

University of Nebraska - Lincoln

DigitalCommons@University of Nebraska - Lincoln

Nebraska 4-H Clubs: Historical Materials and Publications

4-H Youth Development

1956

Dairy Club Manual--The Heifer and Producing Cow : Extension Circular 6-11-2 1956

C. W. Nibler

T. A. Evans

Follow this and additional works at: <https://digitalcommons.unl.edu/a4hhistory>



Part of the [Service Learning Commons](#)

Nibler, C. W. and Evans, T. A., "Dairy Club Manual--The Heifer and Producing Cow : Extension Circular 6-11-2 1956" (1956). *Nebraska 4-H Clubs: Historical Materials and Publications*. 179.
<https://digitalcommons.unl.edu/a4hhistory/179>

This Article is brought to you for free and open access by the 4-H Youth Development at DigitalCommons@University of Nebraska - Lincoln. It has been accepted for inclusion in Nebraska 4-H Clubs: Historical Materials and Publications by an authorized administrator of DigitalCommons@University of Nebraska - Lincoln.

Dairy Club Manual

the heifer and producing cow



EXTENSION SERVICE - UNIVERSITY OF NEBRASKA
COLLEGE OF AGRICULTURE AND U. S. DEPARTMENT
OF AGRICULTURE COOPERATING W. V. Lambert, Director

CONTENTS

<p>HEIFERS SIX MONTHS TO ONE YEAR 3</p> <p style="padding-left: 20px;">Questions for Discussion..... 5</p> <p>HEIFERS FROM TWELVE MONTHS TO FRESHENING..... 7</p> <p style="padding-left: 20px;">Normal growth 7</p> <p style="padding-left: 20px;">Housing 12</p> <p style="padding-left: 20px;">Breeding 13</p> <p style="padding-left: 40px;">Questions for Discussion 14</p> <p>REPRODUCTION 14</p> <p>PEDIGREE 15</p> <p>REGISTRATION CERTIFICATE... 20</p> <p style="padding-left: 20px;">Questions for Discussion..... 24</p> <p>PREPARING YOUR HEIFER FOR SHOW 24</p> <p style="padding-left: 20px;">Show ring classification..... 26</p> <p style="padding-left: 40px;">Questions for Discussion..... 27</p> <p>FEEDING AND CARE OF THE COW 28</p> <p style="padding-left: 20px;">Feeding before freshening..... 28</p> <p style="padding-left: 20px;">Care at calving time..... 28</p> <p style="padding-left: 20px;">Feeding for milk production..... 29</p> <p style="padding-left: 20px;">Pastures 31</p> <p style="padding-left: 40px;">Questions for Discussion..... 33</p> <p>COMPOSITION OF FEEDS..... 33</p> <p style="padding-left: 20px;">Protein 33</p> <p style="padding-left: 20px;">Carbohydrates and fats..... 34</p> <p style="padding-left: 20px;">Minerals 34</p> <p style="padding-left: 20px;">Vitamins 34</p> <p style="padding-left: 40px;">Questions for Discussion..... 35</p>	<p>FITTING AND SHOWING THE COW 35</p> <p style="padding-left: 20px;">Fitting 35</p> <p style="padding-left: 20px;">Showing 40</p> <p style="padding-left: 20px;">In the ring..... 41</p> <p style="padding-left: 40px;">Questions for Discussion..... 42</p> <p>MILK 42</p> <p style="padding-left: 20px;">Milk sugar 43</p> <p style="padding-left: 20px;">Protein 43</p> <p style="padding-left: 20px;">Mineral or ash..... 43</p> <p style="padding-left: 20px;">Milk fat 44</p> <p style="padding-left: 40px;">Questions for Discussion..... 45</p> <p>PRODUCING QUALITY MILK..... 45</p> <p style="padding-left: 20px;">Questions for Discussion..... 47</p> <p>MANAGED MILKING 47</p> <p style="padding-left: 20px;">Questions for Discussion..... 49</p> <p>RECORDS 50</p> <p style="padding-left: 20px;">Dairy Herd Improvement As- sociations 50</p> <p style="padding-left: 40px;">Questions for Discussion..... 51</p> <p>MARKETING 52</p> <p style="padding-left: 20px;">Questions for Discussion..... 55</p> <p>AILMENTS OF HEIFERS AND COWS 56</p> <p style="padding-left: 20px;">Brucellosis 56</p> <p style="padding-left: 20px;">Breeding problems..... 57</p> <p style="padding-left: 20px;">Foreign objects 57</p> <p style="padding-left: 20px;">Mastitis 57</p> <p style="padding-left: 20px;">Tuberculosis 58</p> <p style="padding-left: 40px;">Questions for Discussion..... 58</p>
--	--

Distributed in furtherance of Acts of May 8 and June 30, 1914. Extension Service of the College of Agriculture, University of Nebraska, and U. S. Department of Agriculture cooperating. W. V. Lambert, Director, Lincoln, Nebraska.

(2-50-10M)
(12-56-10M)

Dairy Club Manual

C W. NIBLER*

THE COMPLETE 4-H Dairy calf club projects extend over a three-year period. The Dairy Calf Club Manual is used by first-year club members. That manual can also be used as a reference by advanced dairy calf club members. The second part, or this manual, which will help you feed and manage your yearling heifer and cow, furnishes subject matter for the second- and third-year projects.

This manual is divided into sections, and following each section is a series of questions. It is suggested that the leader use these and other questions for reviewing the manual at club meetings.

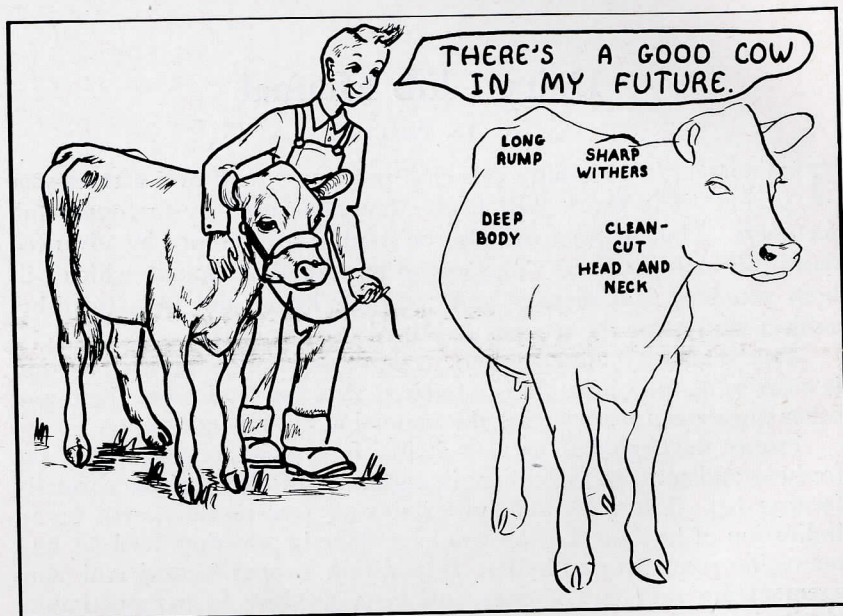
Proper development of your heifer is very important. After she freshens and starts to milk there is a great deal to learn about correctly feeding her. The milk and butterfat your cow produces will be an indication of how good a job you have done in selecting, feeding, and managing your calf and heifer. In addition, proper feeding and management are necessary if your cow is to produce at her maximum. Until she freshens your dairy project has been nearly all expense, but after she starts to milk you should receive some income to apply on current and past expenses. Applying the best information you secure from studying and experience will help you do a better job in taking care of your dairy animals.

HEIFERS SIX MONTHS TO ONE YEAR

After calves are six to eight months old they often are neglected until they are ready to produce milk. Although taking care of your heifer will be simpler and easier than raising your calf, you should not neglect her. An important period in the life of your heifer is when she is six to twelve months old. She needs the proper feed and care during this stage of growth. Don't assume that your heifer can just "rough it" on poor quality roughage after she is eight or nine months old. If heifers are to grow and develop into profitable cows that you want for a herd they need good care. Heifers need ample quantities of high-quality roughage and a daily feeding of grain for normal growth and development.

When good pasture is not available, heifers six months to one year old should be fed all the good quality alfalfa or other legume hay they will eat. When you inspect hay and silage closely, you will find a great deal of difference in quality. The best quality alfalfa is green, leafy, fine and soft stemmed, and has a pleasing odor. Your heifer

* The section on marketing was prepared by T. A. Evans.



will relish this kind of hay and grow better when she receives all she can eat. Corn or cane silage is an excellent substitute for good green grass. Silage should be free from mold and fed fresh. In the late fall and winter and before you have good pasture in the spring, feed your heifer hay and silage. One ton of silage has about the same food value as 700 pounds of high quality alfalfa hay.

A simple grain mixture can be fed at the rate of $\frac{1}{2}$ pound per 100 pounds live weight. For example, if your heifer weighs 400 pounds she needs 6 to 8 pounds of hay, 8 to 10 pounds of silage, and about 2 pounds of grain daily. Increase the amount as the heifer grows. You can use the same grain ration as was fed your calf.

1	2	3
1 part* cracked corn	2 parts cracked corn	4 parts cracked corn
1 part ground oats	1 part ground oats	2 parts ground oats
	1 part wheat bran	2 parts wheat bran
		1 part soybean oil meal

* "Part" means by weight. For example, 100 pounds cracked corn and 100 pounds ground oats.

After heifers are six months old they will make normal growth on good pastures if a small amount of grain is fed as a supplement. Grass is one of nature's best feeds for livestock because it is high in protein and vitamin A. Green and tender grasses are very beneficial to the

animal's digestive system. At certain times in the year pastures may be so plentiful and palatable that additional grain is not needed, but in general you should feed your heifer grain while she is on pasture. Feeding grain at the same rate as when your heifer was receiving hay and silage is a good practice.

You and your father should decide on the kind of pasture program that will yield the most feed per acre. Farmers that have good pastures use different crops during the year in their pasture plan. Generally the best pasture programs start by turning animals onto a small grain pasture such as winter rye the first thing in the spring. When it is too late to pasture rye, alfalfa and brome can be pastured. This is a permanent pasture and produces the most when fertilized and properly managed. Pastures that are divided by a fence, making it possible to change from one to the other at different intervals, produce more feed than those pastured continuously. The permanent pasture should be supplemented with sudan grass or sweetclover late in the summer when it is hot and the brome and alfalfa or permanent pasture is short. Late in the summer and in the autumn volunteer grain, fall rye, or winter wheat can be used for a late pasture.

You and your father have a real opportunity to demonstrate to your neighbors a good long-time pasture plan. Grasses and pasture crops need the same care as other crops and should not be neglected.

Questions for Discussion

1. Let's discuss growing your heifer after she is six months of age. Why is the period from six months to a year important?
2. For winter feeding of heifers why should you feed some silage?
3. How do you think silage compares with alfalfa hay as a feed? About the same, one-half as good, one-third as good or one-fifth as good?
4. How can you detect good quality in hay?
5. What kind of hay do you think is best for growing heifers?
6. Tell the club members what you consider a good grain ration for growing heifers.
7. About how much grain should a 500-pound dairy heifer receive daily?
8. Why is pasture or grass considered a good feed for growing heifers?
9. What crops are used for pasture on your farm?
10. How do you think an improvement in pastures could be accomplished on your farm?



Farm-produced grains, mill-run by-products and protein concentrates can be mechanically mixed very satisfactorily.



Weighing the amount of grain fed each milk cow is the best method to follow.

HEIFERS FROM TWELVE MONTHS TO FRESHENING

The feeding and management of your heifer will not be much different after she is a year old than it was when she was younger. It is possible to decrease the amount of grain fed if high quality roughage is available. However, as she approaches calving it is necessary to properly prepare her for producing milk. Continue to feed high quality roughage and about $\frac{1}{4}$ to $\frac{1}{2}$ pound of grain per 100 pounds live weight. The grains should be ground and well mixed for calves, heifers and cows.

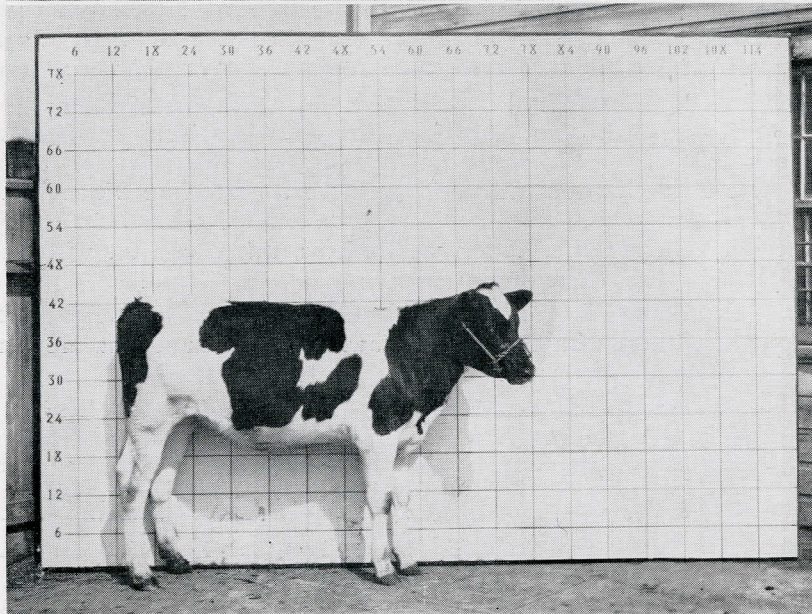
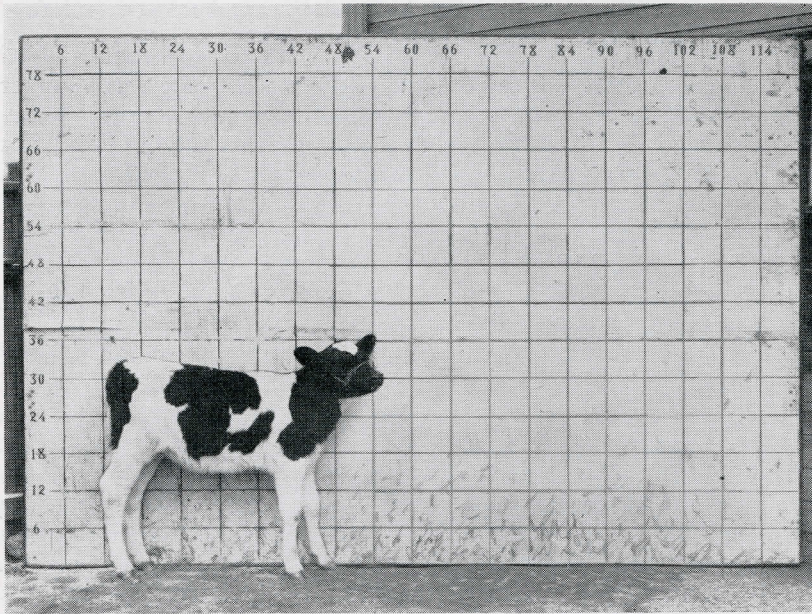
Growing heifers need salt, calcium and phosphorous. To supply salt, add 1 pound granulated salt to 100 pounds grain mixture. To supply the necessary calcium and phosphorous, add 1 pound steamed bone meal to 100 pounds of the grain mixture. If more than 1 per cent steamed bone meal is added to the grain mix, your heifer or cow may not eat it readily. Because salt is very important for livestock and because calcium and phosphorous are the chief minerals in bones, they should be fed in larger quantities than can be provided by merely adding to the grain mixture. The legume hays, particularly alfalfa, are high in calcium but low in phosphorous. The grains contain a fair amount of phosphorous and wheat bran is especially rich in phosphorous. To make sure your animals are securing all the salt they need, keep granulated salt in a box before them. In addition, mix 1 part salt and 1 part steamed bone meal and keep this in a box constantly before them.

Normal growth. Your yearling heifer will change from month to month. Her body will become longer and deeper. As she approaches the time of calving you will notice a thickening over the withers and in the neck. The heifer will look thicker and more meaty than at any other time in her life. After she freshens, this excess fat will disappear and again she will look more angular and dairylike.

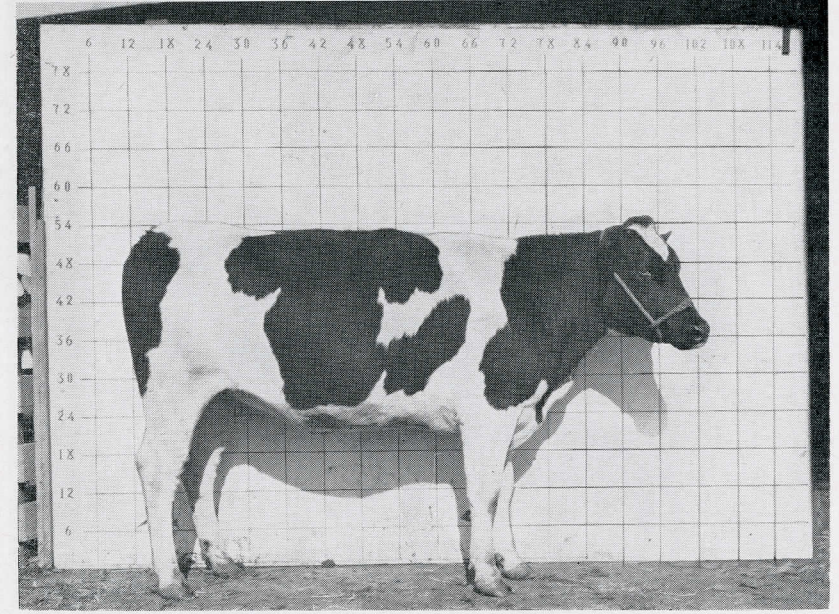
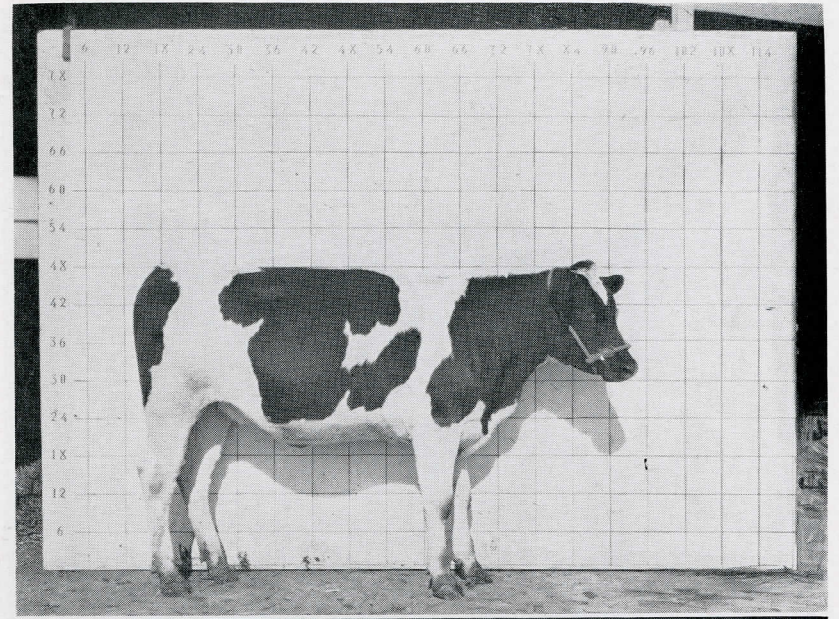
To determine how your heifer is growing, compare her weight and height at withers with the table below. If you cannot measure her height at withers compare her weight with those in the table.

Don't neglect your heifer in this yearling stage. Lead her now and then. Brush her as often as possible. Keep her feet and horns

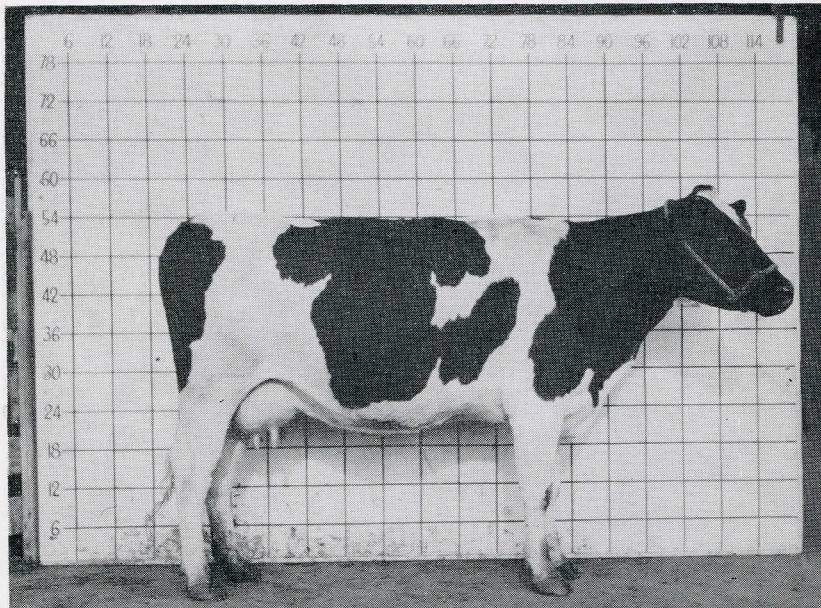
Age	HOLSTEIN		AYRSHIRE		GUERNSEY		JERSEY	
	Weight <i>lbs.</i>	Height withers <i>in.</i>	Weight <i>lbs.</i>	Height withers <i>in.</i>	Weight <i>lbs.</i>	Height withers <i>in.</i>	Weight <i>lbs.</i>	Height withers <i>in.</i>
Birth	92	29.5	72	27.5	67	27.5	54	25.5
6 months	375	40.5	325	38.5	300	37.5	275	36.5
12 months	700	47.0	600	44.0	575	44.0	525	43.0
18 months	900	50.0	750	47.0	725	46.5	675	45.5
2 years	1125	53.0	925	49.5	900	49.0	800	48.5



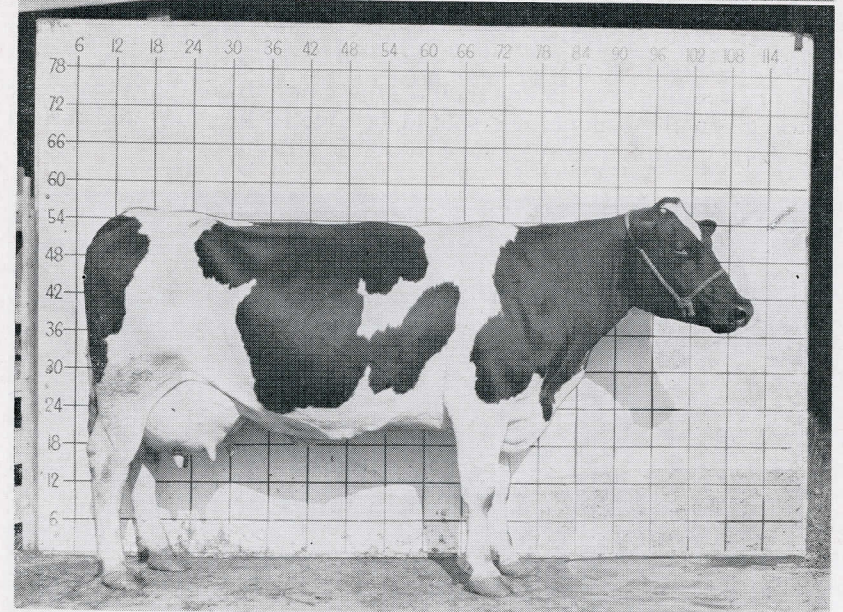
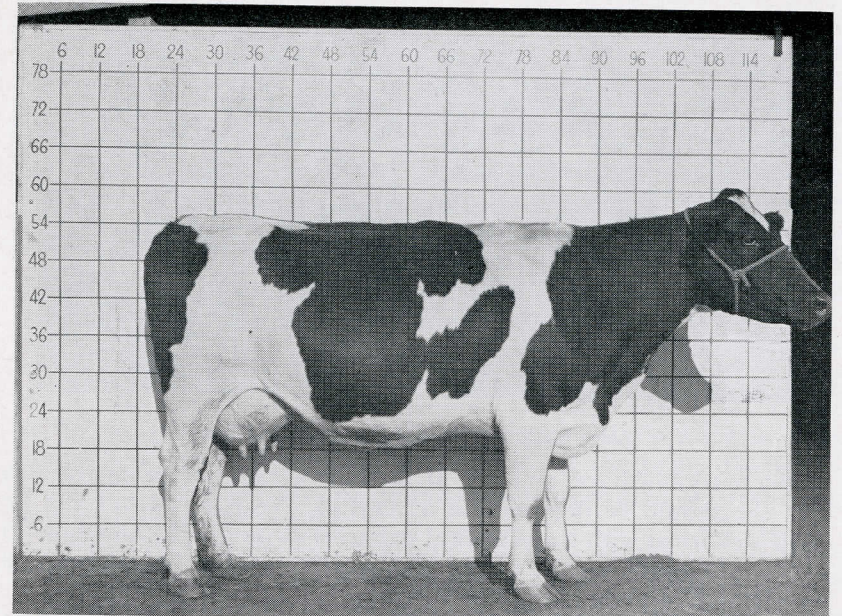
Above, Easter of U Neb 45 days old, weight 117 pounds, height at withers 30 inches. Below, Easter six months old, weight 419 pounds, height 41 inches.



Above, Easter one year old, weight 747 pounds, height 47 inches. Below, Easter two years old, 1,120 pounds, height 52 inches.



Above, Easter three years old, weight 1,165 pounds, height 53 inches. Below, Easter four years old, weight 1,297 pounds, height 54 inches.



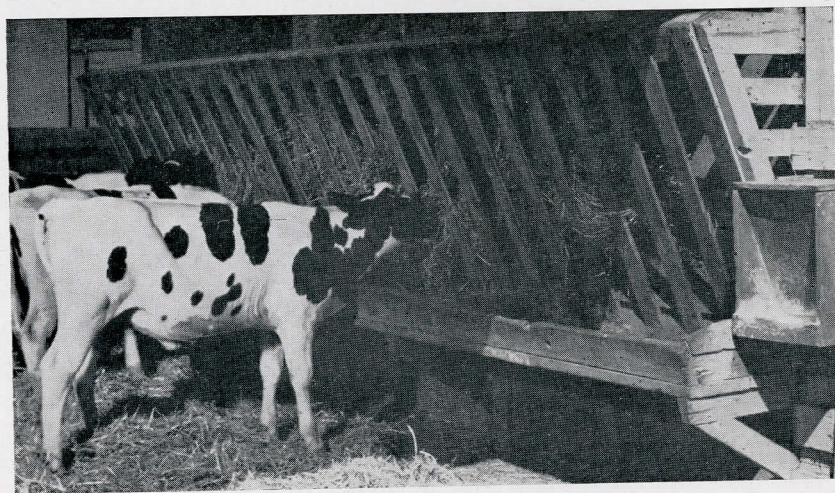
Above, Easter five years old, weight 1,328 pounds, height 54 inches. Below, Easter six years old, weight 1,455 pounds, height 54 inches.



Shade should be provided for growing heifers.

properly trimmed and trained. If the animal was not dehorned as a calf, she should be dehorned as a yearling. Yearling heifers can be easily dehorned with a mechanical dehorner or saw. The best time to remove the horns is early in the spring or late in the fall when there is no danger of harm from flies.

Housing. You don't need an elaborate barn for your heifer, but give her some protection from severe weather. Heifers seem to do better if allowed to run in open sheds. If you provide plenty of feed and dry bedding your heifer should grow normally without elaborate housing. In the summer she should be able to lie down and rest in the shade. Supply plenty of fresh water at all times.



Heifers in open shed with hay rack, silage and grain manger, and mineral box.

Breeding. Your heifer should be bred when she is old enough and has shown the proper development. Jerseys and Guernseys should be bred when they are 15 to 17 months old. At this age they should weigh 600 to 700 pounds. Jerseys, which mature faster, can be bred at the younger age and Guernseys at the older age. Ayrshires, Holsteins, and Milking Shorthorns should be bred when they are 17 to 18 months old and weigh 750 to 850 pounds. Brown Swiss are the slowest maturing of the dairy breeds and should be bred when 18 to 19 months old, or when they weigh about 800 pounds. Heifers that reach the desired size before the ages recommended may be bred a little earlier. Don't breed heifers when they are too small.

Production records show that heifers freshening in late fall or early winter are the most profitable producers, and those freshening in the summer are the least profitable. Although cows that freshen in the fall or early winter are the most profitable, consumers want about the same quantity of milk every day of the year. Therefore, dairymen who supply the year-round milk market plan on freshening cows in their herds every month.

Many other factors may influence the time when you will breed your heifer. For example, if you plan to exhibit your cow or her offspring at the fairs or shows you may vary the time of breeding. Generally cows show best after they have been fresh two to six weeks. At this period they are in good condition and their udders appear at their best. It is generally recommended that heifers be bred when they are large enough for breeding regardless of the time they will freshen.

The period from the time a heifer becomes pregnant until she calves is called the gestation period. The length of the gestation period varies from 282 to 285 days. Heifers pregnant for the first or second time generally have a slightly shorter gestation period than older cows. Male calves are apt to be carried a little longer than female calves. On an average the gestation period is a little shorter for twins. (See gestation table on page 60 of this circular.)

The value, type and production of the offspring from your heifer will be greatly influenced by its sire. Breed your heifer to a bull that transmits dairy characteristics. If such a bull is not available on your farm try to locate one in your neighborhood. You may need to inquire and look around to locate a good bull but the offspring you secure from him will repay you for the work.

There are many artificial breeding cooperatives in Nebraska that provide services to 4-H dairy calf club members. Bulls from which services can be secured artificially have been carefully selected for type and production. Before your heifer is bred, ask your county agricultural agent whether artificial breeding is available in your community. The main purpose of artificial breeding is to spread the influence of good sires to more owners of dairy cattle.

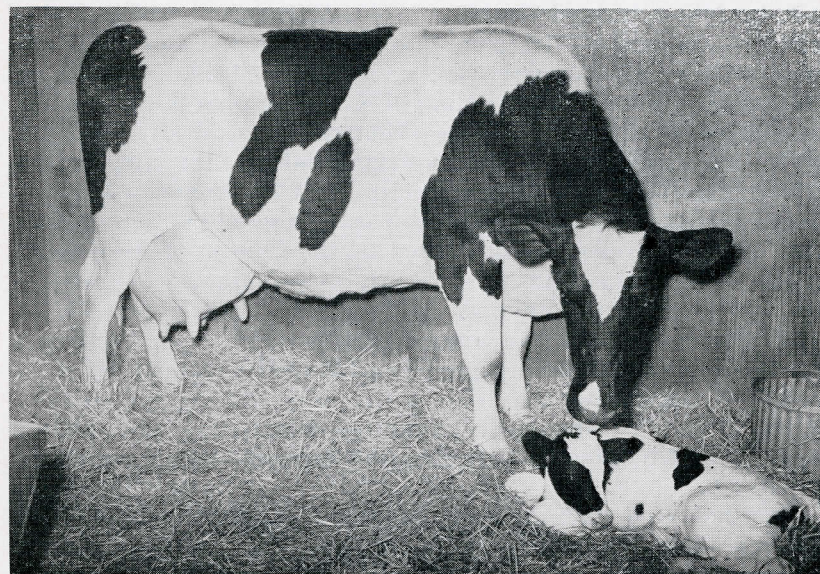
A cooperative breeding association is a group of farmers organized for the purpose of artificially breeding their cows and heifers to selected bulls. A qualified technician is employed to do the breeding for the organization. The service fee paid by the members is used to pay the technician and the bull stud, and for miscellaneous expenses. If you have only a few heifers and there is an association available you should be able to breed your heifers artificially to good purebred bulls.

Questions for Discussion

1. What is the best way to provide salt for growing heifers?
2. Why is steamed bone meal a good mineral?
3. How much should Holstein and Guernsey heifers weigh at birth, and at 6 and 18 months of age?
4. What kind of housing do you have for your heifer?
5. At what age should Guernsey and Jersey heifers be bred and how much should they weigh?
6. What are the slowest maturing of the dairy breeds and how old should they be when bred?
7. From the standpoint of profitable production, what season of the year is best for heifers to freshen?
8. Why do cows exhibited at fairs have an advantage if they have been fresh only two to six weeks?
9. What is the gestation period, and what is its length in days or months?
10. If there is a cooperative breeding association in your community, tell the club members how it operates.

REPRODUCTION

Now that you are an advanced 4-H dairy club member you will be interested in knowing more about reproduction. All life starts from a single cell which has been formed by the union of the egg cell or ovum from the dam or mother and the sperm cell from the sire or father. When a sperm cell unites with an egg cell fertilization is said to have taken place, thus beginning pregnancy. This one cell formed by both parents is extremely small and is not visible to the naked eye, yet it divides and redivides, growing as it does, and eventually becomes the mature animal. Characteristics such as color, size, body shape and ability to produce milk are all determined at the time of fertilization. Therefore, individual calves are a chance combination of a sample of the characteristics possessed by the parents. The chances of the calf possessing desirable characteristics will be improved through intelligent selection of the parents. These characteristics are collectively termed the inheritance or heredity of the calf. Aside from choosing which animals are to be parents you can do little about the inheritance. The feed and care that your animals receive are called en-



A clean, well lighted, warmly bedded box stall has been provided for this cow and her newly born calf.

vironment. You determine to a large extent what this environment will be, and you should make it as good as possible in order that the inheritance may perform well. Growth and later production of the animal are influenced by both heredity and environment, and if either one is poor the performance of the animal will be hampered accordingly.

PEDIGREE

A pedigree is a diagram of the ancestors of a calf. In addition to the sire and dam, the grandparents, great-grandparents and even great-great-grandparents may be shown. The sire and his ancestors appear at the top half of a pedigree, the dam and her ancestors at the bottom half. Since the sire and dam contribute equal amounts of inheritance to the calf, weakness in either half of the pedigree should be avoided. The pedigrees of dairy animals should contain more than a listing of the names and registration numbers of the animals. Production records of females should be shown. This is expressed in pounds of milk and butterfat produced at a certain age. If "2x" is beside the figure it means the cow was milked two times daily; if "3x" appears it means she was milked three times daily. Some records are made in 10 months, some in 12 months.

There are different kinds of production records because there are different testing plans followed by dairy cattle breeders. For example,

"A.R." means Advanced Registry. When milk and butterfat production is determined by this plan, one knows that the cow's milk was weighed daily and a butterfat test was determined once a month for a period of 305 or 365 days. The H.I.R. testing plan is very similar; however, daily milk weights are not kept, as production is determined by a noninterested supervisor who weighs and tests the milk one day each month. The letters "H.I.R." mean Herd Improvement Registry. These two types of production testing are sponsored by the respective breed associations and are supervised by the College of Agriculture.

The letters "D.H.I.A." mean Dairy Herd Improvement Association, and records are maintained by noninterested supervisors for the farmers' benefit on grade or purebred cattle. This type of testing is discussed in more detail on pages 50 and 51 of this manual. It is important to know how many days a cow milks during her lactation period. Evidence of regular reproduction is important and this can be determined by observing the intervals between the start of successive records.

The show ring winnings of the animals are also listed on the pedigrees. For males, production records of their daughters or sisters may be listed. The milk and butterfat production of a bull's daughters is very important in determining how good he is in transmitting production.

Within the last few years letters such as "VG" or "G" have been printed on pedigrees. These pertain to an official type or classification. The highest rating is Excellent (E), then in order Very Good (VG), Good Plus (GP), Good (G), Fair (F), and Poor (P). The Guernsey breed association uses Desirable instead of Good Plus and Acceptable instead of Good; otherwise, all breed associations use the same system of grouping. After you study the production records, the show ring winnings, and the official type classification you should be better informed about the characteristics your calf will inherit.

The males always appear at the top of the brackets, the females always at the bottom. The most important animals in the pedigree are those nearest related to the calf. A famous animal remotely related can contribute little to inheritance of the calf. The most any grandparent can contribute is one-fourth, and the most for any great-grandparent is one-eighth.

A good pedigree is shown on page 18. At the left side is the name of the animal, Major of Lilly Swiss, with his registration number. The animal must have a registration number to be considered registered. The date of birth, the farm on which he was born, and the present owner and his address are all essential information.

The first animal on the top bracket is the sire or father, identified by his full name and registration number. This bull was classified as an eight year old and scored as follows: Over-all Classification Rat-

ing, Excellent; General Appearance, Excellent; Feet and Legs, Very Good; Rump, Good Plus; Dairy Character, Very Good; and Body Capacity, Excellent. He has 19 classified daughters with a classification score as follows: Over-all Classification Rating, 84.6; General Appearance, 84.9; Legs and Feet, 83.9; Rump, 83.4; Dairy Character, 84.6; Body Capacity, 85.3; Mammary System 83.6, including a score of 84.6 on the fore udder and 83.0 on the rear udder. This means that all parts scored Good Plus except Body Capacity which scored Very Good.

Abbreviation	Title	Numerical Score
Ex	Excellent	90 or better*
VG	Very Good	85 and less than 90*
GP (D)	Good Plus**	80 and less than 85
G (A)	Good**	75 and less than 80***
F	Fair	70 and less than 75****
P	Poor	Below 70†

* Guernseys can be classified lower than "Excellents" and "Very Goods" until 10 years of age.

** Guernseys use the term "Desirable" for "Good Plus" and "Acceptable" for "Good."

*** Brown Swiss use the range from 70 to 80 for "Good."

**** Brown Swiss use the range from 60 to 70 for "Fair"; Holsteins, 65 to 75. Brown Swiss, Holsteins, and Jerseys prevent registration of males from "Fair" cows.

† Ayrshires do not use the "Poor" classification. Brown Swiss, Holstein, and Jersey associations cancel registration certificates of animals classified "Poor."

Royal James Ambassador of Vernon had 10 daughters whose dams had milk and butterfat records. A comparison of the records indicates the bull's ability to transmit milk and butterfat production to his daughters. The daughters produced 1,694 pounds more milk and 108 pounds more butterfat than their dams, and the butterfat test was raised 0.4 per cent. Some of this increase in production is probably due to better feeding and management practices; however, the bull is a plus proven bull. The information shows how the bull transmitted type and production to his offspring.

Alice M. B., the dam or mother of Major of Lilly Swiss, was classified when five years old. She rated as follows: Over-all Classification Rating, Good Plus; General Appearance, Good Plus; Legs and Feet, Good Plus; Rump, Very Good; Dairy Character, Very Good; Body Capacity and Mammary System (both fore and rear udder), Good Plus.

This cow made six records on twice-a-day milking and the length of records varied from 269 to 305 days. The amount of milk produced, the average test of the milk and the pounds of butterfat are all shown on the pedigree. The six consecutive records indicate this cow was a good producer and reproducer. Two daughters of this cow also are listed with their classification score and milk and butterfat records. By studying this information you learn the type, producing ability and transmitting ability of Alice M. B.

A GOOD PEDIGREE

NAME OF BULL.....
 Major of Lilly Swiss
 REG. NO. 94593
 DATE OF BIRTH.....10-30-48
 BREEDBrown Swiss
 BRED BYLilly-Smith
 OWNED BY.....
 University of Nebraska
 ADDRESS ...Lincoln, Nebraska

Royal James Ambassador of
 Vernon

NO. 40112						
8 yrs. E. E VG GP VG E						
19 Dau. Classification Average	84.6	84.9	83.9	83.4	84.6	85.3
	83.6	84.6	83.0			
10 dau.	11312	4.1	468			
10 dams	9618	3.7	360			
	+1694	+4	+108			

Alice M. B.					
NO. 95783					
5 yrs. GP GP GP VG VG GP					
GP GP GP					
2-2 305 2X 7666	4.99	382.6			
3-2 269 2X 8262	4.59	379.3			
4-2 272 2X 8593	4.62	397.3			
5-0 293 2X 10121	4.53	458.6			
7 305 2X 11468	4.32	496.0			
8-0 305 2X 12083	4.39	530.9			
2 dau. Pearl of Lilly Swiss					
139576 VG. VG GP GP VG					
VG VG VG GP					
3-10 350 2X 13127	4.37	573.5			
Alice Pansy of Lilly Swiss					
158022					
2-11 305	10721	4.01	430.2		

Bubbling Over of Walhalla						
NO. 33458						
11 dau. Classification Average	85.7	85.2	85.0	85.9	85.0	86.1
	83.4	82.9	81.1			
7 dau.	10631	4.0	425			
7 dams	12522	4.0	503			
	-1891	.0	-78			

Royal Jane of Vernon					
NO. 55497					
9 yrs. E E E VG VG E VG VG					
VG					
2-4 3X 365	14427	3.94	568.8		

Maiden's Betty Boy J. B.						
NO. 42937						
17 dau. Classification Average	83.1	83.5	85.3	81.8	85.0	84.1
	83.1	83.9	81.8			
12 dau.	11556	4.2	480			
12 dams	11269	4.0	454			
	+287	+2	+26			

Clepe's Best M. B. 95788					
Classified E E E E E					
7-2 365 3X 25436	4.75	1207.5			
World's record when made					
Alice of Lilly Swiss					
NO. 74159					
3-5 305 2X 11170	3.95	441.2			

Beauty Boy Blackstone of Walhalla						
NO. 28150						
5 dau. Classification Average	86.5	86.5	85.0	86.5	88.5	86.5
	83.5	80.5	85.0			
14 dau. with 17 records all im-						
mature 324 dys. 11,067 lb M.						
4.0% 442 lb B.F.						
Beauty Boy Bubbles of Walhalla						
NO. 46858						
2-5 4X 365	12004	4.08	490			

Royal Pathfinder of Vernon						
NO. 30474						
2-4 3X	14427	3.94	569			
Jane of Vernon 2nd						
NO. 43893						
10 yrs. 365 2X 21306	4.53	966				
Ed E E E E E E E E						

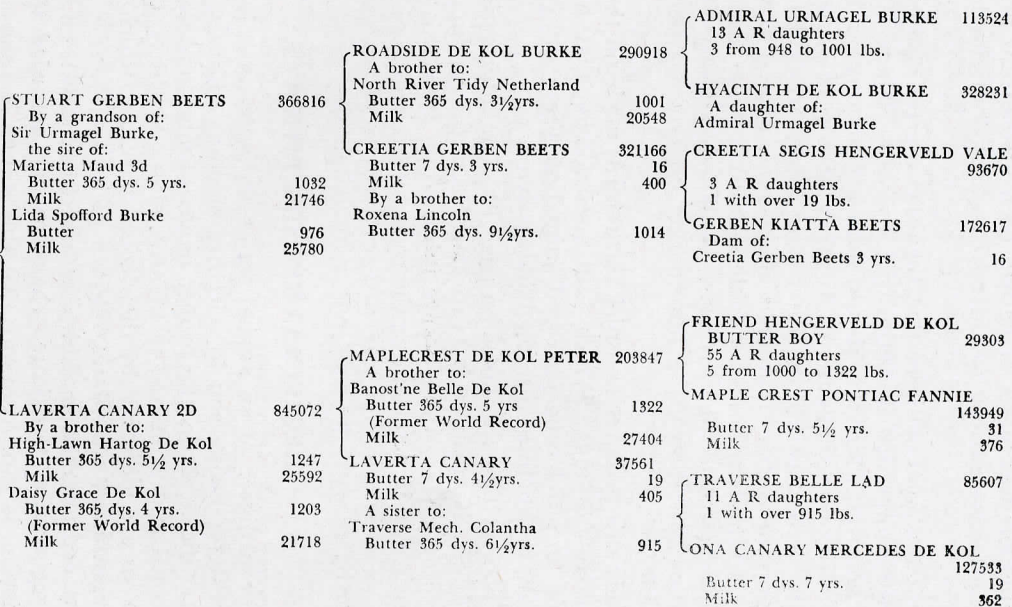
Swiss Betty Boy						
NO. 27137						
21 dau. Classification Average	84.6	85.4	81.9	83.6	86.7	86.8
	83.8	82.3	84.4			
36 dau.	10352	4.2	436			
36 dams	11724	1.2	489			
	-1372	0	-53			
Royal's Maiden of Vernon						
NO. 62286						
5 yrs. 365 3X 18753	4.54	852				

Valley Boy of Lee-Land						
NO. 32209						
7 dau. Classification Average	79.2	83.6	84.3	78.6	82.9	83.9
	76.8	76.8	78.6			
8 dau.	10774	4.0	432			
5 dau.	10171	4.0	406			
5 dams	11149	3.9	433			
	-978	+1	-27			
Orfila P. K.						
NO. 32026						
Classification VG						
7-3 2X 357	11154	3.83	426			
8-3 2X 211	8046	4.17	335			
9-3 2X 327	10506	3.89	409			
11 2X 365	12869	3.77	483			
2 dau. Verna B. B. 82884						
3 yrs. VG VG GP GP VG VG						
VG VG VG						
3-8 305 da. 3X 19285	4.21	808				

A POOR PEDIGREE

PEDIGREE Mona De Kol Beets
 H. B. NO. 1054028
 BORN February 24, 1947

The sire carries a double cross of the blood of Sir Urmagel Burke, sire of four from 30 to 35 lbs. butter in seven days.



The paternal grandsire, Bubbling Over of Walhalla, has classified daughters with production records. He was a minus proven bull although the cows to which he was bred were very high producers with records that averaged 12,522 pounds of milk and 503 pounds of butterfat. Although his proving was minus, the average production of his daughters was high. If he had been bred to low producing cows his daughters probably would have increased production over their dams.

This is a good pedigree that furnishes a great deal of information to anyone interested in Major of Lilly Swiss. There are a few weak spots, however, which you should notice. Only one production record is included on the daughter of Royal Pathfinder of Vernon. This bull does not have classified daughters, but information about him is not as important as that on animals more closely related to Major of Lilly Swiss. No information is available indicating the type of the maternal grandmother, Alice of Lilly Swiss. Although winnings from fairs and shows are not shown, the information on type classification is very complete.

Study this pedigree and pick out records made on three- and four-time-a-day milkings. Which bull sired a cow that made a world record? In purchasing purebred animals accurate and complete pedigrees are very helpful if studied and analyzed.

A poor pedigree is shown on page 19. The information supplied is all indirect. No definite facts are stated as to the production or type of any animal. You cannot secure information from this pedigree that will assist you in determining the transmitting ability of Mona De Kol Beets. The information was used primarily to fill up space. Compare this pedigree with the good one analyzed above.

REGISTRATION CERTIFICATE

The pedigree of an animal shows the ancestors. Information on the pedigree assists you in selecting breeding animals. The registration certificate shows the proper name, number and date of birth of an animal and a method of identification. Ayrshires, Guernseys and Holsteins are identified by their color markings, which are shown on the registration certificates. Brown Swiss and Jerseys are identified by tattooed numbers in their ears, which are shown on the certificate. The registration certificate, when properly recorded with the breed association, is your assurance that the animal is a purebred.

When an animal is sold a certificate of transfer must be recorded with the breed association in order that the animal can be properly transferred on the books of the association to the new owner. Although your animal may have a purebred sire and dam she is not recognized as a purebred unless a certificate of registration is recorded on the



breed books of the proper breed organization. It is very important that applications for registry and transfers be correctly and completely filled out before they are mailed to the proper breed association. The cost of registering cattle advances as they become older, so you should register your calves before they are 6 to 12 months old. If you own purebred cattle or want to develop a purebred herd, be sure to take proper care of all registration and transfer papers. If these are not properly filled out and recorded, you own only grade cattle and there is a difference between the value of purebred and grade cattle.

A special herd book or filing cabinet should be provided for valuable papers about your animals. The breeding of purebred dairy cattle is an additional business to the regular feeding and management operations. A successful purebred breeder must know about the ancestors of his animals. He needs to be familiar with popular sires and cow families, and know about their type and production. Accurate and complete records must be kept up to date. After breeding good purebred animals, it is necessary to develop the ability of showing and telling other people about the cattle. This is necessary in the selling of surplus stock.

Registered cattle are properly called purebreds. It is incorrect to call them thoroughbreds or "full-blooded" or use any other term except purebred. Thoroughbred is the name of a breed of race horses. Below are the names and addresses of the different breed associations:

- Ayrshire Breeders' Association—Brandon, Vermont
- Brown Swiss Cattle Breeders' Association—Beloit, Wisconsin
- American Guernsey Cattle Club—Peterborough, New Hampshire
- Holstein-Friesian Association of America—Brattleboro, Vermont
- American Jersey Cattle Club—6th and Long, Columbus 15, Ohio
- American Milking Shorthorn Society—Springfield, Missouri

In addition to handling all registration and transfer papers, the breed associations can furnish information about the different breeds

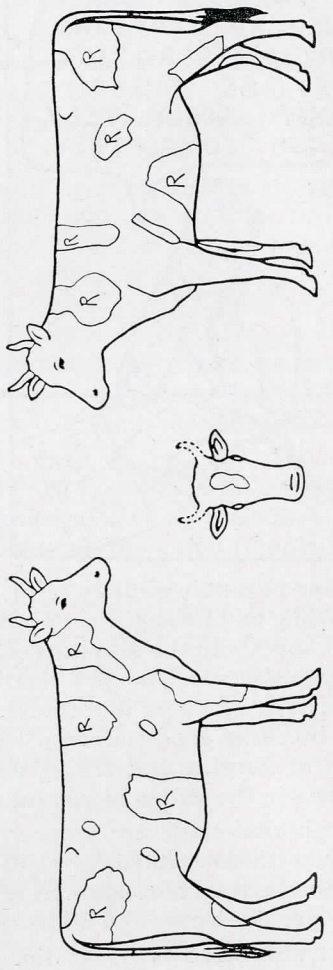
APPLICATION FOR REGISTRY

No. Given.....
 TO THE SECRETARY OF
 The Ayrshire Breeders' Association
 BRANDON, VERMONT

Tattoo No. 2.8.2.

Please register in the Ayrshire Herd Book the following named and described animal for which is enclosed fee of \$ 3.00
 Sex **FEMALE**. Name **J.O.B. SUNSET ORATOR**. Born **2-25-49**
 Name and Number of Sire **STRAITHGLASS MISTY ORATOR 89354**
 Name and Number of Dam **VICTORY SULKORE MAJESTY 292476**
 Signature of Breeder **John C. Smith** Address **ROUTE 2, GERING, NEBR.**
The breeder is the owner of the dam at the time of service.
 Signature of Owner of Sire **J. W. Albright**
This signature required only if the sire of the animal is not the breeder of the animal to be registered.
 Signature of first Owner **John C. Smith** Address **" 2, GERING "**
The first owner is the owner of all time of birth.
 Signature of Applicant for Registry **John C. Smith** Address **" " " "**
In case applicant for registry is not the first owner a transfer signed by the first owner must accompany this application.

BREEDERS' RECORD
 Name of calf **J.O.B. SUNSET ORATOR** Date of birth **2-25-49**
 Sire of calf **STRAITHGLASS MISTY ORATOR 89354**
 Dam of calf **VICTORY SULKORE MAJESTY 292476**
 Date application forwarded to Ass'n. **5-20-49** Date fee remitted **5-20-49**

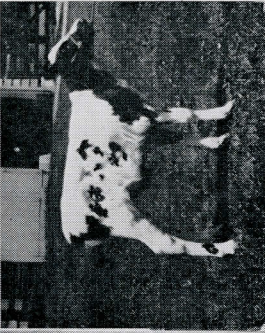
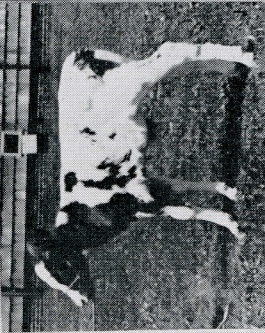


An application for registry ready to submit to the secretary of the Ayrshire Breeders' Association, Brandon, Vermont. The information is accurate and complete. The R on the sketches stands for red. The applicant keeps the Breeder's Record, tearing off the application on the dotted line.

The Ayrshire Breeders' Association
 --- CERTIFICATE OF REGISTRY ---

REGISTRY NO. 89354
 THE MALE NAMED **Strathglass Misty Orator** TATTOO NO. 235
 BORN **April 25, 1947** CAR TAG NO.
 SIRE **Strathglass Mister Douglas 47364**
 DAM **Willow Brook Ora 277123**
 BRED BY **Hugh J. Chisholm, Port Chester, N. Y.**
 FIRST OWNER **Hugh J. Chisholm, Port Chester, N. Y.**
 DATE 10-13-48 TO Dairy Department, University of Nebraska, Lincoln, Nebr.
THIS ANIMAL HAS BEEN ONLY TRANSFERRED IN THE HERD REGISTER OF THE AYRSHIRE BREEDERS' ASSOCIATION AS FOLLOWS:
 SERVICE SIRE

TYPE CLASSIFICATION RATING			
DATE	INSP.	AGE	RATING

A completed certificate of registry for an Ayrshire male.

to club leaders and members. A breed magazine or journal is published by each of the breed associations. These publications contain helpful information. You can subscribe to them by writing directly to the respective associations.

Questions for Discussion

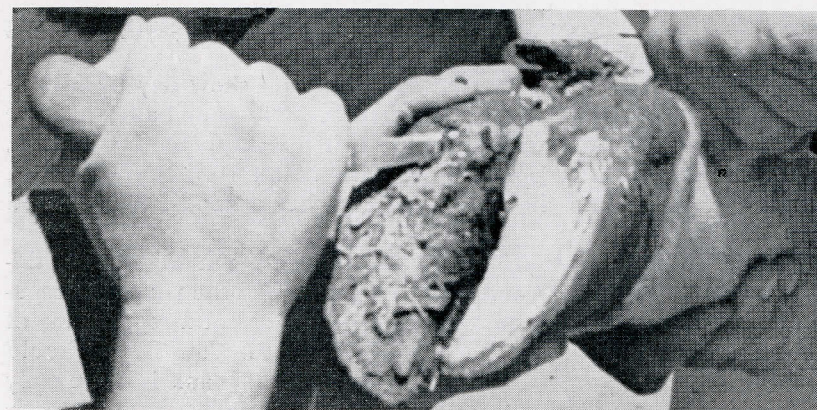
1. Life starts from the union of two cells. Which sex (male or female) produces the egg or ovum and which produces the sperm (spermatozoon) cell?
2. What should you find listed on a calf's pedigree?
3. On a pedigree what does "2x" or "3x" mean, and what does "G" or "GP" mean?
4. What is the lactation period?
5. What information can you find on the registration certificate about a purebred animal?
6. Can you register a calf if the sire and dam are not properly registered?
7. If you buy a purebred calf, how are the registration papers transferred to you?
8. How can you determine whether or not you have the proper registration papers for a calf you purchase?
9. Where are the main offices of the five major dairy breeds and the Milking Shorthorn Society?
10. If you wanted specific information about the pictures of Brown Swiss cattle to whom and where would you write?

PREPARING YOUR HEIFER FOR SHOW

To fit and show yearling heifers at the fairs, practically the same procedure is followed as in fitting and showing calves. Therefore, before starting to fit your heifer, review the procedure printed in the Dairy Calf Club Manual. Yearlings, trained properly as calves, should be easy to show. Concentrate on fitting your heifer so that her hide is pliable; and her hair is clean, soft and silky in appearance.

To refresh your memory and to emphasize the necessary steps, the proper procedure for fitting a yearling dairy heifer is outlined below:

1. Be sure your heifer is securing enough of the proper feeds to put her in good condition. Add a little linseed oil meal to the grain ration to improve her hide and hair. Yearling heifers need plenty of good roughage and about 3 pounds of grain daily. Heifers that are thin might use advantageously more than 3 pounds grain. You will need to adjust the grain feeding to the needs and condition of the heifer.
2. Keep your heifer in a barn or shed and blanketed during the day. At night she can be turned out for exercise.
3. Begin brushing your heifer daily four to six weeks before show day. Use a soft-bristled brush. This brushing is very important.



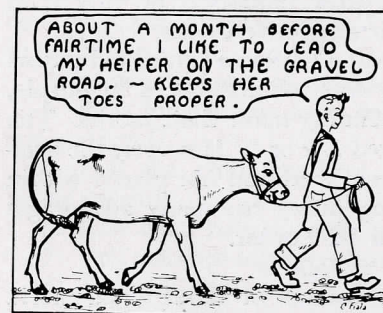
Clean the sole of the foot with the hoof knife when preparing the foot for trimming.

4. Trim the feet two or three weeks before exhibiting. The hoof should be trimmed by removing the excess from the sides and toes in order that the sole or underside is level.

5. Study the condition of your heifer's horns to see whether they need training. Start training and fitting the horns four to six weeks before the fair or show.

6. Clip the hair from your heifer's head and tail about two days before show day. There is slight variation in clipping the heads of different breeds. Heads of Holsteins, Guernseys and Jerseys are clipped the same. Clip the head to an imaginary line behind the ears and around the throat latch. Clip the inside and outside of the ears. For Ayrshires the same procedure is followed except that 1/2 to 1 inch of long hair is left at the base of the horn. For Brown Swiss the hair on the top or upper part of the inside of the ear is not clipped. The hair

is clipped from the outside or backside, and from the lower part of the ear inside. For Milking Shorthorns the hair is not clipped from the head or ears. For all the dairy breeds long and unruly hair sometimes should be clipped from the neck. Clip to an imaginary line where the neck joins the shoulders. Carefully blend the unclipped and clipped hair by clipping with the grain of the hair.



7. Continue to train your heifer by leading her daily. Have her take short steps, starting and stopping her slowly. This training is essential for larger heifers if they are to be properly exhibited. There is no sub-

stitute for long and continued brushing, nor for carefully training your heifer to lead.

8. Prepare your heifer for the show ring on show day by following the same procedure as with the calf. See that your halter fits, the animal is properly fitted and clean, the switch is fluffy, the hoofs clean, and the horns properly polished. Fill the heifer with hay and grain and before going into the show ring give her a good fill of soaked beet pulp.

Show ring classification. Before you enter your heifer for exhibition, secure a fair catalog and study very carefully the rules and regulations. Be sure you can conform to all the rules and regulations of the show, particularly those that pertain to health. Your heifer should be entered in her proper class. Be sure the entry blank is completely and properly filled out and sent before the closing date to the proper official. Write plainly or print all of the required information on the entry blank. In some age groups the classes are divided into juniors and seniors. For example, yearlings are generally divided into the junior and senior yearling classes.

A junior yearling is an animal born between January 1 and June 30 of the preceding year. In September, at show time, she may actually be between 14 and 20 months old.

A senior yearling is an animal born between July 1 and December 31 of the year preceding the year in which the junior yearling was born. In September she may actually be between 20 and 26 months old.

Example:

The date of the fair, September, 1957. Junior yearling born between January 1 and June 30, 1956. Senior yearling born between July 1, 1955, and December 31, 1955.

For exhibition purposes, you can understand the advantages of having your calves born immediately after January 1 or July 1, as they will be large when shown in their respective classes.

The Danish or group plan of awarding prizes to junior exhibitors is being used at more and more fairs. Animals are placed in purple, blue, red or white ribbon groups, depending upon their merits. The animals within the groups may be placed 1, 2 or 3. However, the original plan provided for animals to be grouped and not placed within the groups. This method of awarding prizes has many advantages over the system of awarding prizes in a 1-2-3 order.

The advantages of this system are as follows:

1. It awards the same premium to animals of about equal merit.
2. It recognizes large numbers of high quality animals which can be placed in the purple and blue ribbon groups.
3. At the same time a small number of inferior animals do not receive higher ratings than they deserve.

4. It gives no advantage to the exhibitor of an animal of a minority breed where competition is limited.

The main disadvantage of the grouping system is that it is difficult to make available in advance a definite amount of money for the awards. The quality of the animals exhibited determines the number that will be placed in the different groups. Therefore, more or less money may be needed than was earlier anticipated. The most satisfactory method to use in publishing premiums is to announce that a definite amount will be divided among the purple, blue, red and white ribbon groups as the show warrants. This method has proved satisfactory.

Generally the purple group is considered of superior quality, the blue group of excellent quality, the red group of good quality and the white group of not such good quality.

An exhibitor that receives a ribbon when his animal is placed in one of the groups should not consider it as a first or second prize, but as recognition of having exhibited an animal of superior, excellent or good quality.

Take the necessary health and registration certificates with you to the fair. Superintendents at many shows check registration certificates for the identification of animals. Birth dates are checked to see that an animal is shown in its proper class.

It is easy to lose valuable papers at fairs; therefore, precautions should be taken to protect them. Keeping papers in a specially constructed compartment in the show box, which is kept locked, will help keep them from being lost.

Questions for Discussion

1. Let us devote some time to talking about preparing heifers for exhibition. Tell the club members what the calf manual said about fitting calves for show.

2. In six weeks you will exhibit your heifer. Tell the club members what you are feeding and any suggested changes you will make in the ration.

3. From what part of the hoof should trimming be done?

4. How long before show day should the hair be clipped from the tail and head?

5. Tell the club members how to clip the head and tail of a Jersey yearling.

6. How is the hair clipped from the ears of Brown Swiss?

7. Tell the club members how to clip a Milking Shorthorn heifer.

8. Tell the club members how to lead a yearling into the show ring and exhibit her.

9. Example: The State Fair is September 10, 1957. Your yearling was born March 7, 1956. Should she be entered in the junior or senior yearling class and why?

10. At most fairs, animals are placed into classes depending on whether they were born before or after one of two dates. Do you know what two dates are used to divide the classes?

FEEDING AND CARE OF THE COW

Feeding before freshening. You will want to do a good job of feeding your cow just before freshening. The proper feeding of the mother before freshening will influence the size and strength of her calf. Good feeding practices will also influence milk and butterfat production. In addition, the size and growth of the heifer, freshening for the first time, will be influenced by proper feeding before calving.

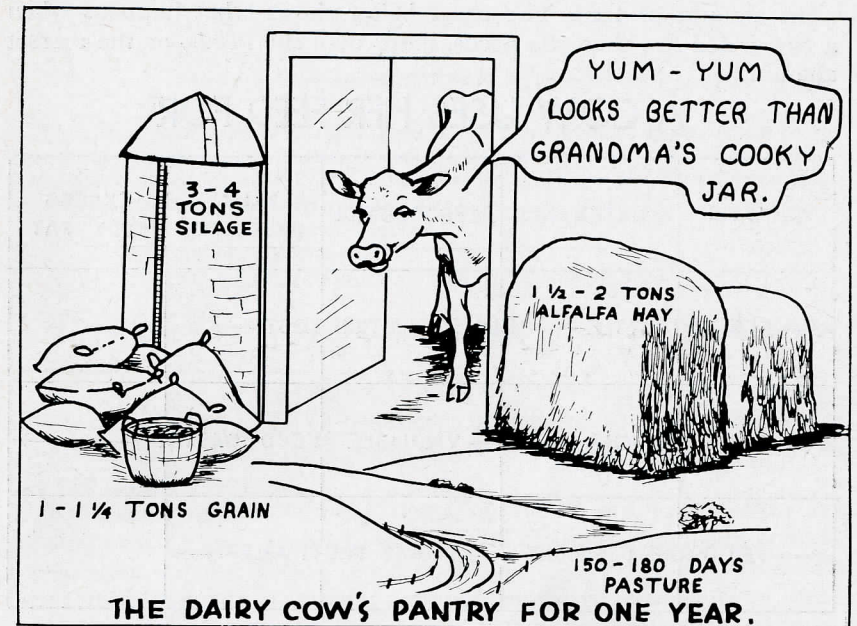
Feed liberal quantities of good quality roughage. Six to eight weeks before freshening feed a good ration like those suggested on pages 30-31.

Feed approximately 3 pounds of grain daily, varying the amount according to the animal's condition. If the heifer is thin, increase the grain and feed about 5 pounds daily. If she is fat, reduce to 1 or 2 pounds daily. A heifer that is in good condition when she freshens produces milk with a higher butterfat content than does the same heifer if she is thin.

Two or three weeks before your cow freshens discontinue the feeding of corn or barley. At this time feed a laxative ration that has a cooling effect on the cow. If this is done there will be less inflammation in the udder. Ten days to two weeks before freshening reduce the amount of grain fed, but continue with a cooling or laxative ration containing bulky feeds such as oats and wheat bran.

Care at calving time. Your heifer should become accustomed to her milking stall before freshening. If allowed to come in and go out with the milking herd at milking time, she will become acquainted with the milking procedure. During the pasture season there is no better place for your heifer to calve than in the pasture. The disadvantage of calving in the pasture is the danger of dogs or other cattle disturbing the heifer. Box or maternity stalls provide an excellent place for heifers to calve. The box stall should be roomy and well lighted. Before your heifer is placed in the stall, the stall should be thoroughly cleansed and disinfected. After the stall is dry, new clean bedding should be placed in it. Keep your heifer dry and warm after calving. Provide lukewarm water for drinking, especially in cold weather. The first grain your heifer receives after calving should be a bran mash. If bran is not available, use ground oats. The bran mash is prepared by mixing water with wheat bran until it forms a wet mealy ball when grasped in the hand.

Before a heifer calves her udder becomes swollen and the swelling often extends up on the belly. Do not become alarmed about this swelling. It should disappear within a short time after freshening.



Laxative feeds such as the bran and oats after calving will help relieve this congested condition of the udder. Two or three weeks will be required before the heifer can be expected to produce her maximum. Therefore, feed her moderately during the first few weeks of lactation.

Feeding for milk production. Feed your producing cow all the high quality hay and silage she will consume. When both hay and silage are fed, your cow needs 1½ to 2 pounds of hay and 3 to 4 pounds of silage per 100 pounds of live weight. If only good quality hay is fed, 3 to 4 pounds per 100 pounds of live weight is needed. This means that a 1,200-pound cow will eat about 18 pounds of hay and 36 to 48 pounds of silage daily. The 1,200-pound cow that is fed only quality hay needs 36 to 48 pounds daily. In one year a cow of this size that produces 9,000 pounds of milk and 325 pounds of butterfat needs about 2 tons of alfalfa, 3 tons of silage, 1¼ tons of grain and 150 to 180 days of good pasture.

Your cow will be different from other cows. Each animal is an individual and you need to become familiar with the habits of your own animal. In herds of dairy cattle there is a tendency to overfeed some animals and underfeed others. If you are to feed properly you need to know your cow's weight, her production, and the butterfat content of her milk. She will use feed for growth, body maintenance, milk production and reproduction. Excess feed will be converted into body fat and stored on the cow's body. By watching their cows carefully, experienced dairymen know when the animals are receiving the

right amount of feed. The chart below shows what happens when a cow is fed less than she needs, more than she needs, or the correct amount.

A COW USES HER FEED FOR

GROWTH	MAINTENANCE	REPRODUCTION	MILK PRODUCTION	EXCESS BODY FAT
← FED TOO LITTLE — MILK PRODUCTION LOST —→				
← FED TOO MUCH — VALUABLE FEED WASTED —→				
← FED CORRECT AMOUNT — PROVES PROFITABLE —→				

The amount of grain you feed milk cows should be determined by a number of factors.

1. Feed grain according to the cow's milk and butterfat production.
2. Feed high-producing cows proportionately more grain than low-producing cows.
3. Feed thin cows proportionately more grain than cows in good condition.
4. Feed young cows proportionately more grain than mature cows.
5. Feed more grain with poor-quality roughage than with high-quality roughage.

The kind of grain ration you feed will depend upon the quality and protein content of the roughage available. Below are listed three different grain rations you can feed with different kinds of roughages.

Roughage. High quality legume hay fed liberally, or good pasture. Example: good, green, leafy fine-stemmed alfalfa. This roughage is high in protein so the grain ration is a relatively low-protein ration containing about 11 per cent digestible protein.

Grain ration. 500 pounds ground corn
300 pounds ground oats
150 pounds wheat bran
50 pounds cottonseed, linseed or soybean oil meal

1,000

Roughage. Medium quality or fair pasture. Good mixed hay or fair legume hay fed with or without corn silage. Example: alfalfa hay and corn silage, or alfalfa and prairie hay mixed. These roughages are medium in protein so the grain ration is a medium-protein ration containing 14 per cent digestible protein.

Grain ration. 400 pounds ground corn
250 pounds ground oats
150 pounds wheat bran
200 pounds cottonseed, linseed or soybean oil meal

1,000

Roughage. Low quality or poor pasture. Prairie or other grass hay, corn or cane fodder fed with or without corn silage. These roughages are low in protein so the grain ration is a high-protein ration containing 17 per cent digestible protein.

Grain ration. 250 pounds ground corn
250 pounds ground oats
200 pounds wheat bran
300 pounds cottonseed, linseed or soybean oil meal

1,000

To each of these rations add 10 pounds of salt and 10 pounds of steamed bone meal.

A simple rule in feeding grain is to feed 2 to 2½ pounds for each gallon of milk (8.6 pounds) produced, provided 2 or more gallons are produced daily. Cows producing less than 2 gallons need only good hay and silage or pasture.

Roughages such as hay and silage should be supplied to cows according to their size. In other words, cows consume roughages according to their weight. Grain is fed according to their milk production. Good producing cows cannot eat enough roughage to produce to their maximum, so they require some grain. For more information on feeding milk cows, see Extension Circular 627.

For more exact amounts of grain to feed cows, use the table below.

GUIDE FOR FEEDING GRAIN

Daily milk production	Milk Testing		
	3.0% to 4% Fat	4.0% to 5% Fat	5.0% to 6% Fat
	Grain to be fed daily	Grain to be fed daily	Grain to be fed daily
15 *	3.5	4.5	5.0
20	4.0	5.5	6.5
25	6.5	7.5	8.0
30	7.5	9.0	10.0
35	9.0	10.0	12.0
40	11.0	13.0	13.5
45	13.0	15.0	16.0
50	15.0	16.5	18.0
55	17.0	18.0	20.0
60	20.0	20.0	24.0
65	22.0	22.0	
70 or above	24.0	24.0	

* With good quality legume roughage, grain need not be fed for milk production under 20 pounds daily.

Pastures. Feeds produced in a luscious pasture furnish most of the necessary nutrients for dairy animals, and these feeds stimulate milk production. Good pastures, throughout the growing season, help to keep milk yields high and feed costs low. Manure from the cattle is returned directly to the soil. Pasture crops are generally soil conserving.

On Nebraska farms everything possible should be done to improve the quality of the pastures. In many pastures, grass is scattered and weeds are present, due to drought conditions, low soil fertility and overgrazing.

Different parts of the state are adapted to different pasture plans, but the following basic principles apply to all farms.

1. Develop and manage pastures to produce the maximum amount of feed for the longest possible grazing season.
2. Use recommended grasses and legumes in the pasture mixture.
3. Use supplementary crops like small grain (oats and rye) and sudan grass during times when permanent pastures aren't producing enough feeds and they need an opportunity to recover.
4. Maintain soils that produce pastures in a high state of fertility by the application of manure and the necessary plant food elements.
5. Keep pastures free from weeds by clipping.
6. Divide pastures into several parts and graze the parts in rotation. During the resting period a new growth of forage generally comes in and rains may freshen the field by washing into the soil some of the fertility from the droppings.
7. Do not graze pastures when grass is too short. Let grasses be 4 to 6 inches tall before grazing. Always maintain at least a 3-inch grass stubble. Sudan grass should be 12 to 15 inches tall before grazing.

Small grain, legumes and grasses can all be worked into a successful pasture plan. Rye seeded early in the fall with ample moisture will provide late fall and early spring pasture. Bromegrass and alfalfa seeded in the fall should be ready to pasture the following May if the moisture conditions are good. The seedbed needs to be properly prepared. Second-year sweetclover is good to use in parts of Nebraska, particularly in the irrigated sections. Sudan grass is drought-resistant, and makes a good pasture in July and August. Do not pasture sudan after a frost or drought if new growth appears at the base of the plants. A pasture mostly of alfalfa is always hazardous because of the danger of bloat.

These precautions can be followed as insurance against bloat when legumes are grazed.

1. Always provide some dry roughage. This is a good practice on any kind of pasture. Many dairymen keep dry roughage in a rack in the pasture where cows have access to it at all times.
2. Feed animals dry roughage before they are permitted to graze legumes.
3. Do not turn animals on legumes after a rain or heavy dew.
4. Provide plenty of salt and water in the pasture.
5. Have material available that can be used for the treatment of bloat.

To guard against unpalatable flavors in milk, remove cows from pastures at least two hours before milking.

A good way to learn more about the use of pastures is to organize a 4-H pasture tour. Visit farms in your community where good pasture systems are used.

Questions for Discussion

1. Why is it a good practice to feed your heifer correctly just before she freshens?
2. What is a good grain ration to feed six to eight weeks before freshening?
3. What is meant by the feeding of a cooling ration ten days to two weeks before and after freshening? Do you follow such a practice?
4. What is the best way to care for your young cow at calving time?
5. How much feed will be eaten in one year by a cow that weighs about 1,200 pounds and produces 9,000 pounds of milk and 325 pounds of butterfat?
6. For what purposes does a cow use her feed?
7. Give a simple rule for feeding grain according to your cow's milk production. If she is producing 42 pounds of 3.8 per cent milk, how much grain does she need daily?
8. Why does a good pasture have advantages over other methods of feeding?
9. What precautions should be followed when cows are on pastures?

COMPOSITION OF FEEDS

Feeds are composed of different elements that are used by the animal for different purposes. It is impossible for you to become familiar with all the details, but possibly you would like to know something about the different parts of feeds. Perhaps your club will want to devote one lesson to the study of feeds. A good 4-H club project is for the leader, assistant leader or members to assemble different kinds of feeds in small glass jars. At a meeting, club members can identify and tell a little about each feed. Twenty or more samples might be collected such as ground corn, oats, wheat bran, trace mineralized salt, steamed bone meal, etc. Below is an explanation of the different elements found in feeds and what they accomplish when eaten by the animal. The explanation is very brief but you can secure much more information about the different parts of feeds if you are interested.

Protein. Protein is the name given to a large number of organic or plantlike substances that contain nitrogen. Some protein is present in all common feeds. Protein is necessary for growth and repair of

muscles, blood and other living body tissues and for production of milk. Homegrown feeds highest in proteins are the legumes such as alfalfa hay. Young, green, growing grass such as we have in early spring and summer is high in protein. As grasses mature and become dry, the amount of protein in them decreases. Prairie hay, corn and cane fodder, and corn silage are very low in protein. The richest source of protein is in feeds made from such seeds as soybeans, cottonseed and flaxseed. After the oil is removed from these seeds, feeds are made from what remains and are called soybean meal, cottonseed meal and linseed meal. Animals must have protein. There is no substitute for it.

Carbohydrates and fats. Our best examples of carbohydrates are sugar and starch. The carbohydrates and fats are used for body energy and milk production. They keep the body warm and supply energy for movement and digestion. Most of the common grains grown on the farm contain carbohydrates and fats. Corn is the best source of carbohydrates for livestock in Nebraska. All the grains contain some carbohydrates and fats.

Minerals. The body of a dairy cow contains many minerals. Some are needed in rather large quantities. Common salt is a necessity. Your milk cow will need 1 to 2 ounces daily. Supply this by adding 1 pound of salt to every 100 pounds of grain mix. In addition, place coarse granulated salt in a tight box that is conveniently located and protected from the wind and rain.

Calcium and phosphorous are needed by dairy animals for bones, teeth, milk production, and reproduction. Cows lacking in either or both of these minerals may show an abnormal appetite by chewing on sticks, bones or posts. They may also have rheumatism and may not reproduce normally. Alfalfa and other legumes are rich in calcium. Wheat bran and cottonseed meal are both rich in phosphorous. Steamed bone meal is nature's best mineral because it contains both calcium and phosphorous in the same proportion as they are found in the body. Supply steamed bone meal by placing 1 pound in 100 pounds of the grain mix. In addition, provide equal parts of steamed bone meal and salt in a box. Salt also should be provided in another box. If you want to use just one mixture, combine 1 part steamed bone meal with 4 parts salt. This will provide salt, calcium and phosphorous in about the right proportions.

Vitamins. In 1912 it was discovered that a mysterious substance prevents or cures the disease called beriberi. This substance was called "vitamine." Since then the general name of vitamin has been used for a number of mysterious organic substances that are necessary for animals but that are needed in very small amounts. Through the discovery of vitamins other diseases like rickets, scurvy and pellagra have been prevented or cured. Since 1912 about 15 known vitamins have

been discovered. Other vitamins and their functions probably will be discovered in the future.

Milk and butterfat are excellent sources of vitamin A which is needed for normal growth and health. Your dairy cow is a little different from other kinds of livestock because she can make all the vitamins she needs except vitamins A and D. She secures vitamin A by eating plenty of good green grass and green, leafy, alfalfa hay. She receives vitamin D from Nebraska's good sunshine. The other needed vitamins are supplied by the farm-grown feeds or are made in the cow's rumen.

Questions for Discussion

1. For what purposes is protein used? Which feeds raised on your farm are high in protein? Which are low in protein?
2. If you need to buy feeds high in protein, which ones can you buy in the nearest town? What do they cost a ton or for 100 pounds?
3. What food elements help keep the body warm or produce body energy?
4. Which grains grown on your farm are good energy producers?
5. How do you feed salt to your dairy cattle? Have you any suggestions for improvement?
6. Why are calcium and phosphorous needed by dairy animals?
7. Which feeds are high in calcium and phosphorous?
8. Why is steamed bone meal a good mineral?
9. On how many vitamins is information now available?
10. What vitamins are found most abundantly in milk and butterfat?

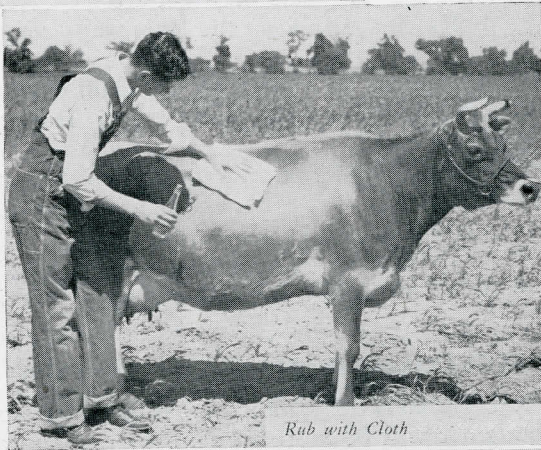
FITTING AND SHOWING THE COW

Fitting. You probably will want to exhibit your cow after she freshens, although it will be more trouble than when you exhibited your calf. Cows in milk need to be moved to and from fairs very carefully to prevent injury and sickness. It will be necessary to observe your cow closely, and feed and milk her regularly while she is away from home. Heavy-producing cows will go off feed when not carefully managed. A few days before moving your cow, reduce the amount of grain being fed. After she is in place on the fair grounds, increase the amount of grain gradually and water her at least three times a day. Probably you will not be able to feed as much grain while your cow is away from home as you do at home, and it is not advisable to feed grain too heavily at the fair. Be sure to keep your cow in a thrifty condition.

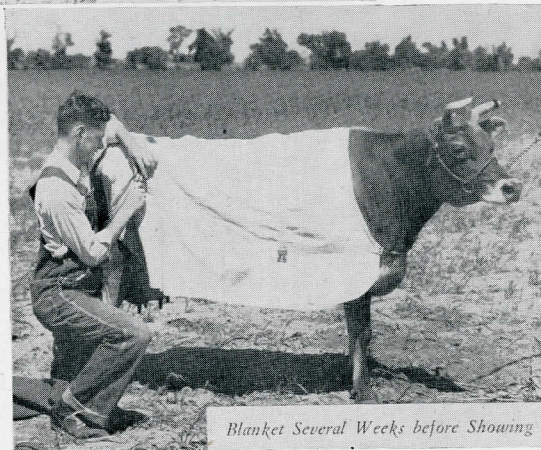
Cows show to their best advantage if they have been fresh four to six weeks before show day. This is the time when they are producing most heavily, and they must be carefully watched.



Brushing Keeps Hair and Hide in Good Condition



Rub with Cloth

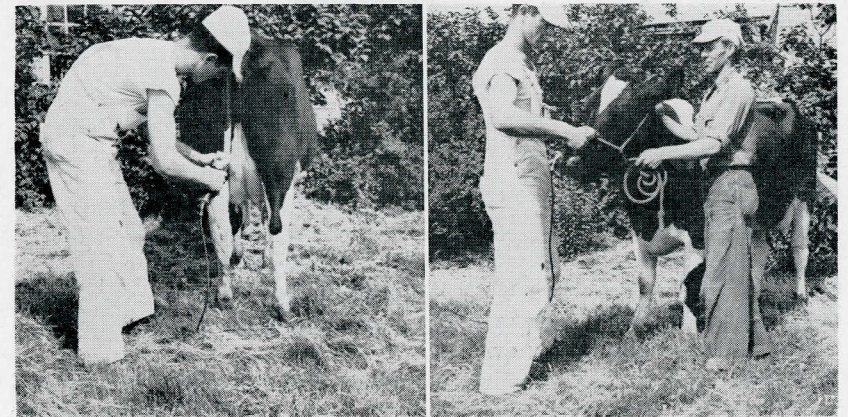


Blanket Several Weeks before Showing

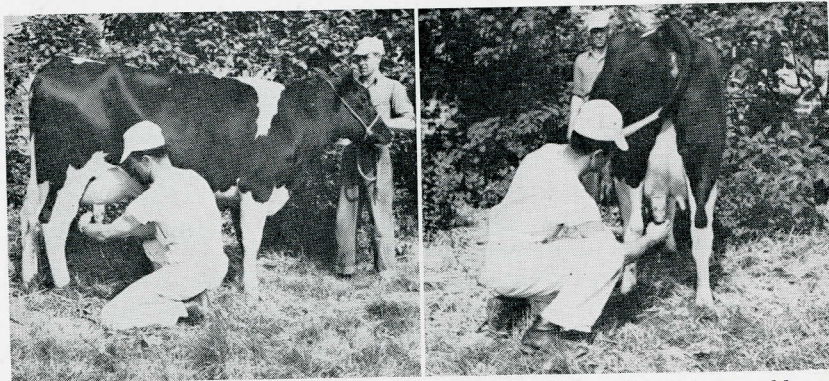
Calves, heifers and cows are fitted in about the same way, but there are slight variations. The cow should respond to showing if she was well trained as a calf to lead and pose. If the cow is shown to her best advantage it is necessary that she be led slowly, and trained to take short steps and to respond to a touch or signal from the showman. When in the show ring the animal should appear alert with her feet kept under her properly, back and rump straight, and head held at an average height. Before showing your cow, review and practice the procedures mentioned in the calf manual.

For your cow some additional fitting of the horns and hide is necessary. She should be blanketed four to six weeks before show day. A blanket made from a duck material will keep the dust and dirt from her hide and hair. If such a blanket is not available, make one from clean gunny sacks. Blanket your cow during the day to prevent the sun from making the hair coarse and stiff. Remove the blanket every day and brush the hair vigorously with a downward, backward motion. This increases circulation and brings out the natural luster of the hair. It also improves the condition of the hide and hair. Do not wash your cow more than once or twice at the beginning of the fitting period, and after that keep her clean by blanketing and brushing. Do not use a coarse brush or curry comb, as these will scratch and raise welts on her hide. Clip the belly of your cow just wide enough to show the milk veins and far enough forward to expose the milk wells. The bellies of heifers should not be clipped. Clip the udder of your cow all over, extending in the rear to the attachments.

If the hair is long and unruly on the neck, remove by clipping. In general, when a great deal of clipping is necessary it indicates



Left, clip the cow's tail, starting 2 to 3 inches above the switch. Right, clip the face and head back to the throat latch.



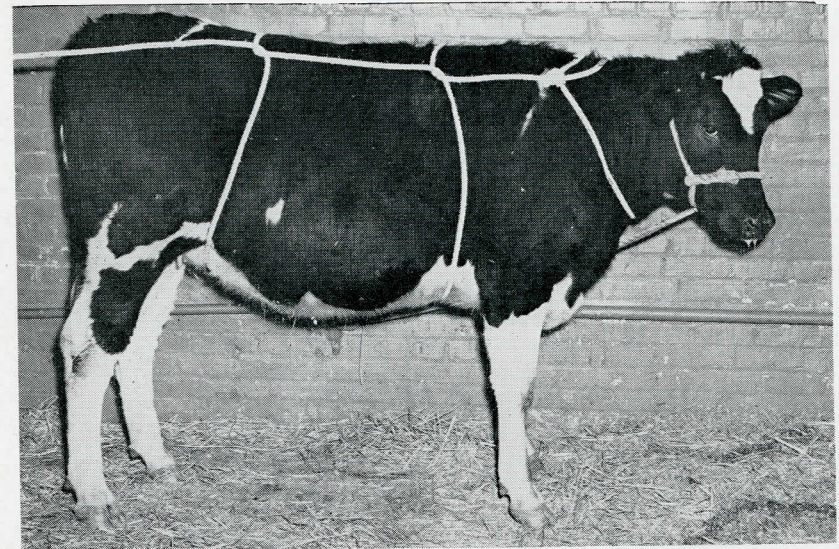
Left, clip the udder before the cow is exhibited. Right, clip the rear udder as high as the attachment.

your cow has not been properly blanketed and brushed. Therefore, keep the clipping to a minimum.

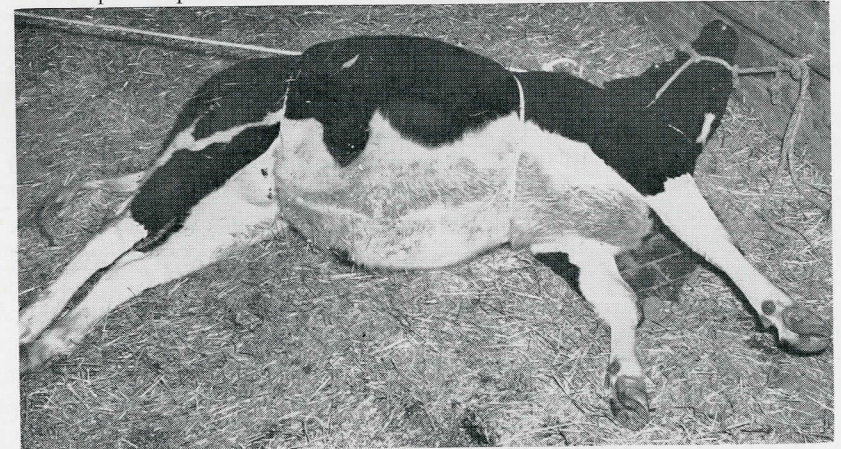
To observe the condition of your cow's feet, stand her on hard level ground. The weight of the animal should be evenly distributed on the soles of all four feet. If the toes are too long, she will stand on her heels or dew claws with the feet far under the body. This makes the legs look sickle-hocked. When walking, an animal with poor feet carries them far forward and places them on the ground in an unnatural or awkward position. The trimming should be done early enough so that the animal will become accustomed to walking normally.

Follow the same procedure in trimming the feet of cows as was followed in trimming the feet of yearling heifers. The wall of the hoof should extend just a little below the sole, so that the weight of the body will be carried primarily on the wall and the sole will be used only as a shock absorber. To trim the sole, pick up the foot and use the nippers and farrier's knife. Occasionally it may be necessary to throw the animal in order to trim the feet. When throwing a cow be sure that you have plenty of help and that you can do the job successfully. If you succeed in laying her down easily and gently it will help in her training; if you fail, it will have the opposite effect. Do not throw animals that are in the advanced stages of pregnancy. When throwing a cow that is in milk, protect her udder by placing a folded gunny sack around the rope in front of the udder. While the animal is down, watch carefully for evidence of bloat. An animal that is down cannot belch normally.

If your cow has horns, spend some time and energy in training and fitting them. Horns are not important from the standpoint of the score card, but if they are present proper polishing will add to the attractiveness of your cow. If it is necessary to shape the horns, start



The casting of an animal is simple if the proper procedure is followed. Fasten the head securely to a post or rail with a strong rope halter. The casting rope is $\frac{1}{2}$ inch in diameter and about 30 feet long. First place around the animal's neck a loop tied with a bowline knot which will not slip or draw tight. Then by means of half hitches place the rope around the heart girth and rear flank. Place the rope in front of the udder on females. After the rope is in place pull steadily directly back over the rump. The pressure over the loin will cause the animal to fall on its side. Keep the rope taut while the animal is down.



The animal is cast. After the animal is down many different tasks may be performed, including the trimming of feet and the removal of extra teats. If the feet are to be trimmed, be sure that they are tied securely with ropes and that the ropes can easily be removed. Cows with udders should have a gunny sack around the rope in front of the udder. Watch for signs of bloat if the animal is kept down for a long period.

to use weights very early to get them properly trained. In shaping and smoothing horns, use a rasp to remove the coarse outer part. Follow this by scraping, using a long stroke with a regular horn scraper or with all or part of a piston ring from an old tractor or large car. Then use a 3/4-inch strip of emery cloth to smooth the horns just as you would use a rag to shine a pair of shoes. Steel wool can also be used to smooth the horns. Smooth completely around the horn, leaving no rough places. Just before you lead your cow into the show ring, apply a light coating of mineral oil, olive oil or vaseline to the horns but don't make them appear too greasy. A harder, more satisfactory finish can be secured by applying a metal polish with a narrow flannel rag. The degree of polish produced depends upon the amount of elbow grease used in drawing the flannel rag back and forth. In the preparation of the horn leave the ends of the horn blunt, not sharp.

Showing. Review the showing techniques described in the Dairy Calf Club Manual. In addition to the instructions in the manual, some supplemental suggestions for showing cows are made here.

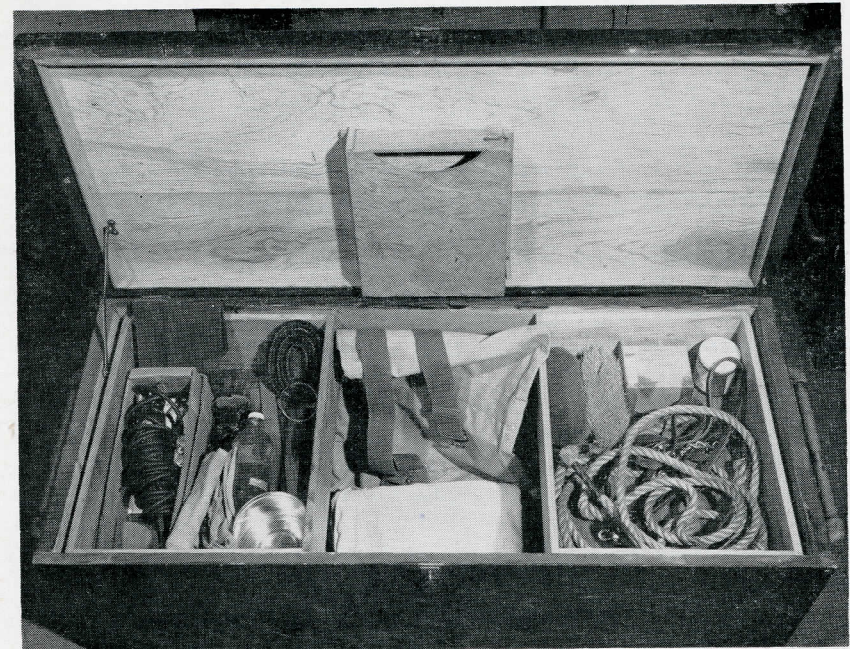
At most fairs there is a definite need for improving the general appearance of the 4-H club exhibits. For example, the bales of straw and hay and sacks of grain should be neatly piled. Pitchforks, buckets, feed containers, and other miscellaneous items should be kept in definite places. "A place for everything and everything in its place," is a good slogan for 4-H dairy clubs. Bedding should be kept clean and well arranged and placed under the cattle. Clubs or counties should provide large wooden boxes or trunks in which halters, brushes, combs, blankets, and all miscellaneous items can be kept in proper order. If the proper facilities are available and used, fewer brushes, combs and halters will be lost.

Boxes should not be so large that they are too heavy when full. Two or more boxes may be better than one box. A box 4 feet long, 20 inches wide and 18 inches deep with handles and painted in 4-H club colors of green and white is easy to move and will hold a great deal of material when properly arranged. This box should be made during the winter months or when there is plenty of time to do a good job.

The day you are going to show, get an early start in the morning. Give your cow a normal feed of hay and grain, but do not water her.

Determine when the classes are to be shown, particularly when cows in milk will be exhibited. A cow shows best when her udder is distended, so she should not be milked the morning of show day. If the udder becomes too tight or if the cow is uncomfortable, release this tension and balance the udder before leading her into the show ring.

About one hour before taking your cow into the ring, start filling her. Beet pulp is the best feed for filling a cow. When it is not available use a liberal amount of roughage, a light grain feed and a mod-



An excellent show box that contains the necessary equipment for showing 4-H dairy animals. The compartment on the lid is for important papers and fair catalogues.

erate amount of water. Too much water may result in scouring and it may leave the animal waterlogged and sluggish. Water fills wear off rapidly and sometimes give the animal a barrel-like shape.

Just before leading into the ring, remove the blanket, brush the cow thoroughly with a soft brush, rub with a turkish towel carrying a little hair dressing, and finish with a brisk rub with the palms of the hands. Comb and brush the tail. Touch up the horns if necessary, slip on the show halter and wipe away any feed, hay or straw that might adhere to the muzzle or body. Lead your cow to a clean place in the aisle and clean the feet.

In the ring. Before you lead into the ring, be sure your personal appearance is pleasing and that you have the necessary entry number and information. The show begins when the animal steps into the ring and continues until she leaves the ring. Follow the same procedure in showing your cow that you followed in showing your calf or heifer.

Not all animals that are exhibited can win; and before different judges and on different days animals will not appear the same. As a result, at different shows the same animals will vary in their placings.

This is what makes exhibiting interesting and offers variety in showing.

At many fairs different club members will place their animals together and show a county group. Groups should be as uniform as possible.

Questions for Discussion

1. Tell the club members why you would like to exhibit your cow at the fair.
2. When does a cow in milk look her best?
3. Why will you need to be more careful in exhibiting your cow than you were in exhibiting your calf?
4. Describe or demonstrate how to prepare the cow's horns for exhibition.
5. Describe or demonstrate how to prepare the cow's feet for showing.
6. What differences are there in clipping cows, heifers and calves?
7. Why is it advisable to blanket your cow four to six weeks before the fair?
8. Have you any suggestions as to how your club's exhibit can be kept neat and clean at the fair?
9. Describe or demonstrate how to prepare your cow properly just before you lead her into the show ring.
10. What is important in showing a number of calves in a group?

MILK

Can you give a god definition of milk? What is milk, and what does it contain? Someone has said that 'milk is the whole, fresh, clean, lacteal secretion obtained by the complete milking of one or more healthy cows, properly fed and kept, excluding that obtained fifteen days before and five days after calving or such longer period as may be necessary to render the milk practically colostrum-free.' That is a long statement, but perhaps it does give you a definition for milk.

Milk is composed of different constituents or parts as shown by the table below.

Constituents	Amt. in normal milk (average per cent)
Water	87.3
Carbohydrate (milk sugar)	4.8
Protein (casein and albumin)	3.4
Ash (mineral matter)	.7
Milk fat (butterfat)	3.8
Total	100.0

The constituents in milk vary, and probably milk from no two cows is exactly the same. Not only is there a variation in the milk from different cows and different breeds, but there is a variation in the

composition of milk from different species of animals. For example, milk from the reindeer contains 17.4 per cent fat while milk from the mare contains only 1.2 per cent fat. Because you might be interested in knowing more about the milk from different animals, the average composition of milk from different species is shown below.

	Water	Fat	Lactose	Protein	Ash
Goat	37.9	3.8	3.2	4.5	0.6
Ewe	80.8	6.9	6.6	4.9	0.8
Mare	90.7	1.2	2.0	5.7	0.4
Water buffalo	76.9	12.5	6.0	3.7	0.9
Reindeer	67.8	17.4	10.1	3.0	1.7
Camel	87.6	5.4	3.0	3.3	0.7
Sow	84.1	4.6	7.2	3.1	1.0
Dog	78.9	8.8	6.8	4.2	1.3
Cat	81.8	3.4	9.2	4.9	0.7

In general, as the fat content of milk increases the other constituents also increase. Milk with a high butterfat content is higher in protein, lactose and mineral than milk with low butterfat content.

At one of your club meetings discuss the different parts of milk and learn more about them. A brief description of the different constituents in milk is given in the next few paragraphs.

Milk sugar. Milk sugar is called lactose. It is a unique sugar in that it is practically tasteless. Lactose is in solution in the milk and is not as sweet as sucrose or cane sugar. Lactose plays a very important part in the absorption of calcium and phosphorous so necessary to the building of bone. The manufacture of milk sugar is expensive and is carried on only where large quantities of skim milk or whey are available. Souring of milk occurs when bacteria change lactose into lactic acid. The bacteria, or germs, are found nearly everywhere and when they get into the milk and conditions are favorable they multiply rapidly, thus causing milk to sour. For example, warm milk sours faster than cold milk because bacteria multiply faster in warm milk.

Protein in the form of casein and albumin is a very important part of milk. Casein forms a large part of cheese. American cheddar cheese is about one-third casein. Commercially casein can be used as a substitute for bone and celluloid in the manufacture of buttons, backs of combs and numerous other articles. Albumin is easily digested. The white of an egg is one of our best examples of nearly pure albumin. The white substance or milk stone sometimes seen on milk utensils is casein and albumin hardened by heating. When lodged in cracks or seams of utensils these substances afford a breeding place for bacteria. Because milk contains protein it is an excellent food for humans, particularly for growing individuals.

Mineral or ash, that part left after milk has been dried and burned, contains the mineral matter of milk. The most important mineral is

calcium (lime), found abundantly in milk. It is needed to build teeth, bones and blood. Milk also contains small amounts of phosphorous.

Milk fat exists in milk in the form of droplets or globules. The globules are very small and can be seen only through a powerful microscope. A cubic centimeter of milk (about 20 drops) contains about 2,000,000 fat globules. The milk fat is made up of nine other fats which vary in amount. One is called "butyrin" and is the characteristic fat of butter because it gives butter much of its flavor and odor. Dissolved in the fat are the valuable vitamins A and D. Vitamin A is very important because it helps the body to grow and resist disease, especially diseases of the eyes, lungs and throat.

The fat in milk varies more than any other of the constituents. Some of the factors causing variation are as follows:

1. Fat varies with the different breeds.
2. The condition of the cow causes a variation in the fat in milk. A cow that is in good condition at freshening time produces milk of a higher fat content than does the same cow when thin.



3. Fat varies with the period of lactation. The percentage of fat increases as the lactation period advances.

4. Milk varies in fat content from day to day and from milking to milking. There is even a difference in fat content between the first and last milk drawn at one milking. The first milk drawn is low in fat while the last is very rich.

This discussion should emphasize to you that milk is a wonderful food. Milk contains so many food elements needed for good nutrition that greater emphasis should be placed on the use of it as milk. Although certain products can be manufactured from milk,

the fact remains that it is best to consume it as milk. A quart of milk will provide the following:

- 45 per cent of the daily protein need;
- 30 per cent of the daily calorie need;
- 66 per cent of the daily phosphorous need;
- 3 per cent of the daily fat need;
- 145 per cent of the daily calcium need;

- 3 per cent of the daily vitamin A need;
- 14 per cent of the daily vitamin B₁ need;
- 100 per cent of the daily riboflavin need;
- 50 per cent of the daily vitamin C need;
- 20 per cent of the daily niacin need.

Most people use milk in some form every day. It is a valuable food for both old and young. It is a necessity, not a luxury. Milk and its products yield a greater return in food values for the money spent than any other food. There is no satisfactory substitute.

Questions for Discussion

1. What does normal cow's milk contain?
2. What species of animal produces milk highest in butterfat?
3. What species produces milk lowest in protein?
4. How does the milk of a ewe differ from that of a cow?
5. If your neighborhood druggist uses milk sugar, for what does he use it?
6. What are the two common proteins in milk? Name foods found in your home that are high in these two proteins.
7. If you spilled some milk on the stove and it completely burned or evaporated, what would remain?
8. Which breeds produce milk high in butterfat content? Low in butterfat?
9. If you tested the milk first taken from your cow and the last secured during the milking process, which would be higher in butterfat?
10. Does the milk from a thin or fat cow test higher after freshening?

PRODUCING QUALITY MILK

Milk is one of nature's best foods. If it comes from a healthy cow it is clean. The care of milk after it is taken from the cow is the dairyman's responsibility.

There are a few essentials in the production of clean milk with a good flavor and a low bacteria count.

1. The milk must be from clean, healthy cows.
2. The milk must be handled in clean utensils.
3. The milk must be kept free from dirt and dust.
4. The milk must be cooled quickly and kept cold.

Your cow and other cows from which you secure milk should be healthy. Some diseases may be transmitted from cows to humans through milk. Cows should be free of tuberculosis, Bang's disease or Brucellosis, mastitis and other ailments. Cows can be tested to determine whether they are free from tuberculosis or Brucellosis. Mastitis, which is defined as any disease of the udder, can be detected by the

use of a strip cup or by close observation and the feel of the udder. When lumps or stringy milk appear, as shown on the fine mesh screen, mastitis is indicated.



The use of a strip cup before milking helps detect abnormal conditions of the milk. (Picture courtesy Michigan State College.)

Rinse milk utensils first with cold water, wash them with warm water containing a wetting agent, rinse and then sterilize with steam or boiling hot water. Store utensils away from dusty places. Wash and rinse milk cans received from the milk plant.

Be sure to wash utensils with a brush. Do not use a rag or steel wool. Where the size of the herd justifies it, the best place for handling milk and milk utensils is in the milk house away from the cow barn. A properly equipped milk house is a big labor saver on the farm. Before milking, rinse the utensils thoroughly with clean water to which chlorine sanitizer has been added.

Dirt has no place in milk under any conditions. Keep the cow's flanks and udder clean. Clip the long hair from the udder and flanks in the fall and winter. Brush the cows when they are placed in the barn and before milking. Keep the hands and clothing of the milker clean. Keep the barn clean, especially where milk is handled. If there is dust in the air at milking time, it will get into the milk. Straining is necessary, but straining doesn't restore dirty milk to a high-grade condition. For straining use cotton disc filters and change filters after every 10 gallons have been strained. Be sure that the milk can is clean and rinsed before filling it with milk. Do not strain the milk into the can in the barn. Keep the can in the milk house and carry the milk to the strainer. Barn odors or any undesirable odor can destroy the good flavor of fresh, clean, properly cooled milk.

Quick cooling milk is desirable because it prevents growth of bacteria. Milk should be cooled to below 50 degrees as soon as possible after milking.

The consumption of milk depends upon whether or not it has a pleasing, palatable flavor. Objectionable flavors are described as acid, salty, malty, rancid, oxidized, barny or feed flavors. These off-flavors are due to one or more causes, and many times can be corrected. Space does not permit a complete and thorough discussion of all the factors that cause off-flavors in milk or cream, but bulletins and circulars

are available that describe reasons for poor flavors in milk and cream and methods to correct such conditions. As the bulk handling of milk increases, it will be more important than ever that milk be produced with no objectionable flavors.

Questions for Discussion

1. Do you drink milk every day, and what kind do you like?
2. If your neighbor wanted to know the four most important essentials of producing high quality milk, what four would you list?
3. Why is it important to have healthy cows?
4. Do you ever wash the milking utensils? What procedure do you follow? Any suggestions?
5. What do you think about clipping long hair from the udder and flanks in the fall and winter?
6. Demonstrate at a club meeting how to use a metal strainer with a cotton filter.
7. Do you strain milk into the can in or out of the barn?
8. How do you cool milk on your farm?
9. Which do you like better—warm or cold soda-pop?
10. Name five factors that cause off-flavor in milk and tell how they might be corrected.

MANAGED MILKING

To most people, milking cows seems a simple process. Because it seemed so simple for many years, individuals have not tried to improve their methods. Within recent years scientists have demonstrated that the entire milking process is complicated and there is a need for improved methods. The structure and functions of the udder and mammary systems are complicated. Milk is manufactured in the udder between milkings. Large quantities of blood are required for milk secretion. About four hundred pounds of blood must be circulated through the udder to supply the nutrients for each pound of milk produced. Small cells (aveoli) continuously remove the different parts that make up milk from the blood stream and store them in the udder. The manufacturing process is fastest immediately after milking. It slows down as the pressure in the udder increases towards milking time. At milking time, the small cells squeeze the milk into the milk cistern above each teat. Milk is drawn from the cistern either by the hands or by machine. You can assist the cow by cooperating with her just before and during the milking procedure. Certain things that you do will aid the cells in squeezing milk into the milk cistern. Other treatments, if improper or rough, will cause the cow to "hold up" or prevent the "let down" of milk.

Let us see what you can do to make milking easier and faster and to get more milk.

1. Treat your cow gently. Don't run her in from the pasture or run her with the dogs. Don't whip or excite her. Place her in the barn with as little disturbance as possible.

2. Brush your cow thoroughly after she has been placed in the barn. She will like this, and it helps produce cleaner milk.

3. Feed your cow grain just before milking, as this helps stimulate "let down."

4. Wash and massage the teats and lower part of the udder for about 20 seconds with water at a temperature of 120° to 130° F. Do this 2 to 3 minutes before you are ready to milk. Use clean individual rags or paper towels for each cow.

5. Milk three or four full streams from each quarter into the strip cup. This causes the udder and teats to fill rapidly with milk. In addition this makes it possible for you to inspect the milk for flakes, clots or lumps which are signs of mastitis.



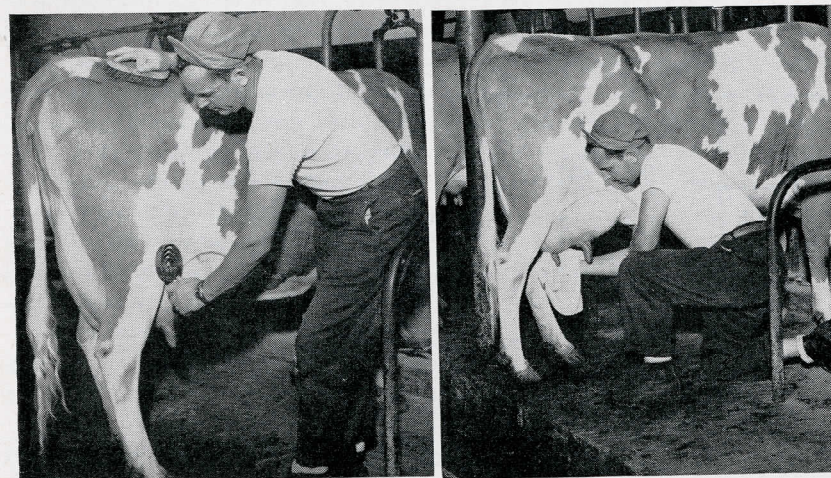
6. Milk your cow rapidly and completely in just as short a time as possible. If you milk by machine, follow the same preliminary procedure. Operate the milking machine according to the manufacturer's directions and remove it immediately after the milk is removed. Do not allow the teat cups to creep up on the udder as this can easily cause injury.

7. Strip your cow with the machine by pulling down on the claw

and massaging the udder when it is about empty. You should learn good milking habits and then teach your heifer when she freshens to respond to good habits. It is hard to break cows from poor milking habits.

Two or three weeks may be required to put good milking habits into use. The main point to remember is to eliminate long-time stripping. Many folks use this fast-managed milking process, and know that it will work. It not only saves time, but makes for healthier udders and an increase in milk production.

Cows with mastitis should be milked last as they are always a source of infection to other cows in the herd. In addition, they are a barrier to the production of high quality milk and may impair human health. Serious consideration should be given to eliminating them from the herd when practical.



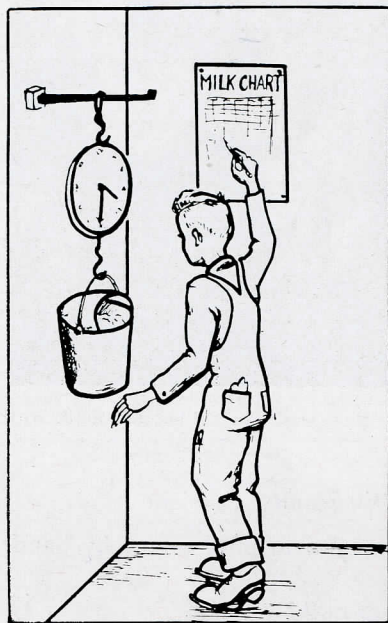
Before milking, curry and brush the cow, then wash the udder and flank with a cloth and warm water.

Questions for Discussion

1. How much time is required for you to milk a cow by hand? Five cows?
2. When does a cow manufacture her milk?
3. Why should you treat cows with kindness when you place them in the barn from the yard or pasture?
4. What practices should you follow to encourage cows to "let down" their milk?
5. Have you ever used a strip cup; and if so, for what purpose?
6. Can you tell other club members how the milking machine works?
7. At the end of the milking process, what is the best practice to follow with the machine?
8. Why should cows with mastitis be milked last?

RECORDS

It is impossible to stress too strongly the necessity of keeping milk and butterfat production records. Accurate and complete records on your producing cow will mean dollars and cents to you. The record book you used in your first year dairy project was designed for use with the dairy calf, yearling heifer, and producing cow. This form (Form 6-01-2) can be used in keeping an account of expenses and income for heifers and cows; and on page 4 there is limited space for milk and butterfat production records. One book should be used for each 4-H dairy animal you own. Detailed directions for keeping records is found on the inside cover of the book. Form 6-15-2 is the best book for keeping dairy production records. All 4-H dairy club members owning cows in production are urged to keep complete records in this book. The directions in the book are self-explanatory.



Dairy Herd Improvement Associations

Many farmers help organize a Dairy Herd Improvement Association (D.H.I.A., sometimes called a cow testing association) in their community and employ a supervisor to keep complete records for them. The supervisor visits each farm every month. Milk from every cow is weighed and tested for the butterfat content. Complete milk and butterfat records are maintained on every cow, and feed consumption for the herd is recorded in the herd book. The records thus secured by farmers through Dairy Herd Improvement Associations are the basis for an improved dairy program.

After 4-H dairy club members conclude their club work, they sometimes receive special training and are employed as supervisors by the associations. The training and experience young men receive as supervisors is very helpful to them in their life work.

The Dairy Herd Improvement Association furnishes the following information:

1. Monthly milk and butterfat production. Information is provided as to the exact amount of milk and butterfat produced in one month. The amount and value of the feed consumed are determined,

as is the value of the product above feed costs. This information properly used can guide a breeder with his long-time breeding program.

2. Monthly butterfat tests on each cow are made by a noninterested party. Because the milk varies in butterfat content from day to day and month to month, it is important to make a test at least once a month during the lactation period. This provides an average butterfat content of the cow's milk during the year.

3. The D.H.I.A. records provide an opportunity for the breeder to study the consistency of his cow's production. The number of days cows milk during the testing year is very important in determining total production.

4. The D.H.I.A. records enable herd owners to feed each cow the amount of feed she can convert into milk most efficiently and profitably.

5. The D.H.I.A. records enable the herd owner to select his best cows for breeding stock. They assist him in determining the breeding worth of cow families and individual sires so that he may improve the inherited capacity to produce milk and butterfat.

6. Records add value to surplus breeding stock, as many sales have demonstrated.

7. Records and butterfat tests on individual cows increase family interest in the breeding of better cows.

8. The D.H.I.A. program can serve as a nucleus for breeders and herd owners to assemble for discussing mutual problems.

The D.H.I.A. program is not an expense for breeders of dairy cattle; it is a sound investment. Breeders of purebred cattle have two other kinds of production testing available. These are Herd Improvement Registry (H.I.R.) and Advanced Registry (A.R.), which are sponsored by the different purebred breed associations. More information about these methods of testing can be secured from the College of Agriculture.

Questions for Discussion

1. Do you keep any kind of records on cows in your herd or in your father's herd?

2. If you weigh a cow's milk daily during her lactation, and one day she produces only half as much in the evening as in the morning, what do you think might be wrong?

3. The D.H.I.A. supervisor visits your farm on May 16, at which time a certain cow produces 38 pounds of milk that tests 3.5 per cent butterfat. How much milk and butterfat will she be credited with for the month of May?

4. What do the letters "D.H.I.A." mean?

5. What are the duties of a D.H.I.A. supervisor?

6. What information is supplied to dairymen with D.H.I.A. records?

7. If a cow produces 8,200 pounds of milk and 290 pounds of butterfat in a year, about how much grain will she eat?

8. Ask at your local creamery for the price of milk and butterfat and determine the value of this cow's product.

9. In addition to the grain she eats, she needs 2½ tons alfalfa hay, 3 tons silage and 150 days of pasture. From local prices, determine her year's feed bill.

10. If you sell cream and feed the skim milk to calves, pigs, and chickens, what is 100 pounds of the skim milk worth as a feed?

MARKETING

When the dairy heifer becomes a producing cow, you will face the problem of what to do with the milk. Some milk, of course, is consumed at home, the amount depending upon the size of the family and how extensively dairy products are included in the diet. There are many uses for milk in the home: as a beverage, for making butter, cheese and ice cream, and in cooking. When there is more milk than can be consumed by the family, the problem of disposing of the surplus in a profitable manner arises.

There are several factors involved in marketing dairy products. Should the product be sold as whole milk or as separated cream? Should it be bottled and sold at retail or sold in bulk to a milk pasteurizing plant? Should it be made into butter or cheese and sold in that form directly to the consumer or should it be sold as whole milk to a butter or cheese manufacturing plant? Should it be sold as Grade A or as ungraded milk?

A few years ago you had more freedom in choosing answers to these questions than you now have. Today changed consumer demand and marketing trends have eliminated some former possibilities for disposing of dairy products at a profit. This is particularly true if you have a relatively small amount of milk.

For instance, in many areas it is no longer possible to sell raw milk directly to the consumer because of health regulations. Pasteurization equipment is too elaborate and expensive to make it practical to attempt to market pasteurized milk on a small scale. This eliminates, in most instances, the possibility of selling bottled milk in small quantities.

At one time it was profitable to convert small quantities of milk into butter and cheese. However, today many people have become accustomed to using factory-made butter and cheese and there is no longer as ready a market for home made products as there was in the past. Even when there is a market, the price at which these products

can be sold is usually not high enough to pay for the extra work involved.

In Nebraska whole milk is marketed principally for sale in bottles. Very little whole milk is marketed for manufacture into cheese, dry milk, or butter. In many communities, milk sold for bottling must meet Grade A standards due either to local milk ordinances or to market demand. Most dairies bottling Grade A milk accept new producers only when the demand rises. Other factors influencing marketing of whole milk are (1) size of your dairy herd, (2) size of your farm, and (3) its location in relation to hauling route.

If you find that there is a dairy plant bottling Grade A milk within a reasonable distance, you can find out whether or not they need additional Grade A producers from your county agricultural agent, local health inspector, or the manager of the milk bottling plant.

If there is a market for your Grade A milk then carefully consider that a large investment in equipment and facilities is needed to produce Grade A milk, and that a certain minimum amount of milk must be marketed annually to show a profit. Many factors are involved in determining the minimum.

One of these factors is a sufficiently large herd to produce enough milk for profitable operation. A second factor is that the farm should be large enough to raise adequate feed, furnish enough pasture and in general support a sufficient number of cows, heifers and young animals. A third factor is location in relation to a hauling route. Some producers haul their own milk to market if they live relatively close by. Grade A regulations make it rather difficult, however, for a producer to haul his own milk unless he has a fairly large volume. If you live some distance from the dairy it is usually more profitable to have your milk picked up by a regular milk hauler. Dairymen using bulk tanks must, of course, have their milk hauled by a bulk pick-up truck. In case of bulk handling it is necessary to give consideration to type of road on which you live and condition of your drive, in addition to the availability of a hauler.

New developments in dairying in recent years affect the marketing of whole milk. Principal of these are (1) use of milking parlors and loafing sheds, (2) use of pipeline milkers, and (3) the trend toward the use of bulk tanks. These have tended to hasten the trend toward increased specialization with dairy farms becoming fewer but larger. While it is not always necessary to have all of these facilities, their use should be taken into consideration in any long range planning for producing Grade A milk. Some milk markets, for instance, will no longer accept Grade A milk from producers who do not have bulk tanks.

If a market for Grade A milk is not available, or for some other reason it is not advisable to dispose of your milk in this way, alternate

methods must be considered. In some communities ungraded milk is still purchased by a pasteurizing plant for bottling. Production of ungraded milk usually requires less elaborate equipment and facilities than those required for Grade A milk. It should be kept in mind, however, that the market for ungraded milk for bottling is probably only temporary. Health regulations and market demand make it probable that in the future all bottled milk will meet Grade A standards.

The other alternative for selling whole milk is to a butter, cheese, or dry milk manufacturing plant. The price paid for whole milk used for manufacturing purposes is usually considerable lower than that paid for milk for bottling. In Nebraska there is very little outlet for "manufacturing" milk since very little cheese is made, dry milk is made largely from surplus supplies of milk intended for bottling, and butter is made almost entirely from farm-separated cream.

The final possibility for marketing your excess milk is in the form of separated cream. Returns from the selling of cream are usually the lowest of any of the marketing methods discussed here. This means that you should have some means of profitably using the skim milk. Use of skim as hog or chicken feed will increase your return.

The principal advantages of selling separated cream are (1) less elaborate facilities and equipment required than for producing fluid milk, (2) small quantities of good quality are acceptable on the market, and (3) there is a cream market convenient to almost every producer.

The methods for producing quality milk described in this manual apply when the milk is to be separated as well as when it is to be marketed as whole milk. Cream produced in a clean manner, cooled to keep it from souring, and marketed at frequent intervals usually brings a higher price than sour or off-flavor cream.

If you are milking only a few cows there probably will be times when your production is quite low, and other times when it will be relatively high. This fluctuation presents a serious problem to a plant which bottles milk, since the plant's demand does not vary a great deal from day to day or from month to month. To the butter manufacturing plant this is not so much of a problem. Although the demand for butter is fairly constant throughout the year, butter is not as perishable as fresh milk and can be stored for several months before it is used.

Farm separated cream is marketed by three methods: (1) farm pick-up on regular cream routes, (2) delivery by the producer directly to the creamery or cream station, and (3) rail shipment. Some producers may use a combination of two or more of these methods.

From the standpoint of quality, the best butter is usually produced from so called "route cream" since it is ordinarily picked up at least

twice a week and delivered directly to the butter manufacturing plant. Cream produced in a clean manner, kept cool, and sent to market at least twice a week usually makes very good butter.

If you are not located on a cream route you can deliver your cream directly to the creamery or to a cream station. If possible, delivery should be made at least twice a week. Cream that is marketed at greater intervals may develop off-flavors which will result in lower quality butter.

If you live in a community where there is no creamery or cream station, cream can still be marketed by shipping by rail to a large "centralizer" or cooperative creamery. Cream marketed in this manner should be shipped frequently since it may take several hours to arrive at its destination during which time it will not be refrigerated.

Questions for Discussion

1. List different ways farmers in your community can market the products from their milk cows?
2. Determine the amount of skim milk available for feeding on farms from cows producing annually 5,000, 7,000 and 10,000 pounds of milk. How much skim milk would be available from herds of 5 and 10 cows that averaged 5,000, 7,000, and 10,000 pounds of milk? (About 85 per cent of whole milk is skim milk.)
3. Determine from your local creamery the price of butterfat when cream is sold, and also determine what the local creamery pays for ungraded and Grade A milk. Using those figures, determine the gross returns from a herd of 10 cows that had an average production of 7,200 pounds of 4.2 per cent milk. Be sure you assign a value to the skim milk when the cream is sold. (For livestock feeding, 100 lbs. of skim milk is worth $\frac{1}{2}$ bushel of corn.)
4. In problem 3, assume that 75 per cent of the gross returns are needed to pay for all feed the cows eat, and for all other expenses like housing, equipment, miscellaneous bills, etc. How much remains for labor income?
5. Assume the base price for milk testing 3.8 per cent is \$4.00 per hundred, with a 7-cent differential. (Price goes up or down 7 cents with each .1 per cent change in test.)

Determine the value of milk from cows producing as follows:

	<i>Pounds of Milk</i>	<i>Per Cent Butterfat</i>
Cow A	5,600	4.0
Cow B	7,400	3.2
Cow C	8,900	3.8
Cow D	9,200	2.8
Cow E	7,700	5.4

Determine the value of one pound of butterfat from each of the five cows.

AILMENTS OF HEIFERS AND COWS

Only healthy cattle are profitable. Dairy heifers and cows may become sick or diseased or they may not grow and do well because of improper feeding and management. It is impossible to furnish detailed information of all the diseases and ailments that may affect cattle; however, a short discussion is given on the following pages about some of the common ailments.

Diseases that might occur, but not discussed in this manual, are—bloat, cowpox, choke, foul foot, indigestion, Johne's Disease, ketosis, leptospirosis, milk fever, trichomoniasis, and vibro fetus. Cows also develop bad habits like kicking, sucking, and smiliar habits. In addition, other diseases, ailments or bad habits might occur from time to time. For more information about common diseases and ailments, see Extension Circular 631, entitled "Dairy Herd Management" and "Farmers' Bulletin," No. 1470 (titled "Care and Management of Dairy Cows.")

Veterinarians in Nebraska communities are prepared to care for the health needs of Nebraska's livestock. Consult them when needed.

Brucellosis. This disease is also called Bang's disease or contagious abortion. You should know about Brucellosis and be on guard against it. It is a germ disease, with infection usually entering the body through the mouth from contaminated feed and water. Germs are carried by the blood to the pregnant uterus where the unborn calf is developing.

Not all infected females abort. Heifers in their first pregnancy are most likely to abort when infection is present. Some cows will abort the second pregnancy, and a few the third. Some females that carry Brucellosis germs produce normal calves regularly.

At calving time there is the greatest danger of spreading this disease to other cattle. There is no known satisfactory treatment for Brucellosis. Every possible treatment has been tried without success. Much can be done to prevent females from becoming infected. Cattle that are bought and brought onto your farm should be quarantined for 30 to 60 days and blood-tested before they are allowed to run with the other cattle. Guard against having strange cattle come onto your farm, as they may be infected with Brucellosis. The vaccination of heifer calves with Strain 19 has met with wide approval. It may not be perfect in every respect, but it is the best vaccine ever produced for the prevention of this disease.

Brucellosis in humans is called undulant fever. This disease is transmitted to humans from swine, goats and cattle. Undulant fever is primarily a disease of men. Children under 12 years of age are relatively resistant to the disease. There is a possibility of contracting undulant fever by drinking raw milk from cows with Brucellosis, but most cases are caused by contacts with infected material. Many years

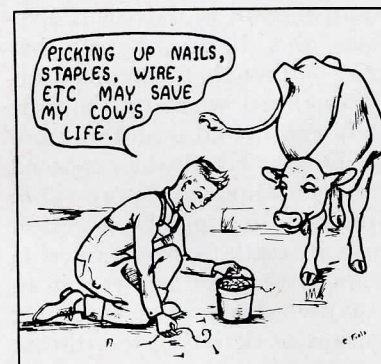
ago undulant fever was known as an occupational disease because it was prevalent among farmers, veterinarians and packing house workers that handled diseased organs from cows, goats and swine.

Guard against Brucellosis in your animals and eliminate it if it should appear on your farm.

Breeding problems. Reproduction is very complicated. Many factors influence the ability of heifers and cows to breed and reproduce. Probably 5 to 10 per cent of dairy heifers are sterile, that is they do not have the ability to have young. Other females may produce one or two calves and then fail to reproduce again. There are many reasons why heifers and cows fail to breed and produce calves. Some of these reasons are very complex and it is impossible to explain in detail why your heifer may not produce young.

Diseases such as Brucellosis may prevent reproduction. Improper feeding or the lack of minerals may influence reproduction. Injury or a deformed condition may have an effect on the reproducing ability of a female. It seems that some females inherit the ability to reproduce better than others. Sometimes veterinarians can correct breeding troubles with heifers or cows, but at other times there is nothing to do but sell for beef the nonbreeding female.

Foreign objects. Every year many valuable dairy cattle die because of nails, staples or wire that they pick up with their feed. After being



taken into the animal's mouth, foreign objects are passed through the gullet into the second compartment of the stomach or reticulum. The objects may remain in this part of the cow's stomach or, if they have sharp ends as in the case of nails and wire, they may eventually work through the walls and puncture the heart or other vital organs and cause death. Scientists have developed a method of removing these pieces from the reticulum by an operation. The best thing, however, is to prevent pieces of wire, staples, nails and similar material from getting into the animal's feed.

Mastitis. This disease is sometimes called garget and generally is noticed when cows produce stringy or watery milk. Mastitis is caused by germs that gain entrance through the opening in the teat. The disease is more noticeable after the udder becomes bruised or is exposed to a cold, damp floor. It is spread from animal to animal by careless hand or machine milking, or by udders coming in contact

with contaminated floors and bedding. Milking from infected udders onto the ground will spread infection.

Because the udder of a dairy cow is such a sensitive organ, every precaution should be taken to prevent its injury. The following practices will help.

1. Handle the udder gently.
2. Follow good milking practices whether you milk by hand or by machine.
3. Prevent the udder from being kicked, bunted or stepped upon by other cows.
4. Drive cows at a walk. Don't let the dog run the cows.
5. Provide plenty of bedding, particularly when cows lie on cement floors or the cold ground.
6. Milk cows regularly.
7. Be careful when drying off cows.
8. Be careful in buying animals about which you do not have definite information and which may be unhealthy.
9. If strange animals are brought onto the farm, isolate them from the rest of the herd for 30 to 60 days.

Feeding mastitis-infected milk to calves is not recommended. Neither should milk from cows with mastitis be used for human consumption.

Tuberculosis. A number of years ago tuberculosis was widespread among dairy cattle. Through the cooperative effort of dairymen, livestock producers and government workers, this disease of cattle has been greatly reduced on Nebraska farms. Although tuberculosis occurs only rarely now, you should be acquainted with it. Tubercle germs are so small that 25,000 of them laid end to end would measure only an inch. They multiply in the body but are killed when exposed to direct sunlight. Clean pens, yards and buildings are more easily exposed to sunlight, so cleanliness on the farm is a good precaution against tuberculosis. Because tuberculosis in cattle is communicable to humans, every precaution known should be used to keep it in check. Tuberculosis can also be transmitted from cows to swine. Scientists many years ago worked out means of detecting the disease by different tests. One of these tests applied by a veterinarian can help you determine whether tuberculosis is present in your herd.

Questions for Discussion

1. Why should dairy cattle be healthy?
2. Name at least ten diseases that affect dairy animals.
3. By what other names is Brucellosis known?
4. Tell the club members about Brucellosis.
5. Approximately what per cent of dairy cattle do not have the ability to reproduce?

6. Is there any danger that animals on your farm might pick up nails, staples or short pieces of wire?

7. Visit the local packing house and try to secure that part of a cow's stomach which contains the foreign objects or hardware.

8. Suggest some management practices that might be followed on your farm to prevent mastitis.

9. Why should tuberculosis be eradicated from all dairy herds?

10. What does nature provide as a good disinfectant?

Gestation Table for Dairy Cows

09

Date of serv-ice	Date of Due to calve	Date of serv-ice	Date of Due to calve	Date of serv-ice	Date of Due to calve	Date of serv-ice	Date of Due to calve	Date of serv-ice	Date of Due to calve	Date of serv-ice	Date of Due to calve	Date of serv-ice	Date of Due to calve	Date of serv-ice	Date of Due to calve	Date of serv-ice	Date of Due to calve								
Jan. 1	Oct. 10	Feb. 1	Nov. 10	Mar. 1	Dec. 8	Apr. 1	Jan. 8	May 1	Feb. 7	June 1	Mar. 10	July 1	Apr. 9	Aug. 1	May 10	Sept. 1	June 10	Oct. 1	July 10	Nov. 1	Aug. 10	Dec. 1	Sept. 9		
2	11	2	11	2	9	2	9	2	8	2	11	2	10	2	11	2	11	2	11	2	11	2	10	11	10
3	12	3	12	3	10	3	10	3	9	3	12	3	11	3	12	3	12	3	12	3	12	3	11	12	11
4	13	4	13	4	11	4	11	4	10	4	13	4	12	4	13	4	13	4	13	4	13	4	12	13	12
5	14	5	14	5	12	5	12	5	11	5	14	5	13	5	14	5	14	5	14	5	14	5	13	14	13
6	15	6	15	6	13	6	13	6	12	6	15	6	14	6	15	6	15	6	15	6	15	6	14	15	14
7	16	7	16	7	14	7	14	7	13	7	16	7	15	7	16	7	16	7	16	7	16	7	15	16	15
8	17	8	17	8	15	8	15	8	14	8	17	8	16	8	17	8	17	8	17	8	17	8	16	17	16
9	18	9	18	9	16	9	16	9	15	9	18	9	17	9	18	9	18	9	18	9	18	9	17	18	17
10	19	10	19	10	17	10	17	10	16	10	19	10	18	10	19	10	19	10	19	10	19	10	18	19	18
11	20	11	20	11	18	11	18	11	17	11	20	11	19	11	20	11	20	11	20	11	20	11	19	20	19
12	21	12	21	12	19	12	19	12	18	12	21	12	20	12	21	12	21	12	21	12	21	12	20	21	20
13	22	13	22	13	20	13	20	13	19	13	22	13	21	13	22	13	22	13	22	13	22	13	21	22	21
14	23	14	23	14	21	14	21	14	20	14	23	14	22	14	23	14	23	14	23	14	23	14	22	23	22
15	24	15	24	15	22	15	22	15	21	15	24	15	23	15	24	15	24	15	24	15	24	15	23	24	23
16	25	16	25	16	23	16	23	16	22	16	25	16	24	16	25	16	25	16	25	16	25	16	24	25	24
17	26	17	26	17	24	17	24	17	23	17	26	17	25	17	26	17	26	17	26	17	26	17	25	26	25
18	27	18	27	18	25	18	25	18	24	18	27	18	26	18	27	18	27	18	27	18	27	18	26	27	26
19	28	19	28	19	26	19	26	19	25	19	28	19	27	19	28	19	28	19	28	19	28	19	27	28	27
20	29	20	29	20	27	20	27	20	26	20	29	20	28	20	29	20	29	20	29	20	29	20	28	29	28
21	30	21	30	21	28	21	28	21	27	21	30	21	29	21	30	21	30	21	30	21	30	21	29	29	28
22	31	22	31	22	29	22	29	22	28	22	31	22	30	22	31	22	31	22	31	22	31	22	30	29	28
	Nov. 1	23	30	23	30	23	30	23	30	23	30	23	30	22	1	22	1	22	1	22	1	22	1	22	1
	23	2	31	24	31	24	31	23	1	23	1	23	1	23	1	23	1	23	1	23	1	23	1	23	1
	24	3	Jan. 1	25	1	25	1	24	2	24	2	24	2	24	2	24	2	24	2	24	2	24	2	24	2
	25	4	2	26	2	26	2	25	3	25	3	25	3	25	3	25	3	25	3	25	3	25	3	25	3
	26	5	3	27	3	27	3	26	4	26	4	26	4	26	4	26	4	26	4	26	4	26	4	26	4
	27	6	4	28	4	28	4	27	5	27	5	27	5	27	5	27	5	27	5	27	5	27	5	27	5
	28	7	5	29	5	29	5	28	6	28	6	28	6	28	6	28	6	28	6	28	6	28	6	28	6
	29	8	6	30	6	30	6	29	7	29	7	29	7	29	7	29	7	29	7	29	7	29	7	29	7
	30	9	7	31	7	31	7	30	8	30	8	30	8	30	8	30	8	30	8	30	8	30	8	30	8
	31	10	8					31	9	31	9	31	9	31	9	31	9	31	9	31	9	31	9	31	9

NOTES