANURE AND ROCK PHOSPHATE APPLICATIONS

(These results were obtained from farm tests in the eastern half of South Dakota in 1914, 1915 and 1917).

Acre Treatment	Average Acre Yield of Corn 1914, 15 and 17	Average Acre Yield Corn in 1914-15
No treatment .....	30.8 bus.	28.5
Manure (6 tons) .....	32.3 bus.	31.3
Manure (6 tons) + Rock Phosphate (600 lbs.) ..	35.5 bus.	34.2
Manure (6 tons) + Acid Phosphate (200 lbs.) ..		35.1

## **5.1**

### **EXPERIMENTAL RESULTS WITH FERTILIZERS IN SOUTH DAKOTA**

The effects of the application of the three most limiting elements of soil fertility, nitrogen, phosphorus and potassium have been tested out on crop rotations at the Experiment Station and substations of the state. Results of the past years indicate that it does not pay to buy nitrogen or potassium. A leguminous crop can be included in the rotation to add nitrogen to the soil. Phosphorus has given varying results at the different stations as follows:\*

#### **Brookings Station:**

During the past 11 years it has increased the average yield of the crops in rotation 30.2 percent.

#### **Highmore Substation:**

#### **Cottonwood Substation:**

#### **Eureka Substation:**

\*The data for the substations to be furnished in the latter part of 1919.

## SUGGESTED CROP ROTATIONS FOR SOUTH DAKOTA

### 3 yr. rotation:

Corn — wheat + (sweet clover) — sweet clover.

Corn — barley + (sweet clover) — sweet clover.

Corn — oats + (sweet clover) — sweet clover.

Corn — emmer + (sweet clover) — sweet clover.

### 4 yr rotation:

Corn — oats — wheat + (sweet clover) — sweet clover.

Corn — barley — wheat + (sweet clover) — sweet clover.

### 5 yr. rotation:

Corn — winter rye — corn — oats + (sweet clover) — sweet clover.

Corn — winter rye — corn — wheat + (sweet clover) — sweet clover.

corn — winter rye — corn — barley + (sweet clover) — sweet clover.

### Rotation With Perennials:

Alfalfa or any combination of perennials to be used as permanent crop either for meadow or pasture as desired.

Perennial, 3 to 9 years, for meadow. Perennial, 3 to 9 years for pasture. Corn, (barley, wheat or rye) and oats.

Perennial, 5 to 10 yrs. Corn — (barley, rye or wheat + sweet clover) — sweet clover — corn — oats. Seed more alfalfa when original field becomes poor, but do not plow the old field until a new stand is secured.

Note—Medium red clover may be used instead of sweet clover in southeast portion of state.

### Tillage Directions for Rotations:

Plow thoroughly six to eight inches for corn, plow 4 or 5 inches for grain after grain, double disk for grain or grass after corn. Do not be afraid to use the harrow in preparation for corn, grain or grain and grass. Put all available manure on ground where corn is to be planted six to ten tons per acre. If there is more than enough for the corn, use it on the meadow.

# **APPROXIMATE AMOUNT MANURE PRODUCED BY LIVESTOCK**

(Exclusive of Bedding)

	Lbs. manure per day per 1,000 lbs. live weight.*	Average number lbs. per animal during year.
Horse .....	50	25,550
Cow .....	70	27,375
Steers (fattening) .	40	
Hog .....	85	6,205
Sheep .....	30	1,314
Hen .....		75

\*Thorne's Farm Manures.

## **PERCENTAGE LOSSES IN MANURE THROUGH LEACHING\***

(6 months period, spring and summer)

Kind Manure	Nitrogen	Phosphorus	Potassium
Horse ..	60	47	76
Cow ....	41	19	8

\*Thorne's Farm Manures.

## FERTILITY IN FARM PRODUCE\*

Produce or Material		Pounds		
Kind	Amount	Nitrogen	Phosphorus	Potassium
Produce—				
(Approximate amounts removable per acre annually)				
Corn, grain....	50 bu.	50.	8.5	9.5
Corn stover....	1½ T.	24.	3.	2.6
Corn crop....		74.	11.5	12.1
Oats, grain....	50 bu.	33	5.5	8.
Oats straw....	1¼ T.	15.5	2.5	26.
Oat crop....		48.5	8.	34.
Wheat, grain....	25 bu.	35.5	6.	6.5
Wheat straw....	1¼ T.	12.5	2.	22.5
Wheat crop..		48.	8.	29.
Soy beans....	25 bu.	80.	13.	24.
Soy bean straw.	2¼ T.	79.	8.	49.
Soy bean crop.		159.	21.	73.
Timothy hay....	3 T.	72.	9.	71.
Clover seed....	4 bu.	7.	2.	3.
Clover hay....	4 T.	160.	20.	120.
Alfalfa hay....	6 T.	300.	27.	144.
Potatoes .....	200 bu.	42.	9.33	60.
Sugar beets....	20 T.	100.	18.	157.
Apples .....	600 bu.	47.	5.	57.
Leaves .....	4 T.	59.	7.	47.
Fat cattle .....	1000 lb.	25.	7.	1.
Fat hogs .....	1000 lb.	18.	3.	1.
Milk .....	10000 lb.	57.	7.	12.
Butter .....	400 lb.	.8	.2	.1

\*Hopkins' Soil Fertility and Permanent Agriculture.



# FERTILITY IN ROUGHAGE, MANURE AND FERTILIZERS

Produce or Material	Pounds per Ton		
	Nitrogen	Phosphorus	Potassium
<b>Roughage**</b>			
Corn stover .....	16	2	17
Oat straw .....	12	2	21
Wheat straw ...	10	2	14
Clover hay .....	40	5	30
Alfalfa hay .....	50	4	24
<b>Manure*</b>			
Horses .....	12	3	8.6
Cattle .....	11	2.8	8
Hogs .....	13	5.5	8
Sheep .....	14	3.9	14
Poultry .....	18	7.6	8
Barnyard manure	10	3	8
<b>Fertilizers**</b>			
Sodium nitrate..	310		
Raw bone meal.	80	180	
Acidated bone meal .....	40	140	
Raw rock phosphate ....		250	
Acid phosphate .		125	
Wood ashes§ ...		10	100

\*Thorne's Farm Manures.

§Wood ashes also contains approximately 1000 pounds of lime per ton.

\*\*Hopkins Soil Fertility and Permanent Agriculture.

# **CONVERSION TABLE FOR ELEMENTS OF FERTILITY**

Amount of	Multiplied by	Give correspond- ing amount of
Nitrogen .....	1.215	..... Ammonia
Ammonia .....	.823	..... Nitrogen
Ammonia .....	5.15	..... Protein
Phosphorus .....	2.29	Phosphoric acid
Phosphoric acid..	.4366	.... Phosphorus
Potassium .....	1.204	..... Potash
Potash .....	.8303	..... Potassium

All fertilizers sold in South Dakota must show analysis in terms of nitrogen, phosphorus and potassium.

## **6. FIELD CROPS**

Crop acreage, production  
and valuation in South  
Dakota.

Variety and planting table

Longevity of seeds

Features of the South Da-  
kota pure seed law

Number of hills or plants  
on an acre.

### **6.1 Cereals**

#### **6.11 Corn**

State corn districts and recommended  
varieties

Variety tests and approximate time  
for maturity

Seed corn selection and testing facts

Corn shrinkage in cribs

Market grades

#### **6.12 Wheat**

Variety tests

Market grades

#### **6.13 Oats**

Variety tests

Market grades

#### **6.14 Barley**

Variety tests

Market grades

F  
Cr

## **6.15 Rye**

Comparative yields winter rye vs.  
spring and winter wheat  
Market grades

## **6.16 Flax**

Variety tests  
Market grades

## **6.2 Forage Crops**

### **6.21 Legumes**

Classification of alfalfa varieties.  
Variety tests alfalfa for hay

### **6.22 Other than legumes**

Classification of sorghums

## **6.3 Root Crops**

Factors of successful storage

### **6.31 Potatoes**

Variety tests  
Size of seed potato pieces in relation  
to yield  
Market grades

## **6.4 Weeds**

Obnoxious weeds and their eradication  
Features of South Dakota weed law

**CROP ACREAGE, PRODUCTION AND ACRE VALUE IN SOUTH DAKOTA**  
 (Comparing first war year 1917 with previous 10 year average 1907-16 inclusive)

	Acreage		Production in Bushels		Acre Yields (bushels)		Farm value per Bushel Dec. 1	
	1917	1907-1916	1917	1907-1916	1917	1907-1916	1917	1907-1916
Wheat .....	3,716,000	3,471,900	52,024,000	38,538,090	14	11.1	1.96	.92
Corn .....	3,350,000	2,457,500	97,150,000	67,335,500	29	27.4	1.20	.51
Oats .....	1,925,000	1,566,000	65,450,000	41,968,000	34	26.8	.61	.36
Barley .....	1,020,000	913,900	26,520,000	19,557,460	26	21.4	1.10	.56
Flax .....	140,000	456,100	980,000	3,831,280	7	8.4	2.99	1.54
Rye .....	350,000	61,380	5,600,000	1,018,908	16	16.6	1.55	.69
<b>Total .....</b>	<b>10,501,000</b>	<b>8,926,780</b>	<b>247,724,000</b>	<b>172,250,038</b>				

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# FIELD CROPS—Variety and Planting Table

Crops and Varieties	Lbs. per Bu.	Lbs. per Acre	Seeding or Planting	
			Time	Depth in Inches
Alfalfa—	60			
Broadcast		10		1
In rows 3 ft. apart		2	Early Spring	
Baltic S. D. 167				
Vale S. D. 22				
Grimm S. D. 162				
(registered common)				
Turkestan S. D. 240				
Common S. D. 12				
Cossack S. D. 38				
(registered common)				
Barley—				
Eastern District	48	72	Early Spring	2-3
Western District				
Manchuria S. D. 105				
Odessa S. D. 182				
Hannchen S. D. 20				
White Smyrna S. D. 28				
Gatami S. D. 122				
Beans—				
White Navy	60	20-30	Late May	2-3
Manchuria Soys				
Buckwheat—				
Japanese	48	24-30	Early June	2
Silver Hull				
Corn—				
(for varieties see districts under corn)	56			
First District			May 10	2
Second District			May 15	2
Third District			May 20	2

Clover—				
Medium Red	60	10	Early Spring	1
White Sweet				
White (for mixtures)				
Alsike (for mixtures)				
Emmer—				
White Spring S. D. 293	40	50	Early Spring	2-3
Flax—				
Resistant S. D. 29 (N. D. 52)	56	28	April 15 on corn	
Select Russian S. D. 686 (N. D. 1215)			ground May 15 on	
Primost S. D. 25 (Minn. 25)			grass land.	1
Grasses (Better to use mixtures)—				
Brome	14	14-18	Early Spring	1
Kentucky Blue	14	42	Early Spring	
Red Top	14	14-18	Early Spring	
Slender Wheat	14	14-18	Early Spring	
Timothy	45	15	Early Spring	
Grass Mixtures—				
Pastures—				
Dry Land				
{ Brome		8		
{ Alfalfa		4		
{ Sweet Clover		4		
or { Brome		10		
{ Sweet Clover		6		
Wet Land				
{ Timothy		6		
{ Red Top		8		
{ Alsike Clover		4		

Crop and Varieties	Lbs. per Bu.	Lbs. per Acre	Seeding or Planting	
			Time	Depth in Inches
Upland (Eastern Section)				
{ Timothy		6		
{ Blue Grass		14		
{ White Clover		4		
Meadow—				
Dry Land			Early Spring	1
Brome		8		
Alfalfa		6		
Wet Land				
Timothy		6		
Red Top		8		
Alsike Clover		4		
Upland (Eastern section)				
Timothy		8		
Red Clover		6		
Sorghum		50	Late May	1
Forage—Minnesota Amber S. D. 341		6		
Dakota Amber S. D. 887		6		
Sudan Grass		25		
Grain				
Kaoliang—Altamont S. D. 655		5		
Manchur Brown S. D. 289				



Millet—					
Shelley S. D. 343		50	25	Late May	1
Dakota Kursk S. D. 932					
Kursk S. D. 79					
Oats—					
Sixty Day S. D. 165		32	48-64	Early Spring	2-3
Silvermine S. D. 932			64-80		
Swedish Select S. D. 112			64-80		
Peas—					
Canadian Field		60	120	Early Spring	2
Potatoes—					
<b>Early</b>	<b>Late</b>	60	600-720	Early potatoes in late May. Late potatoes in early May	5
Irish Cobbler	Rural New Yorker				
Early Ohio	Guerney's Bugless				
	Carmen No. 3				
	Burbank				
	Raleigh				
Proso—					
Tambox S. D. 80		50	25	Late May	1
Black Vornouezh S. D. 93					
Rape—Dwarf Essex		60	4-5	April	½
Rye—(winter)—					
Advance S. D. 1030	Swedish S. D. 348	56	70	Sept. 15	2-3
Wheat—					
Spring—		60	60-75	Early Spring	2-3
<b>Common</b>	<b>Durum</b>				
Marquis S. D. 515	Kubanka S. D. 75			Common	
(beardless)	(bearded)			60-75	
Preston S. D. 67	Pierson S. D. 999			Durum	
(bearded)				75-90	2-3
				Early Spring	

## FIELD CROPS—VARIETY AND PLANTING TABLE (Continued)

Crop and Varieties	Lbs. per Bu.	Lbs. per Acre	Seeding or Planting	
			Time	Depth in Inches
Acme S. D. 284 (bearded)				
Winter— Turkey S. D. 144 Kharkof S. D. 191 (bearded) (bearded)		75	Sept. 1-15	2-3
Combination of Crops—				
Oats and Canadian Field Peas		32 + 60	Early Spring	
Beardless or Hulless Barley and Peas		50 + 60	Early Spring	
Beardless or Hulless Barley and Rape		50 + 3	Early Spring	
Oats and Rape		56 + 3	Early Spring	
Winter Rye and Rape (spring sown)		56 + 3	Early Spring	
Rape in corn after last cultivation		4 — 5		
Soy beans in Corn		15 + 14	May 15-25	

# **LONGEVITY OF SEEDS SHOWING AVERAGE YEARS VIABILITY\***

<b>Field Crops</b>		Millet .....	2
Alfalfa .....	3	Oats .....	3
Barley .....	3	Rape .....	5
Buckwheat .....	2	Rye .....	2
Clover .....	3	Sorghum .....	2
Corn .....	2	Wheat .....	2
Flax .....	2		
Grasses—			
Brome .....	3		
Kentucky Blue. .	3		
Orchard .....	3		
Red Top .....	3		
Timothy .....	4		
<b>Garden Crops</b>		Parsley .....	3
Bean .....	3	Pea .....	3
Beet .....	6	Pumpkin .....	4
Cabbage .....	5	Radish .....	5
Carrot .....	4	Rutabaga .....	
Cauliflower .....	5	Salsify .....	2
Celery .....	8	Squash .....	6
Cucumber .....	6	Tomato .....	4
Egg plant .....	6	Turnip .....	5
Lettuce .....	5	Watermelon .....	6
Muskmelon .....	5		
Onion .....	2		
Parsnip .....	2		
<b>Weed Seeds</b>		Smartweed .....	
Burdock .....		Thistle—	
Cocklebur .....	7	Bull .....	
Dandelion .....	2	Canada .....	
Dodder .....	7	Russian .....	
Fennel .....	4	Wild Mustard ..	7
Fox Tail .....		Wild oats .....	7
Jimson weed .....		Wild parsnip ...	
Morning glory..			
(field bindweed)			
Quack grass .....			
Purslane .....	7		
Ragweed .....			
Sheep sorrel .....			

\*The foregoing are averages; there may be extremes showing a greater number of years.

**FEATURES OF SOUTH DAKOTA'S PURE SEED LAW****6**

Standard of Purity and Germination of Agricultural Seeds included in the Law.

Name	Per Cent of Purity	Per Cent Germinable Seeds
Alfalfa ( <i>Medicago sativa</i> ) .....	96	80
Barley .....	98	90
Blue Grass, Canadian ( <i>Poa compressa</i> ) .....	90	45
Blue Grass, Kentucky ( <i>Poa pratensis</i> ) .....	80	45
Brome, awnless ( <i>Bromus inermis</i> ) .....	90	75
Clover, Alsike ( <i>Trifolium hybridum</i> ) .....	90	75
Buckwheat .....	96	90
Clover, crimson, ( <i>Trifolium incarnatum</i> ) .....	98	85
Clover, red ( <i>Trifolium pratense</i> ) .....	92	80
Clover, white ( <i>Trifolium repens</i> ) .....	90	75
Corn, field ( <i>Zea mays</i> ) .....	99	90
Corn sweet .....	99	75
Fescue, meadow ( <i>Festuca pratensis</i> ).....	95	85
Flax ( <i>Linum usitatissimum</i> ) .....	96	89
Millet, common ( <i>Setaria italica</i> ) .....	90	85
Millet, hog, ( <i>Panicum miliaceum</i> ) .....	90	85
Millet, pearl ( <i>Penisetum typhoideum</i> ) .....	99	65
Oats ( <i>Avena sativa</i> ) .....	98	90
Oat grass, tall ( <i>Arrhenatherum avenaceum</i> ) .....	72	70
Orchard grass ( <i>Dactylis glomerata</i> ) .....	70	70
Rape ( <i>Brassica rapa</i> ) .....	99	90
Redtop ( <i>Agrostis alba</i> ) .....	90	70

Rye ( <i>Secale cereale</i> ) .....	98	90
Rye Grass, Perennial ( <i>lolium perenne</i> ) .....	90	90
Rye Grass, Italian ( <i>lolium italicum</i> ) .....	95	80
Sorghum ( <i>Andropogon sorghum</i> ) .....	96	80
Sorghum, for fodder .....	90	60
Timothy ( <i>Phleum pratense</i> ) ....;	96	85
Wheat ( <i>Triticum</i> ) .....	98	90

#### **Labeling:**

Each package or lot of agricultural seeds exceeding one pound in weight which is sold or offered for sale by any person, firm or corporation in the state shall be labeled as follows:

1. The commonly accepted name of the kind and variety of seed.
2. Full name and address of party making the sale.
3. Statement of purity of the seed containing specifying approximate percentage of impurities and naming the noxious weeds as quack grass, dodder and Canada thistle.
4. Germination test made within one year preceding date of sale.
5. When mixed seeds for lawn or other purposes are sold or offered for sale also include on the label the names of the kinds

of varieties of seeds composing the mixture.

#### **Law does not apply to:**

1. The growing or selling seeds for food or manufacturing purposes.
2. Seeds in transit.
3. Any seeds sold and delivered direct where the buyer has full and free privilege of examination before paying for the seed and voluntarily accepts it without requiring label as specified.

#### **Penalty:**

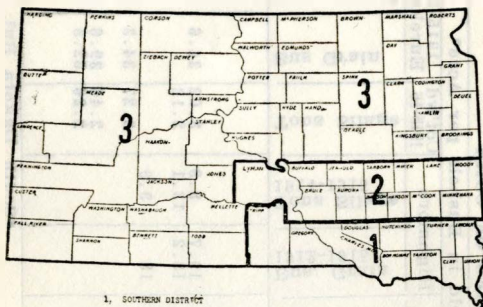
Whoever violates any provisions of the seed law shall be guilty of a misdemeanor and in addition thereto shall be liable in damages to the purchaser of the seed for the purchase price thereof. It shall be the duty of the state's attorney to prosecute all persons found violating any of the provisions of the law.

# **NUMBER OF HILLS OR PLANTS ON AN ACRE** Varying Distances

**6**

Dis- tance	10 in.	12 in.	15 in.	18 in.	20 in.	2 ft.	2½ ft.	3 ft.	3½ ft.	4 ft.	4½ ft.	5 ft.	5½ ft.	6 ft.
in.														
10 ..	62726													
12 ...	52272	43560												
15 ...	41817	34848	27878											
18 ...	34848	29040	23232	19360										
20 ...	31363	26136	20908	17424	15681									
ft.														
2 ...	26136	21780	17424	14520	13068	10890								
2½ ..	20908	17424	13939	11616	10454	8712	6969							
3 ...	17424	14520	11616	9680	8712	7260	5808	4840						
3½ ..	14935	12446	9953	8297	7467	6223	4976	4148	3565					
4 ...	13068	10890	8712	7260	6534	5445	4356	3630	3111	2722				
4½ ..	11616	9680	7744	6453	5808	4840	3872	3226	2767	2420	2151			
5 ...	10454	8712	6969	5808	5227	4356	3484	2904	2489	2178	1936	1742		
5½ ..	9504	7920	6336	5280	4752	3960	3168	2640	2263	1980	1760	1584	1440	
6 ...	8712	7260	5808	4840	4356	3630	2904	2420	2074	1865	1613	1452	1320	1210

**SOUTH DAKOTA**  
MAP SHOWING CORN DISTRICTS



1. SOUTHERN DISTRICT  
2. CENTRAL DISTRICT  
3. NORTHERN DISTRICT

## RECOMMENDED VARIETIES OF CORN

Southern Half

Northern Half

### District No. 1

	Wimble's Yellow Dent
Reid's Yellow Dent	Fulton's Yellow Dent
Wimble's Yellow Dent	Minnesota 13
Rainbow Flint*	Silver King
	Rainbow Flint*

### District No. 2

	Minnesota 13
Minnesota 13	Dakota White
Fulton's Yellow Dent	Rainbow Flint*
Rainbow Flint*	Big Squaw*
Silver King	Silver King
	Golden Glow

### District No. 3

Northwestern Dent	Northwestern Dent
Minnesota No. 13	Longfellow Flint*
Dakota White	North Dakota White
Rainbow Flint*	Flint*
Smutnose Flint*	Big Squaw*
Golden Glow	
Silver King	
Big Squaw*	

\*—Recommended for silage and hogging off.

## COMPARATIVE YIELDS OF VARIETIES OF CORN

6.11

Variety	Approximate Number Days for Maturity— for Planting to Ripening.	Yield in Bushels per Acre*						
		Brookings 1914-16 inc.		Highmore		Cot'wd 1915-16	1915-16 Eureka	
		Bus Grain	Tons Silage	Bus. Grain 1912-1915	Tons Silage 1914-1915	Tons Silage	Bus Grain	Tons Silage
Dent Corn—								
Reid's Yellow .....	135-150							
Wimple's Yellow .....	130-145	50	13.9					
Fulton's Yellow .....	125-140							
Minnesota 13 (yellow) .....	120-135	61.9	12.9	19.7	8.9	3.02	34.6	6.89
Silver King (Wis. 7)(white) ..	120-135	60.6	13	18.2	13.1	2.12		
Dakota White .....	120-135	57	15.7					
Golden Glow .....	120-135	55.8	11.8	18	9.9			
Northwestern (reddishbrown)	100-115	53.5	15			3.27	34.3	10.7
Flint Corn—								
Big Squaw (reddish brown) ..	110-125	89.8	22			2.46	39.6	16.5
Rainbow (blue white) .....	120-135	72	20.9			2.26	52.3	20
Smutnose (varied) .....	110-125							
Longfellow (red) .....	100-115	61.6	19					
North Dakota White .....	110-125							

\*South Dakota Bul. 181



## ADDITIONAL FACTS IN SEED CORN SELECTION

(Purdue Agri. Exp. Station Bul. 224)

1. For permanent corn improvement only ears from disease-free stalks should be used for seed purposes.

2. For seed corn purposes no infested and weakened ears should be planted. These can be detected and discarded before planting by a careful study of the germinating seedlings in the germination test. The seedlings with rotted embryos and stalks indicate the ears to be discarded for seed purposes.

3. The planting of seed corn infected with disease-producing organisms is in a great measure responsible for missing hills, slow growing stalks, barren stalks, down stalks, nubbins and early blighting of plants in the field with the large reduction in yield which these conditions bring about.

### CORN SHRINKAGE IN CRIBS

Ten year average. Percentage by months.  
Iowa Exp. Station.

Month	Average Shrinkage	Monthly Rate
November .....	5.2	5.2
December .....	6.9	1.7
January .....	7.5	.6
February .....	7.8	.3
March .....	9.7	1.9
April .....	12.8	3.1
May .....	14.7	1.9
June .....	16.3	1.6
July .....	17.3	1.0
August .....	17.8	.5
September .....	18.2	.4
October .....	18.2	.0

## MARKET GRADES OF SHELLED CORN

### Classes

Shelled corn shall be divided into three classes:

**White Corn:** At least 98 per centum by weight of the kernels are white. A slight tinge of light straw color or of pink on kernels of corn otherwise white shall not affect their classification as white corn.

**Yellow Corn:** At least 95 per centum by weight of the kernels are yellow. A slight tinge of red on kernels of corn otherwise yellow shall not affect their classification as yellow corn.

**Mixed Corn:** Consists of corn of various colors not coming within the limits for color as provided in the definitions of white corn and yellow corn. White capped yellow kernels shall be classified as mixed corn.

### Grade Requirements

	Minimum test weight per bu.	Maximum limits of—			
		Moisture	Foreign material and cracked corn	Damaged corn	
				Total	Heat damage
	Lbs.	%	%	%	%
1.....	55	14.0	2	2	.0
2.....	53	15.5	3	4	.1
3.....	51	17.5	4	6	.3
4.....	49	19.5	5	8	.5
5.....	47	21.5	6	10	1.0
6.....	44	23.0	7	15	3.0
Sample					

Sample grade shall be White corn or Yellow corn, or mixed corn, respectively, which does not come within the requirements of any of the grades from No. 1 to No. 6.

All determinations except color, damage and heat damage shall be upon the basis of the grain including foreign material and cracked corn.

(1) The corn in grades Nos. 1 to 5 inclusive, shall be cool and sweet.

(2) The corn in grade No. 6 shall be cool, but may be musty or sour.

# COMPARATIVE YIELDS OF VARIETIES OF WHEAT<sup>1</sup>

Species and Variety	Yields in Bushels per Acre			
	Brookings 1905-1916	Highmore 1905-1916	Cottonwood 1909-1916	Eureka 1913-1916
Durum Kubanka S. D. 75 (bearded)	16.8	16.2	3.	20.8
Preston Preston S. D. 67 <sup>2</sup> (bearded)	16.7	13.5	2.6	11.8
Fife Marquis S. D. 515 <sup>3</sup> (bearded)	19.3	16.4		17.5
Bluestem Haynes S. D. 169 (bearded)	12.7	11.5	1.2	8.5

Wheat Cir., Agronomy Dept.,  
S. D. State College

1. At Highmore a new rust resistant variety, Acme S. D. 284, has been developed. In 3 years trials it yielded 27.9 bushels per acre as compared with 21.7 bushels for Kubanka 75.

2. Commonly called Velvet Chaff, Johnson, Bearded Red Fife or Climax.

3. Average yields 1913 to 1920 for Brookings, Highmore and Eureka.

Grade No.	Minimum limits of test weight per bushel		Moisture	Maximum limits of—				Wheats of other classes		
				Damaged kernels	Foreign Material other than dockage					
	Classes: Hard Red Spring	Classes: Durum, Hard Red Winter, Common White & White Club; Sub- class Red Winter	Subclass: Red Walla	Class: Hard Red Spring and Durum	Classes: Hard Red Winter, Soft Red Winter, Common White and White Club	Total	Heat Damage	Total	Matter other than cereal grains	Total
1.....	58	60	58	% 14.0	% 13.5	% 2	% 0.1	% 1	% 0.5	% 5
2.....	57	58	56	14.5	14.0	4	0.2	2	1.0	10
3.....	55	56	54	15.0	14.5	7	0.5	3	2.0	10
4.....	53	54	52	16.0	15.5	10	1.0	5	3.0	10
5.....	50	51	49	16.0	15.5	15	3.0	7	5.0	10

**Sample Grade.**—Shall be wheat of the appropriate subclass which does not come within the requirements of any of the grades from No. 1 to No. 5 inclusive.

# **OAT VARIETIES AND THEIR ACRE YIELDS IN SOUTH DAKOTA**

Variety	Brookings 1903-1921	Highmore 1903-1921	Cottonwood 1909-1921	Eureka 1909-1921
Early— Sixty-day	55.4	37.9	22.8	38.3
Late— Swedish Select	43.6	31.7	13.5	30.4

Oat Cir., Agronomy Department,  
S. D. State College

# MARKET GRADE REQUIREMENTS FOR OATS

6.13

Grade	Condition and general appearance. <sup>1</sup>	Minimum test weight per bushel (Pounds)	Sound cultivated oats not less than— (Per Cent)	Heat damaged (oats or other grains) (Per Cent)	Foreign material (Per Cent)	Wild oats (Per Cent)	Other colors, cultivated and wild oats (Per Cent)
		Not Less Than					
<sup>2</sup> 1	Shall be cool and sweet, and of good color .....	32	98	0.1	2	2	<sup>3</sup> 2
2	Shall be cool and sweet, and may be slightly stained .....	29	95	.3	2	3	<sup>4</sup> 5
3	Shall be cool and sweet, and may be stained or slightly weathered ..	26	90	1	3	5	10
4	Shall be cool, and may be musty weathered, or badly stained .....	23	80	6	5	10	10

Sample Grade—Shall be white, red, gray, black, mixed, bleached, or clipped oats, respectively, which do not come within the requirements of any of the grades from No. 1 to No. 4, inclusive.

<sup>1</sup>The percentage of moisture in grades Nos. 1, 2, and 3 shall not exceed 14½, and in grade No. 4 shall not exceed 16.

All determinations shall be upon the basis of the lot of grain as a whole, including foreign material, other grains and wild oats.

# COMPARATIVE YIELDS OF LEADING VARIETIES OF BARLEY

Varieties	Yields in Bushels per Acre					
	Brookings 1913-17	Highmore 1910-17	Cottonwood 1916-17	Eureka 1909-17	Belle Fourche	
					Dry Land 1912-16	Irrigated 1914
Six row—Manchuria S. D. 105 (Minn.) 105 .....	53.8	22.8	10.1	27.	20.5	19.1
Odessa, S. D. 182 .....	51.8	28.9	18.7		23.5	
Oderbrucker S. D. 178 (Wis) 6 .....	47.1					
Two Row—Hanchen, S. D. 28 .....	31.5	25.2	14.3	33.5	25.7	
White Smyrna, S. D. 28 .....	37.8	25.4	15.0		28	
Special (Black 6 row) Gatami S.D. 122	47.7	26.6	12.7	23.6	22.4	

**MARKET GRADES FOR BARLEY**

No. 1—Shall be plump, bright, clean and free from other grains, shall weigh not less than 48 pounds to the measured bushel.

No. 2—Shall be sound and of healthy color, not plump enough for No. 1, reasonably clean and reasonably free from other grains, shall weigh not less than 46 pounds to the measured bushel.

No. 3—Shall include all slightly shrunken and otherwise slightly damaged barley, not good enough for No. 2, shall weigh not less than 44 pounds to the measured bushel.

No. 4—Shall be barley not good enough for No. 3, shall be reasonably sound and reasonably clean, shall weigh not less than 42 pounds to the measured bushel.

No. 5—Shall be reasonably sound and reasonably clean, not good enough for No. 4, shall weigh not less than 40 pounds to the measured bushel.

No. 6—Shall include all barley which for any reason or cause are unfit for the higher grades.

Sample grade shall include all barley in a heating condition, too musty or too damp to be safe for warehousing or that is badly bin burnt or fire burnt, badly damaged, exceedingly dirty, containing live weevils or otherwise unfit for storage.



**COMPARATIVE YIELDS WINTER WHEAT, SPRING WHEAT AND WINTER RYE**  
(Following Corn)

Grains	Yields in Bushels per Acre				
	Brookings Wheat 10 yr. av. Rye 3 yr. av.	Highmore* 7 yr. av.	Cottonwood	Eureka	Newell (Fallow Ground)
Winter wheat .....	19.8	9.0	.2	0	22
Spring Wheat .....	14.8	12.1	1.5	10.1	12.1
Winter Rye .....	41.6	14.1	4.1	7.8	

\*Winter wheat is not dependable; winter rye is the most dependable small grain crop.  
So. Dak. Exp. Sta. Bulletin 161

**MARKET GRADES RYE**

No. 1—Shall be sound, plump and well cleaned and weigh not less than 56 pounds to the measured bushel.

No. 2—Shall be sound, reasonably clean, reasonably free from other grains and weigh not less than 54 pounds to the measured bushel.

No. 3—Shall be rye that is slightly damaged or from any cause unfit for No. 2.

Sample Grade shall include all rye in a heating condition, too musty or too damp to be safe for warehousing, or that is badly bin burnt or fire burnt, badly damaged, exceedingly dirty, containing live weevils or otherwise unfit for storage.

Dockage—This includes any foreign material which can readily be removed from the rye by use of appropriate cleaning devices. The quantity of dockage shall be calculated in terms of percentage based on the total weight of the grain including the dockage. The percentage of dockage when so calculated, when equal to 1% or more, shall be stated in terms of whole per cent and when less than 1% shall not be stated. The percentage of dockage, so determined and stated, shall be added to the grade designation.

# **FLAX VARIETIES AND THEIR ACRE YIELD IN SOUTH DAKOTA**

Varieties	Higmore	Belle Fourche Exp. Farm		Cottonwood 1913-1915	Eureka 1913-1915
		Dry Land 1912-1915	Irrigated 1912-1915		
Russian (N. D. No. 155) .....	7.1	9.2	10.4		
Select Russian (N. D. No. 1215) .....		10.2			
Resistant (N. D. No. 52) .....	9.2		9.0		
Primost (Minn. No. 25) .....	6.2	8.3	10.2	3.9	10.1

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**MARKET GRADE FLAXSEED**

No. 1—Northwestern Flaxseed—Shall be mature, sound dry and sweet, shall be northern grown, and shall weigh not less than 51 pounds to the measured bushel, shall contain not more than 12.5 per cent of damaged seed.

No. 1—Flaxseed—Shall be sound, dry and free from mustiness, shall be northern grown, shall weigh not less than: 49 pounds to the measured bushel, shall contain not more than 20 per cent of damaged seed.

No. 2 Flaxseed—Shall weigh not less than 47 pounds to the measured bushel, may be bin burnt, immature, field damaged or musty, and yet not to a degree to be unfit for storage.

Sample Grade—Shall be flaxseed which does not come within the requirements of the above grades, or that is damp, warm, moldy, fire burnt, very musty or otherwise unfit for storage.

Test weight of flax should be made after it has been cleaned and the amount of foul seed or dockage determined.

# CLASSIFICATION ALFALFA PLANTS AND VARIETIES

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Species	Varieties	Plant Characteristics			
		Growth	Leaves	Flowers	Pods
Medicago sativa	Baltic Common Irrigated Non-Irrigated Grimm Turkestan Imported strains	Upright	Ovate-oblong and toothed	Born on axis; blue and purple color	Twisted spirally
Medicago falcata	Siberian as Irkutsk Semipalatinsk Russian as Kharkov Orenburg	Upright to procumbent. Endures dry cold climates and severe wind sweep	Variations	Yellow and part yellow in color	Sickle shaped
Medicago media	Cossack Cherno North Sweden French	Hybrids between M. sativa and M. falcata. Endures cold dry climates		Varied in color	

Medicago ruthenica	Gobi-desert	Spreading Endures cold and severe wind sweep	Small, narrow and abundant		Flat and oval containing as a rule not over 4 seeds.
Medicago platycarpa	Siberian No. 73	Hard, smooth and almost trailing stems Endures ex- treme cold		Yellow in color	Flat

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**RELATIVE YIELDS OF HAY OF ALFALFA VARIETIES**  
Pounds field cured hay per acre. 1913-15

Variety	Brookings	Highmore	Cottonwood	Eureka	Average
Vale S. D. 22 .....	3180	2213	2365	2502	2565
Grimm S. D. 162 .....	2917	2470	2260	2481	2532
Turkestan S. D. 240 .....	3117	2278	2555	2159	2527

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**SORGHUMS****Classification:**

Sudan grass is best for hay.  
Amber canes are best for coarse fodder.  
Dwarf milo is best for silage.  
Kaoliang is best for grain.

**Method of Seeding:**

Best results obtained where drilled rows  
36 to 42 inches apart and cultivated with  
exception Sudan Grass which yielded more  
in 6 or 12 inch rows where moisture was  
plentiful. Sow one inch deep.

## FACTORS FAVORING SUCCESSFUL STORAGE

1. **Favorable Temperature:** A temperature sufficiently high to protect from frost, and low enough to retard decay; for most vegetables 34 to 38 degrees F. is most favorable. Potatoes can be stored most successfully in a temperature of about 38° F.

2. **Good Ventilation:** Dead air favors the development of decay and the accumulation of moisture on the roof and walls of the store room, and tends to dripping, which is very objectionable. Ventilation can usually be secured by providing the store-room with a number of vents of good size, which may be opened or closed as the condition within demands.

3. **Condition of Crop:** Roots or tubers to be placed in storage should be mature, sound and free from bruises. Carrots, beets and potatoes, especially if wet when dug, are sometimes better stored temporarily under a slight covering in the field, rather than put at once into a permanent store-house during warm or moderate fall weather. This gives them a chance to dry and "sweat." They must not, however, be permitted to freeze. Be careful that vegetable tops are not mixed with the tubers or roots, as these will set up decay.

4. **Air Circulation:** Storing roots or tubers in bins with slatted sides and floor will provide for a free circulation of air about them, and greatly retard decay due to sweating or overheating. Where large quantities must be piled together, place large slatted ventilating shafts up through the piles of vegetables.

5. **Size of Bins:** Do not make the bins large, nor pile the roots or tubers too deeply. Bins 6 or 8 feet by 10 feet are of a good size for root storage. A depth of 4 or 5 feet, with plenty of head room, will give better results than a greater depth.

6. **Racks:** Some vegetables, particularly onions and cabbage, will keep much better if stored in open racks. The rack should be constructed with slatted floor and sides so that the air may circulate freely all around the stored product.

7. **Good Drainage:** The root-house or storage room should be so located that perfect drainage will be provided. Excessive moisture increases the humidity within the storage room.

8. **Cleanliness:** Bacteria and fungi flourish in dirty, damp places, causing heavy losses that might have been avoided. Remove decayed fruit and vegetables at once.



Variety	Acre Yields in Bushels (Six highest yields in each station in black type)			
	Brookings 1914-16	Highmore 1914-16	Cottonwood 1915-16	Eureka 1915-16
Early—				
Acme .....	118.1	103.4	67.8	99.2
Bliss Triumph .....	104.6	88.9		
Early Ohio .....	150.	111.9	51.4	195.5
Early Rose .....	114.2	82.9		
Eureka .....	181.6	141.3	40.2	198.8
Irish Cobbler .....	194.	148.1	46.4	257.
New Queen .....	151.4	134.4	38.5	120.9
Quick Lunch .....	151.5	84.7	35.9	108.4
Six Weeks .....	97.	72.3	55.3	74
Surprise .....	155.4	126.7	40.3	154.
White Harvest .....	148.6	126.1	72.2*	102.
West Ohio .....	193.	87.2	53.9	181.2
Late—				
Astonisher .....	166.			160.
Blue Victor .....	159.5	174.4	55.9	181.7
Bugless .....	227.4	134.6	42.8	243.9
Burbank .....	172.	92.8		127.2
Carmen No. 3 .....	169.5	139.8		98.4
Golden Russet .....	179.	150.8	35.4	176.
Late Rose .....	214.1	49.2	34.2	
Livingstone Banner .....	118.3	97.6		129.9
Pearl .....	161.4	91.	40.2	126.
Raleigh .....	202.			213.3
Rural New Yorker .....	149.	121.9		138.2

\*Not recommended for general culture.

S. Dak. Exp. Station Bul. 176.

# **SIZE OF SEED POTATOES PIECES IN RE- LATION TO YIELD**

Tests were made with Early Ohio and Car-  
men No. 3.

Size of seed piece	Yield in bushels per acre	Percentage in- crease over small seed
Small .....	174.7	
Medium (Quarters)	271.7	55.5
Large (Halves) ***	298.5	70.9

S. Dak. Exp. Sta. Bul. 155

## POTATO GRADES

### U. S. No. 1—

Sound potatoes of similar varietal characteristics, practically free from dirt or other foreign matter, frost injury, sunburn, second growth, **growth cracks**, cuts, scab, blight, soft rot, dry rot, and damage caused by disease, insects, or mechanical **or other** means.

- b The diameter of potatoes of the round varieties shall be not less than 1 7-8 inches, and of potatoes of the long varieties 1 3-4 inches.

### U. S. No. 2—

Potatoes of similar varietal characteristics, practically free from frost injury and **soft rot**, and free from serious damage caused by sunburn, cuts, scab, blight, dry rot or other disease, insects, or mechanical **or other** means.

- b The diameter of potatoes in this grade shall not be less than 1 1-2 inches.

In order to allow for variations incident to commercial grading and handling of the above grades, five percent by weight of any lot may be under the prescribed size, and, in addition, **six** percent by weight of any such lot may be below the remaining requirements of this grade; but not more than one-third of such **six** percent, that is to say, not more than two percent by weight of the entire lot, may have the flesh injured by soft rot.—(d).

### Explanation of Grade Requirements

a. "Practically free" means that the appearance shall not be injured to an extent apparent upon casual examination **of the lot**, and that any damage from the causes mentioned can be removed by the ordinary processes of paring without appreciable increase in waste over that which would occur if the potato were perfect. Loss of the outer skin (epidermis) only shall not be considered as an injury to the appearance.

b. "Diameter" means the greatest dimension at right angles to the longitudinal axis.

c. "Free from serious damage" means that any damage from the causes mentioned can be removed by the ordinary processes of paring without increase in waste of more than ten percent by weight over that which would occur if the potato were perfect.

d. "Soft rot" means a soft, mushy condition of the tissues, from whatever cause.

## OBNOXIOUS WEEDS AND THEIR ERADICATION

### Barberry

Perennial. The barberry is the only plant that can be infected with the rust when it is in the black fall and winter condition. In the spring the rust will spread from the barberry to the grains or grasses. The harmful barberries have spiny edged leaves; red oval berries in clusters, spines usually three in one place, a bright yellow color under the bark and are usually four to six inches high. The Japanese barberry is not susceptible to black stem rust and should not be destroyed.

South Dakota has a barberry law which provides for the destruction of all harmful barberries. It also provides that the owner shall not be paid for the barberries or the expense of destroying them. The State Entomologist is the police authority in this law. Thirty days is given for the destruction of the barberries after which the owner may be charged with the expense of destroying the barberries and may be fined from \$25 to \$500.

### Canada 'Thistle—

Perennial. Propagated by seeds and deep root stocks. The persistent starvation of roots, the use of the hoe, cultivated crops and early fall plowing may be effective under varying conditions.

### Cocklebur—

Annual. The common practice of eradication in cultivated fields is that of pulling the weed. Stubble land, infested, should be plowed immediately after harvest. If this cannot be done at once, clip the stubble to prevent the cockleburs from producing seed. If none of the plants are permitted to seed, the pest will eventually die out.

### Morning Glory or Field Bindweed—

Perennial. Pasturing with sheep weakens seed so that eradication is easy. In small areas of infestation deep plowing or turning on the hogs should be practiced. Use smother crop as alfalfa which requires frequent cutting. The seed is most frequently found in grain.

**Quack Grass—**

Perennial. Plow in late June. Replow or disk to keep ground black until late September. Seed 5 pecks winter rye. After removing rye, disk stubble and sow 2 pecks millet or early fall plow for corn the next season. If preferred, sow sweet clover to thicken stand and utilize as pasture for a year or more before trying to eradicate it. Sheep and hogs weaken it.

**Russian Thistle—**

Annual. Thorough cultivation, rotation of crops and neighborhood cooperation.

**Wild Mustard—**

Annual. Use the fanning mill—sow clean seed of small grain. Wild mustard is not troublesome over great areas where suitable crop rotations are practiced, especially employing a well cultivated crop on land at least one year in four. Clean seed and clean cultivation over wide areas will drive it out.

**Wild Oats—**

Annual. Employ the most modern cleaning machinery, and sow clean seed of small grain. A sheet of celluloid carefully adjusted over one of the riddles of certain makes of fanning mills will help hold wild oat kernels flat and clean a greater amount out of the wheat. Employ rotations with a clean cultivated crop such as corn, or potatoes, at least one year in four. Wild oats will be driven out with persistent use of clean seed and well adapted rotations.

## FEATURES OF THE S. D. WEED LAW

### 1. Destruction of Weeds.

Every person and every corporation shall destroy on all lands which he or it may own or occupy, all weeds, plants, and shrubs of the kind known as Wild Sunflower, Canada Thistle, Cockle Burr, Burdock, Barberry\*, Creeping Jennie and Quitch or Quack Grass in such time of the year as will prevent the seeding and spread of such weeds, plants and shrubs. Quitch grass or Quack grass and other noxious weeds, plants or shrubs which propagate from the roots, shall be destroyed by the cultivation of the soil in a manner to uproot the same, and the roots thereof shall be gathered and burned.

### 2. Annual Notice of Weed Eradication—

In April each year the County Auditor shall publish notice in the official newspapers of the county that the weed law will be strictly enforced.

### 3. Enforcement of Weed Law—

It shall be the duty of the township board of supervisors or in case of unorganized townships the duty of the county commissioners to see that the requirements are complied with. If the foregoing provisions are not complied with, a ten days written notice must be given the owner or occupant to the effect that if he does not destroy the weeds within time designated, such weeds will be destroyed by such board at expense of owner of land. In case of unoccupied land, notice may be given by posting in three public places upon the land.

### 4. Hiring the Destruction of the Weeds—

Provision is made for the township boards or county commissioners hiring persons to destroy the noxious weeds at such wages as may be agreed upon and the payment for same made from the general fund of the township or county.

### 5. Paying for the Destruction of Weeds—

The township board or the county commissioners, as the case may be, must keep accurate records of moneys expended, description of land involved, and file same with register of deeds. The owner or lessee shall be liable for all expenses incurred, as expense becomes a lien on the property.

\*The common barberry was further legislated against in 1919. It is unlawful to permit its existence on any premises or to sell or offer the same for sale.

## **7. ENTOMOLOGY**

Suggestions concerning spray  
material

### **7.1 Insects**

#### **7.11 Field Crops**

Most common insects and control  
methods

#### **7.12 Orchard and Garden Crops**

Most common insects and control  
methods

### **7.2 Bees**

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## SUGGESTIONS CONCERNING SPRAY MATERIALS

1. It is advisable to use commercially prepared spray materials.

2. Spraying is a form of crop insurance and not a "cure all."

### 3. **Arsenate of Lead—**

Before mixing arsenate of lead powder into a spray solution, it should first be diluted with water to about the consistency of cream. For insect poisoning it should be used at the rate of  $1\frac{1}{2}$  pounds to 50 gallons water or spray solution. 2 table-spoonsful to 1 gallon water. It is less liable than Paris green to harm the foliage.

### 4. **Paris Green—**

May be applied dry or sprayed as liquid. If used dry, make dust mixture by adding one pound of the poison to 20 lbs common flour or slacked lime and apply when plants are damp from dew or rain. When using the poison as a spray use 1 lb. to 100 gallons of water.  $\frac{1}{2}$  teaspoonful to one gallon of water. Never combine Paris green with lime sulphur.

### 5. **Hellebore—**

A powder which kills both as a poison and by contact with insects. Especially useful in combating worms while fruit is ripening. Use only strictly fresh powder and dust on after having mixed it with three or four times its weight of flour.

6. **Kerosene Emulsion—**(for scale and all sucking insects.)

Kerosene ..... 2 gallons  
Rain water ..... 1 gallon  
Soap .....  $\frac{1}{2}$  pound

Dissolve the soap in water by boiling; take from the fire and while hot turn it into the kerosene and churn briskly for 5 minutes. Before using dilute with 6 to 9 parts of water.

### 7. **Bordeaux Mixture—**

The general formula of 4-4-50 means 4 pounds copper sulphate, 4 lbs. stone lime and 50 gals. water. For treating potatoes for blight it should be 5-5-50. Bordeaux should be made fresh for each spray. Dissolve the copper sulphate in hot water and dilute the solution to 25 gallons. (Don't use iron or tin vessels as it corrodes the metal). Slack the lime and add enough water to it to make 25 gallons. Then pour the two diluted solutions through a strainer simultaneously. **Do not mix the two ingredients together in concentrated form or more than will be used at the time.** For a gallon of spray solution use  $1\frac{1}{2}$  ounces each of copper sulphate and stone lime and 1 gallon water and prepare as suggested.



## FIELD CROP INSECTS AND THEIR CONTROL

(Most Common)

### Army Worms—

- a. Crop Attacked: Cereals, meadows, garden truck.
- b. Character of Injury: Prefers to feed in grass or small grain growing in low moist part of field. If worms are abundant, they migrate. Feeding and migration usually takes place at night. Most serious injury in July and August.
- c. Methods of Control:
  1. Watch rank growing grass or grain in rather low areas for outbreaks of army worms and spray or burn such areas before worms leave.
  2. When worms are migrating use:
    - (a) Poisoned bait. (c) Spray
    - (b) Trenches (d) Irrigation ditches

### Blister Beetles—

- a. Crop Attacked: Alfalfa, potatoes, beans, etc.
- b. Character of Injury: Destruction of foliage.
- c. Methods of Control:
  1. Cut alfalfa when beetles are abundant.
  2. Spray beans and potatoes with lead arsenate.

### Corn Ear Worm—

- a. Crops Attacked: Corn of all kinds.
- b. Character of Injury: Usually feed upon kernels or ears of corn. Worst injury due to moulds that follow work of ear worm, thereby causing illness and at times death in stock to which such corn is fed.
- c. Methods of Control:
  1. Fall plow.
  2. Dust silk of corn at intervals of 3 to 4 days with lead arsenate powder; this is practical only on show corn, breeding corn and seed corn.

### Corn Root Aphis—

- a. Crop Attacked: Corn.
- b. Character of Injury: Principal damage done to small corn plants. Suck nourishment from roots of plant causing dwarfing of plants with yellowing or reddening of leaves.
- c. Methods of Control:
  1. Rotate so that corn will not grow more than 1 year or at least not more than 2 years in succession on same field.

2. Practice late fall plowing to depth of 6 inches and deep spring disking.
3. Obtain co-operation amongst neighbors.

#### **Cutworms—**

- a. Crops Attacked: Corn, small grain, garden truck, etc.
- b. Character of Injury: Cuts off stems of plants close to surface of ground or trifle beneath it in spring. Feed principally at night and remain concealed in daytime under clods of earth or rubbish or buried in the soil from one-half to two inches near the injury caused the preceding night.
- c. Methods of Control:
  1. Plow land liable to harbor cutworms (such as grass land, timothy, weedy fields) as early as possible. Plowing in August preferred. If early plowing is impossible, then late plow and follow by spring disking.
  2. Use poison bait.
  3. If cutworms are migrating like army worms, use army worm control.
  4. Use poultry, turkeys, etc.
  5. On land liable to harbor cutworms, put in crops not subject to cutworm injury.
  6. Protect garden plants with tin cans or cylinders of paper.

#### **Grasshoppers—**

- a. Crops Attacked: Alfalfa, corn, small grain, potatoes.
- b. Character of Injury: Destroy entire plant at times especially if insects are present in large numbers.
- c. Methods of Control:
  1. Destroy eggs by plowing, disking and harrowing.
  2. Destroy hoppers with poison bait (very effective).
  3. Destroy hoppers with hopper catchers.
  4. Destroy hoppers with poultry and turkeys.
  5. Destroy hoppers by spraying with lead arsenate.

#### **Poison Bait Formula**

Bran .....25 lbs.  
 White Arsenic, crude.....1 lb.  
 Amyl acetate ..... $\frac{3}{4}$  oz.  
 Cheap molasses .....2 qts.  
 Water ..... $3\frac{1}{2}$  gals.  
 Sufficient for 5 to 10 acres.  
 Broad cast in early morning.

## 7.11

### Potato Beetle—

- a. Crop Attacked: Potato.
- b. Character of Injury: Larva feed upon leaves.
- c. Method of Control: Spray with lead arsenate or Paris green and lime, or dust with powdered lead arsenate.

### Wheat Stem Maggot—

- a. Crops Attacked: Wheat, rye, barley.
- b. Character of Injury: Destruction of stem in small plants, and girding of large plants causing blighting of head.
- c. Methods of Control: No satisfactory remedy as yet.

### Wireworms—

- a. Crops Attacked: Corn, small grain crops, potatoes, etc.
- b. Character of Injury: Injury is done in early spring, being confined to the seed, the roots or stem underneath surface of soil.
- c. Methods of Control:
  1. If hay land is to be planted to corn (and this is not good practice from an entomological standpoint), plow after hay is cut and disk several times during remainder of summer.
  2. Land in corn attacked by wireworms should be deeply cultivated even at expense of cutting surface roots.
  3. If wireworms are in wheat field that is to be put into corn next year, plow as soon as wheat is harvested and disk.
  4. Follow sod or hay land by crop not attacked by wireworms.
  5. Poorly drained or heavy soils infested with wireworms should be drained.
  6. Sow more seed than usual.

### White Grubs—

- a. Crops Attacked: Corn, potatoes, garden crops.
- b. Character of Injury: These are the larvae of May beetles feeding upon roots and underground stems. If abundant, may do serious damage.
- c. Methods of Control:
  1. Fall plow preferably in October or before and harrow. If insect is in beetle stage, fall plow at any time.
  2. Run hogs before October 15, in sod or hay land which is to be broken up and poultry after plowing, if possible.
  3. Rotate crops and do not put corn or potatoes in sod or hay land newly

broken which contains many white grubs.

**Grain Weevil—**

- a. Crops Attacked: Infests stored small grains.
- b. Character of Injury: Greater part of injury caused mostly by the immature stages or "grubs" of the beetle. Their work is concealed within the kernel.
- c. Methods of Control:

Fumigation with carbon bisulphide, using 1 pound to each 100 cubic feet or 100 bushels grain. Bins must be tight and every precaution against fire must be observed as the gas is inflammable. Thoroughly clean bins before storing new crop of grain.

Insects	Crops Attacked	Character of Injury	Control
<b>Orchard</b> Aphis	All fruit trees	Cluster on under side of leaf causing curling. Sucking insect.	Spray with nicotine sulphate or kerosene emulsion solution as leaf buds show green and if necessary later before leaves curl.
Caterpillars	Orchards and small fruits	Eating leaves.	Spray with lead arsenate.
Codling Moth	Apples	Larva eats cavities within fruit.	Spray with lead arsenate when petals fall and repeat 3 weeks later.
Curculio	Apple, plum, and grape	Crescent shaped puncture made in fruit when eggs are laid. Larva feeds in fruit.	Spray with lead arsenate when leaf buds open in the spring and follow spray schedule.
Currant Worms	Currants and gooseberries	Defoliates bushes	Spray with lead arsenate. If fruit is coloring, dust bushes with hellebore.
Plum Borer	Plums and cherries	Bores into trunk and branches	Cut out borers with a knife in fall and again in spring.
Plum web-spinning sawfly	Plum	Spinning of web, eating of leaves by larva	Spray with lead arsenate.

Scale Insects	Fruit, shade and ornamental trees	Appear on twigs and when abundant on leaves and fruit. Cause weakening and death.	Spray trees when dormant with lime sulphur and with black leaf 40 as soon as eggs hatch.
<b>Garden Crops</b> Cabbage Worm	Cabbage and other crucifers	Feeds on heads.	Spray with paris green and soap or dust with paris green and lime or powdered lead arsenate. Spray when moths flutter about the cabbage.
Cucumber Beetle	Cucumbers, melons	Eating of foliage.	Plant excess seed; cover plants with netting or dust or spray with Bordeaux and lead arsenate every week as long as necessary.
Flea Beetle	Potatoes, cabbage, radishes, cucumbers, beets, etc.	Eating of foliage.	Spray with Bordeaux mixture.
Plant Lice	Garden truck	Weakening of plants by sucking.	Spray with nicotine sulphate or kerosene emulsion before leaves curl.
Potato Beetle	Potato	Eating of foliage by larva.	Spray with lead arsenate or Paris green and lime or dust with powdered lead arsenate. Repeat every two weeks, if necessary.

## **8. RODENT PESTS**

### **8.1 Control Measures**

Pocket gophers  
Ground squirrels  
Prairie dogs

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## CONTROL MEASURES

### **Pocket Gophers:**

**Trapping**—Where these animals are not too abundant trapping is very effective. A No. 0 steel trap may be set by digging down a few feet behind a newly made mound and placing the trap flush with the bottom of the burrow. The trap should be partially covered with fine dirt, care being taken not to hinder the action of the trap. Even better success will be had in trapping with one of the special traps for these animals commonly on the market.

**Poisoning**—Poisoning by use of baits of sweet potato or of parsnips placed in their underground runways has proven the best method on large fields and for cooperative work on adjacent farms.

The baits should be cut about one inch long and one-half inch square, and washed and drained. From a pepper box slowly sift one-eighth ounce of powdered strychnine (alkaloid) and one-tenth of this quantity of saccharine (ground together in a mortar) over about four quarts of the dampened baits, stirring to distribute the poison evenly.

The runways, which are usually four to eight inches beneath the surface, can be located by means of a probe made of any strong handle an inch in diameter and thirty-six inches long. One end should be bluntly pointed. Into the other should be fitted a piece of three-eighths inch iron rod, protruding about twelve inches, and bluntly pointed. A foot rest aids in probing in hard soils. By forcing down the iron rod near the gopher working, a foot or two back of fresh mounds, the open tunnel can be felt as the point breaks into it. The blunt end of the instrument is then used carefully to enlarge the hole, a bait or two is dropped into the run, and the probe hole closed.

### **Ground Squirrels** (All South Dakota species):

The most successful method of controlling ground squirrels is by means of a poisoned oat bait.

Mix one tablespoonful of gloss starch in one-half teacup of cold water, and stir into one-half pint of boiling water to make a thin, clear paste. Mix one ounce of powdered strychnine (alkaloid) with one ounce of baking soda (bicarbonate), and stir with the starch to a smooth, creamy



## 8.2

mass free of lumps. Stir in one-fourth pint of heavy corn sirup and one tablespoonful of glycerine, and finally one scant teaspoonful of accharine. Apply to eighteen quarts of oats and mix thoroughly to coat each kernel.

Each quart of poisoned grain is sufficient for forty to sixty baits. This quantity, scattered (one teaspoonful to a place) along squirrel trails, or on clean, hard surfaces near the holes, will not endanger stock.

### **Prairie dogs:**

Poisoning by means of a poisoned oat bait is recommended as the best method. The formula is as follows:

Dry gloss starch .....	
.....1 heaping tablespoonful	
Strychnine (alkaloid) powdered	
.....1 ounce	
Baking soda.....	1 ounce
Corn sirup.....	$\frac{1}{4}$ pint
Glycerine.....	1 tablespoonful
Saccharine.....	1-10 ounce
Clean oats.....	13 quarts

Dissolve the dry gloss starch in a little cold water and add to three-fourths pint of hot water. Boil, stirring constantly until a thin clear paste is formed. Mix together the powdered strychnine (alkaloid) and baking soda, sift into the hot starch paste, and stir thoroughly to a smooth creamy mass. Add the corn sirup, glycerine, and saccharine and stir thoroughly. Pour this mixture over the oats and mix thoroughly so that each grain is evenly coated. (It is important that only the best grade of thoroughly clean oats be used, as chaff absorbs and wastes much valuable strychnine, and poisoned weed seeds imperil useful bird life.)

Each quart of prepared grain is sufficient to treat about forty prairie dog holes. This quantity should be sparingly scattered on clean hard ground near each hole. Do not place the bait on loose or dusty ground or in the holes. With reasonable care in scattering the bait, live stock on the open range will not be endangered. The poison is effective at any time the prairie dogs are active.

### **CAUTION**

All utensils used in the preparation of poisons and all poison containers should be kept **PLAINLY LABELED** and **OUT OF REACH** of children, irresponsible persons, and live stock.

## **9. CROP DISEASES**

Solutions for seed treatment

### **9.1 Field Crops**

Common diseases and control

### **9.2 Orchards and Small Fruits**

Common diseases and control

### **9.3 Garden Crops**

Common diseases and control

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## SOLUTIONS FOR SEED TREATMENT

### GRAIN:

**Formaldehyde Treatment**—For loose and covered smut of oats and covered smut of wheat and barley.

Consisting of 1 pint formalin (40 per cent formaldehyde) to 40 gallons of water. Soak the seed in this for 10 minutes, stirring thoroughly or sprinkling seed with solution after spreading on a clean floor. Shovel the grain over several times during the sprinkling so all seed is moistened, shovel into a pile, cover with sacks for 2 to 5 hours and spread out to dry or sow at once. 40 gallons solution will treat from 40 to 50 bushels seed.

**Hot Water Treatment**—For loose smut of wheat and barley.

Extremely difficult to apply. Soak grain in cold water for 4 hours prior to treatment. Then soak it for 10 minutes in water at 129 degrees Fahrenheit. Spread out to dry. It is not advisable to treat much seed in this way without a great deal of experience, but enough could be treated for a few acres for a seed plot to produce smut free seed. Use gunny sacks for dipping.

All seed grain should be thoroughly cleaned before treating.

### POTATOES:

**Corrosive sublimate:** Dissolve 4 ounces corrosive sublimate in 30 gallons water. Treat seed tubers for 1½ hours. Solution must not be used in metallic vessels. Tubers should be uncut when soaked. Solution can be used 4 times, but addition of 1 ounce corrosive sublimate to 30 gallons solution after each batch is soaked, keeps the treating solution at proper strength.

**Formaldehyde:** Consists of 1 pint formalin (40 per cent formaldehyde) to 30 gallons water. Soak seed tubers for 2 hours and spread out on clean surface to dry. Tubers should be treated whole. This solution is good until all used up.

# COMMON FIELD CROP DISEASES

9.1

Crop	Diseases	Characteristics	Control or Prevention
Alfalfa	Bacterial Disease	Leaves wilt and turn yellow; stems become coppery brown. Roots rot at center of crown.	Use hardiest varieties. Mow first crop early.
	Leaf Spot	Small round black spots on leaves; usually not serious.	Rotation. Cutting hay crop earlier.
Barley	Leaf Rust—	Orange red spots on leaves; usually not serious.	Early seeding.
	Stem	Dark brown spots, rather long and narrow on stems and leaves.	Early seeding and complete destruction of common barley in the community.
	Loose Smut—	Heads blackened and destroyed leaving a bare rachis.	Hot water seed treatment.
	Covered	Black smut masses form in place of grain covered by grayish membrane. No odor as in covered smut of wheat.	Formaldehyde seed treatment
	Stripe Disease	Long brown stripes on leaves; weak stem and shriveled head.	Soak seed 30 minutes in formaldehyde solution, strength 1 pint to 30 gal. water.

Beans	Anthracnose	Brown spots on pods and seedlings.	Seed selection and spraying vines with Bordeaux mixture 5-5-50.
	Blight	Watery brown patches on leaves at first; pods show watery spots and may rot. Diseased leaves curl and look scorched.	Seed selection, crop rotation and spraying vines with Bordeaux 5-5-50.
	Rust	Rusty brown or black spots on under side of leaf; plants sometimes turn yellow. Not usually serious.	Destruction of diseased tops and pods.
Corn	Smut	Black smut masses on stalks, ears, tassels or leaves.	No practical method.
	Root and Ear rot	Cracked kernels, weak and barren stalks, and rotted roots pinkish in color.	Crop rotation: avoid corn and wheat alternating. Field selection of seed from sturdy stalks.
Emmer	Smut	Dark masses form in place of grain.	Formaldehyde seed treatment. <b>9.1</b>

## COMMON FIELD CROP DISEASES (Continued)

9.1

Crop	Disease	Characteristics	Control or Prevention
Flax	Canker	Small cankers form near base of stalk eating part way through. Stalks break over. Loss often 15 to 30 per cent.	Plant flax in rows north and south so small plants shade each other.
	Rust	Rusty brown streaks mostly on stems. Usually not serious.	Early seeding.
	Wilt	Wilting and yellowing of plants at any stage of growth.	Treat with one pint of formaldehyde to 30 gallons of water.
Millet	Smut	Dark smut masses form in heads.	Formaldehyde seed treatment.
Oats	Leaf Rust	Short orange colored streaks on leaves.	Early seeding and use of early maturing varieties.
	Stem Rust	Rusty brown streaks becoming black as season advances formed on leaves and stem.	Early seeding and use of early maturing varieties.

	Loose Smut	Heads mainly destroyed leaving frame work dusty black.	Formaldehyde seed treatment.
	Covered Smut	Smut masses form in place of kernels, chaff dies.	Formaldehyde seed treatment.
	Spikelet Sterility	Heads turn white and produce no seed.	Treatment unknown.
	Blackleg	Stem blackened and rotted at base when plants are 6 to 8 inches high; some leaves salmon yellow; black rot of tubers.	Seed selection and formaldehyde seed treatment.
	Early Blight	Circular brown spots with concentric ridges on leaves; plants die prematurely due to spots coalescing.	Spray with Bordeaux 5-5-50 when plants are 6 ins. high and repeat every 2 weeks if necessary.
Potatoes	Late Blight	Irregular brown spots on leaves; slight moldiness on lower parts of stems; dry rot near surfaces of tubers, sometimes developing soft rot especially in storage.	Spray with Bordeaux 5-5-50 when plants are 6 ins. high and repeat every 2 weeks if necessary.
	Fusarium wilt	Sudden yellowing and wilting of plant and dry rot of tubers.	Crop rotation, seed selection.

Crop	Diseases	Characteristics	Control or Prevention
Potatoes (continued)	Rhizoctonia	Small brownish black specks on tubers may form aerial tubers and many small tubers below soil surface.	Corrosive sublimate and formaldehyde seed treatment. Spray with 5-5-50 Bordeaux mixture.
	Rot	Dry brown odorless rot, cavity in center lined with fungus.	Seed selection and rotation.
	Powdery dry		Throw out all injured tubers at storing time. Disinfect
	Late blight		bins with 1 to 50 solution of
	Stem ends	Wet rot in bin. See Late	formaldehyde.
	rot	Blight above.	
	Scab	Scab spots on surface of tuber or on surface of injuries.	Seed treatment with formaldehyde or corrosive sublimate.
	Tipburn	Brownish appearance on leaf tips. Due to leaf hopper injury.	Spray with Bordeaux mixture.
	Powdery scab	Powdery brown mass like puff ball forms in tuber.	Quarantine, destruction of diseased plants and long rotation.
	Wart disease	Ugly warts form on tubers. Not found in S. D. to date. Be on guard against it.	Quarantine, destruction of diseased plants and long rotation.



Rye	Ergot	Gray masses, several times size of rye grain forms on heads.	Seed selection, crop rotation, use of dry seed at least one year old. Separate ergot from seed by floating in salt brine.
	Rust	Rusty brown streaks on stems or leaves, similar to wheat stem rust. Seldom serious.	No treatment.
	Smut	Stems distorted somewhat enlarged with black powdery injuries.	Formaldehyde seed treatment. Crop rotation.
Sorghum	Blight	Reddish spots on stems and leaves.	No treatment.
	Head Smut	Dark smut masses form in head. Not reported in S. D. to date.	No treatment.
	Kernel Smut	Smut mass forms in place of kernels and are easily broken up.	Formaldehyde seed treatment.
Wheat	Black end	End of kernel blackened.	Rotation and hand selected seed for seed plot. 9.1

## COMMON FIELD CROP DISEASES (Continued)

9.1

Crop	Diseases	Characteristics	Control or Prevention
Wheat (continued)	Ergot	Grayish masses form instead of grain.	Same as for ergot in rye.
	Leaf Rust	Orange red spots, short and rectangular on leaves only.	Early seeding and use of early and resistant varieties such as (Acme) wheat.
	Stem Rust	Rusty brown streaks on leaves and stems turning black as season advances.	Same prevention as for leaf rust and destroy all common barberry bushes in community.
	Stripe	Long yellow stripes or oblong spots on leaves. Reported but once in S. D. to date.	Quarantine.
	Loose Smut	Head destroyed except central rachis which remains dusty with black smut.	Hot water seed treatment.
	Stinking Smut	Smut masses form in place of grain; chaff remains green but heads appear twisted. Decided odor.	Formaldehyde seed treatment.
	Scab	Mouldy, salmon pink mass forms at base of chaff, attacks kernels, shrivels the slightly affected and destroys those severely affected,	Use of thoroughly graded seed and crop rotation. Avoid corn and wheat alternating.

## MOST COMMON DISEASES ORCHARD AND SMALL FRUITS

9.2

Crop	Disease	Character of Injury	Prevention or Control
All fruit trees	Crown gall	Large wart or tumor like growths at junction of root and stem on nursery stock. Weakens tree.	Destroy all affected trees.
Apple	Blight	Wilting, browning of leaves which do not fall.	Prune out all affected portions at once and burn.
	Black rot	Cankers on limbs and black rot of fruit.	Cut out cankers and spray with fungicide.
	Blotch	Cankers on limbs and black rot of fruit.	Cut out cankers and spray with fungicide.
	Rust	Rust on leaves and fruit.	Destroy all cedar trees in vicinity.
	Scab	Brown spots on leaves and scab on fruit.	See spray schedule.

Crop	Disease	Character of Injury	Prevention or Control
Plum	Black knot	Black knots on limbs.	Cut out and burn.
	Brown rot	Soft rot of fruit.	See spray schedule.
	Leaf spot	Brown spots on leaves.	See spray schedule.
	Plum pocket	Fruit becomes enlarged hal-low and deformed soon after blossoming period.	Severe pruning of diseased twigs and spraying with lime sulphur as blossoms show pink.
Cherry	Black knot	Same as plum.	Same as plum.
	Brown rot		
	Leaf spot		
Currant and Gooseberry	Anthracnose	Spot disease attacking leaves, young canes and petioles of leaves.	See spray calendar.
	Powdery Mildew	Leaves and fruit affected with grayish to brownish velvety growth.	See spray calendar.

Raspberry	Anthracnose	Spots on canes.	Cut affected canes clear down to root. See spray calendar.
	Cane blight	Wilting of young canes.	Cut out and burn all affected canes.
	Leaf spot	Brownish spots on leaves.	See spray calendar.
Strawberry	Leaf spot	Brown spots on leaves with affected area falling out.	Spray with Bordeaux as soon as growth starts, then new growth after crop is harvested and repeat 3 weeks later.
	Powdery Mildew	Same as gooseberry.	See spray calendar.

Crop	Disease	Character of Injury	Prevention or Control
Bean	(See field crop diseases)		
Beet	Leaf spot	Brownish spots on leaves	Spray with Boreaux mixture.
Cabbage and Califlower	Black rot	Black soft rot of roots	Destruction of diseased plants and rotation of gar- den crops.
	Club root*	Wilting of plants during day and malformations on roots.	Destruction of diseased plants and rotation of gar- den crops.
Celery	Blight	Irregular brown spots on leaves and stems. Also af- fects carrots.	Spray with Bordeaux mix- ture when plants are small.
	Rust	Reddish rust on leaves and stem.	Spray as for blight.

Cucumbers, Melons, etc.	Downy mildew	leaves, leaves dying.	Spray with Bordeaux.
		Angular brown spots on	
	Mosaic disease	Stunting of fruit.	Destroy affected plants. Use good seed.
	Wilt	Sudden wilting of plants.	Keep plants vigorous. Spray with Bordeaux and arsenate of lead.
Pea	Mildew	White coating on leaves.	Spray with Bordeaux.
Potato	(See field crop diseases)		
Tomato	Leaf blight	Similar to late blight potatoes.	Spray with Bordeaux at time of setting of plant.
	Leaf spot	Small dark brown spots on leaves.	Spray with Bordeaux.
	Blossom end rot	Brownish rot on blossom end of fruit.	Proper cultural conditions.

\*Also affects radishes, turnips and rutabagas.

## **10. HORTICULTURE**

Planting table for orchard and  
small fruits

### **10.1 Orchard Fruits**

Recommended varieties for South Da-  
kota

Spray calendar

Pruning of fruit trees

### **10.2 Small Fruits**

Recommended varieties for South Da-  
kota

Spray calendar

Pruning of small fruits

### **10.3 Gardening**

Suggested varieties of garden crops for  
South Dakota

Planting table

Hor



### DISTANCES APART FOR PLANTING FRUIT TREES OR BUSHES

Kind of Fruit		Time required to bear	Longevity under high culture
Apples	30'x40'	3 yrs. Good crop in 10 yrs.	25-40 years
Crabs	10'x10'	3 yrs. Good crop in 10 yrs.	25-40 years
Plum	16'x20'	3 yrs. Good crop 5 to 6 yrs.	20-25 years
Currant	4'x 5'	1 yr. Good crop in 2 to 3 yrs.	20 years
Gooseberry	4'x 5'	1 yr. Good crop in 2 to 3 yrs.	20 years
Raspberry	3'x 6'	1 yr. Good crop in 2 to 3 yrs.	8-12 years
Strawberry	1'x 3'	1 yr. Heaviest crop gener-   ally in 2 years.	3 years

# RECOMMENDED VARIETIES ORCHARD FRUITS FOR SOUTH DAKOTA DISTRICTS

Fruits and Varieties		Districts			
		Northern	Central	Southern	Black Hills
<b>Apples:</b>					
Early Summer—	Fall—				
1. Duchess	4. Anisim				
2. Lowland Rasp- berry	5. Dudley	1-2-3	All	All	All
3. Yellow Trans- parent	6. Iowa Beauty	4-7-8			
	7. Longfield	9-10			
	8. Okabena				
	9. Patten Greening				
	10. Wealthy				
<hr/>					
Winter—					
Early—	Late—				
11. Hibernial	17. Northwestern	11-17-	11-12-	All	All
12. Iowa Blush	Greening	18-	13-17-		
13. Milwaukee	18. Malinda		18-19-		
14. Salome	19. McIntosh Red		20-21		
15. Sheriff	20. Plum Cider				
16. Scott Winter	21. Wolf River				
<hr/>					
<b>Cherries:</b>					
1. Early Richmond	4. Homer				
2. English Morello	5. Wragg	None	None	All	1-3-5
3. Large Montmor- ency					

### **All the Following Varieties Adapted to Each District.**

---

#### **Crab Apples:**

##### **Early—**

- 22. Boner Sweet
- 23. Early Straw-  
berry
- 24. Florence
- 25. Martha
- 26. Sweet Russett
- 27. Whitney

##### **Late—**

- 28. Hyslop
- 29. Late Red  
Siberian
- 30. Late Yellow  
Siberian
- 31. Lowland
- 32. Mercer
- 33. Tracundent

#### **Plums:**

- |                  |            |
|------------------|------------|
| 1. Cheney        | 6. Terry   |
| 2. DeSota        | 7. Wastesa |
| 3. Forest Garden | 8. Weaver  |
| 4. Hawkeye       | 9. Wolf    |
| 5. Surprise      | 10. Wyant  |

#### **Hybrid Plums:**

##### **Sandcherry and Japanese Plum Hybrids—**

- |              |             |
|--------------|-------------|
| 1. Cheresota | 4. Sapa     |
| 2. Opata     | 5. Waitampa |
| 3. Sanistoa  |             |

##### **Native Plum and Chinese Apricot Hybrids**

- |           |           |
|-----------|-----------|
| 6. Hanska | 8. Tokata |
| 7. Toka   |           |

##### **Native Plum and Japanese Plum Hybrids—**

- |            |            |
|------------|------------|
| 9. Kohinta | 10. Waneta |
|------------|------------|

##### **Native Plum and Sandcherry Hybrids—**

- 11. Compass
-

## SPRAY CALENDAR

	1st Spray	2nd Spray	3rd Spray	4th Spray
APPLES	Just as the leaf buds break, showing pink.	As soon as the petals have fallen.	Two or three weeks later.	Middle to late July.
Chief enemies controlled	Scale, scab, aphid, bud moth.	Scab, aphid, canker worm. The best preventive against wormy apples.	Codling moth, scab, tent caterpillar, aphid.	Scab, codling moth (second brood) bitter rot, blotch.
Formula 1 Gal. mixture	1 pint lime sulphur. 1 teaspoon Black Leaf 40, 1 teaspoon arsenate of lead. 1 gal. water.	1/5 pint lime sulphur. 1 teaspoon Black Leaf 40. 1 teaspoon arsenate of lead 1 gal. water.	Same as for 2nd spray.	Bordeaux (4-4-50) 1 teaspoon arsenate of lead.
Formula 50 Gal. mixture	5 gal. lime sulphur, 3/8 pint Black Leaf 40, 2 1/2 lbs. arsenate of lead. 45 gals. water.	1 1/4 gal. lime sulphur. 3/8 pint Black Leaf. 2 1/2 lbs. arsenate of lead. 50 gals. water.	Same as for 2nd spray.	Bordeaux (4-4-50). 2 1/2 lbs. arsenate of lead.

PLUMS and CHERRIES	1st Spray A few weeks be- fore time of blooming.	2nd Spray Just before blossom buds open.	3rd Spray Just after blossom petals fall.	4th Spray About 10 days later after fruit has set.
Chief pests controlled.	Scale, aphis, curculio, plum pocket.	Brown rot, plum pocket.	Brown rot, curculio, aphis.	Brown rot, aphis.
Formula 1 gal. mixture	1 pint lime sul- phur. 1 teaspoon arsenate of lead. 1 gal. water.	1/5 pint lime sulphur. 1 tea- spoon arsenate lead. 1 gal. water.	Bordeaux (4-4-50) 1 teaspoon ar- senate of lead. 1 teaspoon Black Leaf 40.	Bordeaux (4-4-50) 1 teaspoon Black Leaf 40.
Formula 50 gal. mixture.	5 gal. lime sul- phur. 2½ lbs. arsenate of lead. 45 gals. water	1¼ gal. lime sulphur. 2½ lbs. arsenate of lead. 50 gals. water.	Bordeaux (4-4-50) 2½ lbs. arsenate of lead. ¾ pint Black Leaf 40.	Bordeau (4-4-50) and ¾ pint Black Leaf 40.

## PRUNING OF FRUIT TREES

### WHEN—

1. Late winter or early spring—if the object is to develop growth of twigs, fruit spurs or branches.

2. Midsummer—if the object is to develop fruit buds.

3. Fall or early winter—if the object is to develop growth in diameter of the trunk or limbs.

4. Any time—if the object is to remove interfering branches, dead or diseased branches or branches marring beauty of tree.

### HOW—

1. Head low—to produce a stronger tree with trunk better protected from sun scald; tree more easily pruned and sprayed and fruit more easily gathered.

2. Annually remove such branches as growth may indicate to keep the tree balanced and conforming to desired shape.

## RECOMMENDED VARIETIES SMALL FRUITS FOR SOUTH DAKOTA DISTRICTS

Fruits and Varieties	Districts			
	Nrthern	Central	Southern	Black Hills
<b>Currants:</b>				
Red—				
1. London Market				
2. Long Burth Holland				
3. Pamona				
4. <b>Perfection</b>				
5. Red Dutch				
6. <b>Victoria</b>				
White—				
7. White Grape				
All Varieties adapted Each District				
<b>Grapes:</b>				
1. Beta				
2. Concord				
3. Niagara	1	1	All	All
4. Worden				
<b>Gooseberries:</b>				
1. Carrie				
2. Houghton				
3. Pearl				
All Varieties adapted Each District				
<b>Raspberries: (Red varieties)</b>				
1. King				
2. London				
3. Ohta				
4. Sunbeam				
5. Turner	3-4	3-4	1-3-4	1-2
<b>Strawberries:</b>				
Early—				
1. Senator Dunlop				
Everbearing—				
2. Progressive				
Both Varieties adapted Each District				

CURRANTS AND GOOSE- BERRIES	1st Spray	2nd Spray	3rd Spray	4th Spray
	As leaves open.	2 weeks later or sooner if worms appear.	2 weeks later if necessary.	2 weeks later if necessary.
Chief enemies controlled	Mildew	Mildew Worms	Anthracnose Mildew Leaf Spot Worms	Same as for 3rd spray.
Formula 1 gal. mixture	Bordeaux 4-4-50	Same solution as for 1st spray adding 1 tea- spoon arsenate of lead.	Same as 2nd spray.	Same as 2nd spray. If danger of staining fruit, use liver of sul- phur instead of Bordeaux.
RASPBERRY	1st Spray	2nd Spray	3rd Spray	4th Spray
	Before leaves open.	When leaves $\frac{1}{2}$ grown.	On young canes 6 inches high.	Repeat one week later.
Chief enemies controlled	Cane blight Leaf spot.	Cane blight Leaf spot.	Cane Blight Leaf Spot Anthracnose	Leaf eating in- sects. Cane Blight Anthracnose
Formula 1 gal. mixture	Bordeaux (4-4-50)	Repeat.	1 gal. Bordeaux (4-4-50). 1 tea- spoon arsenate of lead.	Repeat as for No. 3.



## PRUNING OF SMALL FRUITS

**Currant and Gooseberry**—All canes over three years old should be cut out early each spring.

**Raspberry**—All canes one year old should be cut out early each spring.

**Sandcherry Hybrids**—These should be renewed like the gooseberry, saving the new sprouts for bearing fruit.

## SUGGESTED VARIETIES OF GARDEN CROPS

- | Crop—                       | Varieties  |
|-----------------------------|--|
| Asparagus—                  |  |
| Palmetto                    |  |
| Beans—                      |  |
| Bush, wax or yellow podded: | Brittle Wax,<br>Pencil-Pod Black, Kidney Wax.                  |
| Green Podded:               | Stringless Green Pod,<br>Fordhook Favorite.                    |
| Shell:                      | Dwarf Horticultural, Marrowfat<br>(soup), Goddard.             |
| Pole, green podded:         | Kentucky Wonder,<br>Burger.                                    |
| Wax podded:                 | Golden Cluster.  |
| Bush Lima:                  | Fordhook Bush, Henderson's<br>Bush.                            |
| Pole Lima:                  | Early Leviathan, King of<br>Garden.                            |
| Beets—                      |  |
| Early:                      | Early Model, Crosby's Egyptian.                                |
| Second early or main crop:  | Detroit Dark<br>Red, Improved Blood Turnip.                    |
| Cabbage—                    |  |
| Early:                      | Jersey Wakefield, Copenhagen<br>Market.                        |
| Midsummer:                  | Danish Roundhead.  |
| Late:                       | Danish Ballhead(for winter storing)                            |
| Carrots—                    |  |
| French Forcing (early),     | Chantenay, Dan-<br>vers' Half Long.                            |
| Cauliflower—                |  |
| Snowball                    |  |
| Celery—                     |  |
| Summer and fall:            | Golden Self-Blanching,<br>Easy Blanching.                      |
| Winter Storing:             | Winter Queen, Giant<br>Paseal.                                 |
| Corn (sweet)—               |  |
| Extra early:                | Peep O'Day   |
| Second early:               | Golden Bantam  |
| Late:                       | Country Gentleman<br>Stowell's Evergreen                       |
| Cucumbers—                  |  |
| White Spine and Long Green  |  |
| Eggplant—                   |  |
| Black Beauty                |  |
| Kohl Rabi—                  |  |
| White Vienna                |  |
| Lettuce—                    |  |
| Head:                       | May King, Big Boston, Loose Leaf,<br>Grand Rapids, Prize Head. |

Muskmelon—

Emerald Gem, Fordhook.

Onion—

Yellow: Yellow Glove, Yellow Globe Danvers.

Red: Red Weathersfield, Southport Red.

White: 'White Portugal, Southport White.

Parsnip—

Hollow Crown, Offenham Market.

Peas—

Extra early and smooth: Best Extra Early, Surprise, Little Gem.

Early and wrinkled: Thomas Laxton, Little Marvel.

Main-crop: Stratagem, British Wonder.

Pepper—

Ruby King, Neapolitan Early, Chinese Grant.

Potatoes—

Early: Irish Cobbler, Early Ohio.

Late: Carmen No. 3, Burbank, Raleigh, Guernsey's Bugless.

Pumpkin—

Table Use: Small Pie.

Field Use: Mammoth.

Radishes—

Glove, extra early: Scarlet Globe, Scarlet Turnip, White Tip.

Second early: Crimson Giant.

Long, early: White Icicle, Long Cardinal, Strasburg, Chartier, Lady Finger.

Rhubarb—

Linneaus.

Rutabagas—

Hansen's Siberian, White Fleshed Neckless.

Spinach—

Bloomdale Savoy, Thick Leaf.

Summer Squash—

White Bush, Yellow Crookneck.

Winter Squash—

Hubbard, Delicious.

Swiss Chard—

Lucullus, Large Ribbed White.

Tomatoes—

Early: Bonny Best, Earliana.

Late: Matchless, Stone (season too short)

Turnips—

Extra Early Purple Top, White Milan Petrowski.

Watermelon—

Kleckley Sweet.

PLANTING TABLE FOR GARDEN TRUCK

10.3

CROP	Seeds or Plants for 100 ft. of row	Distance for Plants to Stand			Depth of planting	Time to Plant	Ready for use after planting
		Horse Cultiv.	Hand Cultiv.	Plants Apart in Rows			
Asparagus	60-80	3-5 ft.	12-24 in.	15-20 in.	3-5 in.	Early spring	1-3 yrs.
Beans (bush)	1 pint	30-26 in.	18-24 in.	5 or 8 to ft.	$\frac{1}{2}$ -2 in.	Succession at 2 weeks intervals	40-65 days
Beans (pole)	$\frac{1}{2}$ pint	3-4 ft.	3-4 ft.	3-4 ft.	1-2 in.	Early June	50-80 days.
Beets	2 oz.	24-36 in.	12-18 in.	5 or 6 to ft.	1-2 in.	Early spring and midsummer	60-80 days.
Cabbage	$\frac{1}{4}$ oz.	30-36 in.	24-30 in.	12-18 in.	$\frac{1}{2}$ in.	Early spring	90-130 days.
Carrots	1 oz.	30-36 in.	18-24 in.	6 or 7 to ft.	$\frac{1}{2}$ in.	Early spring and midsummer	75-110 days
Cauliflower	$\frac{1}{4}$ oz.	30-36 in.	24-30 in.	14-18 in.	$\frac{1}{2}$ in.	June (transplant)	100-130 days
Celery	$\frac{1}{4}$ oz.	3-6 ft.	18-36 in.	4-8 in.	$\frac{1}{2}$ in.	Transplant late June or early July	120-150 days
Corn (sweet)	$\frac{1}{4}$ pint	36-42 in.	30-36 in.	30-36 in.	1-2 in.	At two weeks intervals until July 1st	60-100 days
Cucumber	$\frac{1}{2}$ oz.	4-6 ft.	4-6 ft.	4-6 ft.	1-2 in.	Early summer and Midsummer	60-80 days
Horseradish	70 roots	30-40 in.	24-30 in.	14-20 in.	3-4 in.	Early spring	1-2 yrs.
Kohl-rabi	$\frac{1}{4}$ oz.	30-36 in.	18-24 in.	4-8 in.	$\frac{1}{2}$ in.	Early spring and Midsummer	60-80 days.
Lettuce	$\frac{1}{2}$ oz.	30 in.	12-18 in.	4-6 in.	$\frac{1}{2}$ in.	Early spring and at 2 weeks intervals	60-90 days
Melon, musk	$\frac{1}{2}$ oz.	6-8 ft.	6-8 ft.	Hills 6 ft.	1-2 in.	Early summer	120-150 days
Onion (seed)	1 oz.	24-36 in.	12-18 in.	4 or 5 to ft.	$\frac{1}{2}$ -1 in.	Seed early spring	130-150 days
Parsnip	$\frac{1}{2}$ oz.	30-36 in.	18-24 in.	5 or 6 to ft.	$\frac{1}{2}$ -1 in.	Early spring	125-166 days
Peas	1-2 pints	3-4 ft.	30-36 in.	15 to ft.	2-3 in.	Early spring and at 2 weeks intervals	40-80 days
Pepper	$\frac{1}{4}$ oz.	30-36 in.	18-24 in.	15-18 in.	$\frac{1}{2}$ in.	Transplant in June	100-140 days
Potato (Irish)	5 lbs. (or 9 bu. per A.)	30-36 in.	24-36 in.	14-18 in.	4 in.	Late spring	80-140 days
Pumpkin	$\frac{1}{2}$ oz.	8-12 ft.	8-12 ft.	Hills 8-12 ft.	1-2 in.	May to July	100-140 days
Radish	1 oz.	24-36 in.	12-18 in.	8-12 ft.	$\frac{1}{2}$ -1 in.	Early spring and at 2 weeks intervals	20-40 days
Rhubarb (plants)	33 plants	3-5 ft.	3-5 ft.	3 ft.	2-3 in.	Early spring	1-3 yrs.
Rutabagas	$\frac{1}{4}$ oz.	30-36 in.	18-24 in.	6-8 in.	$\frac{1}{2}$ -1 in.	Early spring and Midsummer	60-80 days
Spinach	1 oz.	30-36 in.	12-18 in.	7 or 8 to ft.	1-2 in.	Early spring and early fall	30-60 days
Squash (bush)	$\frac{1}{2}$ oz.	3-4 ft.	3-4 ft.	Hills 3-4 ft.	1-2 in.	Early summer	60-80 days
Squash (late)	$\frac{1}{2}$ oz.	7-10 ft.	7-10 ft.	Hills 7-9 ft.	1-2 in.	Early summer	120-160 days
Tomatoes	$\frac{1}{2}$ oz.	3-5 ft.	3-4 ft.	3 ft.	$\frac{1}{2}$ -1 in.	Transplant in early summer	100-140 days
Turnip	$\frac{1}{2}$ oz.	24-36 in.	18-24 in.	6 to 7 to ft.	$\frac{1}{4}$ - $\frac{1}{2}$ in.	Early spring and late summer	60-80 days.
Watermelon	1 oz.	8-12 ft.	8-12 ft.	Hills 10 ft.	1-2 in.	May and June	100-120 days

## **11. FORESTRY AND LANDSCAPE GARDENING**

Suggestions for beautifying home  
grounds

Trees adapted to South Dakota

Shrubs for home ground planting

Biennials and perennials for  
home ground planting

Annuals for home ground plant-  
ing

Pruning of hardy shrubs

For  
L G

## **SUGGESTIONS FOR BEAUTIFYING HOME GROUNDS**

1. Make a definite planting plan and then plant according to the plan.
2. Avoid straight rows by grouping the planting along the borders, in the corners or about the foundation.
3. Leave a large open lawn.
4. Be liberal in the use of flowering shrubs and perennials. Have a lavish succession of bloom all season.
5. Most ornamentals need winter protection and all ornamentals need the protection of a good shelter belt.
6. Plant evergreens for winter effect, they extend a feeling of warmth.

# TREES ADAPTED TO SOUTH DAKOTA

Classification of Trees	Utility	Districts to which Adapted	
Broad Leaf—			
1. Rapid Growing			
Cottonwood	B C	1 to 5	<p>The state districts are divided according to rainfall; they are</p> <p>1. Southeastern Section Rainfall 25 inches.</p> <p>2. Eastern Section Rainfall 20 inches to 25 inches.</p> <p>3. Central Section Rainfall 15 inches to 20 inches.</p> <p>4. Northwest Section Rainfall 15 inches.</p> <p>5. Black Hills Section Rainfall 20 inches to 25 inches.</p> <p>Numbers indicate the sections where each tree can be grown.</p>
Basswood	A B C	1 to 2	
Mulberry	A B C	1 to 2	
Wild Black Cherry	B C	1 to 2	
Willows	B C	1 to 2	
Soft Maples	B C	1 to 2	
Box Elder	B C	1 to 4	
Silvered Leaf Poplar	A B C	1 to 2	
Canadian Poplar	B C	1 to 3	
Northwest Poplar	B C	1 to 3	
Laurel Leaf Willow	C	1 to 5	
2. Medium Growing			
White Elm	A B C	1, 2, 5	
White Ash	A B C	1, 2, 5	
Green Ash	A B C	1 to 5	
Honey Locust	A B C	1 to 4	
Hackberry	A B C	1 to 2	
American Mt. Ash	A	1, 2, 5	
European Mt. Ash	A	1, 2, 5	
White Birch	A	1, 2, 5	
Black Birch	A	1, 2, 5	
Art Leaf Weeping Birch	A	1, 2, 5	

3. Slower Growing		
Hard Maple	A B C	1 to 2
Walnut	A B C	1 to 2
Russian Olive	C A	1 to 5
Siberian Pea Tree	C A	1 to 4
Buffalo Berry	C A	1 to 5
Wild Plum	C	1 to 5
Evergreen—		
1. Medium Growing		
Ponderosa Pine	A B C	1 to 5
Austrian Pine	A B C	1 to 2
Scotch Pine	A B C	1 to 2
Colorado Blue Spruce	A B C	1, 2, 5
White Pine	A B C	1 to 2
European Larch	A B C	1 to 2
White Spruce	A B C	1, 2, 5
Norway Spruce	A B C	1, 2, 5
Jack Pine	A B C	1 to 5
2. Slow Growing		
Silver Fir	A B C	1 to 5
Black Hills Spruce	A B C	1 to 5
Red Cedar	C	3 to 4

The Utility Classification  
is—  
A. Ornamental Trees  
B. Woodlot Trees  
C. Shelterbelt



## SHRUBS FOR HOME GROUND PLANTING

Common Name and Month of Blooming	Botanical Name	Color of Flower	Character	Growth
			Height Ft.	Habit
April—				
Japanese Barberry	Berberis Thumbergii	Yellow	2—4	Dense
Thumbergs Spirea	Spirea Thumbergii	White	2—4	Dense
May—				
Dogwood	Cornus Alba. Sanguinea	White	3—6	Spreading
	Cornus Alba. Elegantissima	White	3—6	Spreading
	Cornus Alba. Siberica	White	6—10	Spreading
Lilac	Syringa Japonica	Purple	5—10	Bushy
	Syringa Josikaea	Purple		Bushy
	Syringa Persica	Purple		Bushy
	Syringa Persica alba	White		
	Syringa Vulgaris	Purple		Branching
	Syringa Vulgaris alba	White		
Snowball	Viburnum Opulus Sterilis	White	3—8	Spreading
Yellow Flowering Currant	Ribes Aureum	Yellow	3—6	Bushy
Indian Currant	Symphoricarpus Vulgaris	Yellow		
June—				
Bridal Wreath	Spirea Van Houtii	White	5—7	Archy

Honeysuckle	Lonicera Tartarica	Pink	4—10	Spreading
	Lonicera Tartarica Grandi-flora	Pink	4—10	Spreading
	Lonicera Tartarica Alba	White	4—10	Spreading
Elder	Lonicera Morrowii	Red fruit	4—10	Spreading
	Sambueris Canadensis	White	5—12	Shrubby
	Sambueris Nigra Aurea	White	5—10	Shrubby
	Sambueris Nigra laciniata	White	5—10	Drooping
	Sambueris Racemosus	White		
July—				
Spirea Anthony				
Waterer	Spirea Anthony Waterer	Crimson	2—3	Spreading
Snowberry	Symphoricarpus Racemosus	Pink	2—6	Spreading
August—				
Hydrangea	Hydrangea Paniculata			
	Grandiflora	White	6—12	Spreading
Sumach	Rhuss glabra laciniata	Pink	6—15	Branching
	Rhuss laciniata	Crimson fruits	5—10	Branching
	Rhuss typhina	Crimson fruits	4—8	Branching
	Rhuss typhina laciniata	Crimson fruits	4—10	Branching
September or Later—				
Billards Spirea	Spirea Billardii	Pink	5—10	Bushy
Spirea Anthony	Spirea Anthony Waterer	Red	2—5	Bushy
Waterer				
Burning Bush	Enonjmous Europeus	Reddish	2—4	Bushy

# BIENNIALS AND PERENNIALS FOR HOME GROUND PLANTING

11

Common Name and Month of Blooming	Color of Flower	Character of Growth	
		Height Ft.	Habit
May—			
Garden Pinks	Mixed	1—2	Slender
Peony		2—4	Bushy
Bleeding Heart	Pink	2—4	Bushy
June—			
Columbines	Variety	1—3	Spreading
Day Lillies	Orange Red	2—5	Slender
Japanese Iris	Variety	1—2	Tall
July—			
Gaillardia Grandiflora.	Mixed	2—3	Spreading
August—			
Hardy Sage	White foliage	1—3	Bushy
Hollyhocks	Mixed	4—8	
September or later—			
Shasta Daisy	White	1—3	Bushy
Gaillardia Golden Glow	Reddish	1—3	Slender
Snap Dragon	Mixed	2—4	Slender
Chrysanthemums	Variety	2—4	Slender
Delphinium	Blue	2—5	Slender
Hardy Phlox	Mixed	2—3	Bushy

## ANNUALS FOR HOME GROUND PLANTING SHOWING APPROXIMATE MONTH OF FLOWERING

June—

Sweet Pea  
Nasturtium  
Pansy

July—

Chinese and Japanese Pinks  
Marigold

August—

Asters  
Bachelor Button  
Four O'clock  
Snap Dragon

September or later—

Cosmos

### BULBS

May—

Tulip

August and September—

Gladiolus

### PRUNING OF HARDY SHRUBS

1. Prune according to method of flowering.
  - a. Those which bear flowers on the same season's growth—flowering season generally summer and fall. Examples—rose, hydrangea, mock orange—should be pruned in the dormant season.
2. Those which flower on points of growth that start from the preceding year's growth—flowering season usually in the spring. Example—flowering almond, snowball, spires, lilacs, etc.  
Prune just as soon as the blossoms fade.

## **12. SILOS AND SILAGE**

Silo capacity tables

Daily quantities of silage for  
livestock

Silage values

Cost of filling silo

Value of silage cut at different  
stages

Silo

## CAPACITIES OF SILOS

Depth of silage after settling	Capacity in tons—Inside diameter					
	10 ft.	12 ft.	14 ft.	16 ft.	18 ft.	20 ft.
20	26					
22	30					
24	34	49				
26	38	55				
28	42	61	83			
30	47	67	91			
32		74	100	131		
36		87	119	155	196	
40			138	180	228	281
42				193	245	302
44				207	262	323
46					280	345
48						368

Depth of silo should not be more than 3 times diameter nor less than twice diameter.

The weight per cubic foot increases with the depth, being less than 20 pounds at or near the surface, and 61 pounds at the depth of 35 feet. The mean weight of silage for whole, where depth of silo is—

Depth of Silage in Feet	Mean Weight lbs. per cu. ft.
1 .....	18.7
5 .....	22.1
10 .....	26.1
15 .....	29.8
20 .....	33.3
25 .....	36.5
30 .....	39.6
35 .....	42.8

# FEEDING CAPACITIES OF SILOS

(Winter season)

12

Inside diameter of silo	Quantity of silage in depth of 2 in. Pounds	Number of animals that may be fed allowing daily				
		40 lbs. head	30 lbs. head	20 lbs. head	10 lbs. head	4 lbs. head
10 ft. ....	524	13	17	26	52	130
12 ft. ....	754	19	25	37	76	190
14 ft. ....	1,026	25	34	51	100	250
16 ft. ....	1,340	33	44	67	132	330
18 ft. ....	1,696	42	56	85	168	420
20 ft. ....	2,094	52	70	104	208	520

**APPROXIMATE QUANTITY OF SILAGE REQUIRED PER DAY**  
(Ill. Sta.)

Beef Cattle—	Kind of Stock	Daily Ration—Pounds
	Wintering calves, 8 months old .....	15 to 25
	Wintering breeding cows .....	30 to 50
	Fattening beef cattle 18-22 months old—	
	First stage of fattening .....	20 to 30
	Later stage of fattening .....	12 to 20
Dairy Cattle .....		30 to 50
Sheep—		
	Wintering breeding sheep .....	3 to 5
	Fattening lambs .....	2 to 3
	Fattening sheep .....	3 to 4



**\*VALUE OF SILAGE PER TON—Based on the Value of Corn**

Price of Corn per Bushel	3 bu. of corn per ton	4 bu. of corn per ton	5 bu. of corn per ton	6 bu. of corn per ton
.20	1.90	2.00	2.10	2.20
.30	2.25	2.40	2.60	2.75
.40	2.65	2.85	3.15	3.30
.50	3.05	3.30	3.70	3.90
.60	3.45	3.80	4.25	4.55
.70	3.90	4.30	4.80	5.20
.80	4.35	4.85	5.40	5.85
.90	4.80	5.40	6.00	6.55
1.00	5.30	5.95	6.60	7.25
1.10	5.80	6.50	7.25	7.95
1.20	6.30	7.10	7.90	8.65
1.30	6.85	7.70	8.55	9.35
1.40	7.40	8.30	9.20	10.10
1.50	7.95	8.90	9.90	10.85

\*Adapted from Wallace's Farmer, March 1, 1918.

### COST OF FILLING SILO

40 to 80 rds. haul, 15 hours work, 100 tons,  
12 acres.

1 man to cut corn, \$3.00 per day ...\$	4.50
3 horses to cut corn, \$3.00 per day ..	4.50
1 binder to cut corn, \$5.00 per day.	7.50
5 men to haul, \$3.00 per day .....	22.50
5 teams to haul, \$10.00 per day .....	15.00
1 man to help unload, \$3.00 per day.	4.50
1 man to feed silo, \$3.00 per day ...	4.50
1 man in silo, \$3.00 per day .....	4.50
1 silage cutter, \$8.00 per day .....	12.00
1 15 horse gas engine, \$10.00 per day.	15.00
Cost of twine 50 lbs. at 20c lb. ....	10.00
Cost of filling silo .....	\$104.50
Cost per acre .....	8.71
Cost per ton .....	1.045

### FEEDING VALUE OF SILAGE CUT AT DIFFERENT STAGES OF GROWTH

Kind of Silage	Pounds Silage per head daily	Average daily gain per head	Average lbs. silage per lb. gain
Frosted corn .....	56.2	2.09	26.9
Glaze or Dent stage	71.7	2.28	31.4
Dough stage .....	73.4	2.27	32.1
Blister or milk stage .....	76.9	1.94	39.8

Average results of 2 feeding periods of  
119 and 90 days in 1916-17 and 1917-18. 5  
steers in a lot, each averaging 840 lbs.

South Dakota Exp. Sta. Bul. 182.

**LIVESTOCK PRODUCTION STATISTICS**

Livestock	Number of Head Livestock for every 1000 people in U. S.	
	1900	1919
Cattle .....	600	350
Hogs .....	800	600
Sheep .....	880	450

Dr. C. W. McCampbell in Breeders' Gazette

**HORSES:**

Teeth—

Temporary teeth, 24; permanent teeth, male 40, female 36-40.

There are three indicators of age, first the eruption of the teeth, second the "cups" or "tables" on the wearing surfaces, and third the form and relative position of the teeth. In the horse the eruption of the incisor teeth is as follows:

Location of Teeth	Temporary or colt teeth come in at	Permanent or horse teeth come in at	Permanent teeth are up in wear at
1st pair middles or nippers..	Birth or 1st two weeks	2½ yrs.	3 yrs.
2nd pair or intermediates (lo- cated on either side of the nippers) .....	4 to 6 weeks of age	3½ yrs.	4 yrs.
3rd pair or corners .....	7 to 8 months	4½ yrs.	5 yrs.

As the teeth wear down the "cups" disappear in quite regular order, hence the following suggestions as to age:

Lower Jaw	Cups Leave at	Upper Jaw	Cups Leave at
Middle or nipper pair .....	5½—6 years	Middle pair .....	9½ years
Intermediate or next pair .....	6½—7 years	Intermediate pair .....	10½ years
Corner pair .....	7½—8 years	Corner pair .....	11½ years

## **CATTLE:**

### **Teeth—**

Temporary—20; permanent—32.

Milk teeth (4 pr.) appear within 1st month.

First pair permanent teeth appear at 18 months.

Second pair permanent teeth appear at 27 months.

Third pair permanent teeth appear at 36 months.

Fourth pair permanent teeth appear at 45 months.

### **Horns—**

After two years growth the horns grow more slowly causing a more or less distinct ring for each years growth thereafter.

## **SHEEP:**

### **Teeth—**

Temporary—20; permanent—32.

First pair permanent teeth appear at 12 months.

Second pair permanent teeth appear at 26 months.

Third pair permanent teeth appear at 37 months.

Fourth pair permanent teeth appear at 48 months.

**Minimum Weights in Carlots of Livestock—Interstate Shipments—established by Interstate Commerce Commission on which all railroads in the Northwest must Protect the Shipper.**

Car Lengths Inside Measurement	Car Length Usually Spoken of as	For Cattle	For Hogs Double Deck	For Hogs Single Deck	For Sheep Double Deck	For Sheep Single Deck	For Mixed Cars
33 ft. 9 in. or less (1) ..	33 foot	20,500	20,500	16,000	20,500	11,000	(2)
Over 33ft. 9in. to 36ft. 7in.	36 foot	22,000	22,000	17,000	22,000	12,000	(2)
Over 36ft. 7in. to 40ft. 6in.	40 foot	24,000	24,000	19,000	24,000	14,000	(2)
Over 40 ft. 6 in. ....	44 foot	26,000	26,000	21,000	26,000	16,000	(2)

(1) Will not apply to following: C & N W; C B & Q; R I; N P; C G & W and M & St L.

(2) The rate on mixed carloads of livestock will be the highest rate per 100 lbs. for any kind of stock in the car and subject to the highest carload minimum weight, except that when a full deck of sheep and a full deck of hogs are loaded in a double deck car, the single deck rates on each will apply.

**Showing the approximate (per head) capacity of cars of different lengths for cattle, hogs and sheep of different weights.**

Approximate carrying capacity of different length cars, in numbers											
Car Lengths	Cattle weighing from			Hogs weighing (per deck)				Sheep Weighing (per deck)			
	500 to 700 lbs.	800 to 1000 lbs.	1000 to 1200 lbs.	100 lbs.	150 lbs.	200 lbs.	250 lbs.	50 lbs.	85 lbs.	100 lbs.	120 lbs.
31 .....	35	24	19	112	82	70	61	142	112	104	91
	39	26	21	116	86	72	63	146	116	107	95
33 .....	38	25	20	119	87	75	67	150	115	107	96
	42	27	23	124	91	77	69	155	119	111	100
36 .....	40	27	22	130	95	82	70	165	130	120	103
	45	30	25	135	99	85	72	170	135	125	107
40 .....	50	31	27	145	106	88	80	184	145	134	117
	52	33	28	150	110	92	82	188	149	138	121
44 .....	51	34	28	160	117	98	86	200	160	148	129
	55	36	30	165	121	102	90	208	164	125	134

**Caution:—Do not load heavy in hot weather.**

Average Gestation Period		Extremes (days)
	Weeks or Days	
Rabbit	30	
Cat	7 50	
Dog	8 1/2 60	
Sow	16 112	109 to 120
Ewe	22 150	146 to 157
Cow	40 1/2 283	240 to 311
Mare	48 1/2 340	307 to 412

Date of Service	Date Animal Due to Give Birth			
	Mare	Cow	Ewe	Sow
Jan. 1	Dec. 6	Oct. 10	May 30	Apr. 22
Jan. 11	Dec. 16	Oct. 20	June 9	May 2
Jan. 21	Dec. 26	Oct. 30	June 19	May 12
Jan. 31	Jan. 5	Nov. 9	June 29	May 22
Feb. 10	Jan. 15	Nov. 19	July 9	June 1
Feb. 20	Jan. 25	Nov. 29	July 19	June 11
Mar. 2	Feb. 4	Dec. 9	July 29	June 21
Mar. 12	Feb. 14	Dec. 19	Aug. 8	July 1
Mar. 22	Feb. 24	Dec. 29	Aug. 18	July 11
Apr. 1	Mar. 6	Jan. 8	Aug. 28	July 21
Apr. 11	Mar. 16	Jan. 18	Sep. 7	July 31
Apr. 21	Mar. 26	Jan. 28	Sep. 17	Aug. 10
May 1	Apr. 5	Feb. 7	Sep. 27	Aug. 20
May 11	Apr. 15	Feb. 17	Oct. 7	Aug. 30
May 21	Apr. 25	Feb. 27	Oct. 17	Sep. 9
May 31	May 5	Mar. 9	Oct. 27	Sep. 19



June 10	May 15	Mar. 19	Nov. 6	Sep. 29
June 20	May 25	Mar. 29	Nov. 16	Oct. 9
June 30	June 4	Apr. 8	Nov. 26	Oct. 19
July 10	June 14	Apr. 18	Dec. 6	Oct. 29
July 20	June 24	Apr. 28	Dec. 16	Nov. 8
July 30	July 4	May 8	Dec. 26	Nov. 18
Aug. 9	July 14	May 18	Jan. 5	Nov. 28
Aug. 19	July 24	May 28	Jan. 15	Dec. 8
Aug. 29	Aug. 3	June 7	Jan. 25	Dec. 18
Sep. 8	Aug. 13	June 17	Feb. 4	Dec. 28
Sep. 18	Aug. 23	June 27	Feb. 14	Jan. 7
Sep. 28	Sep. 2	July 7	Feb. 24	Jan. 17
Oct. 8	Sep. 12	July 17	Mar. 6	Jan. 27
Oct. 18	Sep. 22	July 27	Mar. 16	Feb. 6
Oct. 28	Oct. 2	Aug. 6	Mar. 26	Feb. 16
Nov. 7	Oct. 12	Aug. 16	Apr. 5	Feb. 26
Nov. 17	Oct. 22	Aug. 26	Apr. 15	Mar. 8
Nov. 27	Nov. 1	Sep. 5	Apr. 25	Mar. 18
Dec. 7	Nov. 11	Sep. 15	May 5	Mar. 28
Dec. 17	Nov. 21	Sep. 25	May 15	Apr. 7
Dec. 27	Dec. 1	Oct. 5	May 25	Apr. 17

### DURATION AND FREQUENCY OF HEAT IN FARM ANIMALS IN REGULAR CONDITION

	In heat for	If not impregnated heat will recur in
Mares .....	5-7 days*	3 to 6 weeks
Cows .....	2-3 days*	3 to 4 weeks
Ewes .....	2-3 days	17 to 28 days
Sows .....	2-4 days	21 days

\*Subject to variation.

# INCUBATION PERIOD OF FOWLS

	Average	Extremes
Goose .....	30 days	27 to 33 days
Turkey .....	29 days	26 to 30 days
Duck .....	29 days	26 to 32 days
Peahen .....	28 days	28 to 30 days
Guinea Hen .....	26 days	25 to 26 days
Hen .....	21 days	20 to 23 days
Pigeon .....	18 days	16 to 20 days

## MATING TABLE

Showing number of females to each male.

### Horses—

2 yr. old stallion .....	10
3 yr. old stallion .....	30
4 yr. old stallion .....	75

### Cattle—

Yearling bull.....	30
2 yr. old bull or over.....	60-75

### Hogs—

Boar pig.....	15
Yearling boar or over.....	40

### Sheep—

Lamb ram.....	20
Yearling ram or over.....	50

Chickens (cock).....10-15

Turkeys (Tom).....15

Geese (Gander).....2-3

Ducks (Drake)..... 7

Guinea .....3

## LIVESTOCK BREED ASSOCIATIONS

### Horses—

- Percheron Society of America,  
Wayne Dinsmore, Chicago, Ill.  
American Association of Importers and  
Breeder of Belgian Draft Horses,  
J. D. Connor, Jr., Wabash, Ind.  
American Clydesdale Association,  
R. B. Ogilvie, Chicago, Ill.  
The American Shire Horse Association,  
W. G. Lynch, Tonica, Ill.  
National French Draft Horse Association,  
C. E. Stubbs, Fairfield, Iowa.  
American Suffolk Horse Association,  
A. Graham Galbraith, DeKalb, Ill.  
American Trotter Register Association,  
Wm. H. Knight, 355 Dearborn St.,  
Chicago, Ill.  
American Saddle Horse Breeders Association,  
R. H. Lilliard, Louisville, Ky.  
American Shetland Pony Club,  
Julia M. Wade, LaFayette, Ind.

### Cattle—

- American Shorthorn Breeder's Association,  
F. W. Harding, Chicago, Ill.  
American Hereford Cattle Breeders Association,  
R. J. Kinzer, Kansas City, Mo.  
American Aberdeen-Angus Breeders Association,  
Charles Gray, Chicago, Ill.  
American Galloway Breeders Association,  
R. W. Brown, Carrolton, Mo.  
The Polled Durham Breeders Association,  
J. H. Martz, Grenville, Ohio.  
American Polled Hereford Breeders Association,  
B. O. Gammon, Des Moines, Ia.  
Red Polled Cattle Club of America,  
Harley A. Martin, Gotham, Wis.  
American Guernsey Cattle Club,  
Wm. H. Caldwell, Peterboro, N. H.  
Holstein-Friesian Association of America,  
F. L. Houghton, Brattleboro, Vt.  
American Jersey Cattle Club,  
R. M. Gow, 324 W. 23 St., New York, N. Y.  
Ayrshire Breeders Association,  
J. M. Watson, Brandon, Vt.  
Brown Swiss Record Association,  
Ira Inman, Beloit, Wis.

### 13.1

#### Hogs—

- American Berkshire Association,  
Frank S. Springer, Springfield, Ill.  
American Poland-China Record Association  
W. M. McFadden, Chicago, Ill.  
National Poland-China Record Association,  
A. M. Brown, Winchester, Ind.  
The Standard Poland-China Record Association,  
F. L. Garrott, Maryville, Mo.  
The American Duroc-Jersey Swine Breeders Association,  
Robt. J. Evans, Chicago, Ill.  
The National Duroc-Jersey Record Association,  
J. F. Pfender, Peoria, Ill.  
The Chester-White Swine Record Association,  
F. F. Moore, Rochester, Ind.  
National Mule Foot Hog Record Association,  
G. C. Kreglow, DeGraff, Ohio.  
American Hampshire Swine Association,  
E. C. Stone, Peoria, Ill.  
The American Yorkshire Club,  
Harry G. Krum, 471 Fairview N.,  
St. Paul, Minn.  
The American Tamworth Swine Record Association,  
E. N. Ball, Hamburg, Mich.

#### Sheep—

- American Shropshire Registry Association,  
Julia M. Wade, LaFayette, Ind.  
American Southdown Breeders Association,  
Frank S. Springer, Springfield, Ill.  
American Hampshire Sheep Association,  
C. A. Tyler, Detroit, Mich.  
American Oxford Down Record Association,  
W. A. Shafer, Hamilton, Ohio.  
The American Cheviot Sheep Society,  
Edw. A. Stanford, Cooperstown, N. Y.  
The Continental Dorset Club,  
Edith Chidester, Mechanicsburg, Ohio.  
American Cotswold Association,  
F. W. Harding, Waukesha, Wis.  
National Lincoln Sheep Breeders Association,  
Bert Smith, Charlotte, Mich.  
American Rambouillet Sheep Breeders Association,  
Dwight Lincoln, Milford Center, Ohio.  
Standard Delaine Merino Sheep Breeders Association,  
R. M. Wood, Douglas, Wyo.  
American and Delaine Merino Association,  
S. M. Cleaver, Delaware, Ohio.

**SOUTH DAKOTA LIVESTOCK BREEDERS' ASSOCIATIONS**

South Dakota Improved Livestock Breeders' Association,  
J. W. Wilson, Brookings, Secretary.

Shorthorn Breeders' Association,  
D. E. McMoines, Huron, Secretary.

Hereford Breeders' Association,  
J. H. St. Clair, Beresford, Secretary.

Holstein Breeders' Association,  
T. E. Gage, Groton, Secretary.

Western Livestock Breeders' Association,  
C. F. Stewart, Buffalo Gap, Secretary.

Poland-China Breeders' Association,  
C. W. Stanley, Dolton, Secretary.

Hampshire Swine Breeders' Association,  
E. P. Sand, Mitchell, Secretary.

State Poultry Association,  
Dr. M. W. Myler, Mitchell, Secretary.

Duroc-Jersey Association,  
A. L. Haynes, Mitchell, Secretary.

## **LIVESTOCK EXHIBIT CLASSIFICATIONS AND TERMS**

(Some of the State Fair Regulations as to Livestock Classes)

**Horses:** The base date for computing ages is September 1.

**Cattle:** The base date for computing ages is September 1, except for Junior classes which is January 1. With September 1 as the base date, a senior calf or yearling would be born between September 1 and January 1, while a junior calf or yearling would be born between January 1 and September 1.

**Get of Sire**—Consists of 4 animals, any age, either sex.

**Produce of Dam**—Consists of 2 animals of any age, either sex.

**Aged Herd**—Bull 2 yrs. old, one aged cow, one two year old heifer, one yearling heifer and one heifer under one year old.

**Young Herd**—Bull over one year and under two years, two heifers over one year and under two years, two heifers under one year; all except bull to be bred by exhibitor.

**Calf Herd**—Bull under one year old and two heifers under one year old; all animals to be owned and bred by exhibitor.

**Junior Champion**—Competed for by junior and senior calves and yearlings.

**Senior Champion**—Competed for by two-year olds and over.

**Grand Champion**—Competed for by junior and senior champions.

**Hogs:** The base date for computing ages is September 1, except for Junior classes which is March 1.

**Old Herds**—Boar and 3 sows farrowed before September 1 of year previous.

**Young Herd**—Boar and 3 sows farrowed on or after September 1 of year previous.

**Get of Sire**—Consist of 4 animals, any age, get of one boar.

**Produce of Dam**—Consist of 4 animals, any age, produced by one sow.

**Junior Champion**—Must have been farrowed on or after September 1 of year previous.

**Sheep:** The base date for computing ages is September 1.

**Exhibitor's Flock**—Ram any age, ewe two years old or over, ewe one year old and under two, and ewe under one year.

**Breeder's Flock**—Ram and 4 ewes, any age, bred and owned by exhibitor.

**Get of Sire**—Consist of 4 lambs, either sex, get of one ram, bred and owned by exhibitor.

### VALUE OF A PUREBRED SIRE Selling Prices

Age of Colt	Purebred Stallion	Grade Stallion	Difference in favor of Purebred
4-6 mos. ....	\$ 78.77	\$ 51.25	\$ 27.52
1 year .....	132.84	85.00	47.84
4 years .....	303.00	200.20	102.80

("The data was obtained by writing the stallion owners of Wisconsin for the selling prices of their foals in 1911.")

—Dr. Alexander.

### ESSENTIALS OF A BULL ASSOCIATION

1. Three farmers or three blocks of farmers may form an association.

2. Each farmer of each block of farmers purchases a purebred bull belonging to the same breed as mutually agreed upon.

3. These bulls should be of standard approved type, breeding and of perfect health.

4. Each farmer or each block of farmers mutually agrees to exchange bulls about each three years.

5. If abortion or any other contagious disease appears, each farmer or block of farmers agrees to do everything possible to stamp it out and stop the use of the infected bull as long as there is danger from the contagion.

6. By this plan each farmer may have the use of a high quality purebred sire at a very low cost.

\*A block is based on 40 to 50 cows.

**AVERAGE WEIGHT OF FEEDING STUFF**

Feeding Stuff	One Quart Weighs Pounds	One Pound Measures Quarts
Corn, whole .....	1.7	0.6
Corn, meal .....	1.5	0.7
Corn, bran .....	0.5	2.0
Corn and cob meal ....	1.4	0.7
Gluten meal .....	1.7	0.6
Gluten feed .....	1.3	0.8
Germ meal .....	1.4	0.7
Wheat, whole .....	2.0	0.5
Wheat, ground .....	1.7	0.5
Wheat, bran .....	0.5	2.0
Wheat middlings (stand.)	0.8	1.3
Oats, whole .....	1.0	1.0
Oats, ground .....	0.7	1.4
Rye, whole .....	1.7	0.6
Rye, meal .....	1.5	0.7
Rye, bran .....	0.6	1.8
Rye, middlings .....	1.6	0.6
Barley, whole .....	1.5	0.7
Barley, meal .....	1.1	0.9
Buckwheat .....	1.4	0.7
Buckwheat middlings ..	0.9	1.1
Soy beans .....	1.8	0.6
Alfalfa meal .....	0.6	1.7
Molasses .....	3.0	0.3
Linseed meal, old process	1.1	0.9
Linseed meal, new process	0.9	1.1
Cotton-seed meal .....	1.5	0.7



Feeds	Digestible			Nutritive
	Pro.	C-H	Fat	Ratio: 1 to
Concentrates—				
Corn .....	.076	.668	.046	10.2
Corn and cob meal .....	.061	.637	.037	11.8
Gluten meal .....	.302	.439	.044	1.8
Gluten feed .....	.216	.519	.032	2.7
Hominy feed .....	.070	.612	.073	11.1
Germ oil meal .....	.165	.426	.104	4.0
Wheat .....	.092	.675	.015	7.7
Wheat bran .....	.125	.416	.030	3.9
Wheat middlings (shorts) .....	.134	.462	.043	4.2
Red dog flour .....	.148	.565	.035	4.4
Wheat screenings .....	.096	.473	.036	5.8
Oats .....	.097	.521	.038	6.3
Barley .....	.090	.668	.016	7.8
Emmer (speltz) .....	.095	.632	.017	7.1
Buckwheat .....	.081	.497	.025	6.8
Buckwheat middlings .....	.246	.383	.061	2.1
Rye .....	.099	.684	.012	7.2
Rye middlings .....	.126	.555	.031	5.0
Rye bran .....	.122	.566	.028	5.2
Rye feed (shorts and bran) .....	.122	.558	.029	5.1

Kafir grain .....	.090	.658	.023	7.9
Milo grain .....	.087	.662	.022	8.2
Feterita grain .....	.093	.666	.025	7.8
Kaoliang grain .....	.085	.670	.033	8.8
Sorghum grain .....	.075	.662	.026	9.6
Millet seed .....	.084	.637	.024	8.2
Flax seed .....	.206	.170	.290	4.0
Linseed meal (o. p.) .....	.302	.326	.067	1.6
Linseed meal (n. p.) .....	.317	.379	.028	1.4
Cottonseed meal .....	.370	.218	.086	1.1
Soybean .....	.307	.228	.144	1.8
Sunflower seed with hulls .....	.135	.381	.203	6.2
Skim milk .....	.036	.051	.002	1.5
Tankage (60% protein) .....	.587		.126	0.5
Molasses (cane or blackstrap) .....	.010	.582		58.2
Roughages (cured)				
Corn fodder .....	.030	.473	.015	16.9
Corn stover .....	.021	.424	.007	21.0
Sorghum fodder .....	.028	.448	.020	17.6
Kafir fodder .....	.041	.450	.017	11.9
Milo fodder .....	.019	.363	.028	22.4
Timothy .....	.030	.428	.012	15.2
Prairie hay .....	.040	.414	.011	11.0
Millet .....	.050	.460	.018	10.0
Red Top .....	.046	.459	.012	10.6
Oat hay .....	.045	.381	.017	9.3

Feeds	Digestible			Nutritive Ratio 1 to
	Pro.	C-H	Fat	
Alfalfa .....	.106	.390	.009	3.9
Red clover .....	.076	.393	.018	5.7
Alsike clover .....	.079	.369	.011	5.0
Sweet clover .....	.109	.382	.007	3.7
Soy beans .....	.117	.392	.012	3.6
Peas and oats .....	.083	.371	.015	4.9
Clover and timothy .....	.040	.397	.011	10.6
Wheat straw .....	.007	.351	.005	51.7
Oat straw .....	.022	.343	.012	16.8
Barley straw .....	.009	.402	.006	46.2
Roughages (green)				
Corn fodder .....	.010	.128	.004	13.7
Kaffir fodder .....	.011	.124	.004	12.1
Blue grass .....	.023	.148	.006	7.0
Orchard grass .....	.017	.130	.006	8.5
Timothy ..	.015	.193	.006	13.8
Alfalfa .....	.033	.104	.004	3.4
Red clover .....	.027	.130	.006	5.3
Sweet clover .....	.033	.103	.003	3.3
Alsike clover .....	.027	.118	.004	4.7

Clover and mixed grasses .....	.022	.141	.006	7.0
Soy beans and corn .....	.017	.136	.006	8.8
Peas and oats .....	.024	.106	.006	5.0
Peas oats and rape .....	.023	.073	.005	3.7
Rape .....	.026	.100	.003	4.1
Silage—				
Corn .....	.011	.150	.007	15.1
Sorghum .....	.006	.116	.005	21.2
Alfalfa .....	.012	.078	.006	7.7
Corn and soy beans .....	.016	.138	.008	9.8
Miscellaneous—				
Sugar beet .....	.017	.054	.001	3.3
Mangel .....	.008	.064	.001	8.2
Turnip .....	.018	.073	.001	4.2
Pumpkin .....	.011	.045	.005	5.1

# COST OF ONE POUND AT A GIVEN PRICE AND WEIGHT PER BUSHEL 13.2

When a Bushel Costs	When a Bushel Weighs						
	32 lbs.	40 lbs.	48 lbs.	50 lbs.	56 lbs.	60 lbs.	70 lbs.
	1 lb. Costs	1 lb. Costs	1 lb. Costs	1 lb. Costs	1 lb. Costs	1 lb. Costs	1 lb. Costs
Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents
30.....	.937	.750	.625	.60	.536	.500	.428
32.....	1.000	.800	.667	.64	.571	.533	.457
34.....	1.062	.850	.708	.68	.607	.567	.486
36.....	1.125	.900	.750	.72	.643	.600	.514
38.....	1.187	.950	.792	.76	.678	.633	.543
40.....	1.250	1.000	.833	.80	.714	.666	.571
42.....	1.312	1.050	.875	.84	.750	.700	.600
44.....	1.375	1.100	.917	.88	.786	.733	.628
46.....	1.437	1.150	.958	.92	.821	.767	.657
48.....	1.500	1.200	1.000	.96	.857	.800	.686
50.....	1.562	1.250	1.042	1.00	.893	.833	.714
52.....	1.625	1.300	1.083	1.04	.928	.867	.743
54.....	1.687	1.350	1.125	1.08	.964	.900	.771
56.....	1.750	1.400	1.167	1.12	1.000	.933	.800
58.....	1.812	1.450	1.208	1.16	1.036	.967	.828
60.....	1.875	1.500	1.250	1.20	1.071	1.000	.857
62.....	1.937	1.550	1.292	1.24	1.107	1.033	.886
64.....	2.000	1.600	1.333	1.28	1.143	1.067	.914
66.....	2.062	1.650	1.375	1.32	1.178	1.100	.943
68.....	2.125	1.700	1.417	1.36	1.214	1.133	.971
70.....	2.187	1.750	1.458	1.40	1.250	1.167	1.000

72.....	2.250	1.800	1.500	1.44	1.286	1.200	1.028
74.....	2.312	1.850	1.542	1.48	1.321	1.233	1.057
76.....	2.375	1.900	1.583	1.52	1.357	1.267	1.086
78.....	2.437	1.950	1.625	1.56	1.393	1.300	1.114
80.....	2.500	2.000	1.667	1.60	1.428	1.333	1.143
82.....	2.562	2.050	1.708	1.64	1.464	1.367	1.171
84.....	2.625	2.100	1.750	1.68	1.500	1.400	1.200
86.....	2.687	2.150	1.792	1.72	1.536	1.433	1.228
88.....	2.750	2.200	1.833	1.76	1.571	1.467	1.257
90.....	2.812	2.250	1.875	1.80	1.607	1.500	1.286
92.....	2.875	2.300	1.917	1.84	1.633	1.533	1.314
94.....	2.937	2.350	1.958	1.88	1.678	1.567	1.343
96.....	3.000	2.400	2.000	1.92	1.714	1.600	1.371
98.....	3.062	2.450	2.041	1.96	1.750	1.633	1.400
100.....	3.125	2.500	2.083	2.00	1.786	1.667	1.429

NOTE—The above table is an aid in determining the cost of a ration. If it is desired to ascertain the cost of a pound of oats when it sells for 50 cents per bushel, follow down the column under the heading "When a Bushel Costs" until the number 50 is reached; then to the right to the column headed "32" because there are 32 pounds in a bushel, where 1.562 is given as the price of 1 pound of oats.

**COST OF PASTURE PER COW PER DAY**

Interest at 6 per cent on the value of the land with pasture season 150 days.

Acres per cow	Value of Land per Acre						
	\$25 Cents	\$50 Cents	\$100 Cents	\$150 Cents	\$200 Cents	\$250 Cents	\$300 Cents
1	1	2	4	6	8	10	12
1½	1½	3	6	9	12	15	18
2	2	4	8	12	16	20	24
2½	2½	5	10	15	20	25	30
3	3	6	12	18	24	30	36
3½	3½	7	14	21	28	35	42
4	4	8	16	24	32	40	48

## PRECAUTIONS IN CALF FEEDING

1. Feed regularly.
2. Feed at proper temperature (100° F)
3. Feed individually. Feed sweet milk.
4. Do not over-feed.
5. Make all changes gradually.
6. Give access to fresh water and salt.
7. Keep all utensils clean.
8. Provide clean pens with plenty of light and sunshine.
9. Provide plenty of bedding.
10. Keep in place where temperature does not vary too much.

## FEEDING CALVES SKIM MILK

1. Let calf have colostrum or fresh milk; take from mother not later than fifth day.
2. Feed whole milk for two weeks; gradually change to skim milk, using 10 days in making the change.
3. Start with 8 to 10 pounds and gradually increase to 12 to 16 pounds at six months.
4. Begin feeding a ground grain mixture at two weeks of age. Feed only what calf will readily clean up shortly after each feeding. Following grain mixtures are suggestive:

### No. 1.

Ground corn .....	40 lbs.
Ground oats .....	60 lbs.

### No. 2

Cracked corn .....	30 lbs.
Ground oats .....	30 lbs.
Bran .....	30 lbs.
Oil Meal .....	10 lbs.

5. Provide good alfalfa or clover hay at all times, good pasture when possible.



## 13.2

# **APPROXIMATE YEARLY COST OF FEEDING LIVE STOCK**

## **Draft Horse:**

6 mo. full feed of grain.	
Hay 10 lbs. grain 16 lbs.	
Hay at \$20.00 ton (12 months) .....	\$ 36.50
Oats at 50c bu. 6 months .....	45.00
Oats—6 mo. 1-2 full feed .....	22.50
Total .....	\$104.00

## **Light Horse:**

Hay (Same as draft) .....	\$36.50
Oats 10 lbs. daily 6 mo. ....	28.00
Oats 5 lbs daily 6 mo. ....	14.00
Total .....	\$78.00

## **Dairy Cow:**

8 mo. feed, 4 mo. pasture.	
Silage 30 lbs. daily, \$8.00 ton .....	\$28.80
Alfalfa hay 8 lbs. \$20.00 ton .....	19.20
Grain ground 8 lbs. \$45.00 ton .....	43.20
Pasture 4 months .....	6.00
Total .....	\$97.20

## **Beef Steer or Cow:**

6 mo. feed, 6 mo. pasture.	
Silage 50 lbs. daily \$8.00 .....	\$36.00
Oil meal 2 lbs. daily \$65.00 .....	11.70
Pasture .....	6.00
Total .....	\$53.70

## **Steer on Range:**

12 mo. pasture .....	\$ 6.00
Two ton hay .....	20.00
Total .....	\$26.00

## **Sheep Range:**

12 mo. pasture .....	\$1.20
600 lbs. hay at \$10.00 .....	3.00
Grain 100 lbs. at \$3.00 .....	3.00
Total .....	\$7.20

## **Farm Sheep:**

6 mo. pasture .....	\$1.20
Alfalfa Hay 3 lbs. daily \$20.00 ton ..	5.40
Grain 1-2 lb. 200 days \$45.00 ton .....	2.25
Total .....	\$8.85

## **Hogs:**

1/6 sow feed 3 months 150 lbs. grain ..	\$3.37
300 lbs. skim milk .....	2.25
Pasture and 1/2 grain feed 4 mo.	
Pasture 10 hogs to acre at \$20 acre.	2.00
Self fed grain 1/2 full feed 360 lbs...	8.10
Five Months—	
Ear corn, 8 lbs. daily, 1200 lbs ....	27.00
Self fed Tankage 100 lbs. ....	5.50

**Total cost .....** \$48.22

# MARKET CLASSES OF HORSES WITH LIMITS IN HEIGHT AND WEIGHT

Classes	Sub-classes	Height Hands	Weight Pounds
Draft Horses	Light Draft .....	15-3 to 16-2	1600 to 1750
	Heavy Draft .....	16 to 17-2	1750 to 2200
	Loggers .....	16-1 to 17-2	1700 to 2200
Chunks	Eastern and Export Chunks .....	15 to 16	1300 to 1550
	Farm Chunks .....	15 to 15-3	1200 to 1400
	Southern Chunks .....	15 to 15-3	800 to 1250
Wagon Horses	Expressers .....	15-3 to 16-2	1350 to 1500
	Delivery Wagon .....	15 to 16	1100 to 1400
	Artillery Horses .....	15-1 to 16	1050 to 1200
	Fire Horses .....	15 to 17-2	1200 to 1700
Carriage Horses	Coach .....	15-1 to 16-1	1100 to 1250
	Cobs .....	14-1 to 15-1	900 to 1150
	Park Horses .....	15 to 15-3	1000 to 1150
	Cab .....	15-2 to 16-1	1050 to 1200
Road Horses	Runabout .....	14-3 to 15-2	900 to 1050
	Roadster .....	15 to 16	900 to 1150
Saddle Horses	Five-Gaited Saddler .....	15 to 16	900 to 1200
	Three-Gaited Saddler .....	14-3 to 16	900 to 1200
	Hunters (Light—Middle—Heavy)..	15-2 to 16-1	1000 to 1250
	Cavalry Horses .....	15 to 15-3	950 to 1100
	Polo Ponies .....	14 to 14-2	850 to 1000
Mining Mules .....		12 to 16	600 to 1350
Cotton Mules .....		13-2 to 15-2	750 to 1100
Sugar Mules .....		16 to 17	1150 to 1300
Farm Mules .....		15-2 to 16	900 to 1250
Draft Mules .....		16 to 17-2	1200 to 1600

# SUGGESTED RATIONS FOR HORSE FEEDING

13.3

	Grain
Colt (at weaning time) .....	2 lbs. oats
Colt (one year old) .....	4 lbs. oats
Horse (two year old) .....	6 lbs. oats

Roughage
Hay ad. lib.
Hay ad. lib.
Hay ad. lib.

Rations for 1000 lb. horse—

Type of Work	Grain	Roughage
Maintenance for Idle Horse	5 lbs. ear corn	3 lbs. alfalfa hay 9 lbs. corn stover
	4 lbs. oats or rolled barley	4 lbs. clover hay 10 lbs. oats straw
		4 lbs. alfalfa hay 14 lbs. corn fodder
Very Light Work	10 lbs. ear corn	5 lbs. alfalfa hay 5 lbs. timothy hay
	8 lbs. oats	4 lbs. alfalfa hay 6 lbs. timothy hay
	8 lbs. rolled barley	4 lbs. alfalfa hay 5 lbs. prairie hay
Medium Work	13 lbs. ear corn	6 lbs. alfalfa hay 7 lbs. timothy hay
	12 lbs. oats      1½ lbs. bran	11 lbs. timothy hay
	10 lbs. rolled barley	6 lbs. alfalfa hay 5 lbs. prairie hay

(13.3)

**Severe Work**

12 lbs. shelled corn	12 lbs. alfalfa hay
2 lbs. bran	4 lbs. corn stover
12 lbs. oats	8 lbs. timothy hay
2 lbs. bran	5 lbs. clover hay
10 lbs. rolled barley	8 lbs. alfalfa hay
2 lbs. gluten meal	6 lbs. prairie hay

All feeds must be clean. For every 100 lbs. increase in liveweight add 10% to the ration. Figures based on U. S. Farmers' Bulletin 1030.

**ALFALFA VS. PRAIRIE AND TIMOTHY HAY FOR HORSES**  
(140 day trial)

Horses in each lot	Average ration lbs.	Initial weight	Av. Gain or loss per head	Daily cost of feed per 1000 lbs. liveweight
17	Alfalfa hay 10 Shelled corn 8 Oats ..... 2	1163	25.6	(cents) 12.95
74	Prairie hay .14 Corn ..... 4 Oats ..... 8	1185	-12.9	18.86
76	Timothy hay 14 Corn ..... 4 Oats ..... 8	1159	- 7.7	19.21

Alfalfa fed horses showed no shortness of wind, softness, lack of endurance or excess urination.

—Kan. Bul. 186.

**\*RANGE PRODUCTION OF BEEF—MARKETING AT DIFFERENT AGES**  
**(Based on Range with 360 Head Capacity)**

Cattle Marketed as	Range Capacity (360 Head)	Head Marketable Annually	Average Weight	Total Weight
3 year olds	119 cows (83 calves) 81 yearlings 79 2-yr. olds 77 3-yr. olds	77	1140	87,780
2 year olds	151 cows (106 calves) 103 yearlings 101 2-yr. olds	101	940	94,940
Yearlings	210 cows (147 calves) 145 yearlings	145	700	101,500
Calves	360 cows (252 calves)	252	400	100,800

\*John T. Caine, Ill., 21st Annual Convention, Amer. Nat'l. Livestock Assoc.

**GRAIN REQUIREMENTS FOR FATTENING STEERS****13.4**

Grain required for 100 pounds gain fattening steers in feed lot different periods.

Feeding Period	Grain for 100 lbs. gain	Increase of feed required
Up to 56 days.....	730 lbs. of grain	
Up to 84 days.....	807 lbs. of grain	10 per cent
Up to 112 days.....	840 lbs. of grain	15 per cent
Up to 140 days.....	901 lbs. of grain	23 per cent
Up to 168 days.....	927 lbs. of grain	27 per cent
Up to 182 days.....	1000 lbs. of grain	37 per cent

Types and Market Classes of Livestock—Vaughn.

**WINTERING STEERS**  
**(90 day period—No grain fed)**

Feeds per Head Consumed Daily	Daily Gain Lbs.	Total Gain Per Head	Pounds feed for 100 lbs. gain
Corn Silage .....63 lbs.	2.4	216	2600
Fodder silage .....45 lbs.	1.94	175	2300
Corn fodder .....28 lbs.	1.76	158	1600
Corn silage .....31.5 lbs.	1.25	112	Silage 2500
Prairie hay ..... ad lib.			Hay 770
Millet .....21 lbs.	.63	14	13200

Steers weighed average of 775 lbs. each.

S. Dak. Bul. 137.

# **ROOTS VS. CORN SILAGE FOR FATTENING STEERS**

Daily Allowance per Head lbs.	Daily Gain Lbs.	Lbs. Feed for 100 Lbs. Gain		
		Concentrates	Prairie Hay	Silage or Roots
Corn Silage ..... 7.	2.54	835	227	277
Prairie Hay ..... 5.8				
Sugar Beets ..... 6.3	2.55	823	217	248
Prairie Hay ..... 5.5				
Mangels ..... 9.	2.61	813	284	343
Prairie Hay ..... 7.4				
Stock Beets ..... 8.9	2.39	873	257	374
Prairie Hay ..... 6.1				

90 day feeding trial; 4 yearling steers averaging 800 lbs. in each lot; concentrates consumed daily by each steer were 19.4 lbs. shelled corn and 1.7 linseed meal.

S. Dak. Bul. 137.

## STEER FEEDING RESULTS—SOUTH DAKOTA 1914

13.4

	Lot 1	Lot 2	Lot 3	Lot 4	Lot 5
<b>Preliminary Feeding</b>	Corn	Corn	Corn	Corn	Corn
<b>Period—91 days</b>	Silage	Silage	Silage	Silage	Silage
Feeds fed—		Red Clover	Sweet	Alfalfa	Prairie
		Hay	Clover Hay	Hay	Hay
Av. daily gain	2.32	2.29	2.45	2.49	2.01
Total gain per head	211	208	223	227	183
Cost per 100 lbs. gain.	\$4.03	\$4.40	\$4.34	\$4.30	\$4.70
Feed for 100 lbs. gain.	s. 2700	s. 2500	s. 2300	s. 2300	s. 2900
		h. 150	h. 150	h. 160	h. 150
<b>Fattening Period—</b>					
<b>101 days</b>		Ground	Ground	Ground	Ground
Feeds fed daily (lbs.)—		corn 15.7	oats 15	Barley 14.8	Speltz 16
Corn Silage	56	17.4	17	14.2	17
Oil Meal	2.93	1.5	1.5	1.5	1.7
Av. Daily gain	2.24	2.26	1.78	2.28	2.24
Total gain per head	227	228	180	231	226
Cost per 100 lbs. gain	\$6.10	\$9.37	\$11.65	\$9.65	\$9.47
Feed for 100 lbs. gain					
Corn silage	2500	770	970	760	770
Oil meal	100	7	860	720	700
Ground feed		690	8	7	7
<b>Av. cost per 100 lbs.</b>					
<b>gain during 192 days</b>	\$5.10	\$7.20	\$7.60	\$7.00	\$7.38

Four 775 lb. steers in each lot. Silage valued at \$3.00 per ton, leguminous hays at \$10.00 per ton, prairie hay at \$6.00 per ton, oil meal at \$36.00 per ton and ground grain at \$1.00 per cwt,  
S. Dak. Bul. 160.



**SUGGESTED RATIONS FOR BEEF CATTLE**  
**Wintering Breeding Cows—**

**No. 1.**

Corn silage 56-60 lbs.  
Oil meal (or cottonseed meal) 1 lb.

**No. 2.**

Corn silage 25-35 lbs.  
Oil meal 2 lbs.  
Straw 10-15 lbs.

**No. 3.**

Corn silage 30-40 lbs.  
Alfalfa hay 10 lbs.  
or Clover hay 10-15 lbs.  
or wild hay 10-15 lbs.

**CHAMPION COWS OF THE DAIRY BREEDS****Holstein Friesian.**

Bella Pontiac, 46321 C. H. B.  
Milk one year 27,017 lbs.  
Butterfat one year 1311.46 lbs.

**Guernsey:**

Countess Prue, 43785  
Milk one year 18,626.9 lbs.  
Butterfat one year 1103.28 lbs.

**Jersey:**

Lad's Iota, 350672  
Milk 365 days, 18,632 lbs.  
Butterfat, 1048.07 lbs.

**Ayrshire:**

Lily of Willowmoor, 22269  
Milk one year, 22,596 lbs.  
Butterfat one year, 955.56 lbs.

**Brown Swiss:**

College Bravura 2d, 2577  
Milk one year, 19,460.6 lbs.  
Butterfat one year, 798.16 lbs.

Age		Ayrshire		Brown Swiss		Guernsey	Holstein		Jersey	
		Milk in 365 days	Fat in 365 days	Milk in 365 days	Fat in 365 days	Fat in 365 days	Fat in 7 days	Fat in 365 days		Fat in 365 days
2 yr.	Jr.	6000	250.5	6000	222	250.5	7.2	250.5		250.5
	Sr.	6500	268.8							
3 yr.	Jr.	7000	287.1	6429	238.4	287	8.8	287		287
	Sr.	7500	305.4							
4 yr.	Jr.	8000	323.7	7286	271.3	323.5	10.4	323.5		323.5
	Sr.	8500	342							
5 yr. ....		9000	360	8143	304.1	360	12	360		360
6 yr. ....				9000	337					

## **COW TESTING ASSOCIATION REQUIREMENTS**

1. There must be 26 farmers or dairymen as members, so that the tester may visit one herd for each working day in the month.

2. The cost will be approximately \$2.50 to \$3.00 per cow and at least 350 cows must be included in the association, or a flat rate of \$35.00 to \$40.00 annually may be charged each member.

3. The business of the association should be conducted through a well perfected organization with constitution and by-laws.

4. A good qualified man should be hired as tester by the association.

5. Semi-official yearly tests may be arranged for in this connection. They are conducted on two consecutive days each month. Strictly official tests are supervised daily by an official tester and are usually of 7 or 30 days duration.

6. At times it may be advisable to test cows only once every two months. This would materially reduce the cost per member, and at the same time secure satisfactory results. Under this modified plan there should be 52 members.

# MILKING MACHINES VS. HAND MILKING

Time Required per Milking, by Machine and by Hand, for Herds of Different Sizes.

	Hand Milking				Machine Milking			
	Number of Farms	Number of Milkers per Herd	Minutes per Milking per Cow	Number of Cows per Milker	Number of Farms	Number of Operators per Herd	Minutes per Milking per Cow	Number of Cows per Operator
15 cows and less .....	28	1.4	7.3	8.25	32	1.1	4.8	10.6
15 to 30 cows .....	63	2.4	6.85	9.7	72	1.5	4.45	15.3
30 to 50 cows .....	16	3.1	6.85	13.3	41	1.9	4.1	20.5
50 cows or more .....	6	4.3	7.1	17.0	11	2.4	3.2	27.8

U. S. Dept. Bul. 432.

## SUGGESTED DAIRY RATIONS

### 6 Mos.—1 Year of Age—

Grain—Same mixture as for calf feeding in proportion of one pound grain daily for first hundredweight of heifer and one-half pound for each additional hundredweight.

Roughage—Good pasture or all leguminous hay they will eat. With roughage other than legumes add 1 part of linseed oil meal to the grain mixture.

### Over 1 Year of Age—

Corn silage with alfalfa hay make a very good ration. With roughage other than legumes feed 2 parts ground corn, 4 parts ground oats and 1 part bran.

## DAIRY CATTLE RATIONS

### Suggestions—

1. Under most circumstances the cow should be fed all the roughage that she will eat up clean, adjusting the grain ration to the milk production.

2. A grain mixture should be fed in the proportion of 1 pound to each 3 to 4 pints or pounds of milk produced daily by the cow. Another rule is 1 pound of grain each day for every pound of butter fat produced during the week.

3. Feed all the cow will respond to in milk production. When she begins to put on flesh, change ration or cut down the grain.

4. When on pasture it is not profitable to feed a grain mixture to the average cow.

Grain Mixtures with Low Protein Roughages as Corn Silage, Corn Stover, Timothy, Prairie Hay and Millet Hay.

#### No. 1.

	Lbs.
Ground Barley .....	100
Ground Corn .....	100
Ground Oats .....	300
Wheat Bran .....	100
Oil Meal .....	100

#### No. 2

	Lbs.
Corn and Cob Meal .....	200
Wheat Bran .....	100
Oil Meal .....	100

Grain Mixtures with High Protein Roughages as Clover, Alfalfa or any Leguminous Hay.

## No. 1.

	Lbs.
Ground Corn .....	200
Ground Oats .....	100
Ground Barley or Speltz .....	100
Wheat Bran .....	100

## No. 2.

	Lbs.
Ground Barley, Speltz or Corn .....	300
Alfalfa Meal .....	100
Bran .....	100

Grain Mixtures with Low and High Protein Roughages, as Corn Silages and Leguminous Hay or Corn Stover and Leguminous Hay.

## No. 1.

	Lbs.
Ground Barley or Speltz .....	100
Ground corn .....	100
Ground oats .....	300

## No. 2

	Lbs.
Ground Corn .....	200
Ground Oats .....	200
Bran .....	100

## MILK AND CREAM TESTING

### Milk Tests—Causes of poor tests—

Insufficient mixing of milk and acid, which may cause either a burned test, or leave some undissolved curd.

Too much or too little acid, the former giving a dark fat column containing charred matter and the latter a very light one with some undissolved curd at the bottom of the fat column.

Too strong or too weak acid.

Too high temperature of either acid or milk or both.

Too slow speed on tester, and using hard water.

### Cream Tests—Causes of Variation—

Change in the position of the cream screw.

Change of speed at which separator is turned. Low speed thinner cream, and higher speed thicker cream.

Vibrating bowl—uneven or unfirm foundation. Thin cream.

Dirty separator—thin cream.

Too much rinse water—thin cream.

Incorrect rate of inflow.

Temperature of milk. Warmer milk means thinner cream. Skim as soon as milked.

## FORMULA FOR STANDARDIZING MILK AND CREAM

X—represents the per cent of fat in the milk or cream to be standardized.

Y—represents the per cent of fat in the milk, cream or skim milk to be used in standardizing X.

Z—represents the per cent of fat desired in the standardized product.

(Y—Z) or (Z—Y) equals pounds of X to use.

(X—Z) or (Z—X) equals pounds of Y to use.



# SELF-FED VS. HAND FED SYSTEMS AND STANDARDS IN THE DRY LOT.

(Table of comparisons for growing and fattening pigs. Pigs 2½ to 6 mos. old—first 100 days of feeding.)

System	Group No. Standard	I. Choice Free Self Fed	II. Choice Free Hand Fed Thrice	III. Choice Free Hand Fed Twice	IV. Dietrich Water Free Will	V. Dietrich Water Weighed	VI. Kellner	VII. Wolff- Lehmann
Average daily gain .....		1.13	1.16	.95	.85	.83	.79	.59
Average final weight .....	155.	158.	137.	127.	125.	121.	101.	
Average feed eaten daily .....	4.62	4.84	4.09	3.64	3.64	3.23	2.63	
Feed required for 100 pounds gain..								
Shelled corn .....	300.	296.	287.	304.	311.	283.	334.	
Wheat middlings .....	53.	64.	78.	63.	64.	59.	55.	
Tankage .....	55.	58.	65.	60.	61.	66.	57.	
Total all feeds .....	408.	418.	430.	427.	436.	407.	446.	
Cost 100 pounds gain* .....	\$ 5.90	\$ 6.07	\$ 6.35	\$ 6.21	\$ 6.35	\$ 6.03	\$ 6.42	
Profit per hog** .....	1.25	1.08	.62	.67	.54	.77	.34	

\*Prices of feeds: Shelled corn, 70 cents; wheat middlings \$1.45; tankage \$2.50.

\*\*Hogs selling at \$7.00, feeds as charged in gain cost.

Iowa Experiment Station.

**SUGGESTED HOG RATIONS\*****Dry Lot Feeding**

1. Breeding sows (gilts and sows should be gaining  $\frac{1}{2}$  to 1 lb. daily during pregnancy.)
  - (a) Breeding time (Flush to increase the number in litter, starting 10 days before breeding.)
  - (b) During pregnancy.
    - (1) Corn (50 to 75) self fed. Ground alfalfa (50 to 25) self fed. Increase or decrease alfalfa to govern fatness of sows.
    - (2) Corn 90, tankage 10.
2. Suckling sows (limit feed for first 10 days getting onto full feed as soon as possible.)
  - (1) Corn, middlings and tankage—self-fed; salt.
  - (2) Corn 70, middlings 15 and tankage 15; salt.
3. Growing and fattening hogs for market.
  - (a) Suckling pigs, 5 to 40 lbs. (fed in a creep) Corn, middlings and tankage—self-fed; salt.
  - (b) Weanling pigs, 30 to 100 lbs.
    - (1) Corn, middlings and tankage—self-fed; salt.
    - (2) Corn 80 and tankage 20.
  - (c) Shoates, 100 to 175 lbs.
    - (1) Corn, middlings, tankage—self-fed; salt.
    - (2) Corn 90 and tankage 10.
  - (d) Hogs. 175 to 350 lbs.
    - (1) Corn and tankage—self-fed; salt and charcoal.
    - (2) Corn 95 and tankage 5; salt and charcoal.
  - (e) Sows for market
    - (1) When in "run down" condition—corn and tankage—self fed, salt and charcoal; omit tankage last 2 or 3 weeks.
    - (2) When in good thrifty condition—all corn they will eat, salt.
  - (f) Stags for market (feed same as sows)

**Pasture Feeding**

1. On pastures of low protein as dry hard blue grass, millet, sorghum, timothy, rye or wheat over 8 inches and oats and barley over 5 inches. Feed practically the same rations as for dry lot.
2. On pastures of high protein as alfalfa, rape clover and young tender blue grass and timothy. Practically same feed as in dry lot, except to mature fattening hogs and brood sows. Mature fattening hogs, those

over 175 lbs. do well with just corn alone, while brood sows do well with corn 90 and tankage 10.

\*NOTE—Rations given on basis of pounds in a hundred total. If skim milk is substituted for tankage, use 20 times as much or with middlings, 17 times as much. Salt ought always be placed before the hogs. Charcoal made from corn cobs is good, especially when hogs are largely on a corn feed. Barley, rye, emmer, millet kaffir corn, milo maize and sorghum seed (any of which should be ground) are all quite similar to corn and may be used as a substitute for it.

### COMPARATIVE VALUE OF HOG FEEDS

	Pounds of pork produced per bushel of corn
Corn alone .....	10.
Corn and shorts (2 to 1) .....	12.
Corn and blue grass .....	12.5
Corn and tankage (10%) .....	14.
Corn and soy beans (7 to 1) .....	14.
Corn and clover .....	14.
Corn and milk (1 to 3) .....	17.4

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**COMPARATIVE VALUE OF SKIM MILK AND OTHER SUPPLEMENTS TO GRAIN FOR  
HOG FEEDING**

When 100 lbs. Tankage Costs	100 lbs. Skim Milk is Worth	When 100 lbs Middlings Costs	100 lbs. Skim Milk is Worth	When 100 lbs. Oil Meal Costs	100 lbs. Skim Milk is Worth	When 100 lbs. Soy Bean Meal Costs	100 lbs. Skim Milk is Worth
\$2.00	\$.22	\$1.00	\$.27	\$1.50	\$.16	\$2.00	\$.19
2.25	.25	1.25	.33	1.75	.19	2.25	.21
2.50	.28	1.50	.40	2.00	.21	2.50	.23
2.75	.31	1.75	.47	2.25	.24	2.75	.26
3.00	.33	2.00	.54	2.50	.27	3.00	.28
3.25	.36	2.25	.61	2.75	.29	3.25	.30
3.50	.39	2.50	.67	3.00	.32	3.50	.32
3.75	.42	2.75	.74	3.25	.34	3.75	.35
4.00	.44	3.00	.81	3.50	.37	4.00	.37
4.25	.47					4.25	.39
4.50	.50					4.50	.41
4.75	.53					4.75	.43
5.00	.56					5.00	.46

Mich. Agri. Exp. Sta. Bul. 92.

### VALUE OF MILK IN HOG FEEDING

State Experimental Results—Av. Initial Wt. of Hogs 92 lbs.

Feed	Average Gain per Head (pounds)	Grain for Pound of Gain (pounds)
Lot 1—Shelled corn .....	64.5	4.68
Lot 2—Shelled corn and sweet milk .....	101.5	3.12
Lot 3—Shelled corn and sour milk .....	101.5	3.18
Lot 4—Shelled corn and buttermilk .....	103.	3.15

S. D. Exp. Sta. Bul.136.

### KAOLIANG MEAL AND ALFALFA HAY IN HOG FEEDING

(Results of period Feb. 1 to Mar. 28, 1914, 4 pigs each lot, average initial weight was 200 lbs.)

	Average Gain per Head (pounds)	Grain for pound Gain (pounds)
Lot 1—Kaoliang Meal and Alfalfa Hay .....	54	5.81
Lot 2—Kaoliang Meal .....	48	6.61
Lot 3—Corn Meal and Alfalfa Hay .....	73	4.63
Lot 4—Corn Meal .....	66	5.22

S. Dak. Exp. Sta. Bul. 157.

**VALUE OF FORAGE CROPS FOR HOGS**  
(Figures obtained from 1 to 5 years results)

Crop	Number Hogs per Acre	No. Days Pasture	Pounds Gain accredited to acre of forage	Pounds of Grain per Pound of Gain
Alfalfa .....	10.3	163.	591.8	3.07
Red Clover .....	11.	133.	567.7	2.95
Rape, Oats and Clover.....	10.	90.	414.6	2.47
Rape .....	19.	98.	392.8	2.74
Rape and Oats .....	9.3	126.	354.1	3.6
Blue Grass .....	12.	165.	324.6	4.5
Sorghum .....	15.	86.5	275.	4.
Cowpeas .....	12.	32.8	212.7	3.58
Rye .....	12.	49.6	211.7	1.96
Soybeans .....	14.	31.	117.6	3.

Mo. Agri. Exp. Sta. Bul. 110

The gains on forage were made from 20 to 30 per cent cheaper than those on dry lot feeding. The average number of hogs that may be profitably pastured on an acre of forage ranges from 8 to 14 head, depending upon abundance of forage.

**HOGGING DOWN CORN**  
**Varieties of Corn for Hogging Down and Value of Rape Supplement.**

42 day feed 6 hogs in each lot av. 95 lbs. each	Minnesota 13	Wis. White Dent	Yellow Triumph Flint
	Corn Alone With Rape	Corn Alone With Rape	Corn Alone With Rape
Av. Gain per Head Lbs.	44	47	45
		57	44
			58

S. Dak. Bul. 157.

**Number Days Required for Pigs to Clean Up One Acre Corn**  
**(Hogging Down—125 lbs. pigs)**

Number pigs foraging	Yield 40 bu. per acre	Yield 50 bu. per acre	Yield 60 bu. per acre	Yield 70 bu. per acre
	Days	Days	Days	Days
20	15	19	23	26
40	8	9	11	14
60	5	6	8	9
80	4	5	6	7

Minn. Exp. Station.

# Comparative Value of Supplements in Hogging Down Corn (1909-11)

Supplement, if any, to Standing Corn "Hogged Down"	Initial Weight of Shotes (pounds)	Hog Gain accredited to the acre (pounds)	Cost per 100 lbs. Pork
Corn, alone .....	69	357.2	3.14
Meat meal 10% .....	69	795.0	2.43
Rape and pumpkins .....	92	651.7	1.86
Soybeans .....	81	535.7	2.73
Canadian fieldpeas .....	50	333.8	4.42
Rye, green and meat meal 10%....	69	789.6	2.69

Ia. Exp. Sta. Bul. 143

Cost of growing corn to maturity was \$11.15 per acre.



**COMPARATIVE VALUE OF GRAINS IN SHEEP FEEDING**  
(110 day feeding trial)

Average Ration Lbs.		Lambs in each Lot	Initial Weight	Daily Gain Lbs.	Feed for 100 lbs. gain	
					Grain	Hay
Oats	1.6					
Mixed hay	1.3	10	70	.25	650	535
Shelled corn	1.5					
Mixed hay	1.3	10	71	.28	561	485
Emmer	1.8					
Mixed hay	1.4	18	75	.29	660	511
Shelled corn	1.6					
Mixed hay	1.4	19	76	.32	513	462

S. Dak. Bul. 80 and 86.

**FATTENING LAMBS ON GRAIN AND RAPE PASTURE**

(Av. results for 1908-09; 11 and 12. Lambs in each lot averaging 70 lbs. each and fed for 37½ days.)

Kind of Feed	Grain Consumed Lbs.	Total Gain Lbs.	Av. Daily Gain Lbs.
Rape .....		157.7	.355
Rape, pasture and shelled corn .....	242.5	148.5	.33
Rape, pasture and oats .....	292.5	185.	.405
Rape, pasture and barley .....	297.5	184.5	.40

**FATTENING LAMBS ON ALFALFA AND PRAIRIE HAY**

(Results in 1908, 10 lambs each lot, averaging 87 lbs. and fed for 44 days.)

Kind of Feed	Pounds Grain Consumed	Pounds Hay Consumed	Total Gain	Cost per lb. gain in cents
Alfalfa hay and grain mixture..	967	1238	313	4.2
Prairie hay and grain mixture..	967	940	234	5.3

Grain mixture consisted of corn, oats and oil meal costing 1c per lb. The hay cost 3c per lb. Sheep valued at 7c per lb. South Dakota Experiment Station Bulletin 119.

**SUGGESTED RATIONS FOR SHEEP****Breeding Ewes**

Feed  $\frac{1}{2}$  lb. of any of the following grain mixtures per ewe daily; also 2 lbs. sweet silage and 2 to 4 lbs. bright clean hay. Avoid feeding too much corn to breeding ewes. For suckling ewes the grain mixture may be increased to  $\frac{3}{4}$  or 1 lb. per ewe daily. Mixtures Nos. 1 and 2 recommended where good leguminous hay is fed. Mixture No. 3 also suitable for stimulating milk flow of suckling ewe.

**No. 1**

Oats or ground barley.....	60 lbs.
Bran .....	40 lbs.

**No. 2**

Shelled corn .....	25 lbs.
Oats .....	75 lbs.

**No. 3**

Shelled corn or barley .....	45 lbs.
Oats .....	45 lbs.
Oil meal .....	10 lbs.

## MARKET CLASSIFICATION AND GRADES OF WOOL

The wool from any particular breed of sheep is not always given the same market grade. Wool is graded upon the basis of length, fineness, quality and condition. The finer the wool the more grease it has and the higher will be its percent shrinkage.

Length	Fineness or Grade	Condition
Clothing—under 2 inches in length and sound. Weak wool that is longer falls in this class.	XX—Fine— $\frac{1}{2}$ blood— $\frac{3}{8}$ blood and $\frac{1}{4}$ blood	Domestic— Clean and bright from sheep under best of management.
Delaine—fine wool that is 2 to 3 inches long.	Fine and medium	Territory— Dirty or discolored, produced under range condition.
Combing—over 3 inches long.	Fine— $\frac{1}{2}$ blood— $\frac{3}{8}$ blood— $\frac{1}{4}$ blood and braid.	Blanket and Carpet— Poorest kinds of wool, worst features being presence of hemp or dead fibres.
Burly, cotted, seedy, chaffy or black wool represent lowest grades.		

Merinos and Rambouillets—produce wool of higher grade than  $\frac{1}{2}$  blood.

Southdown—produce wool of  $\frac{3}{8}$  blood, usually clothing.

Shropshire—produce wool of  $\frac{3}{8}$  blood, combing or clothing.

Oxford, Hampshire, Cheviot and Dorset—produce wool of  $\frac{1}{4}$  blood or higher.

Cotswolds, Lincolns and Leicester—produce wool of  $\frac{1}{4}$  blood or braid combing.

## PRINCIPLES OF HOUSING POULTRY

### 1. Fresh Air—

May be had through open front houses, allowing 1 square foot of opening to 20 square feet of floor space. Openings should be fitted with frames covered with muslin or burlap for severe or stormy weather. This type of house should be 14 to 20 feet deep with back, ends and roof as near air tight as possible.

### 2. Dryness—

is secured by abundance of fresh air and sunlight at all times. Buildings should be located on high ground with good air and surface drainage. Floors should be 6 to 10 inches above outside ground level.

### 3. Sunlight—

is of vital importance and windows should be arranged to admit all sunshine possible. Face buildings south and use two sash windows placing them so as to extend from a little below the eaves to within 2 feet of the floor. Use about one square foot of glass to 10 square feet of floor space.

### 4. Floor Space—Depends upon breeds.

Light breeds require 3 square feet floor space per bird. General purpose breeds require 4 square feet floor space per bird. Meat breeds require 5 square feet floor space per bird.

### 5. Arrangement—

Houses should be 7 feet in the clear at the highest point. Roosts should be placed at rear of house and about 8 inches above drop boards, which should be about 3 feet above the floor. Nests should be arranged along the side walls. Allow one nest to each 5 birds if trap-nesting 1 nest to each 3 birds. Feed hoppers and drinking fountains should be placed in center of house and raised about 18 inches above the floor to prevent hens scratching filth into them. Roosts, nests, feed hoppers and fountains should be removable, if the house is to be kept free from mites.

## CLASSES AND BREEDS OF POULTRY

**Chickens:**

Class	Standard Weights—Pounds			
	Cockerel	Cock	Pullet	Hen
1. Meat Producing (3 most popular breeds)—				
Brahma .....	9-10	11-12	7-8	8.5-9.5
Cochin .....	9	11	7	9.5
Langshan .....	8	9.5	6.5	7.5
2. General Purpose (4 most popular breeds)—				
Plymouth Rock .....	8	9.5	6	7.5
Rhode Island .....	7.5	8.5	5	6.5
Wyandotte .....	7.5	8.5	5.5	6.5
Orpington .....	8.5	10	7	8
3. Egg Producing (4 most popular breeds)—				
Leghorn .....	4.5	5.5	3.5	4
Ancona .....	4.5	5.5	3.5	4.5
Minorca .....	6.5-7.5	8-9	5.5-6.5	6.5-7.5
Andalusian .....	5	6	4	5
<b>Turkeys</b> (3 most popular breeds)—				
Bronze .....	25	36	16	20
White Holland .....	20	28	14	18
Bourbon Red .....	20	30	12	18

**Ducks** (3 most popular breeds)—

	Young Drake	Adult Drake	Young Duck	Adult Duck
Pekin .....	8	9	7	8
Rouen .....	8	9	7	8
Muscovy .....	8	10	6	7

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**Geese** (3 most popular breeds)—

	Young Gander	Adult Gander	Young Goose	Adult Goose
Toulouse .....	20	26	16	20
Embden .....	18	20	16	18
Chinese .....	10	12	8	10

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**ESSENTIALS IN SELECTING BREEDERS**

1. Select only fowls that conform to breed standard.
2. Constitutional vigor, size, shape, reproducing qualities, eye, and plumage color are of utmost importance.
3. In selecting fowls for egg production look for fowls with:
  - (1) **Head** that is fairly broad and deep, with a stout, well curved beak, with bright color in comb, face and wattles and bright snappy eyes.
  - (2) **Back** of fair length and good breadth.
  - (3) **Body** that is straight from front to rear with good depth from top of back at hip joint to bottom line of abdomen between the legs.
    - (a) Pelvic bones should be well spread, thin (1-4 to 1-3 inch in class 2), pliable, and rounded at the end, never spur like. In Class 3 pelvic bones should be from 1-4 to 3-8 in thickness.
    - (b) Good length between point of breast bone and points of pelvic bones indicate capacity. Any mature fowls with less than  $2\frac{1}{4}$  inches between the foregoing points should be culled from laying flock.
  - (4) **Legs** stout and of fair length, with short toe nails, the latter being indications of working fowls. Long toe nails indicate either disease or laziness.



## PRACTICAL POULTRY RATIONS

### Laying Hens—

#### Grain Mixture No. 1

Corn .....	10 pounds
Oats .....	10 pounds
Wheat .....	5 pounds

#### Grain Mixture No. 2

Cracked Corn .....	200 pounds
Oats .....	100 pounds

#### Mash No. 1

Ground Oats or Barley .....	10 pounds
Corn Meal .....	10 pounds
Meat Scraps .....	5 pounds
Meat Scraps or Tankage .....	5 pounds

#### Mash No. 2

Ground Corn .....	100 pounds
Ground Oats .....	200 pounds
Tankage .....	100 pounds
Salt .....	4 pounds

The mash should be fed in a self feeder and the grain mixture fed in deep litter lightly in the morning and heavy in the evening, the amounts of grain varied so that the hens will consume about equal parts of the grain and mash. Speltz may be substituted for the oats and barley for the wheat or corn in the grain mixture.

Supply an abundance of green feed and fresh water. Sour milk is an excellent addition if it is obtainable.

### Young Chicks—

Don't feed young chicks until they are 48 hours old because just before the chick emerges from the shell the remainder of the egg yolk is inclosed in the abdomen. This will not be absorbed for 48 to 60 hours. If fed before this time, bowel trouble is liable to result. Fine sand or charcoal may be given as soon as the chicks are removed from the incubator or from under the hen. If buttermilk or sour skim milk are to be had it will be unnecessary to provide other feed until chicks are 72 hours old. It is well to have the buttermilk or sour milk before the chicks at all times.

The ration suggested for laying hens will give good growth to young chicks, but oats and barley should be free from hulls and corn and wheat should be cracked to suitable size.

## PESTS AND DISEASES

### Lice and Mites—

These pests will prove fatal to young poultry. Spray houses with any good disinfectant or heavy oil to destroy mites.

### Head Lice—

Dip tip of finger in melted lard. Apply around comb, back of each ear, under jaw. Keep young poultry in a warm place for several hours after greasing.

### Body Lice—

Sodium flouride under wings, on back, under vent. Or a portion of following ointment about size of sweet pea seed under each wing;

- 1 ounce blue ointment
- 2 ounces cup grease.

### White Diarrhea—

From two days to two weeks after hatching diarrhea appears. Chicks become stupid, wings droop, pasty white diarrhea. Chicks die in a few days.

### Brooder Pneumonia—

Affects chicks under four weeks. Become sleepy, wings droop, eyes close, feathers ruffle, head turns towards body, labored or wheezy breathing, accumulation of mucus about the nostrils.

## **13. LIVESTOCK**

Livestock production statistics

Judging ages of animals

Car load weights and capacities

### **13.1 Breeding**

Gestation and mating table

Livestock breed associations

South Dakota livestock breeders' associations

Livestock exhibit classifications and terms

Value of purebred sire

Essentials of a bull association

### **13.2 Feeding**

Average weight of feeding stuffs

Nutrients in feeding stuffs

Cost table per pound

Cost of pasture per cow per day

Precautions in calf feeding

Approximate yearly cost of feeding livestock

### **13.3 Horses and Mules**

Market classes

Suggested rations

### **13.4 Beef Cattle**

Range production table

Grain required for fattening steers

Wintering steers

Corn silage vs. roots for steer feeding

Steer feeding experimental results 1914

Suggested rations

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## **13.5 Dairy Cattle**

Highest producing cows each breed  
Advanced registry requirements  
Cow testing association requirements

### **13.51 Management**

Hand vs. machine milking  
Suggested rations

### **13.52 Milk, Cream, Butter, Cheese**

Causes of poor tests in testing  
Standardizing milk and cream

## **13.6 Hogs**

Self-feeding vs. hand feeding  
Suggested rations  
Comparative value of hog feeds  
Value of milk in hog feeding  
Value of forage crops for hogs  
Hogging down corn

## **13.7 Sheep**

Value of grains in sheep feeding  
Grain and rape pasture in fattening lambs  
Alfalfa vs. prairie hay in fattening lambs  
Suggested rations  
Market classifications of wool

## **13.8 Poultry**

Principles of housing  
Classes and breeds  
Essentials in selecting breeders  
Practical rations

## SOME RELIABLE DISINFECTANTS

### Hog Dips and General Disinfectants—

For use in the treatment of swine fever, the following disinfectants are recommended:—

1. A solution of 10% formalin (100 parts of water to 10 parts of formalin) is used for dipping the animals.

2. A solution of 10% carbolic acid (100 parts of water to 10 parts of carbolic acid) is used for dipping the animals.

3. A solution of 10% creolin (100 parts of water to 10 parts of creolin) is used for dipping the animals.

4. A solution of 10% lysol (100 parts of water to 10 parts of lysol) is used for dipping the animals.

5. A solution of 10% soda ash (100 parts of water to 10 parts of soda ash) is used for dipping the animals.

6. A solution of 10% lime (100 parts of water to 10 parts of lime) is used for dipping the animals.

7. A solution of 10% potassium permanganate (100 parts of water to 10 parts of potassium permanganate) is used for dipping the animals.

8. A solution of 10% sodium hypochlorite (100 parts of water to 10 parts of sodium hypochlorite) is used for dipping the animals.

9. A solution of 10% chlorine (100 parts of water to 10 parts of chlorine) is used for dipping the animals.

10. A solution of 10% iodine (100 parts of water to 10 parts of iodine) is used for dipping the animals.

Disinfectant	Concentration	Use
Formalin	10%	Dipping
Carbolic acid	10%	Dipping
Creolin	10%	Dipping
Lysol	10%	Dipping
Soda ash	10%	Dipping
Lime	10%	Dipping
Potassium permanganate	10%	Dipping
Sodium hypochlorite	10%	Dipping
Chlorine	10%	Dipping
Iodine	10%	Dipping

Disinfectant	Concentration	Use
Formalin	10%	Dipping
Carbolic acid	10%	Dipping
Creolin	10%	Dipping
Lysol	10%	Dipping
Soda ash	10%	Dipping
Lime	10%	Dipping
Potassium permanganate	10%	Dipping
Sodium hypochlorite	10%	Dipping
Chlorine	10%	Dipping
Iodine	10%	Dipping

### Cattle and Sheep Scab—

Disinfectant	Concentration	Use
Formalin	10%	Dipping
Carbolic acid	10%	Dipping
Creolin	10%	Dipping
Lysol	10%	Dipping
Soda ash	10%	Dipping
Lime	10%	Dipping
Potassium permanganate	10%	Dipping
Sodium hypochlorite	10%	Dipping
Chlorine	10%	Dipping
Iodine	10%	Dipping

## MIXING DISINFECTANTS

Some of the liquid disinfectants are very hard to get in complete solution in cold or hard water, and for this reason it is best to use soft warm water whenever possible. The most difficulty will be experienced with carbolic acid when attempting to mix it with cold water. The acid settles in small globules and the water contains no disinfectant properties. The pure acid in the bottom will burn severely.

Compound cresol does not mix well with hard water. When so used, a curdled condition of the water results, and its disinfecting properties are greatly reduced. Always mix it in soft water.

The following table will be found useful for preparing disinfecting solutions of the varying strengths.

1 tablespoonful— $\frac{1}{2}$  oz.

2 $\frac{1}{2}$ tablespoonfuls	in 1 gallon	.....1%
5	tablespoonfuls in 1 gallon	.....2%
7 $\frac{1}{2}$	tablespoonfuls in 1 gallon	.....3%
10	tablespoonfuls in 1 gallon	.....4%
12 $\frac{1}{2}$	tablespoonfuls in 1 gallon	.....5%

1 teaspoonful—1-6 oz.

2	teaspoonfuls in 1 quart	.....1%
4	teaspoonfuls in 1 quart	.....2%
6	teaspoonfuls in 1 quart	.....3%
8	teaspoonfuls in 1 quart	.....4%
10	teaspoonfuls in 1 quart	.....5%

Dr. C. C. Lipp, South Dakota State College

## WHITEWASH FORMULAS

1. Half a bushel of unslaked lime. Slake with warm water; cover it during the process to keep the steam. Strain the liquid through a fine sieve strainer. Add a peck of salt previously well dissolved in warm water; three pounds of ground rice boiled to a thin paste and stir in boiling hot; half a pound of powdered Spanish whiting, and a pound of glue which has been previously dissolved over a slow fire. Add five gallons of hot water to the mixture, stir well and let it stand for a few days; cover up to protect from dirt. It should be put on hot. Coloring matter may be put in to make it of any shade, Spanish brown, yellow ochre, or common clay, etc.

It is well to always strain before using in order to prevent any gritty substance from getting into the valves of the sprayer and interfering with its proper operation. With whitewash thin and smooth, no difficulty will be experienced.

2. Slake fresh quicklime in water, and thin it to a paste or paint with skim milk. The addition of 2 or 3 handfuls of salt to a pail of the wash is beneficial. The addition of 3 ounces of chloride of lime to the gallon of whitewash makes an excellent disinfectant.

## PROPER CARCASS DISPOSAL

The carcasses of all farm animals, no matter what the cause of death, should be disposed of in such manner that there will be no danger of spreading disease. There are 2 methods in common use, the first of which is much more preferable than the second.

1. Burning—All dead farm animals should be burned. There is usually little difficulty in completely consuming the carcass if provision is made so that there is a draft of air from the bottom. The smaller animals may be placed on a metal wheel supported on several bricks, wheel acting as a grate allowing burning without hindrance. Larger animals may be placed over the crossing of two trenches dug at right angles; these trenches need be only a few inches deep and 6 or 8 feet long. Heavy sticks of wood or other supporting material should be placed across trenches to support carcass. It is understood that some attention must be given fire after once started otherwise projecting parts of carcass may not be consumed. It is also of utmost importance that burning be complete. No parts should remain unburned. Any kind of fuel will answer the purpose. Much success has resulted from use of kerosene where wood is not obtainable.

2. Burying—When this is followed, the grave must be large enough so that carcass may be placed on its side. It must be deep enough so that smaller carcasses will be covered with at least 4 ft. of earth; larger carcasses should have 6 ft. over them. It is also advisable to cover the carcass with 3 to 6 inches of fresh lime before throwing on dirt.

Under no circumstances must carcasses be thrown into streams, ponds, old wells, ravines or other out of way places. The practice of burying fowls and little pigs in the manure heap is to be condemned.



## DIRECTIONS FOR SECURING, PACKING AND SENDING SPECIMENS FOR EXAMI- NATION TO ANIMAL HEALTH LABORA- TORY, BROOKINGS, S. D.

### 1. Select proper tissues—

Taking those parts that show characteristic lesions. For best results these should be procured as soon after death as possible.

### 2. Prevent Putrefaction—

Between April 1 and December 1, all tissues intended for bacteriological examination, should be packed in a container surrounded by crushed ice. Those desired for microscopic examination should be preserved in equal parts glycerine and water or in formalin solution, 1 ounce formalin in quart of water.

### 3. Pack well—

As important as securing suitable specimens. Regulations require material be packed in clean metal or glass containers about which is sufficient quantity of absorbent material to take up liquids from accidental leakage or breakage.

(1) Small samples blood may be sent in small vials, wrapped in cotton, or a few drops blood placed between two pieces of glass, allowed to dry, wrapped in cotton and mailed.

(2) Small specimens placed in bottles that are well corked and labeled, wrapped in cotton and placed in screw top mailing case or small tin or wooden box.

(3) Large specimens placed in screw top fruit jars and packed in saw dust in wooden box.

### 4. Shipping—

(1) Each specimen should be labeled for identification.

(2) Each package should contain name and address of person sending it.

(3) Each specimen should be accompanied by separate letter giving history of disease symptoms, post mortem evidences, animals lost or sick, number infected and any other available information.

### 5. Remember—

(1) Stomach contents and other fluids suspected to contain chemical poisons should be sent to the Department of Chemistry, State College.

(2) Feeds suspected to contain poisonous plants, moulds or other material of vegetable origin should be sent to the Department of Botany, State College.

# TEMPERATURE, PULSE AND RESPIRATORY TABLE

	Horses	Cattle	Sheep	Hogs	Chickens
Normal Temperature	100 to 101 F	101 to 102 F	102 to 104 F	101 to 103 F	105 to 107 F
Pulse per minute..	28 to 40	50 to 80	75 to 90	60 to 100	
Respirations per minute..	8 to 16	10 to 30	12 to 20	10 to 20	

An increase of 2 or more degrees temperature is an indication of serious trouble somewhere in the animal body. Anything causing fever causes a quickening of the pulse. Additional information is revealed by the respirations; they may be painful, shallow, jerky or otherwise abnormal.

Sub-normal temperatures are very rare, except in old or emaciated animals. Occasionally a disease may be accompanied by sub-normal temperature but such is very rare. Such a temperature is very often evidence of approaching death.

## A SUGGESTED FARMER'S MEDICINE CASE

Whenever an animal becomes suddenly and seriously ill, no time should be lost in securing a veterinarian. Many of the simple ailments are more readily recognized and yield to simple remedies. Whenever an ailment that appears simple does not show a change within a short time, a veterinarian should be called. It is well for every farmer and stockman to have a few medicines on hand for emergencies, hence this suggested list:

Blue vitriol (copper sulphate)....	2 pounds
Carbolic acid .....	$\frac{1}{2}$ pint
Castor Oil .....	$\frac{1}{2}$ pint
Compound solution of Cresol .....	1 gallon
Epsom salts .....	5 pounds
Formalin .....	1 pint
Linseed oil (raw) .....	2 quarts
Potassium Permanganate .....	$\frac{1}{4}$ pound
Sodium fluorid (talcated) .....	1 pound
Tincture of Iodine .....	4 ounces
Turpentine .....	1 quart
White lotion .....	1 pint
White liniment (modified) .....	$\frac{1}{2}$ pint
Drying or healing powder or ointment.	

### Instruments and Dressings:

Absorbent cotton (1 lb.).  
 Bandages, 4 two inches wide, 5 yards long;  
                   and 2 one inch wide, 5 yards long.  
 Clinical thermometer (at least two).  
 Dressing forceps.  
 Graduate for measuring liquids.  
 Hoof knife.  
 Milk tube.  
 Soap (germicide).  
 Surgeon's knife for castrating.  
 Syringes—  
     Hypodermic (10 c c)  
     Metal dose.  
     Rubber syringe (long nozzle)  
 Trocar  
 Twist

**COMMON MEDICINES AND THEIR ACTION**

**Blue Vitriol (copper sulphate)—**

An antiseptic astringent and mild caustic. Used to burn out proud flesh by dusting it on affected part every two or three days, depending upon how it burns. Also used for foot rot.

**Castor Oil—**

Useful physic for colts, calves and hogs  
Dose for mature hog, 2 oz; colts 2 to 4 oz., calves 1 to 2 oz.

**Epsom Salts—**

A good physic especially for ruminants.  
Dose for mature animals—Cow 1 to 1½ lbs., sheep 2 to 4 oz., hog 1 to 2 oz.

**Linseed Oil (raw)—**

A mild physic or laxative. Dose for mature horse 1 to 2 pints.

**Potassium permanganate—**

Good disinfectant used in drinking water for poultry, the proportion being 1 gallon of water to as much permanganate as will remain on a dime.

**Sodium fluorid (talcated)—**

A good powder for destroying lice on poultry.

**Tincture of Iodine—**

Used in destroying ring worms; used externally as a sweat blister, painting part once a day until it blisters, then grease part and permit healing.

**Turpentine—**

Good for colic, bloating and intestinal worms, stimulates kidneys.

**White Lotion—**

Sugar of Lead .....	1 ounce
Sulphate of Zinc .....	6 drachms
Water .....	1 pint

Shake well before using. Extensively used for wounds, sores and scratches.

Can be used three times a day.

**Liniment (modified white)—**

Aqua ammonia (strong) .....	2 ounces
Turpentine .....	2 ounces
Linseed oil .....	2 ounces

Shake—will blister if used freely. Can be made stronger or weaker by changing amounts of ammonia and turpentine.

**Drying and Healing Powder—**

Oxide of Zinc .....	2 ounces
Calomel .....	2 ounces
Boracic Acid .....	2 ounces
Air-slacked Lime .....	2 ounces

Mix. Dust on wound. Good for galls and sores where dry dressing is desired. Can be made into an ointment by adding lard or vaseline.

# PROPORTIONATE DOSES FOR VARYING AGES OF ANIMALS

Doses	Age of Animals			
	Horse	Cow	Sheep	Hog
Full .....	4 years	3 years	1½ years	1½ years
$\frac{3}{4}$ .....	3 years	2 years	1 year	1 year
$\frac{1}{2}$ .....	2 years	1 year	9 months	9 months
$\frac{1}{4}$ .....	1 year	9 months	6 months	6 months
$\frac{1}{6}$ .....	6 months	6 months	3 months	3 months

This table is only suggestive. The development and physical condition of the animal as well as the effect desired must be given consideration in deciding on dose.

## COMMON AILMENTS AND DISEASES OF THE HORSE

A number of the ailments as azoturia, colic and founder may be avoided by proper feeding and watering.

**Feeding**—When horses are idle the grain feed should be reduced at least one half. If idle for 3 or 4 days, the horse should be brought back gradually onto full feed. An occasional bran mash in the feed is excellent. Have blue grass pasture on which horses may be turned onto at night.

**Watering**—A warm or tired horse should never be given all the water he wants to drink. A few swallows will do no harm, but cool him off first and then give him only a moderate amount of water; after having eaten his grain he can be allowed all he will drink. Very cold water is objectionable.

### **Colic:**

**Cause**—Errors in feeding and watering, sudden chilling, development of gas, constipation, impactions, paralysis of bowel movement, twists in intestines and parasites.

**Symptoms**—Sweating, rolling, pawing, unusual attitudes, distended abdomen.

**Treatment**—Call a veterinarian and in meantime make horse as comfortable as possible.

**Prevention**—See paragraph on feeding and watering.

### **Distemper (strangles: Acute, contagious disease.**

**Cause**—Due to a specific variety of pus producing bacterium.

**Symptoms**—Incubation period 4 to 8 days, nasal catarrh, cough, swelling of glands in region of throat, high fever and abscesses may develop in any part of the body but commonly in throat region.

**Treatment**—Call a veterinarian; sanitation is important; exposed horses should be immunized; the treatment for abscesses is operative.

### **Scratches:**

**Cause**—Exposure to mud, melting snow or fumes from decomposing manure.

**Symptoms**—Slight swelling and fever of legs below the knees and oozing through skin of a watery fluid which later removes the hair in small patches.

**Treatment**—Keep the horse in a dry clean stall out of mud and melting snow,

remove crusts of the scabs by washing thoroughly with warm water and germicidal soap and then apply several times daily white lotion rubbing it in thoroughly.

### **Sore Shoulders:**

**Cause**—Most generally due to poorly fitting collar or bad line of draft either high or low.

**Treatment**—Remove the cause; if galls are not bad wash with hot or cold salt water and apply oxide of zinc ointment; it may be necessary to give animal a rest. Clean collars daily.

### **Thrush:**

**Cause**—Dirty stables, muddy roads, poor quality of horn in the feet.

**Symptoms**—Lameness, slight fever in foot, discharge of thin black pus with very offensive odor from cleft of frog.

**Treatment**—Clean stable, keep horse out of mud for few days, cut away all shreds of frog, pack cleft with cotton saturated with tincture of iodine. Renew dressing daily for several days then pack with plain cotton several days more to exclude foreign matter.

### **Wounds or wire cuts:**

Stop the flow of blood with ice water; cleanse wound thoroughly by irrigation rather than with a sponge or cotton; remove foreign matter, shreds of skin and hair. If extensive, call a veterinarian, otherwise dress daily with a mild disinfectant (2%) and encourage healing from the bottom. Repel flies with fly oil or oil of pine tar placed about the edges of the wound but not in it. When healing has become well started, discontinue the liquid disinfectant using the healing powder instead.

## COMMON AILMENTS, DISEASES AND PARASITES OF CATTLE

**Abortion, contagious:** An infectious disease caused by very small germs (*Bacillus Abortus* of Bang.)

Symptoms—Abortion, retained after-birth and failure to breed; may persist for several years.

Treatment—Absolute isolation of infected animals; extreme sanitation including disinfection of the stable, internal and external parts of the cow, disinfecting the bull and the proper disposal of aborted calf, after birth and all soiled bedding. Immunization in experimental stage. Animals usually develop immunity after one or two abortions.

**Anthrax:** An acute, infectious disease of domestic animals and man caused by anthrax bacilli.

Symptoms—Sudden death; diagnosis seldom possible in the living animal; call a veterinarian for diagnosis and management.

Post mortem—Black tarry blood that shows little or no tendency to clot. Spleen is usually considerably enlarged and its pulp much softened.

Treatment—None; prevention by immunization. A warning is issued against laymen handling carcasses in anyway such as skinning or holding post mortems where anthrax is suspected as this disease is infectious to man.

**Blackleg:** Acute infectious disease of cattle and sometimes sheep. Caused by *Bacillus chauvei*.

Symptoms—High temperature, lameness, swellings in portions of body in thick layers of muscle such as upper leg, buttocks and loin; crackling of swellings; for diagnosis and management call a veterinarian.

Post Mortem—Tumors under the skin which contain a dark bloody frothy ill smelling fluid.

Treatment—none; prevent by vaccination; blackleg aggressin is in its infancy but worth a trial.

**Bloating:**

Cause—Due to formation of large quantities of gas in the rumen which cannot readily escape. Caused more particularly by red clover and alfalfa pasture or hay when animals are unaccustomed to them, green corn, frozen cabbage and frozen rape.



**Symptoms**—Distention of abdomen, particularly in upper left portion, many times the triangular space in front of left hipbone becomes so much distended that it produces a drum-like sound when tapped with the finger. There is difficult breathing and extreme distress.

**Treatment**—Drench with one quart of  $1\frac{1}{2}\%$  formalin solution (3 tablespoonfuls of 40% formaldehyde to quart water). Dose may be repeated in an hour if necessary.

Severe cases of bloating or those in which gas forms very rapidly fail to yield to formalin treatment; these animals can only be saved by the prompt use of the trocar. It should be boiled 20 minutes, dried, wrapped in clean paper and kept in a convenient place for instant use. It should be plunged into left flank in the middle of the triangle in front of left hipbone. The point should be directed inward, downward and forward. The stylus should be removed and cannula left in position for several hours or longer if necessary.

A bit made of piece of rope or wood of suitable size kept in animal's mouth to hold it open often assists the escape of gas from the stomach.

**Corn Stalk Disease:** (see hemorrhagic septicemia)—

**Foot Rot:**

**Cause**—Exposure to juices from putrefying manure or mud.

**Symptoms**—Lameness and slight swelling of the foot between the claws and above the hoof.

**Treatment**—Cleanse space between the claws, remove undermined skin and horn, cleanse with 3% disinfectant, apply blue vitriol ointment and bandage entire hoof. Change daily; keep animal in dry clean stall.

**Hemorrhagic septicemia:** An acute or subacute infectious disease caused by a specific variety of germs; it is especially prevalent in the fall.

**Symptoms**—Fever, colic, swellings over the body, constipation at first, bloody feces, unusual actions.

**Post mortem**—Many of the internal organs contain hemorrhages varying in size from a pin head to a lima bean.

**Treatment**—Call a veterinarian; immunization and prevention by vaccination.

**Garget (caked udder):** May be caused by injury or exposure to cold. Some forms are of bacterial origin.

**Treatment**—Remove cow to a stall with plenty of dry bedding. Bathe udder 4 or 5 times a day in as hot water as hand can stand. Dry with a flannel and apply a salve made up of 3 parts of lard and 1 part turpentine; milk out affected part of udder. Severe cases require a veterinarian's services.

### **Lice:**

**Treatment**—

1. Dip animals on a warm day in 3% creolin solution and repeat in 10 days.

2. Winter Treatment—Dust on and rub into skin a powder made from equal parts of flour of sulphur and sabadilla seed.

After first treatment thoroughly clean and spray stables with a disinfectant, reaching every crack and corner.

**Lumpy Jaw:** A chronic infectious disease of cattle and occasionally hogs and man caused by a low form of plant life called ray fungus.

**Symptoms**—Tumors in skin in region of head and neck and sometimes in the tongue.

**Treatment**—Call a veterinarian as treatment is surgical and medical.

**Milk Fever:** Occurs shortly after freshening, chiefly in matured cows.

**Symptoms**—Cow unconscious and paralyzed, convulsions; her position in lying is quite diagnostic.

**Treatment**—Call a veterinarian. If impossible to secure a veterinarian, inflate the udder with air through a milk tube which has previously been boiled for 20 minutes. Before inflating, the teats should be thoroughly disinfected.

**Ringworm:** Found mostly on calves in late winter and early spring and caused by a small parasite in the canals of the skin.

**Symptoms**—Scabby areas from  $\frac{1}{4}$  to 1 inch in diameter with more or less regular outline.

**Treatment**—Paint parts with tincture of iodine for 3 or 4 days.

**Scab:** Caused by a minute parasite which burrows into and under the skin.

**Symptoms**—The presence of small raised patches on skin which itch excessively; later there is an exudation of serum which dries and forms a scab, still later hair falls out; this process may continue until by spring considerable areas of the body surface are attacked. Often makes its first appearance on the neck.

**Treatment**—Dip in lime and sulphur dip.

Repeat in 10 days. When weather will not permit dipping, and scabby areas are small, hand treatment may be tried. Thoroughly clean and spray stable with lime and sulphur dip.

### **Scours—**

#### **Indigestion Scours:**

Cause—Irritating, fermenting putrefying feed or such as is not suited to age or digestive capacity of the calf. This disease is quite prevalent in young calves fed from pails.

Symptoms—Evident from name, general and rapidly increasing weakness, loss of appetite, death.

Treatment—Give one pint of sweet milk to which has been added 3 to 5 drops of formalin. Repeat 4 or 5 times daily if necessary.

**White Scours:** An acute infectious disease affecting calves foals, lambs and pigs in the order named. It is due to various bacteria—colon bacillus the main one.

Symptoms—Evident from name; extreme weakness; disease rarely lasts more than 3 or 4 days; very few cases recover.

Treatment—Call a veterinarian. Isolation and thorough disinfection. Immunization.

**Tuberculosis:** An infectious disease caused by tubercle germs.

Symptoms—Not always diagnostic; gradual loss of flesh, harsh tight skin; persistent diarrhea, cough and difficult breathing. When suspicioned call a veterinarian and have tuberculin test applied. Notify State Livestock Sanitary Board.

Post mortem—Tumors and nodules varying in size from a pin head to an egg, of grayish color outside, yellowish inside and often gritty; these may appear in any of the glands or internal organs.

Treatment—None. Kill infected animals.

## COMMON AILMENTS, DISEASES AND PARASITES OF HOGS

**Hog Cholera:** An infectious disease caused by a filterable virus.

**Symptoms—**

**Acute—**Loss of appetite, fever, emaciation, constipation at first which is later followed by diarrhea. Red spots on skin of belly.

**Chronic—**Same as acute except milder.

**Post mortem—**The evidences vary with the duration of the disease; congestion of glands connected with internal organs, small hemorrhages, ulcers in the large intestine near its attachment to small intestine.

**Treatment—**None. Call a veterinarian for diagnosis and immunization. Prevent by thorough sanitation of houses and lots and immunization.

## HOG CHOLERA SERUM COMPANIES

**HOG CHOLERA SERUM DOSAGE TABLES**  
**Doses for Serum-alone Inoculation.**

Weight of Hog	Dose of Serum
Below 10 pounds .....	10 c. c.
10 to 15 pounds .....	15 c. c.
20 to 30 pounds .....	20 to 25 c. c.
40 to 75 pounds .....	30 c. c.
100 to 150 pounds .....	40 to 60 c. c.
175 pounds and over .....	80 c. c.

If the herd is infected, the dose or serum should be increased slightly for all apparently well hogs, and all hogs showing high temperatures or other evidence of disease should receive at least a dose and a half of serum.

**Doses of Serum and Virus in Simultaneous Inoculation of Healthy Hogs.**

Weight of Hogs	Dose of Serum	Dose of Virus
Below 10 pounds .....	10 c. c.	
10 to 15 pounds .....	15 c. c.	$\frac{1}{4}$ c. c.
20 to 30 pounds .....	20 to 25 c. c.	$\frac{1}{2}$ c. c.
40 to 75 pounds .....	30 c. c.	1 c. c.
100 to 150 pounds .....	40 to 60 c. c.	2 c. c.
175 pounds and over .....	80 c. c.	2 c. c.

If the herd is infected, the dose of serum should be slightly increased for all apparently healthy hogs, and all those showing high temperature or other evidence of disease should receive at least a dose and a half of serum and no virus.

**Hemorrhagic septicemia (swine plague)—**

An infectious disease caused by specific variety of germs.

Symptoms—Somewhat similar to hog cholera; disease seldom occurs unless as a complication of cholera; diagnosis impossible without post mortem.

Post mortem—Many of the internal organs contain hemorrhages varying in size from a pin head to a lima bean.

Treatment—Call a veterinarian. Sanitation. Immunization gives 50 % results.

**Lice:** Thoroughly spray or better dip animals in a 3 % creolin solution; repeat in 10 days. As a prevention have from  $\frac{1}{4}$  to  $\frac{1}{2}$  inch crude oil in water in the concrete hog wallow. Thoroughly clean and disinfect hog houses, sheds and pens.

**Mange:** A parasitic skin disease affecting practically all domestic animals.

Symptoms—Excessive irritation of skin, intense itching, presence of thick scabs, falling out of hair and general thriftless condition.

Treatment—Thoroughly spray or better still dip in 3 % solution of liquid cresolis compositus or creolin. Repeat in 10 days. If infested area is quite small, apply creolin solution by hand. Thoroughly disinfect houses and pens.

**Necrobacillosis:** An infectious disease of hogs, sheep, cattle and horses and frequently fowls.

Cause—Germs causing this disease are frequently found in mud holes and unsanitary barn surroundings.

Symptoms—Ulcers on the mouth and tongue, abscesses on any part of the head, sore eyes, sore skin, the losing of tails; diarrhea. Ulcers on large intestine.

Treatment—Call a veterinarian; isolate all sick animals; disinfect infected pens and dip animals in 3 % creolin solution. Paint lumps on head or ulcers in the mouth with tincture of iodine. Give internal antiseptic of copper sulphate (1 dram per 100 lb. pig, dissolved in a little water or milk and given internally once daily for several days depending on condition).

**Scours in suckling pigs:**

Cause—Sow's milk too rich; irritating feeds for the sows as putrefying meat, sudden change of sow's feed, caked bag or chilling.

Symptoms—Diarrhea and weakness.

Treatment—Remove cause and dose each pig with 1 teaspoonful castor oil.

**Thumps:**

Cause—Indigestion.

Symptoms—Spasmodic contraction of diaphragm.

Treatment—Prevent by proper care and feeding and plenty of exercise. Give each affected pig a dose of teaspoonful of castor oil.

**Tuberculosis:** An infectious disease.

Cause—Tubercle bacilli germs.

Symptoms—Seldom possible to diagnose in living animal.

Post mortem—Tumors and nodules varying in size from a pin head to an egg, of grayish color outside, yellowish inside and often gritty; these may appear in any of the glands or internal organs.

Treatment—None. It may be prevented by the use of sanitary feed lots and the eradication of tuberculosis in cattle; do not feed creamery by-products unless pasteurized.

**SWINE CONDITIONERS****No. 1**

Glauber's Salts .....	3 parts
Salsoda .....	3 parts
Copperas .....	3 parts
Common salt .....	1 part
Sulphur .....	1 part

(Keep constantly before the hogs. This conditioner acts as a worm preventative.)

**No. 2**

Charcoal .....	10 pounds
Hardwood Ashes .....	10 pounds
Lime (Air slacked) .....	10 pounds
Salt .....	5 pounds
Sulphur .....	5 pounds
Copperas (pulverized) .....	1 pound

(Mix thoroughly and put in a dry place where accessible to hogs.)

**No. 3**

Charcoal (pulverized) .....	1 pound
Sulphur (pulverized) .....	1 pound
Sodium sulphate (pulverized) .....	1 pound
Antimony sulphide (pulverized) ...	1 pound
Sodium chloride (pulverized) .....	2 pounds
Sodium bicarbonate (pulverized) ..	2 pounds
Sodium hyposulphate (pulverized) ..	2 pounds

(Mix thoroughly and give a tablespoonful in ground feed once a day to hogs weighing 200 pounds and to others in proportion to their weight.)



## HOG WORM REMEDIES\*

1. Santonin .....3 grains
- Areca nut .....2 drams
- Calomel .....2 grains
- Sodium bicarbonate .....1 dram

This is a dose for 100 pound hog. If hogs can not be treated separately, doses should be mixed in slop or milk for 10 hogs, permitting only this number hogs to come to trough at one time. It is best to place hogs of the same size or weight together.

2. The U. S. Department of Agriculture recommends 15 drops of oil of chenopodium to one ounce castor oil for each shote weighing 60 to 100 pounds, preferably treating each hog separately.

3. Turpentine—one teaspoonful to 80 to 100 lbs. live weight fed in milk or slop once each day for three consecutive days. The hogs might well be fasted for 12 hours prior to giving turpentine. The last dosing should be followed by a physic at the next feeding by dissolving in the slop, epsom salts at the rate of one pound salts to 1000 pounds live weight.

\*Note—For most effective results each hog should be treated separately.

## COMMON AILMENTS, DISEASES AND PARASITES OF SHEEP

**Hemorrhagic septicemia:** An infectious disease caused by a specific variety of germs.

Symptoms—

Acute—Sudden death often without evidence of any symptoms.

Chronic—Lung form—difficult breathing, cough, bloody discharge from nose; death.

Intestinal form—bloody diarrhea, weakness; death.

Treatment—Call a veterinarian; kill chronically affected animals; immunize well animals and change pastures frequently, if possible, using well drained pastures.

### Scab:

Symptoms—Same as cattle scab.

Treatment—Same as cattle scab.

### Internal parasites:

**Gid, Grub in the Head and Lung worms** cannot be successfully treated; prevention is the logical method. Change of pasture helpful.

#### Stomach worms:

1. Segregate all suspected cases, withholding food for a day before treatment. Carefully drench with a 1% solution of copper sulphate in following doses:

Lambs under 1 year of age 1 to 1½ oz.

Sheep over 1 year old .3 to 4 oz.

In drenching do not hold sheep's nose higher than eyes on account of danger fluid passing into lungs causing almost immediate death. A 1% solution is made by dissolving ¼ lb. copper sulphate crystals (powdered) in 3 gallons water in non-metallic receptacle. This amount is enough for 100 sheep.

2. Prevention is most logical; change of pasture helpful, but if impossible use following mixture:

Arsenous acid .....	1 dram
Sulphate of iron .....	5 drams
Powdered Nux vomica .....	2 drams
Powdered Areca nut .....	2 ounces
Common salt .....	4 ounces

This mixture is sufficient for 30 head and can be fed with chopped grain once or twice a week.

## COMMON AILMENTS, DISEASES AND PARASITES OF POULTRY

### **Blackhead:**

**Cause**—Due to a minute organism, the disease being infectious and contagious.

**Symptoms**—Indications in poults up to three weeks old are whitish or yellowish diarrhea and loss of appetite together with a dull weakened condition and a darkened head.

**Treatment**—There is no practical treatment. Might try keeping ailing poults in dry, ventilated quarters, feeding very little grain and once a week dosing with epsom salts at the rate of one teaspoonful to five poults. Give each poult  $\frac{1}{2}$  grain iron sulphate and  $2\frac{1}{2}$  or 3 grains sodium salicylate in a bread pill.

### **Catarrh or Colds (nasal):**

**Cause**—Improper housing conditions. Climatic exposure or sudden changes of climate.

**Symptoms**—Watery discharge from eyes and nostrils; sneezing; later the discharge becomes thick and sticky and eyelids swell and remain closed on account sticky secretion.

**Treatment**—Isolate affected fowls and give one-third teaspoon of epsom salts in a little mash. Add potassium permanganate to the drinking water for entire flock in proportion of one gallon of water to as much permanganate as will remain on a dime.

### **Chicken Pox:**

**Cause**—Contagious. Filthy, damp quarters weaken fowls vitality and when pox virus is present enables it to develop and produce the disease.

**Symptoms**—Small wart-like ulcers on head and face. Watering of eyes and nose.

**Treatment**—Remove nodules by softening with glycerine. Touch ulcer with iodine.

### **Cholera: (A form of hemorrhagic septicemia)**

**Cause**—Germ known as bacterium avi-septicum, carried by recovered birds, wild birds, pigeons or any one having been on infected premises.

**Symptoms**—Acute—Fowls die within few hours of first signs of illness. Fowl becomes dull, sleepy and indifferent to its surroundings. Wings spread and drooped, dark blue comb and stringy mucus from beak. Soft diarrhea becomes bloody and foamy with whitish masses. Chronic

#### 14.5

Similar to acute with swelling of leg joints. Post mortem shows inflamed digestive tract.

Treatment—Treatment almost futile. Prevent spread by moving healthy fowls to clean quarters, killing sick ones by bloodless method and burning carcasses. Give epsom salts to well flock. Use permanganate in drinking water and clean premises thoroughly.

#### **Egg Bound:**

Cause—Abnormal eggs; injury or derangement of oviduct.

Symptoms—Restlessness, nest visited frequently with unsuccessful attempt to expel egg.

Treatment—Introduce sweet oil into vent with finger to assist in expulsion of egg.

#### **Gapes:**

Cause—Gapeworm attached to walls of windpipe.

Symptoms—Breathing difficult, frequent gaping as if strangled. On post mortem small reddish worms will be found in windpipe.

Treatment—Remove chicks to fresh ground and disinfect runs. Place affected chicks in a covered box, dusting dry air-slacked lime over chicks with shaker can. Close the box for few minutes permitting chicks to breathe the lime dust which causes coughing and expelling of worms. Worms should then be destroyed.

#### **Lice:**

Live and reproduce on the bodies of fowls. Apply a pinch of sodium flourid at base of feather on head, neck, breast, base of tail, below the vent, both thighs and on underside each wing. One pound flourid will treat 100 fowls.

#### **Limberneck:**

Cause—Ptomaine poisoning; acute indigestion or severe infestation of intestinal parasites.

Symptoms—Neck limp with head hanging down between feet.

Treatment—Determine cause of condition and treat accordingly. A teaspoonful of castor oil given to the fowl will sometimes effect a cure.

#### **Mites:**

Live in filthy cracks and crevices of buildings and go on to the hens for food only. Apply strong disinfectant or kerosene thoroughly in region where mites are located as roosts, etc.

**Roup:**

Cause—Filterable virus. Contagious.

Symptoms—Watery discharge from eyes and nostrils with usually an offensive odor. Canker sores in mouth. Eyes may be filled with grayish pads which grow in size and produce ulceration. Disease sometimes spreads to windpipe and lungs. Later stages show weakness and death.

Treatment—Destroy all ailing fowls as soon as first symptoms are noticed. Clean and disinfect houses and yards. Use permanganate in drinking water.

**Scaly Legs:**

Cause—Mite that burrows under scales on legs, multiplying very rapidly causing grayish horny growth.

Symptoms—Legs become incrustated with rough whitish, scaly areas.

Treatment—Apply vaseline containing three per cent creolin to the affected parts. Repeat treatment until cured.

**Tuberculosis:**

Cause—Specific bacterium. Spreads steadily and rapidly when once introduced.

Symptoms—No symptoms are apt to be noticed until disease produces marked weakness and excessive leanness, added to a steadily growing weakness, a pallor of comb, wattles and head, a ruffling of the feathers, diarrhea and in many cases lameness. Post mortem essential. Presence of yellow nodules in liver size of pin head to pea are very suggestive of the disease. Similar nodules are often present on intestines.

Treatment—Suspected fowls should be killed by a bloodless method. Thoroughly disinfect the premises.

**White Diarrhea:**

Cause—Low form of parasites; spreads thru droppings. Some forms are transmitted from parent stock to chicks thru the eggs.

Symptoms—Weakness, whitish diarrhea with pasting up behind. Chicks become listless, lose appetite and remain under cover and finally die.

Treatment—Prevention only successful method of combating disease. Supply sour

## **14. ANIMAL AILMENTS, DISEASES AND PARASITES**

Some reliable disinfectants  
Mixing disinfectants  
Whitewash formulas  
Suggestions for proper carcass  
disposal  
Directions for sending in labora-  
tory specimens  
Temperature, pulse and respira-  
tory table  
Suggested farmer's medicine  
case  
Common medicines and their  
actions.  
Table of proportionate doses for  
animals

### **14.1 Horses**

Colic  
Distemper  
Scratches  
Sore shoulders  
Thrush  
Wounds or wire cuts

### **14.2 Cattle**

Abortion  
Anthrax  
Blackleg  
Bloating  
Corn stalk disease  
Foot rot  
Hemorrhagic septicemia  
Garget  
Lice  
Lumpy jaw  
Milk fever  
Ringworm  
Scab  
Scours  
Common  
White  
Tuberculosis

An  
Dis

### **14.3 Hogs**

Cholera

Serum dosage table

Serum companies

Hemorrhagic septicemia

Lice

Mange

Necrobacillosis

Scours

Thumps

Tuberculosis

Swine conditioners

Worm remedies

### **14.4 Sheep**

Hemorrhagic septicemia

Scab

Stomach worm

Other internal parasites

### **14.5 Poultry**

Blackhead

Catarrh

Chicken pox

Cholera

Egg Bound

Gapes

Lice

Limberneck

Mites

Roup

Scaly legs

Tuberculosis

White diarrhea