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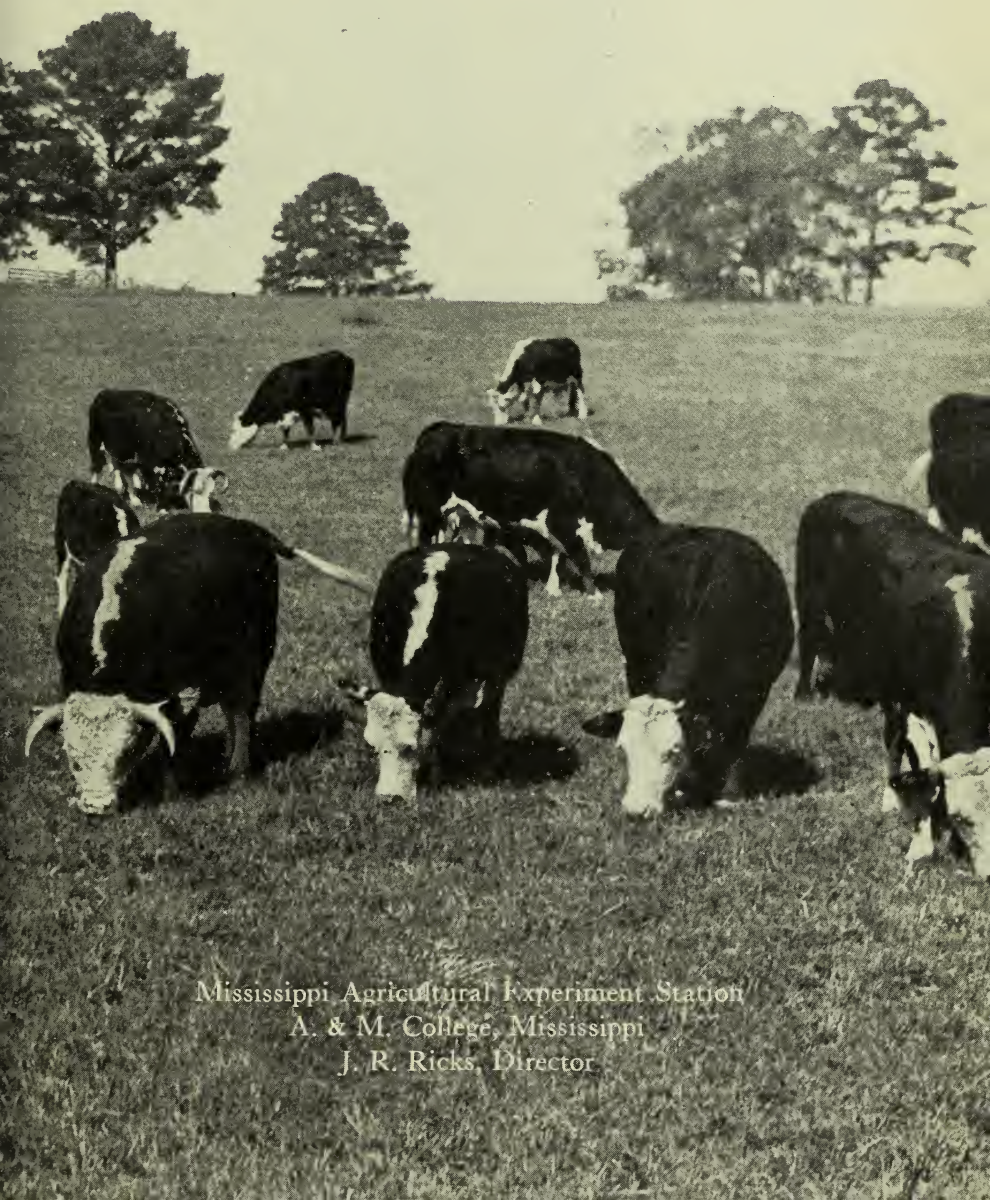
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BEEF CATTLE PRODUCTION IN MISSISSIPPI

BY

GEO. S. TEMPLETON



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J. R. Ricks, Director

SUMMARY

A progress report made on the basis of two years experimental records indicates that shelter is not necessary in this climate for mature cows, yearlings, or weanling calves if the cattle are in good condition when they go into winter quarters and they are properly fed during the winter.

The average grazing period for the past five years, 1924 to 1928, inclusive, extended from the twenty-sixth of March to the eighteenth of December, or 268 days.

Good grade beef calves, dropped on pasture during March and April and having no other feed than good pasture and their mothers' milk, weighed for an average of five years 416 pounds when weaned in December.

Yearling steers and heifers with an initial weight of 480 pounds on pasture made an average gain of 186 pounds per head for the grazing season.

The wintering period for the six year average, 1924 to 1929, inclusive, extended from the nineteenth of December to the twenty-fifth of March, or 97 days.

A ration of 1 pound of cottonseed meal, 15 pounds sorghum silage, and 5 pounds No. 1 Johnson grass hay per calf per day satisfactorily wintered weanling calves with an initial weight of 416 pounds.

With cottonseed meal at \$40.00 per ton, sorghum silage at \$2.80 per ton, and No. 1 Johnson grass hay at \$12.00 per ton, the wintering feed cost per calf was \$6.67 per head.

A ration of 1½ pounds cottonseed meal, 25 pounds sorghum silage, and 8 pounds low grade Johnson grass hay satisfactorily wintered yearling steers and heifers with an initial weight of 613 pounds.

With cottonseed meal at \$40.00 per ton, sorghum silage at \$2.80 per ton, and low grade Johnson grass hay at \$6.00 per ton, the wintering feed cost per head was \$8.93.

A ration of 1 pound cottonseed meal, 30 pounds sorghum silage, and 5 to 7 pounds low grade Johnson grass hay per head per day satisfactorily wintered mature beef cows and two year old heifers with an initial weight of 1038 pounds.

With cottonseed meal at \$40.00 per ton, sorghum silage at \$2.80 per ton, and low grade Johnson grass hay at \$6.00 per ton, the wintering feed cost per cow was \$7.53.

Three groups of heifers of the 1924-25-26 calf crops have been developed as outlined in the bulletin for managing the herd during the grazing and wintering periods. These heifers, as three year olds, have had plenty of substance, have been well developed, have averaged a thousand pounds in live weight, have produced well developed calves, and have made satisfactory brood cows.

Beef Cattle Production in Mississippi

By

GEO. S. TEMPLETON*

The beef cow has always been a source of considerable income for the farmers in many sections of Mississippi. The topography and natural fertility of the soils of the state, a sufficient and well distributed rainfall through a long growing season, available and cheap lands, and a congenial climate are the factors that favor a beef cattle industry in this state.

Even with these very favorable natural advantages, we find in the agricultural yearbook for 1928 that the total cattle population of the state for 1929 (preliminary report) was 835,000, a decrease of approximately 10 per cent for a five year period. No doubt the largest contributing factors for the decrease were the low prices that prevailed for this commodity during a part of this period and the favorable price for cotton.

The human population of the United States is increasing at the rate of about 1,500,000 people annually. For the past 10 year period, the average per capita beef consumption in the Union has been 68.2 pounds. If the future supply of beef for the American table is to be kept up to the ~~best~~ ^{beef} standard and be furnished from home supplies, it would require an increase annually of 186,000 head of 1000 pound steers. About the only territory that is left for expansion of the beef cattle industry is the South-eastern States.

CYCLES OF PROSPERITY AND DEPRESSION IN BEEF CATTLE PRODUCTION

The purchasing power of beef cattle tends to follow a rather definite cycle. The low points in the curves for production coincide quite closely with the high points in the curves for prices. The average length of time from high point to high point in prices is about 14 to 16 years. According to the yearbook of agriculture, the industry is now near the low point on the production cycle and the high point on the price cycle. Apparently, the world beef supply is somewhat similar to that in the United States; consequently, the outlook for the cattle industry in this country is very favorable for those who are established in the business. The low point in the price cycle offers greatest opportunities for starting in the business.

NEEDS FOR MORE EFFICIENT METHODS OF BEEF CATTLE PRODUCTION

A close study of the cycles for prosperity and depression should give the beef cattle producer valuable information for increasing or decreasing slightly his volume of production, but the cattle business itself requires a careful planning of the farming operations and equipping the farm so that about so many cattle can be taken care of properly year in and year out. Attempts to start in the business and stop production on the basis of changing values have proved disastrous. The most successful men in the

*The author is indebted to Mr. D. Maxwell who superintended the feeding of all the cattle used in these tests.

industry are the individuals who have planned their operations over a long period of years, have studied carefully the market requirements, have improved their pastures, have produced very largely all the feeds they have used, have enhanced the value of their herds by using carefully selected herd bulls, have produced a product that the market demands, and have had the product ready for the purchaser at the season when there is the greatest demand.

The beginner should familiarize himself carefully with the phase of the beef cattle industry that he wishes to develop and make a complete study before he launches into the business. There will necessarily be numerous problems that will have to be solved as the business grows.

It is the purpose of this bulletin to outline as simply as possible the answers to a great many problems that come up in producing market beef cattle in this section. The recommendations are based very largely on the studies that have been made with the breeding and management of the beef herd on the Mississippi Experiment Station for the past six years. A list of helpful references is included in the back of this bulletin.

Care and Management of the Herd

BEFORE PURCHASING THE CATTLE

The first thing that the prospective cowman should learn is that he must provide the necessary equipment and arrange for his pastures and feed before any of the cattle are purchased. The prospective breeder should read up on the references cited and it would be time well spent for him to visit as many cattle producers as possible, talk to them about their methods of production, and study carefully the contributing factors to their failures, as well as their successes.

EQUIPMENT NEEDED

Fences. The cowman cannot control his own land and certainly he cannot expect to improve his herd by the use of good herd bulls, or improve his pastures, or utilize his land to the best advantage until the farm is properly fenced. Expensive fences are not an asset to economical cattle production but well built, durable fences are essential and one of the most important parts of the beef cattle equipment on the farm.

Pastures. Good pastures furnish the cheapest feed that can be used in producing beef cattle for the market and these areas of the farm will have to be made the backbone of the production. Pastures will not only furnish the necessary feed for the herd during the great portion of the year, but the pasture is the healthiest place for the herd.

Improving Pastures. The native grasses of the South, the bunch varieties and the wire grasses, furnish satisfactory grazing for only a short season. Fortunately for this section, there is a large variety of carbonaceous and leguminous pasture plants that can be selected for any given soil type or condition that will give a well balanced grazing for the full growing season. It is possible in most cases by carefully studying the pasture requirements of a farm and by developing a simple pasture improvement program to increase the carrying capacity of a permanent pasture one to two hundred per cent in three to four years time.

The seven essential points for building pastures in Mississippi are as follows:

1. Cut all underbrush, briars, and weeds and put the pasture area in condition for regular mowing.
2. Select a mixture of pasture plants that are adapted to the given area and use as many varieties of carbonaceous and leguminous plants in the mixture as possible to give a full season of good quality grazing.
3. Stop the burning over of the pasture area, for the desirable pasture plants cannot reseed and multiply under this practice. Burning favors the production of undesirable pasture plants.
4. Stop the washing of the soil by the proper utilization of terraces where necessary, and the sodding of surfaces where the erosion is less severe.
5. Prevent over-grazing. For the maximum production of forage in the pasture, it is necessary that the plant make considerable growth and reseeding and improving the pasture is impossible where too many animals are maintained on the area.
6. Pasture plants require plant food for development. Generally speaking, the farmer knows the plant food deficiencies of his soil and the amount of fertilizer that must be added for the economical production of cultivated crops. Usually the same principles can be applied to increasing the fertility of his pasture areas as are practiced on his cultivated fields.
7. Conveniently placed shade trees are essential to the comfort of the animals. By selecting the proper varieties of trees, a money return can be secured from the trees in addition to the protection they will give the animals in the pasture.

Water Supply. The beef herd should have free access to a pure supply of water at all times. Deep wells, springs, streams that are not contaminated, and pools or ponds can be used as sources of supply. It is very essential that the supply of water be well guarded, for some of the cattle diseases are harbored in poorly drained, muddy, filthy places. The water supply should be dependable and sufficient to last throughout the pasture or wintering period.

In the construction of pools or ponds, the excavation should be deep and narrow to reduce as much as possible the evaporation during the warm season and to keep the water cool and palatable. The planting of desirable shade trees on the west banks of the ponds will aid materially in keeping the water cool.

Shelter. Expensive shelters for the beef herd are unnecessary in Mississippi. The climate throughout the year does not subject the cattle to critical temperatures. Probably they suffer most during the wet, windy periods of the winter. Thin cattle suffer more during these short periods of time than do cattle that are carrying the proper amount of flesh. Cowmen differ widely in their recommendations as to just how much shelter is necessary on the farm. Some claim that a cheap shelter is economical for mature cattle because of the amount of feed saved by the protection that is given and they are quite sure that shelter for the calves is essential. Others favor wintering the mature cattle in the open, but provide shelter for the calves and young cattle.

For the past two years, an experiment has been under way to determine

what effect and what economic saving there might be in providing shelter for wintering cattle of the various ages. For the first winter's test, two lots of mature cows and two year old heifers and two lots of weanling calves were selected for the test. The comparable lots were divided equally as to breeding, age, and quality. The rations were the same and the only variable that was introduced was the question of shelter or no shelter.

Table 1 gives the results of the first wintering period as follows:

Table 1—The Effect and the Economic Value of Shelter for Wintering Beef Cattle.
December 16, 1927 to March 27, 1928 (101 Days)

	Lot I Shelter	Lot II No Shelter	Lot III Shelter	Lot IV No Shelter
Ration	1 lb. C. S. M. 30 lbs. Sorghum Silage 5 lbs. Low grade Johnson grass hay	1 lb. C. S. M. 30 lbs. Sorghum Silage 5 lbs. Low grade Johnson grass hay	1 lb. C. S. M. 15 lbs. Sorghum Silage 5 lbs. Good quality Johnson grass hay	1 lb. C. S. M. 15 lbs. Sorghum 5 lbs. Good qu Johnson grass
Number of Cattle	11 mature cows and 2 year old heifers	14 mature cows and 2 year old heifers	16 calves	15 calves
Initial weight (lbs.)....	1087	1095	400	399
Weight Jan. 20 (lbs.)	1125	1132	435	429
Weight Feb. 27 (lbs.)	1137	1112	454	430
Final weight (lbs.)....	1112	1074	464	451
Loss or gain in Wt. (lbs.)	25	-21	64	52

The cows in Lot I and the calves in Lot III were fed in the beef cattle barn, were turned out in convenient lots about eight-thirty after the morning feed was consumed, and were returned to the barn about five in the afternoon in time for the evening feed. The cows in Lot II were confined in a four acre lot for the wintering period. There was no shelter whatever provided in this lot. A Bermuda sod gave the cattle a comfortable place to lie down and the feed trough was moved occasionally when the ground around the trough became muddy. The calves in Lot IV were confined for the wintering period to a pasture of about forty acres. The topography of this area is somewhat rolling and a small grove of hardwood trees gave very little, if any, protection to the calves. The sod in Lots II and IV furnished no grazing of any consequence during the wintering period until about the middle of March. The small amount of grazing that was available after this time did not influence the cattle's appetites for their ration.

A study of the results tabulated in Table I indicates that the cows under shelter gained on the average of 25 pounds of live weight during the winter, while the cows with no shelter lost 21 pounds. There was very little apparent difference between the two lots at the close of the wintering period, except the coat of hair of the cattle of Lot II was slightly rougher than that in Lot I. There was no apparent difference in physical condition of the cows in Lots I and II that would indicate that the cattle in Lot II suffered for lack of shelter, nor was there any apparent difference in the calves produced by the two lots or the way they developed their young. The changes in live weight of the weanling calves for the wintering period for Lots III and IV are insignificant. Both lots wintered satisfactorily in every way.

The same experiment was repeated for the winter of 1928 and '29. This time yearling cattle were used in Lots III and IV instead of weanling calves.

Table 2 gives the essential data for the second winter:

Table 2—The Effect and the Economic Value of Shelter for Wintering Beef Cattle.
December 12, 1928 to March 27, 1929 (106 Days)

	Lot I Shelter	Lot II No Shelter	Lot III Shelter	Lot IV No Shelter
	1 lb. C. S. M.	1 lb. C. S. M.	2 lbs. C. S. M.	2 lbs. C. S. M.
Ration	30 lbs. Sorghum Silage	30 lbs. Sorghum Silage	30 lbs. Sorghum Silage	30 lbs. Sorghum Silage
	5 lbs. Low grade	5 lbs. Low grade	3 lbs. Low grade	3 lbs. Low grade
	Johnson grass hay	Johnson grass hay	Johnson grass hay	Johnson grass hay
Number of Cattle	19 mature cows and 2 year old heifers	14 mature cows and 2 year old heifers	23 yearling steers and heifers	15 yearling steers and heifers
Initial weight (lbs.)....	1027	1059	539	551
Weight Jan. 14 (lbs.)	1051	1059	574	582
Weight Feb. 14 (lbs.)	1066	1055	607	608
Final weight (lbs.)....	1045	1028	647	622
Loss or gain in Wt. (lbs.)	18	-31	108	71

Lots I and II were given the same management and equipment as was used for the first winter's test. Again the mature cows and heifers of Lot I maintained their weight more satisfactorily than similar cattle without shelter. The results for the two winters are very uniform. Lots III and IV for the second winter were maintained on the same areas as were provided for the calves the previous winter. While there is some advantage in the gains in live weight of the yearlings in Lot III over the yearlings that had no shelter, both lots wintered satisfactorily in every way and the only apparent difference in the two groups of cattle at the close of the winter was the slightly rougher coats of hair of the cattle in Lot IV.

It will be necessary to extend this study over several years with the different ages of cattle to draw definite experimental conclusions. However, making a progress report on the basis of two years' work, records indicate that shelter is not necessary in this climate for mature cows, yearlings, or calves if the cattle are in good condition when they go into the wintering period. It would seem that a small addition to the rations fed the cattle without shelter would maintain their weight uniformly with the cattle under shelter and that this increased expense of the ration would be less than the amount of money necessary to furnish and maintain the shelter for the cattle of the different ages. All of the cattle in the four lots for the two winters were in good condition and there was no evidence that any of the groups suffered for lack of shelter.

Feed Bunks. Portable feed bunks are very satisfactory for feeding cattle in the open. The bunks should be built of two inch material and preferably from a quality of lumber that will last for several years. The legs should be cut from four by four inch material and should be bolted and braced to the body. For mature cattle, the bunk should be 32 inches high, 10 inches deep, and 4 feet wide. Three feet of trough space should be provided for each mature cow and two year old heifer. Feed bunks for calves and yearlings should be 24 inches high, 10 inches deep, and 3 feet wide. Two feet of trough space should be provided for each calf and two and one-half feet for yearling cattle. The accompanying illustration indicates a good type of construction.

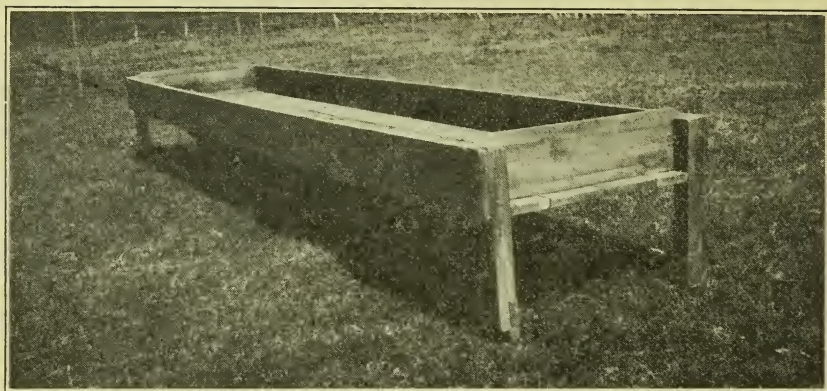


Figure 1—A good type of feed bunk suitable for feeding a ration of cottonseed meal and silage.

Shelter for Storing Feeds. With the present price of concentrated feeds in the South and the type of roughage that is available for beef cattle production, cottonseed meal is the chief concentrate that will be utilized for producing market beef cattle. As this feed is highly concentrated and only small amounts are necessary for wintering the herd, a relatively small space of shelter will be required for housing the concentrated feeds. A sufficient space should be provided for storing the year's supply, if possible, for under normal conditions it is most economical to buy the year's supply between the time of gathering the crop of cotton and the beginning of winter feeding operations.

Silos. Sorghum silage has proved so far to be the cheapest and most satisfactory roughage for wintering the various ages of cattle. The beginner in beef cattle production should make a very careful study of the different types of silos that are being used and consult with the Agricultural Engineering Department of the Mississippi Experiment Station, A. & M. College, Mississippi, for information and advice, bills of material, etc., for constructing silos.

One of the most serious drawbacks in making silage, especially with breeders who have limited capital for starting cattle production, is the necessary amount of money to be invested in equipment to handle the silage crop. Where several neighbors can pool this expense and cooperate in owning the equipment, this handicap is very largely overcome. With the increasing availability of belt power on the farms of the state, this problem is less serious.

Pit silos should be carefully investigated for those sections of the state where the topography of the land and the soil type is of such a nature as to give proper drainage. This type of silo has been successfully used at the sub-station at McNeill, Mississippi, for three years and Mr. S. W. Greene reports that it is very satisfactory in every way. Pit silos require a very small amount of capital for the initial investment, are inexpensive for maintenance, and the silage has been of high quality.

SELECTION OF THE BREED

There is no best breed of beef cattle. The chief differences between the more popular breeds of beef cattle are those of color and breed characteristics. There is more variation between the individuals within a breed than there is between the average individuals of the different breeds. As a rule, a selection of a breed is a matter of personal choice. There would be some advantage, however, in selecting a breed that was popular in the vicinity, as this would facilitate the exchange of herd bulls.

It is not unwise for the beginner to start his cattle breeding operations with native Mississippi cows and a purebred herd bull. Mistakes if made in an undertaking with this kind of investment will not be very costly. The native cows, if wisely selected, will have plenty of capacity for handling feed and produce a sufficient milk supply to develop a desirable grade calf. By mating the correct type of beef bull with these native cows, the best grade heifers can be added to the herd each year to increase the size of the herd and replace the native cows as they approach the end of their usefulness. The majority of the cattle that have been used in the experiments quoted in this bulletin are the result of this type of production. The original herd of cows averaged in breeding flesh from 550 to 650 pounds. Third and fourth top crosses removed from the native foundation herd produced a type of cow that is just as valuable for producing a high quality market steer as could be produced by a great many purebred cows. It will be noted that the present average weight of the mature cattle in the breeding herd is in the neighborhood of 1050 pounds.

THE ABERDEEN ANGUS

The Angus cattle are solid black in color and have no horns. The breed is a model of beef type. They are short of leg, broad and deep of body,

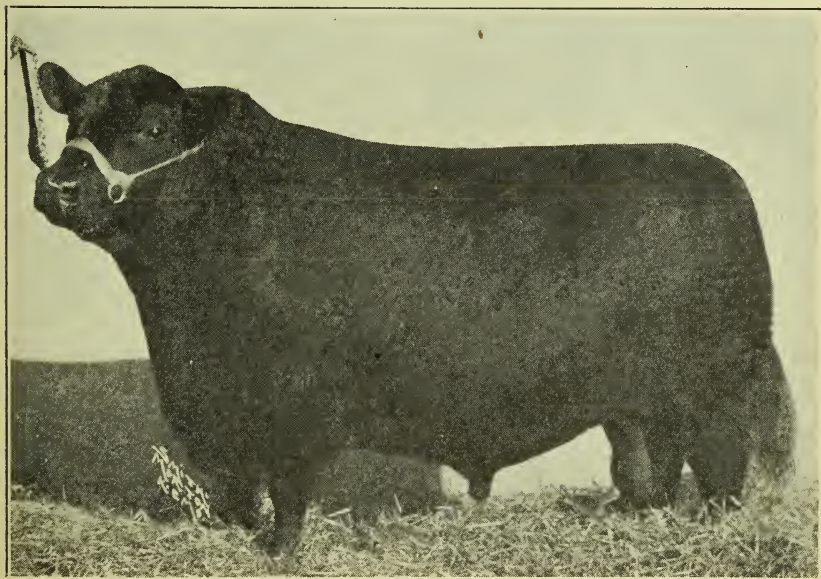


Figure 2—A purebred Aberdeen Angus bull, Playman of Sunbeam 338509.

carrying their breadth and depth uniformly, and are very compactly built. The body is more cylindrical in shape than is characteristic of the Hereford or Shorthorn. The milking qualities of the cows are fair. They are credited with giving more milk than the Hereford, but not as much as the Shorthorn. Cattle of this breed mature very early and have a tendency to fatten well at any age. The breed has an enviable record for high dressing per cent and meat that is well marbled and of first quality. Their merit in these respects has been shown repeatedly in the show ring and in carcass contests.

In size the Angus is smaller than either the Hereford or the Shorthorn. Mature bulls will weigh from 1800 to 2100 pounds and mature cows from 1200 to 1500 pounds. They are somewhat more restless or nervous in their temperament than either the Shorthorn or the Hereford. The breed is becoming more popular in the South and ranks next to the Hereford in this respect and above the Shorthorn.

THE HEREFORD

The Hereford color is distinctive. The body color is a deep, rich red with white head, breast, belly, crest, switch, and legs below the knees and hocks. The body conformation varies slightly from that of the Angus in that they are usually a little fuller in the region of the crops and heart girth. The Hereford cow has been criticized somewhat because of the scanty milk flow, but in most of the cattle of modern breeding this criticism has been removed. They mature early and fatten readily in the feed lot.

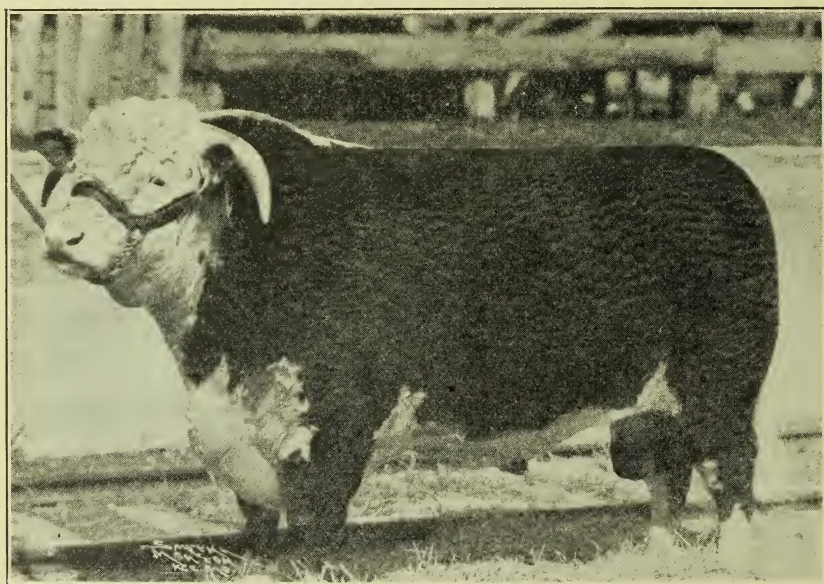


Figure 3—A purebred Hereford bull, Hazford Credit 1456777.

Mature bulls weigh from 1900 to 2200 pounds and mature cows weigh from 1200 to 1600 pounds. The Hereford is noted for its constitution and hardiness. The breed is popular in the South and the breeders have their choice of either the horned or the polled families.

THE SHORTHORN

The Shorthorn breed varies in color, being red, white, and red and white spotted or roan. In conformation the Shorthorn is more rectangular in form than the Angus or the Hereford and the breed carries remarkable development in the round. Of all of the beef breeds, the Shorthorn excels in milk production and for this reason it has become a favorite on small farms where it is desirable for the cows to furnish the family supply of milk and at the same time produce a good beef calf for the market. The Shorthorn has not proved to be as good a rustler under southern conditions as the other two breeds.

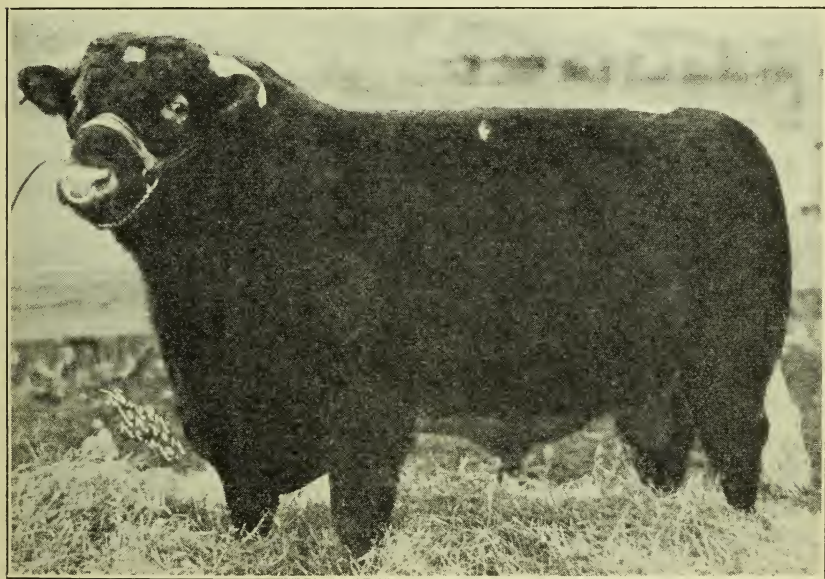


Figure 4—A purebred Shorthorn bull, Maxwalton Referee 1405797.

The Shorthorn is the largest of the beef breeds. Mature bulls weigh from 1800 to 2400 pounds and mature cows from 1300 to 1600 pounds. The breeder has a choice of either the horned or the polled families in this breed.

SELECTING THE COW HERD

The foundation cows for the market herd may be selected from native cows or high grade cows, depending on the amount of money available for the investment. After some experience, the breeder may add a few purebred cows to his herd and gradually build up a purebred herd if his ex-

perience and his market for seed stock justifies developing this type of production. The principle must be kept in mind, however, whether selecting cows for producing market or purebred cattle, that if a good cow bred to a good bull will produce a good calf, a better cow bred to a better bull will produce a better calf. The cows should be as uniform as possible in type to facilitate the selection of a herd bull to improve their common defects. The cows should exhibit quality as indicated by loose, pliable hide and quality of bone. They should carry as much natural flesh as possible, and should have capacity for handling a large amount of feed and a well developed mammary system for producing plenty of milk for the calf. The cows should be selected from herds that are free of abortion, tuberculosis, and other cattle diseases.

SELECTING THE HERD BULL

The herd bull is far more than half of the herd. A cow's inheritance will influence only one calf a year, but the herd bull may influence 20 or 25 times as many individuals a season. If he has been wisely selected and transmits the desirable characteristics to his offspring, the value to the herd, either grade or purebred, will be enhanced very rapidly.

The bull should exhibit marked beef qualities. He should be short of leg, deep and broad of body, compactly built, and carry a wealth of natural flesh of good quality. Bulls for mating with native cows especially should have plenty of substance, but not be of the coarse type. He should exhibit a strong constitution and be vigorous. Milking qualities in the herd are extremely important and this characteristic should not be overlooked in selecting the head of the herd. Use only bulls whose dams are outstanding in this characteristic. Select herd bulls from healthy herds of cattle. It is best to buy bulls that are well developed. Beginners often make the mistake of attempting to buy young calves and develop them. It is usually advisable to invest at least five times the value of the average cow in the herd in making an investment in a herd bull.

CARE OF THE HERD BULL

Outdoor exercise throughout the year is one of the most important essentials for keeping the herd bull in good physical condition. He should have a well fenced pasture of at least two acres and this area should be carefully managed so as to produce a luxuriant growth of both carbonaceous and leguminous pasture plants for as nearly nine months of the year as possible. Succulent pasture grass is the most valuable feed that can be furnished the herd bull.

An inexpensive shelter should be provided for the bull to which he should have free access at all times. Sufficient storage space for feeds and convenience for caring for the bull should be provided in this building.

Usually only one herd bull will be in service at a time on the average Mississippi farm, but it is advisable to have one or two young bulls coming on. The young bulls can be kept with the mature herd bull to good advantage, for the growing bulls will cause the mature bull to take plenty of exercise. In developing young bulls, it will be necessary to supplement

their mother's milk by the time they are a month old and they will need a grain feed in addition to their pasture for developing them to the best advantage. An excellent grain mixture for bulls of all ages is composed of equal parts by weight of shelled corn, wheat bran, and oats. The bull calves will start eating a small amount of this mixture when a month old and will consume more of the grain as they mature, but on the average when on full feed they will require about a pound and quarter of this mixture per hundred pounds live weight daily. The growing calf should have access to a good quality mixed hay in addition to his pasture.

The mature bull when not in service and on good pasture will require little feed in addition. If it becomes desirable to increase his amount of flesh, feed him the same mixture as recommended for the calf, using when on full feed a pound and a quarter per hundred pounds live weight

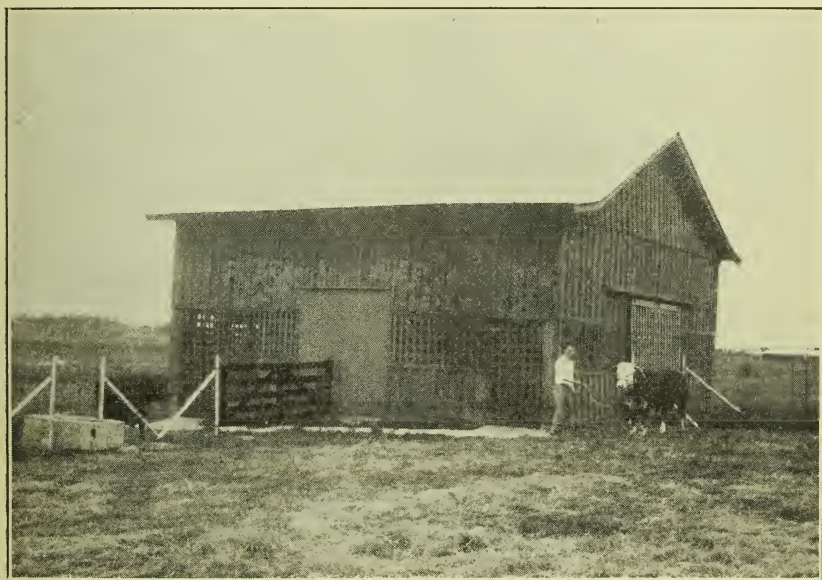


Figure 5—Herd bull barn on the Mississippi Experiment Station farm.

daily. A pound and a half of this mixture in the ration can be replaced with equal amounts of cottonseed meal. For the mature bull, a pound of good quality mixed hay per hundred pounds live weight daily is sufficient. If silage is used at all for the herd bull it should not exceed one-third of the roughage portion of the ration or the maximum of about 15 pounds daily. The amount of grain or roughage fed to the mature bull should be adjusted with the changing of the season and so regulated as to keep him in good breeding flesh. Give the bulls access to salt and pure water at all times.

If for any reason the bull should fail to settle his cows, give him rest from service, see that he takes plenty of exercise, and correct his physical condition if too thin or too fat. Avoid the use of drugs with herd bulls except under the advice of competent veterinarians.

BREEDING

The bull should be kept away from the herd of cows except during the breeding season. Young bulls should not be started in service until they are 12 to 15 months of age, and it is best not to place the heifers in the breeding herd until they are 24 to 26 months of age. In breeding market cattle in this section, the general practice will be for the herd bull to remain in the pasture during the breeding season. Yearling bulls should not be mated with more than 15 to 18 cows, and mature bulls should not exceed 20 to 25 cows under this system of breeding. With purebred cattle and with small herds of high grade cattle, hand mating may be practiced. Under this system, yearling bulls may be mated with two or three cows a week during the breeding season and mature bulls allowed a service a day for the same period.

The type of production will determine the breeding season. In most cases in this section, spring calves will be preferable. However, under some types of management, fall calves may be more desirable. For the production work reported in this bulletin, the herd was bred for spring calves. As it was desirable for the calves to be dropped on pasture, the herd bulls were turned in the pasture with the cows on the fifteenth of June and removed from the herd on the fifteenth of September. The heat period of a cow lasts from 12 to 24 hours and reoccurs every 21 days. Allowing the bulls to remain in the pasture for three months gives every cow four opportunities to settle with calf. If the bull is potent, the cow should conceive with this number of services. If she fails, some method of correcting the trouble will have to be resorted to and a veterinarian should be consulted. The period from breeding time to calving time is known as the gestation period and in a cow averages from 280 to 285 days.

SUMMER MANAGEMENT OF THE HERD

A herd of approximately one hundred head of Angus, Hereford, and Shorthorn cows, their calves, and yearlings and two year old cattle were available for the experiments reported in this bulletin. Groups of the various ages were selected for the different lots and comparable lots in every case were divided as nearly equal as possible as to breeding, quality, age, and size. The group pictures of the cattle used as a cover design and in the body of the subject matter of the bulletin show the quality and the condition of the breeding herd. Pastures furnish the cheapest source of feed for cattle and in producing commercial cattle this type of feed must be used to the maximum.

THE PASTURES

Eight hundred acres of well improved pastures on the Experiment Station farm were available for these studies. This acreage was divided into six pastures. The native growth on these areas before the pastures were improved consisted very largely of bunch grasses and wire grasses and the native pastures furnished some grazing from March until about the first of July. Pasture improvement work was started in 1906. First the pasture areas were cleared of underbrush, briars, etc. Seed beds were then prepared on the higher portions of the pastures and seeds of 17 different kinds of pasture plants were sown during the first few years of the work.

Twelve of these varieties now furnish a good mixture of carbonaceous and leguminous plants and provide grazing for the full growing season. The average grazing period for the past five years extended from the twenty-sixth of March to the eighteenth of December, or 268 days. During the spring the bulk of the grazing consisted of hop clover, white clover, black medic, wild barley, and Kentucky and annual bluegrass. Small amounts of sweet clover, wild sweet pea, and narrow leaf vetch add to the value of this mixture. Most of these plants have seeded by the latter part of May and early June and by this time Bermuda and paspalum are making considerable growth. Lespedeza comes into the mixture a little later and these three plants furnish the bulk of the grazing for the summer and fall.



Figure 6—Midsummer grazing scene on a Bermuda and lespedeza pasture.

The various ages of cattle were so fed during the wintering period that they would make the maximum utilization of the pastures. The weights of the mature cows naturally varied during the pasture season, due to the cows calving and the lactation period. The average pasture weight for the mature cows and two year old heifers was approximately 1050 pounds. These cattle reached the maximum weight during the latter part of September and early October. The quality of the pasture maintained the desired condition for the breeding herd and they went into winter quarters carrying the proper amount of flesh.

It is the practice during normal seasons to reserve one pasture so as to obtain a heavy growth of grass during the latter part of the summer for use during the late fall. For two out of the five years this practice was very satisfactory, but for three of the seasons, because of the unusually dry weather, it was necessary to move the herd during the last half of November and the early part of December to the meadows and stalk fields to maintain their weight until they went into winter quarters the middle of December. The cattle in all cases received no feed in addition to pasture and their weight and condition indicated excellent grazing. Through the

major portion of the grazing season, the herd would be full and lying in the shade by eight to nine o'clock in the morning and would do little grazing again until in the afternoon.



Figure 7—Breeding herd on a late fall pasture consisting of paspalum, Bermuda, and lespedeza.

The calves that were dropped on pasture during March and April and had no other feed than pasture and their mothers' milk weighed for an average of a five year period 416 pounds when they were weaned in December.

It was necessary to divide the yearling group of cattle at different periods in the fall, as part of these cattle were placed in the feed lot or were removed to other areas, so complete weight records are not available for the entire grazing season.

Table 3 will give the available figures for the gains made by this group of cattle.

Table 3—Pasture Gains Made by Yearling Steers and Heifers.

Year	No. of Steers and Heifers Grazed	Initial Weight on Pasture	Weight periods and average weight per animal							Average Total Gain (lbs.)	No. of Days on Pasture	Average Daily Gain (lbs.)
			Apr. 9	May 9	June 10	July 10	Aug. 10	Sep. 16	Oct. 10			
1924	19	516	559	606	637	664	681	689	173	185	.93	
1925	17	Mar. 21	Apr. 17	May 15	June 16	July 15	Aug. 14	Sep. 14	Dec. 18	202	272	.74
		451	498	532	598	607	610	629	653			
1926	38	Mar. 26	Apr. 21	June 24	July 31	Aug. 26	Sep. 23	Oct. 26	Nov. 23	195	243	.80
		526	569	598	653	675	704	727	721			
1927	43	Mar. 9	Mar. 28	Apr. 26	May 25	June 24	July 26	Aug. 27	Dec. 12	175	279	.63
		427	437	486	535	566	585	620	602			

The average initial weight of the yearling steers and heifers when they were turned on pasture was 480 pounds. The increase in live weight during the pasture season was 186 pounds.

Shade trees were convenient in all of the pastures and gave the cattle the protection and comfort desired. Ponds furnished a dependable supply of water and block salt was available throughout the grazing periods.

WINTER MANAGEMENT OF THE HERD

The wintering period for the six year average, 1924 to 1929, inclusive, extended from the nineteenth of December to the twenty-fifth of March, or 97 days. In planning the rations for the first winter, corn silage was available, but this crop was discontinued after the first year and sorghum used in its place.



Figure 8—38 head of yearling Angus steers and heifers made a pasture gain of 195 pounds per head in 1926.

FEEDS SELECTED AND WHY

Sorghum silage was selected as the chief roughage to use in the rations for the various ages of cattle, for it is the cheapest type of roughage that is being raised in this section, is palatable, and is easily combined with the concentrate part of the feed.

For a three year average, corn gave a yield of 8.01 tons of silage per acre, sagrain a yield of 10.85 tons, and sorghum 19.60 tons. In fattening steers for the market, Mr. D. S. Buchanan of this Station has determined that 100 pounds of good quality corn silage has the feeding equivalent of about 125 pounds of sorghum silage and about 140 pounds of sagrain

silage. Considering the much larger yield per acre of the sorghum silage, together with its slightly lower feeding value as compared with corn silage, this crop has a distinct advantage for economical beef production. The sorghum crop not only yields over twice as many tons of the silage per acre, but this plant is more drouth resistant than the corn plant in this territory. The sorghum used was a large growing variety known as Japanese seeded cane or Honey sorghum, sometimes known locally as Texas seeded ribbon cane.

Johnson grass hay is available in this section and as it is desirable to combine a small amount of a dry roughage with silage in making up rations, limited quantities of this carbonaceous hay were used in the rations for all ages of cattle.

Cottonseed meal is readily available, requires small space for storage, keeps well, and is a very economical source of total digestible nutrients for feeding cattle. It is very palatable and combines nicely with the type of roughage used in the various rations. It was the sole concentrate that was used for the wintering tests. A conveniently arranged cattle barn provided plenty of shelter for the entire herd.

The breeding herd was divided into three groups for the wintering periods. Weanling calves made up one group, yearling cattle a second lot, and the mature cows and two year old heifers were handled as a group. In most cases, the breeding herd was either polled cattle or dehorned. The horned cattle, for the most part, were fed in a separate lot. For best results in feeding cattle during this period of the year, individuals of about the same age and condition should be grouped together. The ration fed to each lot of cattle was divided into two feeds daily. Half of the cottonseed meal and half of the silage made up the morning feed. After the cattle had consumed the morning ration, they were turned in lots about half past eight in the morning and remained out of doors for the entire day. Water from deep wells was available at all times in each of the lots. The evening feed consisted of half of the cottonseed meal, half of the sorghum silage, and all of the hay that was fed in the ration. The various groups were returned to the barn about five o'clock in the evening and remained under shelter for the night. A sufficient amount of very low grade hay, pasture clipping or straw was used for bedding and enough of this material was used from time to time to keep the stalls dry and comfortable for the cattle to bed down. Block salt was available in the feed troughs throughout the winter.

WINTERING THE CALVES

The calves were carrying considerable flesh when they were weaned about the middle of December and brought in from the pasture. It was the plan of the production work to use pasture to the maximum and produce cattle as economically as possible. The ration for this group of cattle was so regulated as to cause the calves to make some increase in live weight during the winter. It was considered ideal for this age of cattle to gain on the average from a half to three-quarters of a pound in live weight daily during the wintering period. The calves were not in nearly as high condition when they went on pasture the following spring as they were

when they went into winter quarters, but the increase in live weight was very largely bone and muscular development. The calves came to the spring season in a vigorous, healthy condition and made very satisfactory gains from the time they went on pasture throughout the grazing season. A ration consisting of 1 pound of cottonseed meal, 15 pounds of silage, and 5 pounds of number one Johnson grass hay met these requirements for each of the five winters.

Table 4 gives the detail data for the wintering period for the calves.

Table 4—Wintering Beef Calves. - Five Years Records.

Daily ration per calf	Year	No. of Calves	Days fed	Initial weight lbs.	Final weight lbs.	Gain per calf lbs.	Daily gain per calf lbs.	Winter feed cost per calf
1 lb. Cottonseed meal 5 lbs. Corn silage 5 lbs. No. 1 Johnson grass hay	1923-24	29	102	397	480	83	.81	\$8.80
1 lb. Cottonseed meal 5 lbs. Sorghum silage 5 lbs. No. 1 Johnson grass hay	1924-25	29	95	400	456	56	.59	\$6.74
1 lb. Cottonseed meal 5 lbs. Sorghum silage 5 lbs. No. 1 Johnson grass hay	1925-26	40	101	458	523	65	.64	\$7.17
1 lb. Cottonseed meal 5 lbs. Sorghum silage 5 lbs. No. 1 Johnson grass hay	1926-27	37	80	405	453	48	.60	\$5.68
1 lb. Cottonseed meal 5 lbs. Sorghum silage 5 lbs. No. 1 Johnson grass hay	1927-28	16	100	400	464	64	.64	\$7.10
Average of 4 years using sorghum silage			94	416	474	58	.62	\$6.67

Cost of Feeds

Cottonseed meal	\$40.00 per ton
Corn silage	4.75 per ton
Sorghum silage	2.80 per ton
Johnson grass hay, No. 1	12.00 per ton

It will be noted that the initial weight for the five year average of the calves when they went into winter quarters was 416 pounds and the final weight was 474 pounds, or a gain for the wintering period of 58 pounds. This increase in weight gave an average daily gain of .62 pounds for the five years. With cottonseed meal at \$40.00 per ton, sorghum silage at \$2.80 per ton, and No. 1 Johnson grass hay at \$12.00 per ton, the total cost of the feed for the wintering period was \$6.67 per calf. The ration was economical, palatable, and satisfactory in every way for calves of this weight.

WINTERING THE YEARLING STEERS AND HEIFERS

The yearling steers and heifers for the most part came into the winter in good condition. The ration was so planned for this group to increase their live weight for the winter in the neighborhood of a pound per head

daily. This increase in live weight was made up almost entirely of bone and muscular development. Steers and heifers fed in this manner went on pasture for their second summer in a vigorous and healthy condition and were able to make maximum development during the grazing season. A ration composed of 1½ pounds of cottonseed meal, 25 pounds of sorghum silage, and 8 pounds of low grade Johnson grass hay met these requirements.

Table 5 reports the detail information for the five winters.

Table 5—Wintering Yearling Steers and Heifers. Five Years Records.

Daily ration per animal	Year	No. per lot	Days fed	Initial weight lbs.	Final weight lbs.	Gain lbs.	Daily gain lbs.	Winter feed cost per yearling
1½ lbs. Cottonseed meal 25 lbs. Corn silage 8 lbs. Low grade Johnson grass hay	1923-24	16	102	618	722	104	1.02	\$11.56
1½ lbs. Cottonseed meal 25 lbs. Sorghum Silage 8 lbs. Low grade Johnson grass hay	1924-25	9	95	676	749	73	.77	\$8.41
1½ lbs. Cottonseed meal 25 lbs. Sorghum Silage 8 lbs. Low grade Johnson grass hay	1925-26	17	101	653	744	91	.90	\$8.97
1½ lbs. Cottonseed meal 25 lbs. Sorghum Silage 8 lbs. Low grade Johnson grass hay	1927-28	10	100	535	704	119	1.19	\$8.90
1½ lbs. Cottonseed meal 25 lbs. Sorghum Silage 8 lbs. Low grade Johnson grass hay	1928-29	23	106	539	647	108	1.02	\$9.43
Average of 4 years using sorghum silage			100	613	711	98	.98	\$8.93

Cost of Feeds

Cottonseed meal	\$40.00 per ton
Corn silage	4.75 per ton
Sorghum silage	2.80 per ton
Johnson grass hay, low grade	6.00 per ton

It will be noted that the yearling steers and heifers with an initial weight of 613 pounds gained 98 pounds per head for the wintering period, practically a pound a day. With cottonseed meal at \$40.00 per ton, sorghum silage at \$2.80 per ton, and low grade Johnson grass hay at \$6.00 per ton, it required \$8.93 to feed cattle of this age during the winter.

WINTERING MATURE COWS AND TWO YEAR OLD HEIFERS

The heifers were added to the breeding herd about the time they were 24 to 26 months old, so they were included with the mature cows the next fall and were handled with this group from this period on. The calves were weaned about the time the herd was brought into winter quarters.

With the condition that the breeding herd was carrying each fall, it was decided best to plan the rations in such a way as to just about maintain or

increase slightly the live weight of the cows during the winter. A ration of 1 pound of cottonseed meal, 30 pounds of sorghum silage, and 5 to 7 pounds of low grade Johnson grass hay proved satisfactory for wintering these cattle. The variation in live weight for this group during the different winters may be explained in part by the quality of the roughages used each winter.

It will be noted that the choice hay was fed to the calves and the low grade rough hay to the yearling cattle and mature cows. When there was a choice of this material, the better quality hay was usually given to the yearling group. The silages were of good quality each year. Only choice cottonseed meal was used in the rations.

Table 6 gives the detail data for the six wintering periods.

Table 6—Wintering Mature Beef Cows and Two Year Old Heifers. Six Years Records.

Daily ration per cow	Year	No. of cows	Days fed	Initial weight lbs.	Final weight lbs.	Gain per cow lbs.	Daily gain or loss per cow lbs.	Winter feed cost per cow
1 lb. Cottonseed meal 30 lbs. Corn silage 10 lbs. Low grade Johnson grass hay	1923-24	74	102	1002	1054	52	.51	\$12.37
1 lb. Cottonseed meal 30 lbs. Sorghum silage 7 lbs. Low grade Johnson grass hay	1924-25	76	95	1043	1030	-13	-.14	\$7.88
1 lb. Cottonseed meal 30 lbs. Sorghum silage 5 lbs. Low grade Johnson grass hay	1925-26	55	101	961	1022	61	.60	\$7.77
1 lb. Cottonseed meal 30 lbs. Sorghum silage 5 lbs. Low grade Johnson grass hay	1926-27	27	80	997	994	-3	-.03	\$6.16
1 lb. Cottonseed meal 30 lbs. Sorghum silage 5 lbs. Low grade Johnson grass hay	1927-28	43	100	1163	1168	5	.05	\$7.70
1 lb. Cottonseed meal 30 lbs. Sorghum silage 5 lbs. Low grade Johnson grass hay	1928-29	19	106	1027	1045	18	.17	\$8.16
Average of 5 years using sorghum silage			96	1038	1052	14	.15	\$7.53

Cost of Feeds

Cottonseed meal	\$40.00 per ton
Corn silage	4.75 per ton
Sorghum silage	2.80 per ton
Johnson grass hay, low grade	6.00 per ton

The average weight at the beginning of the winter for the mature cows and two year old heifers was 1038 pounds and they increased during this period on the average 14 pounds per head. There was no case in these records where the rations did not prove satisfactory. The cows delivered normal, healthy calves and developed them nicely.

With cottonseed meal at \$40.000 per ton, sorghum silage at \$2.80 per ton,

and low grade Johnson grass hay at \$6.00 per ton, the winter feed cost for the mature herd was \$7.53 per head. While the hay was charged at \$6.00 per ton, there was a considerable amount of this roughage that would not have had any market value at all.

THE TEST OF THE MANAGEMENT OF THE BREEDING HERD OF CATTLE FOR THE GRAZING AND WINTERING PERIODS

The real test for any type of feeding and management is not only the weight and condition of the cattle that are produced, but the test is to go a step further and determine what effect the feeding and management will have on the reproductive powers of the herd. Three groups of heifers of the 1924-25-26 calf crops have been developed as outlined in this bulletin for managing the herd during the grazing and wintering periods. These heifers as three year olds have had plenty of substance, have been well developed, have averaged 1000 pounds in live weight, have produced well developed calves, and have made satisfactory brood cows. They represent at this age a total concentrate feed bill of 350 pounds of cottonseed meal—100 pounds fed during the wintering period as calves, 150 pounds as yearling heifers, and 100 pounds for the first winter they were in the breeding herd.

ROUGHAGES FOR WINTERING MATURE COWS

Silage and a carbonaceous hay have been used in the experiments reported above. In a great many cases, the cowman will be interested in other types of roughage for wintering the breeding herd. Where large numbers of cattle are to be handled economically, the author is of the opinion that silage will have to be used; but with the beginner or in handling a small herd of cattle, a silo may not be available or even economical and other types of roughage will have to be employed.

During the winter of 1928-29 an experiment was planned to study the relative feeding value of the principal available roughages that would be adapted for wintering mature cows. As it is the plan to continue this experiment, the following record is in the nature of a preliminary report. Future trials may vary the relative values of some of these roughages. As the ration of 1 pound of cottonseed meal, 30 pounds of sorghum silage, and 5 pounds of low grade Johnson grass hay had proved so satisfactory, this ration was used in this experiment as a check and was fed to the cows in Lot I. A good quality Laredo soybean hay was fed to the cows in Lot II and was used as a sole feed. The cows in Lot III were fed the same amount of cottonseed meal as given to Lot I and 20 pounds of low grade Johnson grass hay per head daily. The cows in Lot IV were fed the same amount of cottonseed meal as Lots I and III and 20 pounds of cottonseed hulls.

The cottonseed meal was charged to the cows at the average market price for the period of 10 years. Sorghum silage was charged at the cost of producing this feed and as there was no market value for this material, \$2.80 per ton is the only figure that is available. It will be noted that the soybean hay was charged at the market price for this roughage. This is hardly fair to the feed in comparing it with the silage. If the

figures were available for the cost of producing this hay, it would have been fairer to have used this figure. Low grade Johnson grass hay for the most part was of such quality that it would have had little market value. The cottonseed hulls were charged at the cost delivered on the farm.

Table 7 gives the detail results of this experiment.

Table 7—The Relative Value of Sorghum Silage, Soybean Hay, Johnson Grass Hay and Cottonseed Hulls for Wintering Mature Cows and Two Year Old Heifers.

December 12, 1928 to March 27, 1929 (106 Days)

	Lot I Sorghum Silage	Lot II Soybean Hay	Lot III Johnson Grass Hay	Lot IV Cottonseed Hulls
Ration	1 lb. C. S. M. 30 lbs Sorghum silage 5 lbs. Low grade Johnson grass hay	20 lbs. Soybean hay	1 lb. C. S. M. 20 lbs. Rough Johnson grass hay	1 lb. C. S. M.* 20 lbs. Cottonseed hulls
Number of Cattle	19 mature cows and 2 year old heifers	11 mature cows and 2 year old heifers	19 mature cows and 2 year old heifers	12 mature cows and 2 year old heifers
Initial weight (lbs.)....	1027	1031	1043	1031
Weight Jan. 14 (lbs.)	1051	1062	1059	1034
Weight Feb. 14 (lbs.)	1066	1071	1044	1018
Final weight (lbs.)....	1045	1042	1045	978
Loss or gain in Wt. (lbs.)	18	11	2	-53
Feed cost of wintering per cow	\$8.16	\$21.20	\$8.48	\$14.05

Cost of Feeds

Cottonseed meal	\$40.00 per ton
Sorghum silage	2.80 per ton
Soybean hay	20.00 per ton
Johnson grass hay, low grade	6.00 per ton
Cottonseed hulls	12.00 per ton

*—Unable to get the cows in Lot IV to consume 20 pounds of cottonseed hulls until December 28. Raised meal to 2 pounds on February 15.

The rations fed to the cows in Lots I, II, and III were very satisfactory and little, if any, difference could be noted in these three groups. There was some anticipation at the beginning of the winter as to whether or not there would be a waste in the soybean hay feeding, for some of the soybean stems were as large at the butt end as a lead pencil; but with the limited amount of hay that was given to this group of cows, the waste of this hay was considered insignificant.

The cottonseed hull ration fed to Lot IV did not prove satisfactory. It was impossible to get the cows to consume the 20 pounds of hulls until they had been on feed 16 days. It was very evident that the ration was not as palatable as it should be, for the cows were uneasy at feeding time and were ravenous for other roughages when they were moved from their own quarters to the scales for the regular weighing periods. One cow lost so much weight that it became necessary to remove her from the lot. On the fifteenth of February it was decided best to increase the cottonseed meal to two pounds per head daily and this amount was continued for the rest of the wintering period. There was some evidence that the increase in the amount of cottonseed meal improved the ration.

WINTER SALT REQUIREMENTS OF MATURE CATTLE

It was noted that steers that were being fattened for the market varied considerably in their salt requirements, depending on the character of the rations that were being fed. To make a further study of the salt requirements of cattle, it was decided during the winter of 1928-29 to keep accurate weights of the salt consumed by the mature cows being fed on different types of roughages to determine what their salt requirements would be. Table 8 gives the results of this study in tabular form.

Table 8—Daily Salt Consumption per 1000 Pounds Live Weight During Wintering Period, Winter 1928-29

	Lot I	Lot II	Lot III	Lot IV
Lot number	1 lb. C. S. M.	1 lb. C. S. M.		1 lb. C. S. M.
and	25 lbs. Sorghum silage	20 lbs. Low grade	20 lbs. Soybean hay	20 lbs. Cottonseed
Ration	5 lbs. Hay	Johnson grass hay		hulls
No. cows per lot.....	20	20	12	15
Daily salt consumption				
per 1000 lbs. live Wt.	.44 oz.	1.40 oz.	.67 oz.	1.09 oz.

It will be noted in this record that the daily salt consumption per 1000 pounds live weight varied considerably between the lots fed on the different rations. The lowest consumption, .44 ounce per 1000 pounds live weight daily, occurred in the lot fed on sorghum silage. The heaviest consumption, 1.4 ounces per 1000 pounds live weight, occurred in Lot II with the cows that received the Johnson grass hay ration.

CALVING TIME

The safest place for the cow to deliver a calf is on the pasture. Breeding dates should be so regulated that the cows will calve during the grazing season, if possible. Danger from infection is reduced to the minimum when the calves are dropped on pasture. However, if it becomes necessary for any reason for the cows to calve under shelter, precaution must be taken to have the stall properly disinfected and bedded. Very seldom will beef cows that are in good condition have any complications at the time of calving. They must be watched closely at this period and if for any reason the calf is not delivered promptly they should be given assistance.

DEHORNING

A nicely shaped pair of horns adds to the appearance of the purebred animals of the horned breeds, but the presence of the horns on commercial cattle is very objectionable. Horned cattle require more space at the feed trough and do not feed as uniformly as polled or dehorned cattle. Steers that are hornless are worth from 50 to 75 cents more per hundred weight on the market than horned steers of equal quality. In this climate, horns in the breeding herd are objectionable because the wounds they produce make excellent places for infestation with screw worms. Dehorning should not be attempted during the fly season. All dehorning should be done in the early spring or late fall to avoid trouble from flies.

METHODS OF DEHORNING

Breeding. The use of polled bulls is one of the most satisfactory methods for handling the horned problem in the herd. If such a bull is "pure" polled, practically all of his calves will be polled, even though their dams have horns. If, on the other hand, the bull himself is polled in character but is the result of mating a "pure" polled bull with a horned cow, his get from a group of horned cows will on the average be about half polled calves and half horned calves. This will explain why Angus bulls which are "pure" for the polled character seldom sire any but polled calves, while on the other hand polled bulls from the other beef breeds often sire a number of horned calves.

Use of Chemicals. The shock to the animal will be considerably less during and following the operation and there will be much less labor involved if the dehorning is done before the horns come through the skin of the calf. This is best done when the calf is from three to ten days old. Either caustic potash or caustic soda can be used for this purpose. These chemicals can be purchased at almost any drug store and come in the form of a white stick about the size of a blackboard crayon.

To prevent the growth of horns by the use of caustic, the calf should be cast and made secure. Then a pair of scissors should be used to remove the hair as closely as possible immediately over the budding horn. Moisten the end of the stick of caustic very slightly and rub it with a rotary motion on the horn buttons. The rubbing should continue just long enough to irritate the skin over the entire horn area. Enough of the caustic should be left on the skin to penetrate the growing area of the horn and prevent its development. In a few days the thick scab which will appear over the horn button will drop off and the calf will suffer little inconvenience. If the operation has been properly carried out, the head will be as smooth as if the calf were naturally polled. Precaution must be taken not to allow the skin of the operator to come in contact with the caustic at any time. The heads of the calves should be kept dry for at least an hour following the operation to prevent the caustic from coming in contact with the eyes.

Dehorning Older Cattle. After the horns have started to develop, it will be necessary to remove them by either sawing or clipping. The younger the animal is when treated, the better. In cutting off horns, it is necessary to remove a ring of skin from one-eighth to one-half inch with the horn to insure the destruction of the growing area of the horn and to prevent any further growth.

Treatment After Dehorning. Either coal tar or pine tar should be applied to the wound immediately after removing the horn. These materials are non-irritating, adhere well to the skin, and will act as a fly repellent. In spite of all the precautions that may be followed, occasionally the wound may become infested with screw worms. The animal should be watched closely and if the wound begins to show signs of discharge and the animal is uneasy, he should be examined for screw worms. If the worms are present, chloroform poured into the wound will destroy the worms. They should be removed and the wound given another application of tar. Gasoline may be used in the place of chloroform. If the wound becomes

infected by other agencies, it should be cleaned out thoroughly and the area given an application of tar.

CASTRATION

The primary reason for castrating bull calves and making steers of them is to improve the texture, flavor, and tenderness of the beef. Steers are also much quieter in the feed lot than bulls and for this reason feed more satisfactorily.

Time to Castrate. Castration is best done when the calves are from four to ten weeks of age, but it is practical to castrate bulls of any age. The older the animal at the time of the operation, the greater the risk. It is best to perform this operation in the early spring or late fall, so as to avoid trouble from flies infesting the wounds.

Method. Young calves are usually thrown to be castrated. In throwing, the calf should be placed on his left side and the four feet hog tied. The scrotum should be cleaned with a mild disinfecting agent. The operator then grasps the scrotum well up to the belly with the left hand. The left testicle is pulled down and held firmly in the left hand so that the skin of the scrotum is tight over the testicle. With a sharp knife an incision is made on the side of the scrotum next to the leg, starting the incision at the thick part of the testicle and continuing to, but not into, the median line. The seed is thus exposed and is grasped by the right hand and the left is used to separate the gland from the supporting tendons. With the left hand now holding the testicle the cord is pulled down slightly so that it can be severed an inch or two above the testicle.

With calves the cord can be severed by scraping it gradually with the knife until it is worn into. The lacerated ends of the cord so severed reduce materially the hemorrhage. With older cattle the best practice is to use an emasculator. This type of instrument cuts the cord and, at the same time, so lacerates it as to minimize the hemorrhage very materially.

The right testicle is now removed in a similar manner. This method of castration destroys the minimum amount of tissue, it gives complete drainage, it is rapidly performed, and it leaves the scrotum in good form to fill out nicely when the steer is conditioned for the market. There are several different types of incisions that can be used for this operation, but the incision on the side of the scrotum, as outlined above, is the one that is practiced here at the Station and is very satisfactory. Following the operation, it is a good plan to place a small amount of pine tar on the wound to keep away flies and to act as a disinfecting agency. Unless the wound becomes infested with screw worms or maggots, very little after trouble will be experienced. If the wound is infested, drainage should be made complete and the wound washed out with chloroform or gasoline and the tissues again treated with pine tar.

WEANING CALVES

Beef calves will ordinarily be weaned when they are from six to eight months of age. When the calves are removed from their dams, they should be kept away from them once and for all. It is usually the best

practice, if possible, to confine the calves far enough away from their mothers so that they cannot hear them. The practice of turning the calves with their mothers a day or two later to allow them to suck is not good management. The returning of the calves simply prolongs the period that they will worry for their mothers and in some cases the stale milk that the calves will receive will cause digestive troubles. Careful watch must be kept of the udders of the cows for several days following weaning.

RECORDS OF THE HERD

With purebred cattle, it is very important that careful records be kept of each individual in the breeding herd to facilitate recording the calves and keeping up with the breeding operations. Even with a grade herd, a simple form of keeping records of the individual cows in the herd is very desirable. Each cow should be given an ear notch, a tag, or some other method of individual identification. A record made of the individual each time the herd is inspected will give the owner an opportunity to determine accurately which cows are regular breeders. Notes as to the type of calves that are produced will give additional information that will assist very materially when the time of the year arrives to cull the herd.

MARKETING CATTLE

There are two general methods of marketing beef cattle. The producer should acquaint himself with his markets and determine which method will give him the largest probable return for his animals. Selling cattle to the local butcher or buyer, although a common type of marketing, is probably the least profitable to the cowman. These dealers must necessarily buy on a wide margin and the producer loses accordingly. The central markets offer the best medium for the profitable disposal of the cattle of different ages and market condition. The cowman should select a reliable commission firm at one of the central markets and advise him as to the kind of cattle he has to dispose of. The commission man in return will keep the producer posted as to market conditions and give advice as to the most advantageous time for shipping. It is to the advantage of the commission man to obtain as high a price as possible for the shipper's product.

COOPERATIVE SHIPMENTS

For the cowman who is producing cattle in small enough numbers so that he cannot make a car lot shipment at a time, the cooperative shipping association gives an excellent method for marketing his animals. The shipment is usually made in the name of one individual. The cattle for each owner in the cooperative shipment are given a mark for identification either by clipping the hair or using a paint mark on a certain part of the body of the animal. The commission man is furnished information as to the name of each owner, the number of animals he has consigned, and the mark for identifying his animals. On arrival at the central market, the carload is divided according to the ownership of each consignee. The commission man sells the carload of cattle, prorates the marketing expense

on the live weight basis of the shipment, and each consignee receives his individual return.

SHIPPING CATTLE

The car for a shipment should be ordered far enough in advance of the date of shipment to give time for seeing that the car is properly bedded and in good shape before loading. In ordering cars, the local freight agent can furnish information as to freight charges to the different markets. The size of the car that will be needed should be specified. Standard stock cars are eight feet, six inches wide and either 36 or 40 feet long. The 36 foot car is billed with a minimum weight of 22,000 pounds and a 40 foot car with a minimum weight of 24,000 pounds. The shipper must pay the freight on the minimum weight whether his load of cattle comes up to the minimum or not. No maximum weights are specified, but it is to the shipper's advantage in every case to load the car comfortably full. If too small a number of cattle or too large a number are placed in the car, the shrink in transit will be excessive. Thirty-two 1000 pound steers make a comfortable load for a 40 foot car. If it is necessary to ship a small number of cattle in the car, it will be to the owner's advantage to confine them to a portion of the car by the use of a partition.

The law requires that cattle that are in transit for 28 hours must be unloaded, watered, and fed. If the owner wishes his cattle to go direct to the market and they can reach the point of destination in 36 hours, the shipment can be moved without unloading if the owner makes this request of the freight agent at the time of billing the car and signs a release.



Figure 9—Ready for the Market. Yearling and two year old steer hides furnish excellent packages for marketing home grown roughages. Southern roughages combined with cottonseed meal make a palatable and economical ration for conditioning cattle for the market.

For information on feeding steers, write to the Animal Husbandry Department, Mississippi Experiment Station, A. & M. College, Mississippi.

COMMON AILMENTS

In comparison with other classes of farm animals, beef cattle have very few diseases and disorders. The cowman should acquaint himself with the more prevalent infectious diseases and common ailments in his territory and ever be on the alert for these troubles. Just how much the owner can rely upon his own treatment of the herd will depend on his knowledge of the different diseases. The average man should call on a well qualified veterinarian to handle the diseases that are of an infectious nature. Many excellent articles and bulletins have been written on these diseases and the breeder should familiarize himself with these publications. He should consult his veterinarian, his county agent, or the State Live Stock Sanitary Board at Jackson, Mississippi. The following comments on the more common troubles in the herd are in no way a complete treatise. The statements for each disease are made primarily with the intention of calling the breeders' attention to these conditions that may make their appearance from time to time and assist the cowman somewhat in preventing and controlling infection in the herd that might prove disastrous if neglected.

CONTAGIOUS ABORTION

The native cattle of this territory are more or less free of contagious abortion and it behooves every breeder to use every precaution possible to prevent bringing this dreaded disease into his herd with the purchase of new animals. This disease is caused by specific organisms and the infection usually is introduced through the digestive tract by consuming contaminated feed, drinking water, or by the animals licking contaminated troughs or other infected animals. The more common symptoms are the birth of immature calves, cows failing to conceive, a yellowish discharge, or very weak full time calves that usually die a few days following calving. All animals that are of a suspicious nature should be removed from the herd and kept in isolation for at least three weeks after all signs of discharge disappears. After calving, the dead calf, all foetal membrane and all litter should be carefully burned and the soiled parts of the cow should be thoroughly disinfected. A blood test for contagious abortion makes it possible for the purchaser to have protection from this disease. Only competent veterinarians can handle this test and it would be a wise precaution for the breeder to make purchase of breeding cattle that the test shows to be free of abortion.

TUBERCULOSIS

Tests for tuberculosis on the native cattle of Mississippi show that the herds are remarkably free of this disease. With the traffic that is developing in the cattle industry and the bringing in of breeding cattle from centers in other territories where this disease is prevalent, it becomes necessary for the beef cattle producer to be constantly on the guard against tuberculosis. Indications of the presence of tuberculosis can seldom be diagnosed in the live animal; consequently the tuberculin test is about the only reliable method of diagnosing this disease. Breeding cattle should be purchased when possible from accredited herds. Such herds are under federal sup-

ervation and are free of this disease. In buying cattle from herds that are not accredited, the animals should be purchased subject to the tuberculin test.

ANTHRAX

Anthrax, a disease that is known in certain localities as charbon or splenic fever, is a very infectious and contagious disease. Its presence is usually confined to rather low, moist, poorly drained areas. Death from this disease is very sudden and finding a dead animal in the pasture is usually the first sign of the presence of the disease. Animals that have died suddenly should be treated with suspicion and the carcasses handled with extreme caution until the cause of the death has been determined. The blood of animals that have died of this disease is of a tarry consistency, is of a blackish color, and fails to make firm clots. The spleen of the animal is usually enlarged two to five times its normal size. A positive diagnosis can only be made by examining a sample of blood under a microscope. A veterinarian or the county agent can assist the owner in collecting samples for sending to the State Live Stock Sanitary Board for diagnosis. Carcasses should be burned. In case a positive diagnosis is made, the rest of the herd should be vaccinated promptly and this treatment should be administered only by thoroughly competent hands.

HEMORRHAGIC SEPTICEMIA

While cattle of all ages may be affected with hemorrhagic septicemia, the greatest infection occurs with the younger animals, usually the calves. Animals that are in a run down condition seem to be more susceptible than animals that are in good physical condition. The more common symptoms of the disease are a high body temperature, soft swellings beneath the skin in the region of the throat and neck, the swelling of the tongue, and a mucous discharge from the nose and mouth. A post mortem examination usually reveals blood spots on the lungs, on the walls of the intestines, and in the fatty tissues that surround the kidneys. Treatment of animals that are affected with this disease is useless as a rule. Its spread to the rest of the herd can be prevented by the proper use of immunizing bacterins, by quarantining sick animals, and by proper disinfection.

BLACKLEG

Blackleg is an acute disease that attacks young cattle, usually those between the ages of six and twenty-four months. The characteristic symptoms of this disease are marked lameness and swelling in the region of the shoulder and thigh. This swelling is due to a formation of gas under the hide and if pressure is applied to the swollen place, a peculiar cracking sound is heard, similar to the sound that is made by crumpling a piece of parchment paper. The disease runs a very rapid course and almost always terminates fatally in 36 hours. Prevention rather than treatment is the most successful way to handle this disease. In those districts where blackleg is prevalent, all cattle between the ages of 6 and 24 months should be vaccinated. One vaccination is sufficient to protect

the animal as long as it is susceptible to the disease. In badly infested areas, calves should be vaccinated when they are about three or four weeks of age.

BLOATING

Bloating is caused by a development of gas in the paunch and is due to some digestive disorder. It is easily recognized by pronounced swelling of the left flank. If the bloat is detected in its early stages of development, a piece of wood fastened in the mouth in the fashion of a bit will give relief. The animal, in attempting to remove the stick, soon starts belching and the gas is removed. A drench of two ounces of turpentine and a pint of water is effective. Should the formation of gas continue after the turpentine has been administered, it may become necessary to relieve the pressure. A very convenient instrument for this operation is a trocar and a cannula. The point of the trocar is placed at a point of equal distance from the last rib, the hip bone, and the lower part of the loin. Pressure enough is exerted to force the trocar through the abdominal wall into the paunch. The trocar is withdrawn from the cannula to allow the gas to escape. The finger should be kept over the end of the cannula to regulate the flow of gas, for if the pressure in the paunch is released too suddenly, it may cause the death of the animal. One to two pounds of Epsom salts dissolved in a half gallon of lukewarm water should be given to the animal as a drench following the recovery from a bad case of bloat.

SCOURS

There are two kinds of scours that attack calves. One of these types is due to bacteria in the digestive tract. Unsanitary surroundings are a predisposing factor in this type. A dose of from four to eight ounces of castor oil, depending on the size of the calf, will check the trouble. The more serious type of this disease is very contagious and is indicated by dirty white, sticky feces which has a strong odor. These symptoms indicate "white scours" and when they develop, a veterinarian should be consulted. Usually the latter form of this disease makes its appearance within the first three days after the calf is dropped.

PARASITES STOMACH WORMS

In some sections of the state, the pastures are infested with stomach worms. Where a heavy infestation occurs, the calves are unthrifty, make very poor gains, and some losses are experienced. If the calf becomes unthrifty, his coat of hair rough, and the mucous membrane of the eyes very pale, stomach worms should be suspected and the calf treated. The most effective treatment at the present time is to drench the calves with bluestone (copper sulphate). Use a solution for drenching that contains one per cent copper sulphate and one per cent nicotine sulphate (black leaf 40). The solution is made up by dissolving one and a fourth ounces of bluestone in a gallon of water and after the crystals have dissolved adding one ounce of nicotine sulphate. The calves should be kept away from

