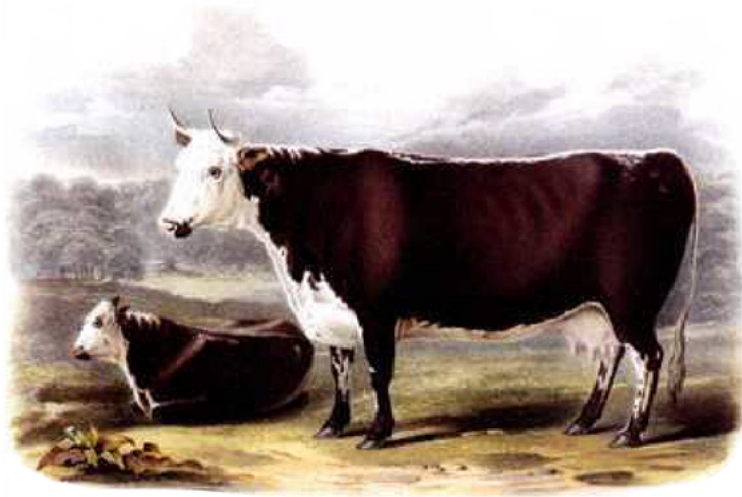


Beef Herd Management in Georgia



Cooperative Extension Service
The University of Georgia
College of Agricultural and Environmental Sciences

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Beef cattle are important to agricultural income in Georgia. The most recent inventory showed that 700,000 plus beef brood cows had calved in the state. Income from beef cattle in Georgia has ranked among the top five enterprises during most of the past 10 years.

The beef industry within the state is primarily a cow-calf program. Most of the calves are sold at weaning and shipped to other areas of the nation for finishing. Stockering (backgrounding) is a substantial and expanding industry in Georgia as well. This program involves growing the calves on forages after weaning and selling them as heavy feeders to other parts of the country for final finishing.

Georgia finishes very little beef and imports over 75 percent of its fed beef. Cattle finishing in the state has been declining for many years.

Beef cattle are in every county in the state and they make a significant contribution to the agricultural income, but the beef industry has not reached its potential. Beef herds are generally small, with the average size herds being less than 50 head. Very few producers raise cattle as their only farming enterprise, and beef cattle are considered a sideline by a high percentage of the producers.

CATTLE & CALVES ON GEORGIA FARMS
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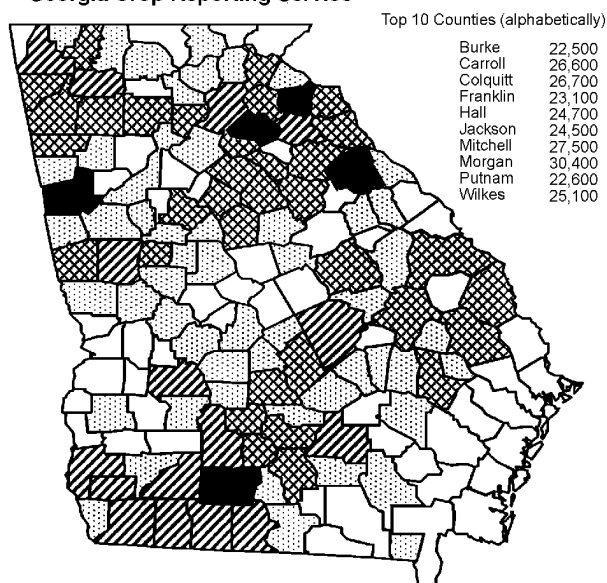


Figure 1.

Beef cattle fit naturally into the organization of most farms in the state. They complement a diversified farming operation by making use of marginal land and crop residue. Cattle can produce extra income by harvesting forages which are grown in a double cropping program on a high percentage of the farms.

Through superior management and planning, the income from beef cattle can be substantially increased. Major expansion in brood cow numbers, stockering, and finishing of cattle is possible if producers want to and are willing to follow proper procedures. Increasing production costs of the past few years also make it imperative that the management level be improved. This publication describes the major points in a well-managed cattle operation.

Getting Started

People often get in the cattle business by chance. Such haphazard starts are seldom satisfying or profitable. The best chance for success in a cattle operation depends on good preparation.

Adequate discussion of all the factors to be considered before starting a cattle operation is difficult. Prospective cattle producers should give attention to establishing pastures, developing adequate facilities and equipment, building fences, and selecting a breed before they actually buy cattle. Persons already in the cattle business should examine their operations to see if they have adequately provided these essentials.

Establishing Pastures

Basic to the cattle business is the development of the pastures. Most cattle operations in Georgia depend on improved pastures. These improvements require varying amounts of time, depending upon the condition of the land to be used for pastures. When you use perennial grasses (bermudas, bahia, fescue), it is generally recommended to have between 1½ to 2½ acres per cow-calf unit. This requirement will vary considerably because of variations in rainfall, soil, fertilizer used, type of grass, and supplemental feed.

Factors to consider when planning a forage system include: land area available; location in the state; productivity of the soils; kinds of livestock that will utilize the forage; and, how intensively the operation

will be managed. These factors influence the forage crops that should be grown, fertilization rates, the quality and distribution of the feed produced and the carrying capacity of the operation.

Any land that produces good yields of other crops is also suitable for pasture production.

Adapted plants should be put on the right soils.

Drought-resistant plants, such as Coastal Bermuda or Tifton 44, should be used on upland soils.

On lowland areas in the Upper Coastal Plains and the Piedmont, dallisgrass and the white clovers are excellent producers. In north Georgia, tall fescue-white clover mixtures can be used on lowland areas, and bahiagrass and the white clovers can be used on lowland soils in south Georgia. Coast-cross-1 is adapted to most soils in the southern part of the Coastal Plain region, but is subject to winter kill.

Intermediate locations between the extreme uplands and the lowlands may be used for winter grazing mixtures and summer hay plants, as well as general pasture mixtures.

In the mountains, tall fescue, orchardgrass-white clover mixtures can be used on uplands and lowlands.

In north Georgia, fescue is the predominant cool season perennial. Most Kentucky 31 tall fescue contains a fungus that has a detrimental effect on cattle performance. This effect or influence may be partially overcome by adding other species of forage to your pasture mixture or by using fungus-free varieties. Fungus-free varieties are not without problems, however. Fescue fungus-free stands are harder to establish and maintain and are not as drought-resistant as fungus-infected stands. Consult your local county extension agent for additional information.

Georgia soils respond well to good management and most are adapted to pasture production. The state is divided into seven soil regions:

Limestone Valley and Uplands

Fertile upland soils and areas along the streams make excellent pastures. Good pastures can be produced on almost any of the land used for crops. Periods of dry weather can occur in spring, summer, and fall. Use drought-resistant plants for upland summer grazing.

Appalachian Mountains

The rich covelands are well-adapted to cool-season perennial and adapted warm-season perennial pastures. Winter annual pasture can be planted on any of the cultivated soils of this region. The better upland soils will be easier to handle, however, because of

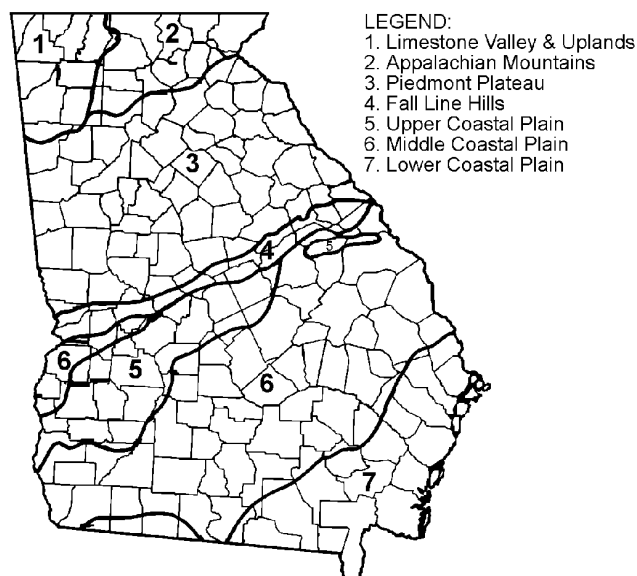


Figure 2.

better drainage. The advantage of this region is the abundant rainfall.

Piedmont

The best land for pasture in this region is along streams. The low, moist areas, if adequately drained, are excellent for summer pastures. The better upland soil is good for winter grazing crops. Periods of dry weather often occur in spring, summer, and fall. Use drought-resistant plants on the uplands for summer grazing.

Fall Line Hills

Land that produces row crops will produce pasture in this region. Some of the better areas will produce winter and summer supplemental pastures. Put sand ridges in hybrid bermuda for hay and grazing.

Upper Coastal Plain

The best pasture soil is in moist areas along the streams, but good results are being obtained in the better uplands. Winter annual pastures do best on the upland soils. Soils in this region are usually heavier and more fertile than those of the middle and lower Coastal Plain. Periods of dry weather occur in spring, summer, and fall. Use drought-resistant plants for summer grazing.

Middle Coastal Plain

The best pasture soils are on good upland and the well-drained lowlands. Most uplands can produce winter pasture and summer pasture. Periods of dry weather occur in spring, summer and fall. Drought-resistant plants should be used for summer grazing.

Lower Coastal Plain

Poorly drained areas in this region should **not** be used for pasture. Good pasture can be produced on the better soils. Any soil that will grow corn will produce pasture in the lower Coastal Plain.

In the Coastal Plain, gallberry bushes indicate good pasture land. Pitcher plants indicate poorly drained areas. Because deep sand with scrub oak is poorly adapted to most pasture plants, it should be planted only to drought-resistant plants such as Coastal Bermuda.

Corrals and Cattle Working Facilities

Any successful beef operation involves handling cattle at various times: separating cows from calves at weaning, during worming or other treatments, when branding, when weighing at sale time, in performance testing, during pregnancy examination, and when loading for movement or sale. Therefore, it is important to have proper facilities and equipment ready before you buy the cattle.

Ideally, the corral should be located on well-drained sandy soil in an area with some shade trees. Put it in a place convenient to the pasture area you will be using. It should have a source of water, electricity and hay and feed trough space so the corral can be used as a holding pen when necessary.

A working chute and a squeeze are necessary parts of a corral. Construct a loading chute that will accommodate the kind of truck or trailer you use. A set of scales is important although it may not be essential to the starting of an operation.

A minimum of two holding pens will be needed in any corral — one for holding the cattle before they

are worked and the other for the cattle after they have been worked. The pens should be large enough to hold all the cattle from one pasture. If cattle are to be held overnight, allow 40 to 60 square feet per head.

Plan the corral so the gates are in the corners of the pen and build them so they will not sag. Unless gates are to be used for cutting cattle, they should close in the direction the cattle are moving. Fences within the corral should be five feet high, but outside fences and fences where cattle will be crowded should be at least six feet high. Although the shape of the pens is not important, avoid narrow corners. Plan pens so you can add to them later.

A good corral layout has a funnel-shaped or circular crowding area, and uses a free-swinging gate so the cattle can be crowded into the working chute. Holding pens should be designed for easy movement of cattle into the crowding area. The holding area should have from 18 to 20 square feet of space per animal, and the crowding pen should be large enough to hold one truckload of cattle, if possible. Do not make the working chute too wide because cattle will tend to turn around. It may be necessary to have one chute for calves and another for mature animals. A chute with sloping sides is an alternative. It should be wider at the top (24-26 inches) than at the bottom (about 16 inches). Make the chutes long enough to hold four or five animals at one time.

Bars overhead in the working chute should be available to help prevent animals from rearing up and falling over backwards. It is also a good idea to include blocking gates or bars that can be inserted to separate animals or to keep them from backing up.

You can build the squeeze chute from plans or buy a commercially-built squeeze chute. If a large number of animals are to be worked, it would probably be wise to consider a commercial squeeze chute.

Include a good loading chute as part of the cattle working facilities. Design it so cattle can be loaded without going through the squeeze chute. Keep the rise to no more than 3½ inches per linear foot. The floor should be either a stairstep or rough enough so cattle will not slip. A chute that has an adjustable height is desirable for loading into trucks of different heights. Construction plans and specifications are available from the county extension agent.

Miscellaneous Equipment and Preparation

Certain miscellaneous equipment will be necessary before or soon after starting a cattle operation: dehorning equipment if horned breeds are grown; identification tools such as branding irons, heater,

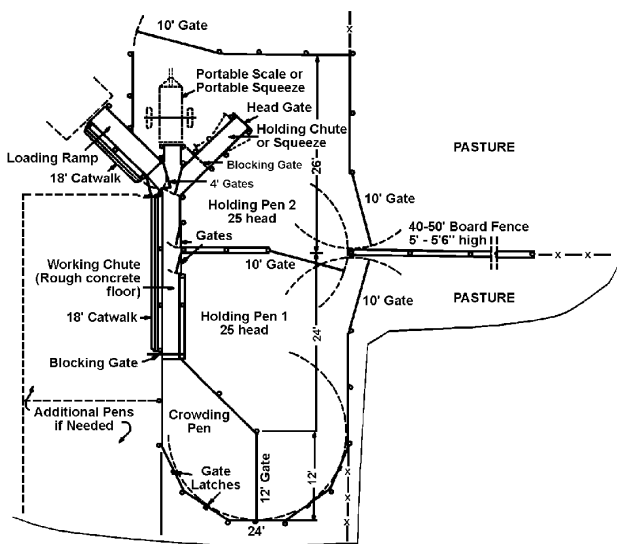


Figure 3. Corral Plan

tattoo outfit, and ear tags; some items of veterinary equipment such as veterinary syringes, thermometers, drench guns, and balling guns.

An adequate, dependable, clean water supply must be ready before you receive your cattle. A well is the most desirable water source. Water pumped from a pond or stream is satisfactory if it's clean. In order to make plans for a water supply, producers should realize that mature cattle will consume 10 to 15 gallons daily. Although cattle may and many times do drink directly from ponds or streams, this water is more likely to be contaminated and cause diseases.

Try to complete storage facilities before you start a cattle program. The kind and size of storage will depend on the feeding system chosen. Appropriate feed bunks, troughs, hay racks, and feed delivery system must accompany the feeding system. (The section on "Herd Nutrition" has more information on feed needs and feeding systems.)

Fences

Pastures need to be properly fenced to prevent many problems in a cattle operation. A permanent, well-constructed perimeter fence is recommended, but some of the newer electric fences are much cheaper and have been used successfully as permanent fences for the boundaries of cattle operations as well as for cross-fences. Cross-fences and various size fields are important to a satisfactory cattle program. This is because certain groups within a herd need to be managed separately. For example, replacement heifers and heifers with their first calves may need to be separated from mature cows.

You also need a well-fenced paddock for keeping the herd bull or bulls. Well-designed bull pens should provide shade and/or shelter (trees will be suitable), adequate source of fresh, clean water and two to three acres per bull of grazing area. Ideally, bull pens should not have fence line contact with beef females. This is to prevent fence damage or the bull getting with the cows when they are not supposed to be. An electric wire on the inside and at the top of the bull pen fence is desired for best containment.

The relative cost of various types of fencing is a major consideration. Expensive fences add to the fixed costs (depreciation) and make it difficult to make a profit, but they must contain the cattle and last a long time. The types of fences for cattle operations listed in order of most expensive (in terms of initial cost) to least expensive are:

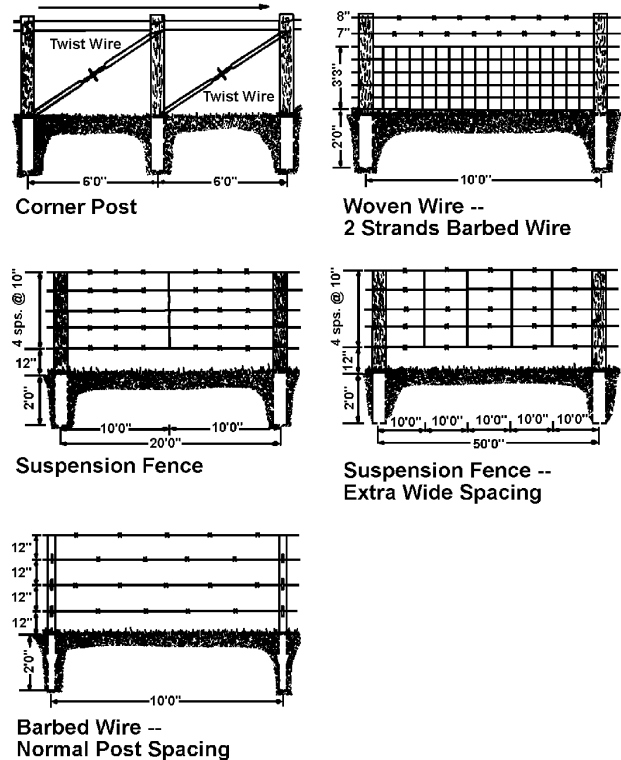


Figure 4. Types of Fencing

- Woven wire with wood or metal posts and 2 strands of barbed wire.
- Barbed wire (4 or 5 strands), and wood or metal posts with normal post spacing (10 feet).
- Barbed wire (5 strands), wood posts spaced 20 feet and wire stays.
- High tensile smooth wire (6 strands) and wood posts.
- Barbed wire (5 strands), wood posts, extra wide spacing (50 feet) with four wire stays.
- Electric fence.

Selecting a Breed

People often want to know if there is a "best" breed of beef cattle. Even though there are strong views concerning the merits of certain breeds, no single breed excels in all traits. With a few exceptions, the most common breeds found in Georgia are listed in the following groups:

- British breeds: Angus, Red Angus, Hereford, Polled Hereford, and Shorthorn;
- Continental breeds: Charolais, Chianina, Gelbvieh, Limousin, Maine Anjou, and Simmental;
- Breeds developed in North America: Barzona, Beefmaster, Braford, American Brahman, Brangus, and Santa Gertrudis.

The British breeds generally excel in fertility, good disposition, and easy fleshing or finishing at medium weights. Continental breeds are generally larger, have fast growth rates, and have leaner carcasses unless fed to heavy weights. The American breeds, which are primarily of Brahman origin, are noted for their heat tolerance and longevity.

Since no single breed has been proved superior in terms of feed efficiency or overall efficiency, a crossbreeding program is best for most commercial cattlemen. Such a system allows producers to combine the desirable characteristics of several breeds and to receive the added benefit of hybrid vigor. (See the section on crossbreeding for more information on this practice.)

Heifers or Mature Cows?

When you have to buy females, advantages and disadvantages exist whether you start with mature cows or with heifers.

If you buy pregnant mature cows or cow-calf pairs, you realize a return sooner. In addition, calving difficulties occur less frequently with mature cows. The major disadvantage is finding quality mature cows for sale. Producers want to keep their best producing cows. Mature cows also have a shorter productive life than heifers.

When you buy heifers, you usually can select from among top quality animals. Heifers also have a longer productive life expectancy than mature cows. A problem with heifers is the high percent that may have to be culled because of failure to breed or poor productive performance. You can also expect greater calving difficulty.

Whether heifers or mature cows are bought, try to buy females with the best quality and performance characteristics available. Always try to buy cows or heifers that will fit the existing or planned calving systems. Changing cows to a different calving season is difficult and costly. If you buy mature cows, be sure they are healthy and not too old. Healthy cows are physically healthy, with good eyes, udders, and teeth. They should also be free from Brucellosis, Tuberculosis, and other diseases. **Always require a veterinarian's health certificate on purchased cows.**

Unless rapid expansion is desired, people already in the cattle business should probably expand by keeping a higher than normal number of replacement heifers. You usually need to keep at least 50 percent of the heifer calves. This system permits replacement of culled cows and allows for genetic improvement.

Commercial or Purebred?

No one can tell you whether to raise purebred or commercial cattle. Personal preference, financial resources, and other factors are going to influence this decision.

It generally takes more money and more intensive management to operate a purebred cattle program than it does a commercial one. In addition to all the management, nutrition, and marketing required for commercial operations, the purebred producer must consider other factors: more time spent for promotion and marketing, original breeding stock is generally more expensive, and small purebred breeders are generally at a disadvantage in comparison to large operators.

Herd Nutrition

The genetic potential for reproduction or weight gains cannot be achieved unless the nutritional needs of a herd are met on a year-round basis.

Ruminant Digestion

Cattle are ruminants. Their stomachs have four compartments that allow them to digest great amounts of roughage. Microorganisms in the stomach break down and digest this roughage. The digestion system of a cow needs a balance of essential nutrients to work properly. These include protein, energy, vitamins, and water. Cattle can also utilize non-proteins such as urea within certain limits. The microorganisms in the rumen can convert this urea into usable amino acids. Total protein is, therefore, usually more important than source of protein in cattle feeding.

Essential Nutrients

Nutrients essential for animal maintenance, growth, reproduction, milk production, or fattening fall into various classes: energy, protein, minerals, vitamins, and water.

Energy

Energy, commonly expressed as TDN (Total Digestible Nutrients), is the major nutrient requirement for beef cattle. Unless the energy needs are met, cattle will not grow or mature properly. Severe energy deficiencies cause stunted calves and brood cows with a low percent calf crop. Cows are also more susceptible to diseases if their energy needs are not met.

Protein

All beef cattle require protein in their diets. Young growing animals and lactating cows and pregnant cows require a higher concentration of protein than most other classes of beef cattle. If cattle do not receive their protein requirements, they will not grow or reproduce properly.

Minerals

Thirteen minerals are generally recognized as essential in beef nutrition. The normal diet of beef cattle in Georgia supplies most of them. Supplemental minerals needed for brood cow herds in Georgia are salt (sodium and chlorine), calcium, and phosphorus. To avoid possible deficiencies, keep a mix of these major minerals before brood cow herds at all times. A general rule is seven percent phosphorus in the mix, and maintain a 2:1 or 1:1 ratio of calcium to phosphorus. Some suggested mineral mixes are as follows:

- 1 part steamed bone meal and 1 part trace mineralized salt,
- 1 part dicalcium phosphate, 1 part trace mineralized salt,
- 1 part defluorinated phosphate, 1 part trace mineralized salt.

Add 30 pounds of cottonseed meal or ground corn to 300 pounds of the mineral mix to prevent caking. Commercial mineral mixes that meet the above requirements are satisfactory, but compare them on a cost basis to a home mix. Small producers may find it more convenient to use a commercial mix if ingredients for a home mix are difficult to find. Trace mineralized salt is usually easy to find and can be used as part or all of the salt in a mineral mix.

Cows may need supplemental magnesium under certain conditions. Lactating brood cows grazing cool season pastures (winter annuals and fescue) are susceptible to a condition known as “grass tetany” characterized by a deficiency in blood magnesium. Feeding a high magnesium mineral supplement, starting 30 days prior to turning cows on winter grazing, has helped prevent this condition. A commercial “high mag” mineral mix is satisfactory. A home mix has also been effective:

- 30% trace mineralized salt
- 30% dicalcium phosphate or bone meal
- 30% magnesium oxide
- 10% cottonseed meal

Vitamins

When cattle are healthy and are on an adequate feeding program (including green pastures), they do not normally need vitamin supplements. One exception is the need for extra vitamin A under certain conditions. Vitamin A exists as carotene in green plants and is converted to vitamin A in the animal's body. Under certain stress conditions or under periods of extended drought when little green grazing is available, a vitamin A deficiency could exist. The effects of a severe vitamin A deficiency could be quite serious. Young animals would not perform properly. Severe deficiencies might cause eye troubles, lack of muscle coordination, lameness, and joint problems, or lead to decreased reproduction efficiency in breeding animals. If a veterinarian or specialist diagnoses a vitamin A deficiency in a herd of cattle, correct it by feeding a high vitamin A supplement, or use an intramuscular injection of about a one million international unit dose. Such an injection usually lasts two to four months.

Water

Even though water is probably the most important of all nutrients for beef cattle, it is probably the most taken for granted. Cattle need fresh water. Water quality is normally not a major problem in Georgia, but it must be free of contamination. If contamination is suspected, have the water analyzed for purity, contaminants, and mineral content.

Water supply may be from ponds, streams, or wells. If cattle drink from a flowing stream, be sure the stream is not polluted above or that your cattle do not pollute the stream for producers who may take water downstream. If a pond or lake is the water supply source, pipe water from the pond to a tank and control this with a float valve.

Daily water requirements for beef cattle vary with the weather and the age and size of the animal. Mature brood cows need from 10 to 15 gallons daily during the summer.

Table 1. Daily Nutrient Requirements of Beef Cattle

Body Weight (lb)	Avg Daily Gain	Dry Matter (lb)	Total Protein (lb)	TDN (lb)	Ca (lb)	P (lb)
<i>Growing Heifer Calves and Yearlings</i>						
400	1.0	9.9	1.01	6.1	.036	.020
400	1.5	10.2	1.17	7.0	.046	.024
600	1.0	13.5	1.19	8.4	.038	.027
800	1.0	16.7	1.36	10.4	.037	.030
<i>Pregnant Yearling Heifers (Last third of pregnancy)</i>						
700	.9	15.3	1.30	8.5	.041	.030
800	.9	16.8	1.40	9.2	.047	.033
900	.9	18.3	1.50	9.9	.048	.037
<i>Dry Pregnant Mature Cows (Last third of pregnancy)</i>						
900	.9	18.2	1.5	9.8	.049	.038
1000	.9	19.6	1.6	10.5	.051	.039
1200	.9	22.3	1.7	11.8	.058	.047
<i>Cows Nursing Calves - Avg Milking Ability (First 3-4 months after calving)</i>						
1000	—	20.2	2.0	11.5	.057	.044
1100	—	21.6	2.0	12.1	.058	.048
1200	—	23.0	2.1	12.8	.062	.051
<i>Cows Nursing Calves - Superior Milking Ability (First 3-4 months after calving)</i>						
1000	—	20.6	2.5	13.8	.080	.056
1100	—	22.3	2.6	14.5	.085	.060
1200	—	23.8	2.7	15.2	.086	.062
<i>Bulls' Growth and Maintenance - Moderate Activity</i>						
700	2.5	17.4	1.9	11.6	.077	.042
1300	1.0	25.4	1.9	14.2	.056	.048
1700	—	27.7	1.9	13.4	.058	.058

From *Nutrient Requirements of Beef Cattle*, Sixth Edition, Revised. National Research Council. 1984.

Table 2. Composition of Feeds (as fed basis)

Feedstuffs	Dry Matter DM	Total Protein	TDN	Calcium	Phosphorus
Dry Roughages *	%	%	%	%	%
1. Alfalfa hay, mid-bloom	90	15.3	52	1.27	0.22
2. Alfalfa hay, early bloom	90	16.2	54	1.27	0.22
3. Bermudagrass hay	89	9.3	49	0.42	0.18
4. Bahiagrass hay	91	7.5	47	0.46	0.20
5. Corncobs	90	2.9	45	0.10	0.06
6. Cornstover	85	5.6	43	0.48	0.08
7. Cottonseed hulls	91	3.7	38	0.14	0.08
8. Fescue hay, early bloom	92	8.7	44	0.28	0.24
9. Grass-clover hay 65-35%	90	10.6	50	0.78	0.27
10. Lespedeza hay, late bloom	93	13.5	47	1.11	0.24
11. Oat hay, mature	91	8.5	50	0.22	0.20
12. Orchardgrass hay, late bloom	91	7.6	49	0.24	0.27
13. Peanut hay	91	9.8	50	1.12	0.14
14. Peanut hulls	91	7.1	20	0.24	0.06
15. Red Clover hay	89	14.0	49	1.36	0.22
16. Straw, wheat	89	3.2	36	0.16	0.04
17. Sorghum hay	91	7.2	51	0.50	0.28
Silages *					
18. Alfalfa, not wilted	30	5.4	17	0.49	0.12
19. Alfalfa, wilted, mid-bloom	38	5.9	22	0.51	0.12
20. Corn, dent mature, well-eared	33	2.7	23	0.08	0.07
21. Grass-legume	40	6.9	22	0.45	0.10
22. Sorghum, grain variety	30	2.3	18	0.11	0.06
23. Sorghum-sudangrass	28	3.0	15	0.13	0.06
Concentrates					
24. Barley	88	11.9	74	.04	0.33
25. Cane molasses	75	4.4	54	0.83	0.11
26. Citrus pulp	91	6.1	75	1.67	0.11
27. Corn dent No. 2	88	8.8	79	.02	0.31
28. Corn distillers solubles	93	26.0	82	.33	1.27
29. Cow's milk	12	3.1	16	.11	0.08
30. Cottonseed meal	91	41.0	69	.16	1.10
31. Cottonseed, whole	92	21.9	88	.15	0.32
32. Dehydrated alfalfa	92	17.4	56	1.39	0.23
33. Ground ear corn	87	7.8	74	.06	0.23
34. Milo	87	8.8	73	.04	0.32
35. Oats	89	11.8	69	.06	0.33
36. Soybean meal	90	42.9	77	.26	0.61
37. Wheat	89	14.2	78	.37	0.36
Mineral Sources					
38. Dicalcium phosphate	97	—	—	21.34	18.72
39. Defluorinated rock phosphate	100	—	—	32.0	18.0
40. Ground limestone	100	—	—	34.0	.02
41. Sodium tripolyphosphate	96	—	—	—	24.0
42. Steamed bone meal	97	8.1	.15	30.58	13.79

* Nutrient content of harvested roughages such as hay, crop residue, or silage can vary greatly. Forage analysis should always be obtained. Refer to Extension leaflet #302 (DH-1-2) for instructions on submitting forage samples.

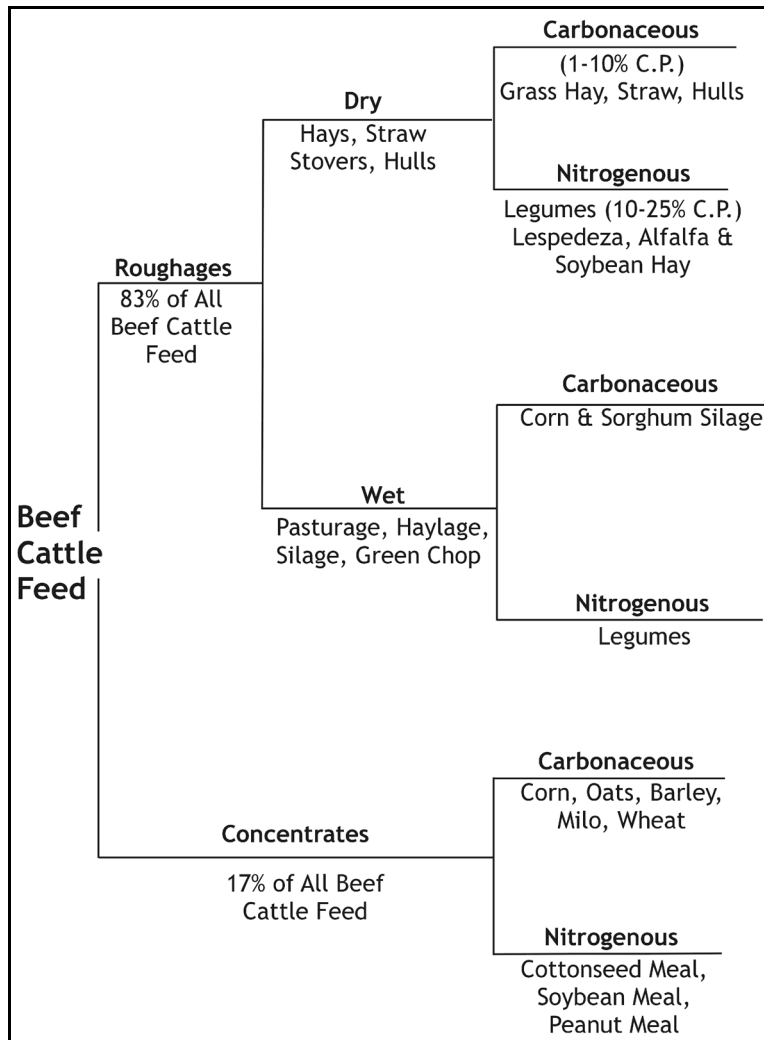


Figure 5. Classification of Feeds

Classification of Feeds

Feeds for beef cattle are generally classified as roughages or concentrates. These categories are determined by the relative fiber and energy contents of the feed. (See Figure 5 for a breakdown of feed classification.) Roughages are subdivided as dry feeds and wet feeds. Both roughages and concentrates break down again into carbonaceous feeds and nitrogenous feeds.

Concentrates and roughages are sometimes also classified into energy or protein feeds.

Protein Supplements

The most common protein supplements for beef cattle in Georgia are cottonseed meal and soybean meal. Peanut meal may be available at times. These oil meal supplements are usually interchangeable on a percent protein basis. Buy them based on their cost per pound of protein.

Urea is not a true protein, but is used sometimes as a protein supplement because cattle can convert the non-protein nitrogen to usable protein through microorganism action in the rumen. Urea has a protein equivalency of 6.25 times the nitrogen content. For example, 45 percent nitrogen urea has a protein replacement value of 281 percent if it is properly supplemented. Use urea as a protein supplement only if it costs less than an organic type supplement. It usually takes six pounds of shelled corn and one pound of urea to replace seven pounds of a supplement such as soybean or cottonseed meal. Provide no more than a third of the daily protein requirements from urea. Urea must be thoroughly mixed in a feed to prevent toxicity. Since an adequate supply of carbohydrates must be available when feeding urea, it is more valuable in a finishing program than with brood cow feeding. Georgia cattle producers use urea mixtures quite frequently.

Protein supplements are available as pellets or as blocks. Some blocks have intake limiters. Some producers use salt plus cottonseed or soybean meal mix (hot-mix). The salt is used as an intake limiter (See section on winter feeding for more information on hot mixes).

Energy Concentrates

The major energy concentrate feeds used in Georgia are corn, grain sorghum (milo), oats, wheat, and some rye and barley. Most of these grains are fed as supplemental feeds for brood cow operations. Rye should not be fed to cattle by itself since it is not very palatable. However, it may be fed in a mix when it makes up 20 to 30 percent of a concentrate mixture. Wheat is more suitable when it makes up no more than 40 percent of a ration. Oats are valuable in creep feeding calves, or when fed as the only grain to supplement the energy requirements for brood cows.

Dry Roughages

The most common dry roughage in Georgia is bermudagrass hay. Other hays used are fescue in central and northern Georgia and bahiagrass in central and southern Georgia. Millet, sudan grass, and forage or grain sorghums can be used for dry roughage when they are properly cured and stored.

Roughages from crop residues are becoming more important to the state's cattle industry. Cornstover, peanut hay, and soybean straw can provide a valuable roughage source where available. In all cases, proper harvesting and storage practices must be used.

Poultry litter is a major by-product feed ingredient for cow-calf operations within the state. It is a source of roughage and protein for brood cow feeding. Poultry litter needs to be properly stored in either deep stacks or in a silo to preserve its quality. (See section on winter feeding for more detail.)

Silage

Corn and sorghum silages are important feed sources for brood cows within Georgia. Silages can be stored for a long period of time and are relatively high in energy. They are generally low in protein and must be supplemented with protein or combined with high protein pastures to meet brood cow requirements.

Balancing a Ration

Base your feeding program for a brood cow operation in Georgia primarily on pastures. You can develop a nearly year-round grazing program through proper planning. When cattle are on high quality pastures with adequate available forage, balancing

rations is of little concern to beef producers. The art of husbandry allows the good manager to determine if the cattle are getting the needed nutrients by observing their condition.

At certain times, however, and with certain groups of cattle, you need to feed a ration prepared from harvested or purchased feeds. Winter feeding and developing replacement heifers are examples of when prepared rations may be needed. Protein supplements and minerals are the ingredients most likely to be purchased.

A balanced ration furnishes the nutrients needed, in the proper amounts and proportions, to allow animals to fulfill a specific purpose: maintenance, growth, gestation, or lactation. The needs may vary considerably. For example, a ration for a dry cow is not sufficient for a cow nursing a calf.

The combination of feeds in a ration depend on:

- The availability and cost of the feed.
- Nutrient content of the feed.
- Size of the animal.
- Purpose for which the animal is fed.

The major ingredients for which we balance a ration are protein, TDN, calcium, and phosphorus. Although some rations are balanced for vitamin A, we will assume the needs are met unless extremely poor ingredients are used. If a vitamin A deficiency is suspected, supply it in a supplement or with an injection.

Balancing a ration is a trial and error method. Experience helps reduce the errors. Use the following steps:

- See Table 1 for the nutrient requirements for the animal.
- See Table 2 (or use your forage analysis) for the nutrient content of the feeds you plan to use.
- Multiply the pounds of feed used by their nutrient analysis.
- Check the totals against the requirements to see if the requirements are met.

Example 1: 1000 lb Dry Pregnant Mature Cow (Last Third of Pregnancy)

Feed Source	Dry Matter lb	Total Protein lb	TDN lb	Ca lb	P -lb
Furnished by 22 lb Bermudagrass hay (Table 2, No. 3)	19.6	2.0	1.8	.092	.040
Total	19.6	2.0	10.8	.092	.040
Requirements	19.6	1.6	10.5	.051	.039
Deficiencies	---	---	---	---	---

In example 1, we found the requirements for a 1000 pound dry pregnant brood cow in Table 1 and recorded them on the requirements line of the example. We assumed the producer had bermudagrass hay, so we started by using 22 pounds of hay and multiplied it by the nutrient contents found in Table 2. The procedure to get the amount for each column is as follows:

Amount	Nutrient	Analysis from Table 2	Pounds
22 lb	X Dry matter	89.0%	= 19.6
22 lb	X Protein	9.3%	= 2.0
22 lb	X TDN	49.0%	= 10.8
22 lb	X Ca	.42%	= .092
22 lb	X P	.18%	= .040

When we checked the totals against the requirements, we found that the hay alone met all the requirements. This is a very simple solution. A producer should always have hay analyzed, since poor hay might not meet the cow's needs.

Example 2 is more complicated. It became evident that corn silage was low in protein and minerals (particularly phosphorus). Soybean meal and dicalcium phosphate were added to meet the deficiencies. The ration was low in dry matter but since the nutrient needs were met, this is no problem. The same procedure of multiplication shown in Example 1 was used.

The extreme difference in nutritional requirements between feeding a pregnant dry cow and a lactating superior cow is seen when you examine examples 1 and 2. The system shown in these examples can be used to balance rations for any beef animal and with any suitable feedstuffs.

Example 2. 1100 lb Cow Superior Milking Ability (first 3-4 mo after calving)

Feed source	Dry Matter lb	Total Protein lb	TDN lb	Ca lb	P- lb
Furnished by 60 lbs. Corn silage (Table 2, no. 20)	19.8	1.62	13.8	.046	.044
Furnished by 2.5 lbs Soybean meal (Table 2, no. 36)	2.3	1.03	1.8	.005	.027
Furnished by .1 lb Dicalcium Phosphate	.1	.034			
Total	22.2	2.65	15.6	.085	.071
Requirements	22.3	2.6	14.5	.085	.060
Deficiencies	2.75	—	—	—	—

Summer Nutrition

Meeting summer nutritional needs of a brood cow herd in Georgia is relatively simple if good pastures have been established (see "Establishing Pastures"). Manage pastures properly by soil testing and then liming and fertilizing according to needs. Maximum fertilizer applications may not always be advisable unless the forage is needed. Your county agent can help with soil testing and planning fertilizer programs. Control weeds by mowing or with chemicals to improve pasture production.

Pastures are most nutritious in the early part of the growing season and generally become poorer in quality in late summer. This is one reason it is so important to coordinate the calving season with the forage program. The best weaning season for most Georgia producers is late summer or early fall.

Pastures are most nutritious when the grasses are grazed relatively short. Mow to improve quality when top growth becomes excessive and remove the excess for hay. This growth will likely be poor quality hay. Refertilize the pasture in mid or late season to improve quality of the forage. Sometimes dry cows can use late season or frosted Bermuda or Bahia, but a protein supplement may be needed. Use rotation grazing some of the time for best use of forage.

Extension agronomists developed the models in Figure 6 to visualize suggested forage systems for beef cattle in north and south Georgia.

Other factors closely related to summer nutrition are discussed in more detail in other sections of this bulletin. They are mentioned here because they are related to this phase of the herd management.

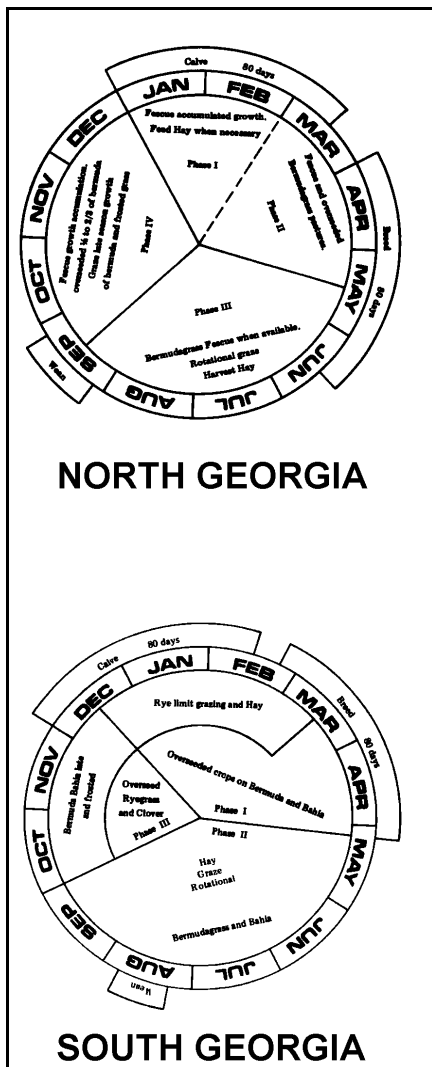


Figure 6. Forage Systems

Water Supply. (Refer to “Miscellaneous Equipment and Preparations”) Check quality and availability of water frequently during the summer.

Minerals. (Refer to “Essential Nutrients”) Check mineral boxes frequently during summer. Be sure they stay full and are in shade. Some producers place mineral feeders away from the water supply to encourage cattle to graze the entire pasture area.

Parasite Control. You must control internal and external parasites in order to have a good summer nutrition program. (Refer to “Herd Health and Parasite Control” for more information.)

Creep Feeding Calves

Creep feeding is practiced, but there is no assurance that it is always profitable. There are times when creep feeding is not advisable:

- Calves nursing good milking cows on adequate pastures show little benefit from creep feeding. It may take as much as 10 pounds of feed to produce an extra pound of gain under such conditions.
- Creep feeding calves makes performance records less accurate because calves nursing poor cows may eat more feed to compensate for the cow’s poor milking ability.
- If grain is high in relation to the price of calves, creep feeding is less advisable.
- If calves are to be sold at weaning time, excessively fat calves usually bring less per pound
- Heifer calves to be kept as replacement heifers may be harmed if creep feeding makes them fat.

Some conditions exist when creep feeding may be advisable:

- When drought or other conditions make pastures deficient in quality or quantity.
- If cows are poor milkers, or if heifers with first calves are becoming extremely thin.
- If grain is cheap in relation to calf prices.
- When you plan to put calves directly in a feedlot or finish them at an early age.
- When teaching calves to eat grain three to four weeks before weaning.

Some producers separate cows with bull or steer calves from those with heifers when the calves are four or five months old. They then creep feed only the bull or steer calves. If you decide to creep feed, it is not necessary to buy a commercial feed. Simple home mixes are very satisfactory. The following mixes are suggested for creep feeding:

Up to 5 months old —

- 100% whole or rolled oats
- 50% whole or rolled oats; 50% whole or cracked corn

Over 5 months old —

- 45% rolled or coarse ground oats; 45% cracked corn; 10% cottonseed meal or other similar protein supplement
- 70% cracked corn; 20% rolled or coarse ground oats; 10% cottonseed meal or other similar protein supplement

Locate creep feeders in shade where cattle rest. Water and mineral supply areas are ideal. Keep feed fresh and dry and do not let feeders become empty once feeding has started.

Winter Nutrition

Winter feeding can be complicated, difficult, and costly, but it is perhaps the most important phase of herd management in Georgia. It is estimated that 80

percent of the variable costs in a brood cow operation are involved in winter feeding. If good management practices and proper planning techniques are followed, however, winter feeding can be relatively less expensive and cattle performance can be improved.

Kinds of Winter Feed

A controlled breeding program timed to work in harmony with forage production on a farm provides the basis for planning an effective and efficient winter feeding system. If calves are weaned and the cows are dry in late summer, they can effectively utilize the low quality forage available on most Georgia farms at that season. Examples of low quality forage are: excess growth of summer perennial grasses, cool season perennials, and crop residue fields. If cows are in good flesh, a condition that must be estimated by an experienced manager, they can normally stay on these low quality pastures until calving time. The quality of residues and frosted warm-season grass may decline rapidly after frost. You may want to leave cows on the lower quality pasture (if it is sufficient for their needs) until they calve and then move the cows with calves to a separate area and start the winter feeding program.

Forages should be analyzed and a ration balanced to meet the needs of a particular production class of beef animal. Some of the more common systems used in Georgia to meet the needs of an average brood cow nursing a calf are (daily feed):

- 20-25 lbs. average quality grass hay (bermuda, bahia, fescue)
2-3 lbs. grain (corn, grain sorghum)
1-1.5 lbs. protein supplement (cottonseed, soybean meal or equivalent). An alternative to this might be 20-25 lbs. hay plus liquid protein supplement (molasses-urea mix); or hay plus 3-4 lbs. whole cottonseed.
- 45-55 lbs. corn silage
1-2 lbs. protein supplement (soybean or cottonseed meal or equivalent)
- 50-60 lbs. sorghum silage
1-2 lbs. protein supplement (soybean or cottonseed meal or equivalent)
- In the northern half of Georgia, fescue pastures interplanted with clover provide a common wintering system. Have hay and/or silage available to feed when pasture quality or quantity is low.

Supplementary protein or energy is sometimes needed in wintering programs. When the roughage or pasture does not meet the cows' needs, there are several alternatives: Limited intake protein-energy blocks; pellets containing various protein-energy

analyses which can be fed on the ground; molasses-urea liquid mixes; "hot mixes," which usually contain salt to limit the intake of protein and/or grain; limited hand-fed amounts of protein and/or grain in troughs. Your county agent or livestock specialist can help you decide on kind and amount of supplements needed.

Winter annuals can help provide an adequate and nutritious wintering program for lactating cows. Winter small grains, ryegrasses, and clovers are used widely in Georgia for wintering cows. These pastures are high in protein (up to 20%) and highly digestible (up to 70% TDN). **GRASS TETANY CAUTION:** Brood cows grazing cool-season grasses are susceptible to grass tetany. Grass tetany (magnesium tetany) is characterized by a low magnesium content in a brood cow's blood. It is sometimes caused by cows grazing cool season, magnesium deficient grasses. Paralysis and death can result from acute cases of grass tetany. Refer to SR 6012, "Grass Tetany and Its Control," *Georgia Cow-Calf Handbook*, for a detailed discussion of grass tetany. A sound management program can reduce the incidence of this problem:

- Use dolomitic lime on soil when soil test calls for lime.
- Provide a high magnesium mineral for cattle, starting 30 days before grazing winter pastures.
- Limit grazing time to not more than four hours a day.
- Feed roughage to capacity.

Mature brood cows which are nursing calves are most susceptible to grass tetany.

Considering the grass tetany problem and the expense involved, limited grazing is recommended when you use annual pastures for wintering brood cows. Graze such crops as small grains, ryegrass, clovers, or mixtures of these for two to four hours per day. When forage is adequate, this time will allow cows to fill. Remove cows before they start walking or lay down. Do not provide other feed, water, or mineral on winter grazing. After removing cows, provide, in addition to water and minerals, one of the following: (a) free-choice average hay, corn stover, other crop residue roughages, or frosted grass or stubble field grazing; (b) 30 to 45 pounds average quality corn or sorghum silage.

A feed system for wintering brood cows using poultry house litter is used extensively in northern Georgia. A mixture of 70 to 80 percent litter and 20 to 30 percent grain makes a good wintering program. Feed cows about five pounds of hay per day in addition to this mix. (Refer to Extension Animal

Science Mimeograph AS-1, "The Use of Poultry House Litter as a Feed Ingredient," for more information on the use of poultry house litter.)

Other variations and feeding systems will satisfactorily winter brood cows. No single method is best in every situation. Choose a system that meets the cows' needs, is economical, and is adapted to your farm.

Planning the Winter Feed Needs

Be systematic in planning the stored feed, supplement, and pasture needs for your herd. The following steps are suggested as a means of estimating feed needs:

Length of winter feeding. This time may vary depending on breeding season, pasture program, and location. However, 140 days may be an average time for most of Georgia. You may wish to increase this to provide some emergency feed for summer drought or other emergencies.

Inventory herd. An animal unit approach may be useful in helping to estimate needs as follows:

1 animal unit = lactating brood cows and bulls
 $\frac{1}{2}$ - $\frac{3}{4}$ animal unit = yearling replacements or dry cows
 $\frac{1}{2}$ animal unit = calves

Use thumb rule daily feed consumption estimates. Depending on the winter feeding program you use, you may need one or combinations of these feeds daily per animal unit:

Grass Hay - 20-25 lbs.
 Grass-legume mixed hay - 20-25 lbs.
 Corn silage - 40-50 lbs.
 Sorghum silage - 50-60 lbs.
 Protein supplement (depends on protein analysis of roughage)
 Grain (depends on TDN of roughage)
 Winter annual pastures - .3-4 A (if limit grazed)
 1-1.25 A (if free-choice grazed)

Estimate total feed needs and acres devoted to winter feed production. For example, let's assume we are going to figure the winter feed needs and land needed to produce feed for 100 animal units using sorghum silage and winter annual pasture.

Feed	Days	Daily Feed/ A.U. lb	Total/ A.U.	No. of A.U.	Total Feed T	Est/A Yield	Land Needed
Sorghum Silage	140	45 lb.	3.15 T	100	315 T	15 T	21 A
Winter Annual Pasture	140		.3 A	100			30 A

This method provides only an approximation of winter feed needs. You may wish to keep greater amounts of stored feeds to prepare for emergency

conditions. Use the oldest and poorest quality stored feeds first when feed is carried over from one year to the next. Also, use the poorest quality feeds for the dry, pregnant cows.

Production Management

Developing Replacement Heifers

Progress in improving a beef herd depends largely on the quality of replacement heifers put in the herd. How well a replacement heifer performs is influenced by how well she is developed. To be most efficient and productive, a heifer must calve by the time she is 23 to 24 months of age, rebreed promptly, and wean a heavy calf. Research has shown that when heifers calve first as two-year-olds, they are more fertile and productive. On the average, they produce one more calf during their life span than when calving as three-year-olds. They also live longer. It is very expensive to keep a heifer for three years before getting any production.

Developing replacement heifers requires superior management. There can be no weak spots in the total management program when developing heifers to calve at two years of age.

Develop a plan to deal with the problems most likely to occur when calving at two years old. Most producers encounter similar problems: (1) heifers do not cycle early enough or conceive promptly; (2) two-year-old heifers may have calving problems; (3) heifers may wean extremely lightweight calves the first time; and (4) there are problems in getting heifers with their first calves rebred. You can handle these problems one at a time:

Heifers do not cycle early or conceive promptly.

The heat cycle or the onset of the estrus cycle is primarily a function of age, size, and nutrition. In general, heifers should be 13 to 15 months old and weigh between 650 and 700 pounds if a high percentage of them are to show estrus. The large continental breeds should be some 50 to 100 pounds heavier. In order to achieve this weight goal, you must start when a heifer is still nursing her mother. She should weigh at least 400 pounds by weaning or she will have to gain too rapidly between weaning and breeding time. Such rapid gains might result in an extremely fat heifer with her productive usefulness impaired.

To determine the daily gain needed to achieve the desired weight at breeding time, use a systematic approach to calculate the needed gain as follows:

Step 1. Figure the weight gain needed between weaning and breeding age.

Weight Desired At Breeding	Weight at Weaning	Amount of Gain Needed from Weaning to Breeding
675 lbs	- 425 lbs	= 250 lbs

Step 2. Figure the days from weaning to breeding age.

Days in Age at Breeding	Age at Weaning	Days from Weaning to Breeding
420 (14 mo.)	- 210 days	= 210 days

Step 3. Figure the daily gain needed from weaning to breeding.

250 lbs. divided by 210 days = 1.2 lbs. per day needed gain

The next step is to use a system to achieve the amount of gain needed to get the heifer to the desired weight in this period of time. It would probably be good to try to exceed this gain slightly, since some of the heifers will not gain as fast as the others. Gains of over 1.75 pounds per day on heifers are usually not desirable since the heifers may become obese. Several systems will help you achieve the desired gain:

- System 1. High quality temporary winter pastures such as small grains or clover will do the job very well. When grazing is short due to cold weather or other problems, grain, silage, or hay may need to be supplemented.
- System 2. Silage plus supplement. This system works well, particularly if good corn silage is used. It may be necessary to feed a small amount of grain daily (2-3 pounds) to keep heifers gaining. One to 1½ pounds of 40 percent protein supplement will also be needed. Have the silage analyzed for nutrient content.
- System 3. Average quality permanent pastures plus supplemental grain and protein. Analyze forage to determine the amount of protein and energy needed.
- System 4. Drylot feeding. Use a complete grain and hay ration to do the job. A sample ration is 10 pounds good quality grass hay, a half pound of 41 percent cottonseed meal and 2½ pounds ground corn. This, however, could be the most expensive system.

See the section on nutrition for more information on feeding replacement heifers. In all cases, check the weight of the heifers occasionally during the growing phase.

Two-year-old heifers have more calving difficulties.

You can partially solve this problem by solving problem 1: get them to the proper weight and size. In addition, you can breed these heifers to a bull which is known to sire calves with small birthweights and you can put heifers due to calve for the first time in a separate lot and give them special attention at calving time. In all cases, heifers with their first calves are about two to three times as likely to have difficult births as mature cows.

Heifers may wean extremely lightweight calves the first time.

Light weaning weights are naturally going to be more common with heifers than with mature cows. Part of this problem is because heifers are still growing and need part of their nourishment for this purpose; it may also be that heifers' nutritional needs are not adequately met. Feed heifers extra energy feed such as grain or high quality silage while they are nursing their calves. You may also have to creep feed the calves of heifers.

Difficulty in getting two-year-old heifers rebred.

Getting heifers rebred promptly for their second calf is a matter of timing and nutrition. Expose heifers bred for their first calves 20 to 30 days ahead of the mature cows. Expose them for about 60 days and then remove the bull. About 60 days later, have these heifers examined for pregnancy and remove the nonpregnant heifers. Such a program allows an extra heat cycle for the heifers to be on schedule with the mature cows for their second calf.

A great deal also depends on nutrition during the lactation period. As stated previously, give limited grain to heifers with their first calves, if needed. Three to five pounds of grain per day, plus the required protein supplement in addition to pasture or hay is probably a good investment. It not only assures a greater percentage of heifers rebred, but also results in heavier weaning weights.

Separating Groups for Better Management

Many problems result when a cow-calf herd is run together year-round. It is easier to leave all the cattle in one group, and small producers may find it very difficult to keep various production groups separated.

However, failure to separate various classes in a cattle herd can cause some serious management problems.

Mature Brood Cows and First Calf Heifers

If mature brood cows are run with heifers nursing their first calves during the winter, there will be some serious feeding problems. The old brood cows will push the young ones away from the feed. Animals that need feed the most will get the least. Many times, it is necessary to give extra feed to heifers while they are nursing their first calves.

Dry Cows And Cows Nursing Calves

Dry cows and nursing cows running together means part of the herd will be improperly fed. If the cows with calves are fed properly, the dry cows will be over-fed. This may not be harmful to the dry cows, but it is expensive and wasteful. A good practice is to move the cows with baby calves to a separate pasture as they drop their calves. This separation is best for feeding management and it also allows producers to isolate and identify cows that fail to calve at all.

Bulls

If you do not separate bulls from the herd after breeding season, you cannot properly carry on a controlled breeding program. A controlled breeding program is one of the most basic management practices, and not separating the bulls prevents other good management practices being followed.

When producers do not separate bulls, it is usually because they lack a suitable bull holding pen. A bull pen should provide grazing and exercise for the bull and be well-fenced. An electric fence in addition to a good, strong woven wire or barbed wire fence contributes extra security. (Refer to the section on fencing for more information on building a bull pen.)

One other point emphasizes the importance of removing the bull from the herd after the breeding season — it will prevent any breeding age heifer calves from getting bred too young. Heifer calves bred too young leads to death loss of heifers and calves produced, and promotes inbreeding in your herd.

Weaned Calves

Once the calves have been weaned at normal weaning time, do not allow them to return to the herd. They need a separate pasture and probably some supplemental feeding to prevent their losing weight.

Bull Calves and Heifer Calves

Purebred producers may wish to separate their cows with bull calves from the cows with heifer calves when the calves are four to five months old. This practice allows the bull calves to be creep fed for

extra growth without causing heifer calves to become overly fat.

Replacement Heifers

Handle replacement heifers separately. They need to be kept growing at a rate that will get them to 650 to 700 pounds by the time they are 13 to 15 months old. Of course, they need to be separated from any breeding age bulls on your farm. Refer to the section on herd nutrition for recommendations on feeding various groups.

Some producers may be unable to follow all of these practices for separating production groups in a beef herd. Separating such groups, however, and giving them the proper feed and management appropriate for their class leads to greater returns from the overall cattle operation.

Controlled Breeding

Limit your controlled seasonal cattle breeding program (which naturally results in a controlled calving season) to 90 days or less. If the season extends beyond 90 days, most advantages of this practice are lost. Controlled breeding is really the foundation for most of the other recommended management practices. There are several reasons for and advantages to a controlled breeding season.

Culling and selection of replacements based on production records is easier. To make meaningful comparisons among brood cows, calves must be born within a 75 to 90 day period. One of the main criteria for culling cows is the relative performance of their calves. You cannot accurately compare cows if the calving season is too extended. Acceptable performance implies not only weaning weight, but also that a cow produce a calf each 12 months.

A controlled breeding season means better care can be given cows at calving time. Percent calf crop is the major economic factor in a cow-calf operation, and care at calving time affects percent calf crop. Cows on a year-round calving season are difficult to check.

Herd health and management is also easier. Many jobs important to the health and management of a herd are more likely to be done properly if cows are on a controlled calving season. These practices include vaccination, dehorning, castration, identification, deworming, and weaning. If a cattle producer can perform all these jobs at one time, they are much more likely to get done, and the labor requirement will be much less. pregnancy testing and culling open cows can greatly influence percent calf crop and herd

profits. These operations, however, cannot conveniently be carried on with year-round calving.

You can improve brood cow nutrition. Winter feeding of the brood cow is the most expensive phase of cow-calf production. If some of the cows are dry and some are nursing calves during the winter, the herd cannot be fed in the most efficient manner. Since cows nursing calves require at least 50 percent more energy than dry cows, neither group can be fed properly if they are running together.

Marketing or stocker-finisher operations are improved. A calf crop uniform in age and size can be marketed to a better advantage. Uniform groups of calves will usually bring several cents per pound more than those sold individually. If calves are uniform in age, they will also fit into on-the-farm stocker or feeding programs.

The Calving Season

Length of Season: A short breeding season (and therefore a short calving season) of 90 days or less is recommended. In addition to the reasons for a controlled breeding season already mentioned, a short breeding season is usually most profitable. Assuming a constant weaning date, early calving cows wean heavier calves than cows calving late in the season.

Table 3 illustrates the improvement in weaning weight when you shorten the calving season. When a constant weaning weight and a two-pound average daily gain are used, a 75-day calving season produces a 46-pound average increase in weaning weight over a 120-day calving season.

Superior managers should strive for a breeding season as short as 60 to 75 days. Work done at the Coastal Plain Experiment Station at Tifton demonstrates how the breeding season can be reduced. They found that when fertile, active bulls were used on healthy, well-nourished, fertile cows in single-bull breeding systems, 90 percent of the calves were born in the first 30 days of the calving season.

Table 3. Effect of Shortening Breeding Season on Average Weaning weight

No. Calving Days	Average Weaning Weight
120	450
75	496

A Split Calving Season: Some producers may prefer a split calving season. For example, producers may divide their cattle into two herds, with one herd calving in October, November, and December. The

other herd might calve in January, February, and March. This system could possibly reduce the bull cost by allowing a producer to breed more cows per bull. Bulls, however, would require better management and nutrition. A split calving season might allow some producers to use feed supplies better and to extend the marketing season. The advantages of a controlled calving season can still be realized in such a system, since both herds could be managed separately. Consider the need for extra labor and facilities for a split season.

Time of Year for Calving: In the southern states, avoid summer calves. Summer calves are born from approximately May 1 to September 1.

Calves born from September 1 through early April may perform satisfactorily in Georgia. The calving period most desirable for a specific operation within the recommended dates will be influenced by several factors.

Feed Supply. The most expensive phase of brood cow nutrition is the winter feeding of lactating brood cows. This factor favors a late winter or early spring calving for many operators. In areas where winter annual pastures are well adapted, a fall or early winter season may be desirable. Young calves gain rapidly when their dams are grazing winter annuals, and cows usually return in heat early.

Labor. The calving season requires a relatively large amount of time and labor. A cattle producer with a diversified farming operation should consider availability of labor when setting the calving season.

Marketing or use of calves. The average relative price of calves at weaning or selling time is important in deciding on the calving season. For example, if feeder calf prices are best in spring or early summer, then this would favor fall-dropped calves, providing the extra value would offset the extra cost of weaning such a calf. If calves are to be backgrounded and/or finished, then a calving season to fit this schedule is important.

Weather. Extremely cold weather will not usually be a critical factor in the state. Though north Georgia may get quite cold during mid-winter, a winter calving program can be planned for any area of the state. A summer calving program is discouraged. Summer calves will still be nursing in the fall, when pastures are generally at their poorest.

How to Start a Controlled Breeding Season

In most herds on a year-round calving season, a natural calving concentration already exists. Nutrition

is the major factor responsible for brood cows cycling and conceiving. Since pastures are usually at peak quality in spring and early summer, a natural concentration of calving may occur in late winter and spring. No system for getting on a controlled breeding program can completely eliminate delaying some cows from their current calving schedule. Taking advantage of the natural concentration in a herd can, however, minimize the problem.

When you convert from year-round calving to a 90-day controlled calving season, a three-year system presents less loss and fewer problems than a one-year system. The following steps are suggested for getting on a controlled breeding system:

- Build a good, strong bull pen or well-fenced bull pasture. You may need an electric fence in addition to a regular fence. Refer to section on fences for a bull pen plan.
- Remove the bull from the herd. Select a removal date to coincide with the latest date you want calves born on your farm.
- Assuming fertile, active bulls have been used, and that there were enough bulls with the herd, pregnancy check all cows 60 days after you remove the bulls from the herd (or at a convenient time such as at weaning). Cull: (a) all non-pregnant, dry, breeding age females that have been running with the bull; (b) all non-pregnant cows with calves five months old or older.
- Return bulls to the herd the first year so the calving season will be six months long.
- Start breeding replacement heifers 20 to 30 days ahead of the final long-range planned breeding date for your herd. Put the bull with mature cows for six months the first year.
- The second year, follow the same system outlined in steps one through five, but start breeding so the calving season will be about 4½ months long.
- The third year, follow the same system outlined in steps one through five, but start the breeding season so the calving season will be 80 to 90 days. Cull all open cows this year when pregnancy checking, regardless of the age of their calves. You can reduce the breeding season even further in following years.

Figure 7 illustrates how a short (60-day) breeding season works.

Figure 8 shows how the controlled breeding system could work. The example is developed for a final long-range January to March calving season. Dates can be changed to adapt to different desired calving dates.

Figure 7. Short Breeding Season (60 Days)

Pregnancy examine	Breed heifers	Breed mature cows	Remove bull from heifers	Remove bull
Aug. 1	Feb. 20	Mar. 22	May 1	June 1
↓	↓	↓	↓	↓
June J A	S O N D J F	M A	M	June

Figure 8. Getting on Controlled Breeding

First Year

Remove bull	Pregnancy examine	Put bull with cows	Breed replacements	Remove bull from heifers	
June 20	Aug. 20	Dec. 22	Feb. 20	May 1	
↓	↓	↓	↓	↓	
June J	A S O	N D J	F M	A M	June

Second Year

Remove bull	Pregnancy examine	Put bull with cows	Breed replacements	Remove bull from heifers	
June 20	Aug. 20	Feb. 1	Feb. 20	May 1	
↓	↓	↓	↓	↓	
June J	A S O N D J F	M	A	M	June

Third Year

Remove bull	Pregnancy examine	Breed heifers	Breed mature cows	Remove bull from heifers
June 20	Aug. 20	Feb. 20	Mar. 22	May 1
↓	↓	↓	↓	↓
June J	A S O N D J F	M A	M	June

Improving Percent Calf Crop

Percent calf crop weaned is the single most important production factor influencing profit in a brood cow operation.

Percent calf crop is defined as the number of calves weaned relative to the number of cows exposed to the bulls. To achieve a high percent calf crop, cows must not only produce a calf, but must produce one every 12 months. Table 4 demonstrates the importance of percent calf crop weaned and time of birth of the calf in the calving season. It assumes the average Georgia calf weighs 400 pounds at 220 days of age. If the average of all the calves in the herd weighed 400 pounds, but only 90 percent of the cows exposed to the bulls weaned a calf, the average pounds of calf weaned per cow is only 360 pounds.

In a herd of cows weaning calves at 220 days of age, each 10 percent change in calf crop weaned results in a 40 pound change in pounds of calf weaned. In addition to this 40-pound decrease, there is a 1½-pound decrease in weight for each day of age the calf is younger than the average of the herd. This amounts to a 31½-pound decrease per heat cycle (21 days) during which the brood cow fails to conceive. Reproductive losses occur at various times in a brood cow's production cycle. Table 5 shows that most of the average total 27 percent reproductive losses occur because cows fail to become pregnant.

Table 4. Pounds of Calf Weaned per Cow Exposed to the Bulls at Various Percent Calf Crops

Age of Calf (Days)	% Calf Crop Weaned			
	100 %	90 %	80 %	70 %
220	400	360	320	280
200	370	333	296	259
180	340	306	272	238
160	310	279	248	217
140	280	252	224	196

Table 5. Time of Reproductive Losses*

1. Cows fail to become pregnant	17%
2. Cows lost during pregnancy (abortions)	3%
3. Calves lost at or after birth	7%
Total Reproductive Losses	27%
Calves Weaned	73%

* Based on Wiltbanks' studies at Texas A&M University.

Many factors influence the percent calf crop.

Nutrition

Failure to conceive accounts for more reproductive losses than abortions or death loss, and this area should be emphasized. Table 6 demonstrates that many non-pregnant cows may be showing heat but still fail to conceive.

In this study, of the 17 percent non-pregnant cows shown in Table 5, nearly four times as many were cycling as were not. Poor nutrition is the major cause of cows failing to show heat. It also causes slow return to heat after calving and non-fertile heat cycles. Cows should gain weight in order to correct this problem.

Table 6. Why Cows Failed to Become Pregnant During Breeding Season*

1. Cows fail to show heat	21%
2. Cows cycled but failed to conceive	79%

* Based on Wiltbanks' studies at Texas A&M University.

The gestation period for most beef cows is between 275 and 290 days. Therefore, the cow is pregnant most of the year. If she is to calve every 12 months, she only has 75 to 90 days after calving until she must be pregnant again. The long gestation period coupled with the long interval from calving to first heat (Table 7) makes it difficult to have a calving interval shorter than 12 months.

Seventy days after calving, only 82 percent of the mature cows and 62 percent of the young cows were in heat. Cows calving late just do not have a chance to start a second cycle in a controlled 90-day breeding season. Table 7 shows that young cows are slower to show heat after calving than mature cows. Since good nutrition is so important in bringing about an early heat cycle, separate young cows from mature cows and give them extra feed.

Table 7. Percent Cows in Heat at Various Times after Calving

Days After Calving	Age of Cow	
	Young	Mature
40	15%	30%
50	24%	53%
60	47%	72%
70	62%	82%
80	68%	89%
90	79%	94%
100	89%	100%

Cows need to be in good, strong condition prior to calving, but not fat. After calving, they need to gain ½ to ¾ pound daily throughout the breeding season.

As Table 8 shows, 95 percent of the cows on a high nutrition level after calving became pregnant during the breeding season. Only 77 percent became pregnant on the low nutrition level. Feed cows according to the standards set on page 18. Remember, first calf heifers need top nutrition if they are to rebreed promptly.

Table 8. Effect - Level of Nutrition on Pregnancy Rate

Level of Nutrition		Pregnancy Rate %
Before Calving	After Calving	
High	Low	77
Low	High	95

Pregnancy Exam

Pregnancy in cows can be determined as early as 45 days after breeding through a rectal palpation.

A veterinarian trained in this skill can be very accurate in determining pregnancy in cows 45 to 60 days after breeding. Pregnancy checking and culling the non-pregnant cows is a cost-saving practice since it prevents the necessity of wintering open cows. Cull non-pregnant cows if they have had a fair opportunity to become pregnant during a normal breeding season. Pregnancy checking, culling open cows, and following good management improve percent calf crop dramatically (Table 9).

Table 9. Effect of 9-Year Pregnancy Exam Study

Percent Pregnant	
1954	1963
55	94

Koger, University of Florida

Bull Selection and Management

You usually use bull selection to make genetic improvement in a herd, but more importantly, the bull must be highly effective in breeding and “settling” cows. Although bulls may be able to breed cows at a very early age, do not use them extensively in a pasture breeding program before they are two years old. Studies at the Coastal Plain Experiment Station at Tifton found two-year-old bulls as effective as three-year-old bulls in breeding efficiency. The following are recommendations for securing, evaluating and managing bulls for a high percent calf crop:

- Secure bulls as far ahead of the breeding season as possible to allow them to become accustomed to their surroundings. Do not select wild-dispositioned bulls that are difficult to handle.
- Use bulls at least two years old in a pasture-mating program. You may use them on a limited (20 to 25 cows) basis, or with a “hand mating” system as young as 15 to 18 months if they are well grown out. A bull’s weight will vary, depending on his feeding program, breed, and other factors, but a two-year-old bull should probably weigh at least 1300 pounds.
- Have your bull checked by a veterinarian for any communicable diseases such as Tuberculosis, Brucellosis, and Vibriosis.
- A veterinarian needs to perform a breeding soundness evaluation on bulls before the start of the breeding season. This examination includes a semen check, examination of testicles for size, shape, and

firmness, and examination of the entire male reproductive system. The bull should also be checked for general physical soundness.

- Have enough bulls on hand. A normal bull-cow ratio is one bull for 40 to 50 cows. Studies show this number may vary widely with individual bulls.
- Bulls should be in strong, thrifty condition for breeding season. Watch their condition and feed supplemental feed if needed to prevent them from becoming too thin. Eight to 10 pounds of a concentrate feed is usually sufficient if they are on good pasture.
- Use single bull breeding units when possible. If multiple sire units are necessary, avoid putting young bulls with old, mature bulls. A platoon, rotation system where bulls are used two to three weeks and then rested while other bulls are turned in has been successful.
- Check cows during breeding season to see if they are “settling.” Record some cow numbers as they breed and then check them 18 to 21 days later to be sure they are bred.
- After the end of the breeding season, confine bulls of similar ages together. Provide feed or a pasture program so they will recover flesh lost during breeding season and so young bulls will continue to grow. Good quality pasture is usually sufficient. If pasture is poor, free choice hay, one pound protein supplement, and eight to 10 pounds grain will provide for the needs of most bulls. Refer to the section on nutrition for specific recommendations.
- The average useful life of a bull is five to six years, though some may be active breeders up to eight to 10 years. Check all bulls for physical soundness at the end of the breeding season.

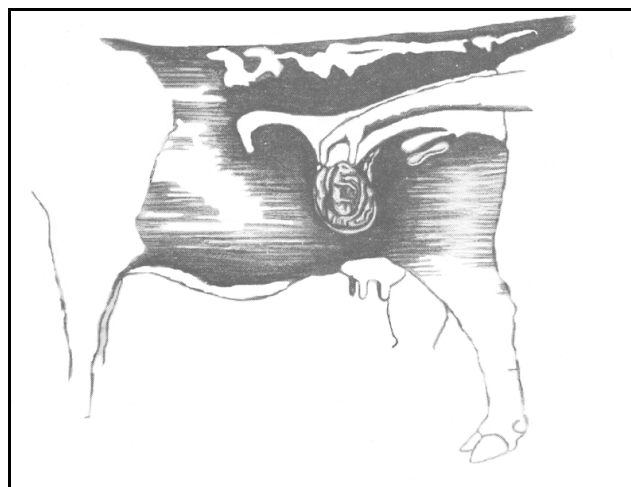


Figure 9. Cow Being Palpated

- Select bulls with moderate birth weights. Bulls with a birth weight of over 90 pounds can be expected to produce calving problems in many cases.

Care at Calving

Nearly 40 percent of the reproductive losses in beef cattle occur at or shortly after birth. Close observation and proper care at this time can prevent much of this loss. The following suggestions can reduce loss:

- Get the herd on a controlled breeding program to reduce the time required for pasture checking.
- Check cows frequently during calving season. Ideally, cows should be checked three to four times daily. Cows close to calving normally try to schedule themselves from the rest of the herd. As calving time approaches, a cow's udder fills, the vulva becomes swollen, and she becomes nervous.
- Separate pregnant heifers from other cows. First-calf heifers are about three times as likely to have calving problems as older cows. If your time for checking pastures is limited, concentrate your efforts on this group. If heifers are properly grown out (See "Developing Replacement Heifers.") and bred to a bull known to sire low birth weight calves, calving problems with heifers can be minimized.
- Assist cows only if necessary. Ideally, cows should calve unassisted. There are times, however, when help is needed. A cow should calve less than three hours after serious labor starts. After the water sac breaks, the front feet should appear with the head resting on the knees. Cows with abnormal birth presentations or those in prolonged labor may need assistance. A competent herd manager can handle most problems, but call a veterinarian if severe problems develop.
- Be sure the calf nurses. A calf should stand and nurse within 30 to 45 minutes. A cow normally licks the calf dry. If the calf is weak or weather is severe, assist by rubbing the calf with a cloth or burlap bag. Be sure the calf can breathe and remove mucus from its nostrils if necessary. Artificial respiration is sometimes needed to get newborn calves to breathe.
- Prevent early calthood losses. Once a calf nurses, the main risk period is past. Accidental losses and predators account for some calf deaths and these need to be prevented. Scours are probably the main cause of early calthood death. Scours may be viral, bacterial, or milk-caused. If a special recurring problem exists, get veterinarian help. Calving on clean sod helps prevent some scours.

Identification

Reasons for Identification

Identification is considered an essential practice in any well-managed beef operation. There are two purposes for identifying cows: (1) to establish ownership, and (2) individual identification for keeping performance records.

Ownership identification is a hide (hot or freeze) brand. Get directions for securing an official ownership brand in Georgia by writing to Marks and Brands Division, State Department of Agriculture, Atlanta, GA 30334. Branding cattle to establish ownership is recommended since it may help prevent cattle theft or other problems.

Individual identification is of utmost importance in operating a profitable cattle program. A cattle numbering system should provide several types of information. First, the numbering method should identify the individual. With an individual number, you can keep performance, health, or other records on a cow. When this individual number is put on a calf, you can also record in a book the date of birth, calf sex, dam and sire numbers, and any other pertinent data. This is the first step in a performance testing program and, when carried out, increases the profitability in a herd. Second, a numbering system should also show, at a glance, the breeding or type of crossbreed of a cow. Use this information to plan a crossbreeding or grading up program. Perhaps the third major bit of information you might want to be able to read directly from a brand number is the year of birth of an animal. All of the above information could be recorded in a book from a single individual number. In larger herds, however, where ranch workers may be moving or working cattle, a system that tells all this information from a glance at the animal may be preferred.

Many ways of working out a system to provide the above information exists. Here is one method used successfully by producers. A calf numbered 19 could mean that it was individual number one and was the first calf born in 1989. Number 159 would be the 15th calf born in 1989, and so on. If you wanted more information, including the crossbreeding information, you could number as follows: 1059. The number one could mean an F₁ (first cross), 05 could be calf number five, and the nine means year 1989. If you change the first number to two (2059), it would mean a second cross (F₂); or if the first number was three, it would mean an F₃. Such information is valuable on a crossbreeding program since you might want to breed all F₁ cows to bulls of breed A, all F₂s to breed B, and

all F₃s to breed C. This system is good up to 99 cows. If you wanted to go to 100 or more, the branding system could look like this:

1
105
9

This could mean an F₁, individual 105, and year of birth 1989. You could put the crossbreeding number on one side of the cow and the rest of the information on the other side. Such a numbering system implies the use of a permanent identification system.

Methods of Identification

There are several commonly used methods for individual identification.

Tattoo: An ear tattoo is required to register most purebred animals. Tattoos are permanent and relatively simple to apply. You must, however, catch and restrain the animal in order to identify it. You can achieve good tattoos if the following steps are followed:

- Clean all wax and dirt from the area of the ear to be tattooed.
- Disinfect tattoo outfit before starting and after each animal tattooed. Set tattoo pliers to desired numerals. Check by tattooing a piece of cardboard before tattooing the ear.
- Firmly clamp the ear with the tattoo pliers.
- Rub the tattoo punctures full of ink until the bleeding stops.
- Do not puncture the ribs on the inside of the ear.

Eartags: Flexible plastic eartags have become popular in recent years. You can buy them prenumbered, or you can number them yourself. Different colored tags can be used to designate sire, herd, or other information. Although eartags are suitable for identifying calves, they are generally not suitable for a lifetime identification of cows or bulls because some of them will be lost.

Fire Branding: Fire branding the hide with hot irons is one of the oldest and most permanent techniques of establishing legal title to cattle. The technique can also be used for individual identification if numerals or letters are used. Fire branding is permanent and provides a mark easily recognized at fairly great distances. Disadvantages do exist: (1) it takes a certain degree of experience to make legible brands, (2) brands require clipping in the winter to keep them legible, (3) the damage to the skin is objectionable to the tanning industry, and (4) some people consider the technique inhumane.

A few clues to good firebrands are as follows:

- Use a properly heated iron. A properly heated iron looks silvery-grey in the daylight. A commercially built branding iron heater fired with L.P. gas is the most satisfactory method of heating irons.
- Restrain the animal with a good squeeze chute.
- Irons must be properly constructed. A face width of approximately ¼ to ½ inch is preferred, and circles or corners should be vented to prevent excessive scarring.
- Brand only dry cattle. Branding wet cattle causes scalding and excessive scarring.
- Brand when flies are not a problem. Use insecticide on the brand if you must brand during fly time.
- To minimize hide damage, brand on upper hip or lower rear leg, not the side.
- Brands should be four to five inches high. Hot iron handles should be 2½ to 3 feet long.

To brand properly, follow certain techniques:

- Restrain the animal.
- Heat the iron as previously described.
- Select the site to be branded. Shoulder, neck, and thigh marks have all been used, but the hip or lower leg are preferred for identification numbers. Health authorities use the jaw as a site for identifying diseased animals.
- Clip heavy hair coats on the site to be branded. (This is necessary only when hair coats are extremely heavy or dirty.)
- Hold the hot iron (firmly) on the hide until the branded area is a rich tan color or looks like new leather.
- Brands will probably need to be clipped annually to be legible. For more details on hot iron branding, refer to *Georgia Cow-Calf Handbook*, SR-3000, "Beef: Individual Identification of Cattle."

Freeze Branding: Freeze branding cattle with super-chilled irons has been used to some extent in recent years. Some people consider it more humane. It is slow, however, costs more than fire brands, and results have been erratic. It also does not work well on light-colored cattle. You need the following materials for freeze branding:

- Chute or restraining device
- Hair clippers, brush, and squirt bottle
- Branding "irons"
- Insulated container for coolant
- Alcohol (95% ethyl, methyl, or isopropyl) or acetone
- Dry ice or liquid nitrogen

Essentials of successful freeze-branding are properly cooled irons, uniform pressure, and correct timing. Key steps to follow:

- Cool “irons” in alcohol and dry ice or in liquid nitrogen.
- Restrain the animal.
- Clip an area on the fleshy part of the rump or side.
- Clean by brushing and wet thoroughly with alcohol from a squirt bottle or sponge.
- Firmly hold the iron for the necessary time.

Timing	Calves	Mature Cattle
Alcohol and dry ice	40 seconds	60 seconds
Liquid nitrogen	10-15 seconds	20-30 seconds

For more details on freeze branding, refer to *Georgia Cow-Calf Handbook*, SR-3000, “Beef: Individual Identification of Cattle.”

Managing the Nursing Calves

Once the calf is born and has nursed, the high risk phase in the life of the calf is over. However, there are some management practices that will increase calf weight and add to marketability.

Identify

The first thing to do to a new calf is to identify it with a tattoo and tag as outlined in the preceding section. Give the calf a number and record in a book the calf’s dam, sex, birth date and other desired information.

Castrate

In commercial herds, castrate bull calves when they are identified. There is practically no shock or bleeding if castration is done at this time, and calves are easier to handle. The best method of castration is with a clean sharp knife.

Grasp the end of the scrotum, pull it tight, and cut off the lower third of the scrotum. After exposure of the testicle, a steady pull on the testicle breaks the spermatic cord inside the body cavity and very little bleeding occurs. Be sure hands are clean, and avoid “fishing” for testicles as this may introduce infection. Use a fly repellent if flies are a problem. If you do not castrate calves at birth, castrate them long enough before weaning so they will be completely healed by that time.

Dehorn

Calves without horns are marketed more easily. There are several methods of dehorning:

- Caustic paste may be applied to the horn button

when the calf is one day to two weeks old. Cut the hair from around the horn button before applying the paste. Do not apply when it is raining because the caustic may get into the calf’s eyes.

- Hot irons, heated with fire or electricity, may be used after the horn button appears and up to the time the calf is about four months old. Apply the iron long enough to kill all horn cells around the horn.
- Dehorning spoons or tubes work well on very small horns. They work by cutting around the horn and scooping it out.
- Barnes type dehorner are satisfactory on calves up to or slightly past weaning. This dehorner comes in two sizes. Since most bleeding occurs with older animals, bleeding can be stopped by cauterizing with a hot iron or pulling the arteries with forceps. See SR-3004, “Castration and Dehorning,” *Georgia Cow-Calf Handbook*, for more information.

Implant

Using a growth implant increases weaning weight by about 10 percent. Currently, there are several implants on the market. All of them have been used with great results, however be sure that they are used only according to the label instructions. Various implants vary as to their use on heifers, suckling calves, etc. Do not use any product on bulls (or bull calves) intended for breeding purposes. Maximum benefit from implanting is obtained when good management is maintained. In addition, maximum response is obtained when the calves are reimplanted according to the product label. Be sure to observe withdrawal times for the product of your choice. Keep current on the approval status of implants. Refer to SR-3010 “Growth Implants for Beef Cattle,” *Georgia Cow-Calf Handbook*, for more information.

Creep Feeding

Refer to the section on creep feeding in the nutrition section of this bulletin. Creep grazing may be a desirable practice at times. It is accomplished by providing a small opening in a fence large enough to allow calves to graze high quality pastures while restricting the cows.

Weaning Management

Weaning is a very important and critical time in a brood cow operation. Calves are normally weaned when they are seven to nine months old. Feed supply, calving season, cows’ condition, market conditions and, perhaps, other factors can influence the exact age of weaning. Late summer or early fall is the weaning

time for most Georgia herds. Pasture conditions are usually poorest at this time and the brood cow needs a rest and time to gain some weight before calving again. The herd should be on a controlled breeding season to match feed and labor considerations and so all calves can be weaned at the same time.

Weigh and evaluate all calves at weaning for performance records. Follow a vaccination and/or preconditioning program as outlined in “Herd Health” or as suggested by your veterinarian. Place calves to be kept for replacements or for stockering on a lush pasture and feed two to three pounds of grain per day for two to three weeks. They may be confined and fed good hay, three to four pounds grain, and one pound protein as another alternative.

Herd Improvement

Progress depends on improvement in both management and breeding. A good record keeping system is essential for selection of superior breeding stock and for making management decisions. Before you can keep adequate records all cows and calves must be individually identified. Establishing a controlled breeding system is also helpful in making record keeping simple.

To do a good job culling cows you will need to know their ages, which ones calved, when they calved and how those calves performed. To select a replacement heifer you need to know ages, sires, dams and how each calf performed compared to other calves in the same group. To establish a good crossbreeding program it is important to know the breed composition of each animal.

To start a record keeping program, record the birth date, sex, dam ID and sire ID of each calf when it is born. Tagging, evaluating and implanting at birth are good management practices and they will fit very well with your record keeping system. Keep up with any differences in management between groups and weigh all calves at weaning. This will provide most of the basic performance data required for maintaining a good performance testing program.

Commercial producers should ask their county extension agent about the Cow Herd Appraisal Performance System (CHAPS). CHAPS is a computer record system that produces calf reports to aid in the selection of replacements. Calf records are adjusted for age of calf and age of dam. These reports can be sorted in a number of ways to make selections easier. CHAPS also provides summaries on cows to aid in

culling decisions. Summaries of total herd performance are produced to help make management decisions.

Purebred breeders should enroll in their breed association performance program. Records sent to breed associations are used in calculating Expected Progeny Differences (EPDs). A purebred breeder may want to keep additional records, but the breed association record program must be part of the total record system for the breeder to have complete performance data.

Producers with small herds who do not have access to scales can still keep basic records. *The Beef Cattle Record Book* (Bulletin 721) is available through your county Extension Office. Calving dates and selling weights can be recorded in this pocket size book. Even basic information like this is helpful in evaluating the cow herd.

Record keeping systems are available for any size or type of operation. Advanced computer systems like CHAPS and Beef association programs provide the most information. Regardless of size of operation, performance records form the basis for genetic improvement.

Replacement Heifers

Continued progress in a brood cow herd depends to a large extent on home-grown replacement heifers. Always use performance records to select replacement heifers. Keep several factors in mind: (1) select the heaviest heifers on the basis of their adjusted 205-day weaning weights and/or their ratios, (2) select heifers from cows with a history of calving every 12 months, and (3) select those heifers that are born early in the calving season. Heifers born in the early part of the calving period tend to calve early themselves as brood cows. Therefore, if you adhere to a 60 to 90-day breeding season, you must select females that were calved early to increase the strength of early calving with your own herd. An excellent approach to replacement heifer selection is to save as many heifers as possible every year after the obvious “tail-enders” and culls have been sold. Because of infertility, age, and health problems, it is usually necessary to keep over 30 percent of the heifers each year. If herd improvement is to occur, keep as many heifers as you can manage. Continue to develop this large number of replacement heifers in a normal fashion. Breed them to calve as two-year-olds, and to calve one month before the mature cow herd begins to calve. Replacement heifers should be placed with the bulls for a period of 60 days. If this is done, then selections can

be made first on weight and secondly on pregnancy within the 60-day breeding period. Keep the pregnant heifers and allow them to have at least one calf. Automatically cull the open heifers.

The next culling of the heifers should be based on the performance of their first calf, and upon their rebreeding for the second calf. Repeatability of calf weaning weight for the same cow is approximately 80 percent. This means the cow that raises the heaviest calf in her first production cycle has an 80 percent chance of being at the top of the herd in weaning the rest of her life. Likewise, the cows with very low first-calf weaning weights would be expected to remain in the low group.

Bull Selection and Use

The bull has correctly been described as “half the herd,” since the bull supplies half the genes of each calf. Therefore, you must select superior bulls.

Bulls with the genetic capability of improving herds with high performance records are not always available. Serious cow-calf operators should always purchase bulls from reputable breeders who have their herds on a performance testing program. The herd should be enrolled in the BCIA, Performance Registry International (PRI), or the performance program of the given breed association. Additionally, it is desirable, but not imperative, to select bulls that have been tested for postweaning gain and growth at a central testing station or an on-the-farm testing program.

Use performance records in the selection of herd sire prospects. It is not enough that a bull is performance tested: his performance relative to his contemporaries is the important point. Always buy and select bulls based on their EPD values for your desired needs or goals.

Performance Program

Differences observed between any two individuals are basically due to genetic makeup and environment. Only the genetic fraction of the differences observed is transmitted to the bull’s (or cow’s) offspring. The environmental fraction is temporary and will change from year to year and season to season.

A good herd performance program attempts to remove as many environmental differences as possible from the records of the animals being studied for selection. Proper records adjust for age of the calf at weaning, age of dam, sex of calf, *etc.* These are environmental differences. The fraction of the observed differences due to genetics and transmitted to the next generation is defined as “heritability.”

Table 10 lists heritability estimates of some economically important beef cattle traits. These estimates indicate that selection should be reasonably effective in changing most performance traits.

When you select herd bulls and replacement heifers, you are simply determining which individuals will be the parents of the succeeding generations. Select bulls based on their superiority in the herd in which they were raised. On performance records, this superiority is identified by the actual and adjusted weights and by ratios. A ratio value is simply the animal's own record divided by the average record of all his contemporaries. A bull with an adjusted 205-day weaning weight of 600 pounds from a group of bulls with an average weight of 500 pounds would have a ratio value of 120. He, therefore, was 20 percent heavier at weaning than the average of all of the bulls with which he was tested. The higher the ratio values for weights, the more superior the individual. A guide to bull selection might take the following steps:

- Decide on the breed of bull(s) needed in your program.
- Locate reputable breeders within the selected breed who are utilizing performance records.
- Be sure the herd is managed in a practical manner and the bulls are properly developed.
- Use performance records and visual appraisal in selecting your bull. Visually, the bull must meet your standards or requirements for conformation and, more importantly, for frame size or scale and muscle. Always attempt to purchase visually acceptable bulls with weaning and yearling weight EPDs in excess of breed average. The higher the EPD, the more superior the individual and consequently, the greater the dollar value of the bull.
- Select bulls from cows superior in production and with a history of calving every 12 months. Also, bulls from cows that calve early in the calving season will sire female calves that do the same.
- Review recommendations in bull selection under the section on improving percent calf crop.

Expected annual progress through selection is based on the formula:

$$\text{Annual Progress} = \frac{\text{Heritability} \times \text{Selection Differential}}{\text{Generation Interval}}$$

When heritability of weaning weight is 30 percent, and the selection differential is 83 pounds (selected individuals, males and females, are 83 pounds heavier than the average of all the animals they were selected

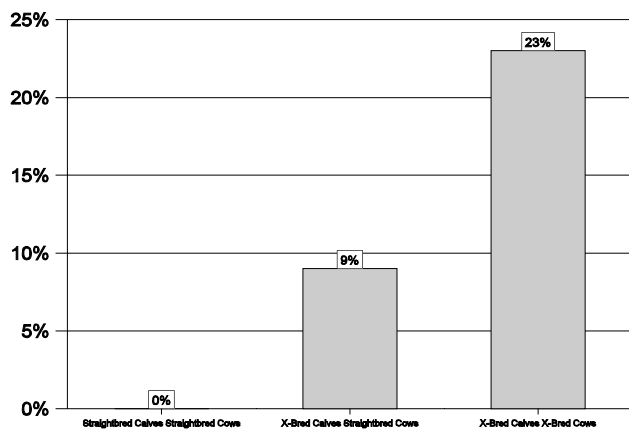


Figure 10. Cumulative Effects of Heterosis for Lbs. of Calf Weaned per Cow Exposed

from), and the generation interval (average age at which the animals become parents) is five years, the annual improvement is five pounds.

Table 10. Heritability Estimates

Trait	Heritability (%)
Calving interval (fertility)	10
Birth weight	40
Weaning weight	30
Cow maternal ability	40
Feedlot gain	45
Pasture gain	30
Efficiency of gain	40
Final feedlot weight	60
Confirmation Score:	
Weaning	25
Slaughter	40
Carcass Traits:	
Carcass grade	40
Ribeye area	70
Tenderness	60
Fat thickness	45
Retail product. . .percent	30
Retail product. . .pounds	65
Susceptibility to Cancer Eye	30

Genetic improvement is slow, but it is permanent and should be viewed as a capital investment; environment is temporary and might be considered an expense. Strong reliance upon performance information in bull selection yields maximum progress and contributes to success in the cow-calf operation.

Crossbreeding

The serious commercial producer must consider crossbreeding. Crossbreeding is responsible for hybrid vigor and is the quickest and most economical method for increasing total beef production.

Crossbreeding is a *planned, systematic* approach to breeding superior individuals of different breeds (or crosses) and is not just a mixing of different breeds and kinds.

Extensive crossbreeding studies have been conducted. While amounts of advantage will vary from test to test, it is generally accepted that crossbred calves, when compared with straightbreds, have certain advantages:

- They are more vigorous at birth, resulting in a higher survival rate at birth and a higher weaning percentage (3%).
- They wean heavier (6%).
- Combined advantages in survival and growth rate give crossbred calves a nine-percent advantage in weight of calf weaned per cow exposed to the bull.

Crossbred brood cows have additional advantages:

- Age at puberty (first heat or sexual maturity) for crossbreeds is 30 to 40 days younger.
- Crossbred females wean a higher percentage calf crop (8%) than straight-bred females.
- They wean heavier calves (10-15%).
- Combined advantages in percent calf crop and growth rate result in approximately 23 percent total production increase when compared with straight-bred cattle.
- Crossbred females live longer.

The cumulative effects of heterosis (hybrid vigor) for pounds of calf weaned per cow exposed are shown in Figure 10. Even higher levels of hybrid vigor are reported from experiments involving Brahman-British breeds crosses in Texas, Louisiana, and Florida.

Using Table 4 for average weaning weights, the introduction of three-breed rotational crossbred calves with their 23 percent growth advantage would yield the following weights (Table 11). The 90 percent calf crop figure from Table 4 is used as the control or comparison group.

Table 11. Crossbreeding Advantage in Weaning Weight

Age of Calf (Days)	Straightbreds 90%	X-Bred Calf Straightbred Cow +9%	X-Bred Calf X-Bred Cow +23%
220	360	392	443
200	333	363	410
180	306	334	376

At 220 days of age, the three-breed rotational crossbreeding program results in an estimated extra 83 pounds per calf. This is a decided economic advantage for crossbreeding.

Crossbreeding systems exist for any size herd. A simple system for herds of at least 50 head is a criss-cross, or two-breed rotation. As shown in Figure 11, Herd A, which consists of straight bred cows, is mated to a bull of a different breed. The breed of bull is selected to complement the breed of cows. The resulting F_1 (first cross) heifers are saved to make up herd B. Herd B cows are then mated back to a bull of the same breed as the original herd A cows. The second cross (F_2) heifers are put in herd A. This sequence can be continued indefinitely.

This system can be used by small producers, is simple, produces female replacements for the herd, and utilizes crossbred dams. Only 67 percent of potential hybrid vigor is achieved, however, and, with natural service, two breeding pastures are required.

For larger herds (150 head or more), a three-breed rotational crossbreeding program works well. Three breeds of bulls are required (as shown in Figure 12), and these breeding groups must be maintained. In this program, the current cow herd (Herd A) is bred to a

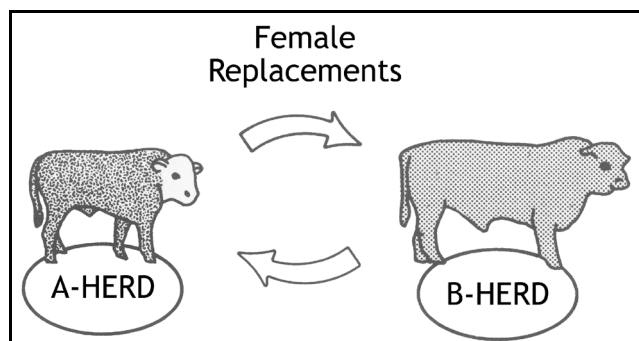


Figure 11. Crisscross or Two-Breed Rotation

different breed of bull. The resulting F_1 females make up herd B and are bred to a second breed bull. F_2 (second cross) females make up herd C, and are bred to the third breed bull (of the same breed as the original cows). The rotation is then continued in the same sequence.

The advantages of the three-breed rotation systems are (1) it maintains an 86-percent degree of hybrid vigor, (2) female replacements are produced in the herds, and (3) crossbred dams are utilized.

Disadvantages include the need for large numbers of cows and cow herds, three or more breeding pastures, and greater management skills.

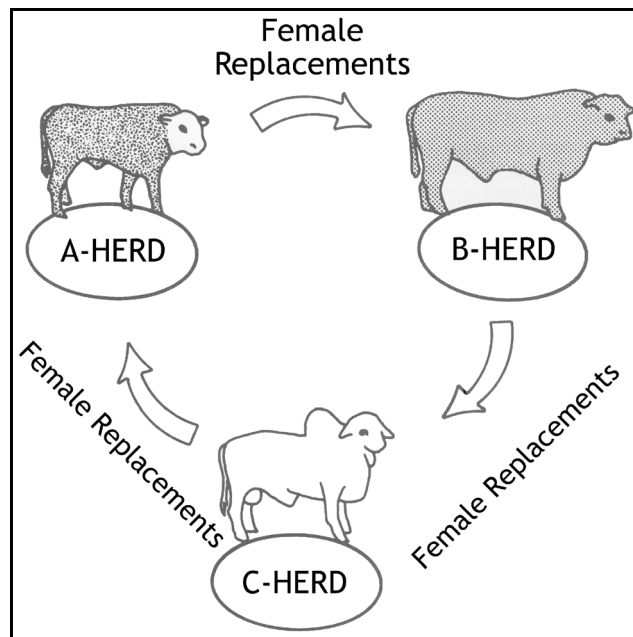


Figure 12. Rotational Crossbreeding System

Other crossbreeding systems are available. Refer to *A Practical Approach to Crossbreeding*, Animal Science Miscellaneous publication No. 35, February, 1978, and SR1007, "Crossbreeding of Beef Cattle," *Georgia Cow-Calf Handbook*, and "Breeding Programs for Small Herds," Georgia Extension Publication, Bulletin 957, for details and other systems.

Artificial Insemination

Artificial insemination (AI) is the procedure of collecting semen from the male of a species and transferring it to the female reproductive tract so conception can take place.

There are several reasons for use of AI in beef cattle:

- AI allows greater use of genetically superior bulls. Bulls proven superior can be used in both purebred and commercial herds to improve the genetic base.
- Bulls can be evaluated sooner by being mated to a random group of cows in several locations. In one generation, data may become available that normally would take the lifetime of the bull to collect. Birth weight, weaning weight, and carcass data are a few of the measurements available in a short period of time. In recent years, in-herd testing and sire evaluation programs have been developed by breed associations through the use of AI.
- Through AI, many bulls normally restricted to one herd are available to many cattlemen. Breed organizations publish performance information on AI

- bulls, allowing use of the superior bulls of the breed.
- Risk of disease can be reduced. Breeding organizations do not process semen from diseased bulls, and antibiotics are added to semen to combat disease.
- Crossbreeding programs can be developed by using AI bulls of different breeds.
- The cost of using a genetically superior bull through AI may be less than owning the same bull. If a valuable bull dies or is injured, the germ plasm is still available since semen can be collected and stored frozen.

The use of AI is not a substitute for good management. Management must be intensified and a positive attitude on the part of the producer is essential. The producer must be convinced of the benefits of AI. Farm and ranch personnel must find the females in heat, put them in a corral for breeding, and inseminate them. Decreased efficiency of these three factors can result in a lower percent calf crop and a longer calving season. Top management methods must be used.

Estrus Synchronization and AI

The use of prostaglandins (such as Lutalyse) to synchronize or group estrus in normally cycling beef heifers and cows can help eliminate a major problem with AI. Prostaglandins regulate the reproductive cycle by causing regression of the corpus luteum, allowing the onset of estrus or heat.

By using prostaglandins, you can reduce the amount of time and labor involved in AI. Considerable cost and labor are still involved, even with the use of prostaglandins. Consult your veterinarian or Extension specialist for more information if you are interested in estrus synchronization.

Basic Economic Considerations

Genetics: Before you decide to use AI, determine if there is additional profit to be made. The decision to use AI should be based on facts, not blue ribbons, high priced bulls, or promotion. Determine whether the extra time and effort of using AI will be repaid at market time.

Study performance data when selecting bulls for use in the AI program. Basic considerations include:

- Birth weight. Since birth weight can influence calving difficulty, do not use AI bulls that sire extremely heavy calves. Birth weight is even more important when breeding virgin heifers.
- Weaning weight and yearling weight.
- Maternal traits.

- Quality factors. These include structural soundness, uniformity of offspring, and correct color patterns (in purebred herds).
- Carcass characteristics.

Records are available from several sources, including AI companies, breed associations, and individual breeders. Study the records carefully before making a decision.

Initiating the Program: The cost of initiating an AI program must be considered. For many cattle producers, it means a complete change in management. Construction of new facilities may be necessary to properly handle cattle. In addition, cost of equipment for insemination and training of personnel must be considered. The producer considering an AI program must look at the long term advantages to see if they outweigh the immediate cost.

Labor Requirements: Initiation of an AI program requires additional labor input. If you do not have adequate labor to do a good job, then do not consider an AI program.

Herd Health and Parasite Control

A healthy disease-free herd is essential if other good management practices are to be successful. The following cattle herd health outline is suggested by Extension Veterinarians, The University of Georgia.

Many factors contribute to a successful herd health program: (1) a controlled breeding program, (2) selection of resistant replacement breeding stock, (3) adequate balanced nutrition, (4) proper facility design, (5) proper waste disposal, (6) a high level of sanitation, (7) complete records, and most importantly, (8) a high level of good management commitment to reducing stresses which predispose animals to disease. You can get information on these and other points through the local county extension agent and subject matter specialists of the Cooperative Extension Service.

The local professionals most qualified to assist the producer in developing a herd health program are veterinarians. Their basic knowledge and training in disease control, as well as knowledge of specific diseases common in the area, make them the best source of reliable information on beef herd health.

The following outline for a cattle herd health program is offered as a check list of procedures including vaccinations, internal and external parasite control, and the care of the newborn calf. Modify these to specific management situations. Carry out

herd health procedures during other times you handle animals, if possible. This will reduce stresses on the animals and reduce labor costs. A record of vaccinations, dewormings, treatments, *etc.*, is very valuable in evaluating a program in times of a problem. A suggested record form is included.

The number in parenthesis (0) after a suggested procedure refers to an explanatory comment found at the end of the checklist.

I. Brood cows, bulls and heifers replacements:

A. Vaccinations: (1)

1. Leptospirosis (2)
2. Vibriosis (3)
3. BVD (4)
4. IBR-PI₃
5. Anaplasmosis (5)
6. Others (6)

B. Internal parasite control:

1. Deworm twice yearly. (7)

Effective products are numerous and come in many forms. Choose the product and method of administration that best suit the operation and/or type of parasites present.

C. External parasite control:

1. Fly, lice and tick control methods include these devices containing insecticide: (8)

Back rubbers	Sprays & foggers
Butt bags	Dusts
Face rubbers	Eartags
Pour-ons	

II. The newborn calf:

A. Identification

1. Eartag
2. Tattoo

B. Antibiotic and Vitamin injections (9)

C. Antiseptic to naval cord-Iodine or appropriate bactericidal agent. (10)

D. Intestinal tract inoculation-optional (11)

E. Castrate/dehorn (12)

III. The nursing calf:

A. Vaccinations:

1. Blackleg-Malignant Edema Complex (13)
2. Bangs disease - 2-6 months of age
3. Mixed bacterins - optional
4. IBR-PI₃ - optional (6)

B. Internal parasite control:

1. Coccidiosis-Strongyloides complex (14)

C. External parasite control. (8)

IV. Weaned calves and stockers:

A. Vaccination (6, 13)

B. Implants (15)

C. Deworming (7)

1. Vaccinations are designed to produce resistance in an animal. Killed or dead products (bacterins or vaccines) require at least two injections to produce a high level of protective antibodies. The spacing of these injections may vary, some intervals being as short as ten (10) days. The interval should be the one on the label or product information leaflet provided. After the initial series has been completed, you may have to give periodic booster vaccinations to maintain a continuing effective level of protection. Consider booster vaccinations a necessity in all instances where a killed or inactivated product (bacterin or vaccine) is used.
2. Leptospirosis is caused by several species of the family *Leptospira*. The use of three- and five-way bacterins is a common practice to “shotgun” protect animals against the most pathogenic species. In the face of an outbreak, two injections, two to three weeks apart, are required to protect the non infected animals. Follow up with a booster vaccination each six months.
3. Vibriosis is a venereal disease of cattle spread by either natural breeding or artificial insemination using semen from infected bulls. Vaccination is strongly recommended in herds where males or females of unknown history are frequently introduced, or where custom processed, green or frozen semen is used for artificial insemination. A yearly booster vaccination is recommended.
4. BVD vaccination is frequently associated with abortions when the product is used in herds containing pregnant animals. Reserve use of this product for herds where the disease has been positively identified. Veterinary consultation is desired when this agent is to be used.
5. Vaccinate all herd bulls for anaplasmosis. The vaccination of brood cows depends upon the amount of risk of exposure compared to the possibility of side effect from the blood origin vaccine. Recent modification in the recommended vaccination schedule has minimized the probability of side effects.
6. Diseases are often localized in occurrence and do not fit into a general herd health program. In this instance, the local veterinarian is the best and only source of professional input into a herd health program. Some of the diseases in this category are

- blue tongue, warts, pasteurellosis, salmonellosis, BRSV, and colibacillosis, as well as the IBR-PI₃ complex in baby calves.
7. Deworming generally removes the adult parasites from the intestinal tract, and can effect developing larvae. Twice-a-year deworming (spring and fall) reduces parasite eggs on pasture thus reducing the exposure of the young and most susceptible animals. Occasional checks of representative numbers of fecal specimens is strongly suggested to monitor program effectiveness. The veterinarian is the source of this service.
 8. Success of external parasite control depends on the choice of proper insecticides and the continued and proper charging of the applicators. The county Extension agent is the source of this information. Know the active ingredients of the insecticides. **Trade names change.**
 9. **ANTIBIOTICS, PENICILLIN, ETC.**, should be used only when needed. Consult your veterinarian for specific problems. The use of penicillin/ streptomycin or tylan at birth is an acceptable practice to prevent infection by organisms susceptible to the drugs. The use of injectable vitamins A and D has been found beneficial in baby calves. Vitamin E and selenium are indicated in herds where white muscle disease has been diagnosed. Get an accurate diagnosis before using these products.
 10. An antiseptic applied to the naval cord is important in preventing “navel ill” in the newborn. The practice is a **must** when calving is done in a holding lot or barn. Clean pastures create fewer problems.
 11. The inoculation of the newborn intestinal tract with a lactobacillus is a growing concept to prevent an overgrowth of *E. coli* and the classical scours of baby calves.
 12. Dehorning and castration are easily accomplished in the baby calf. A skilled herd manager can do this alone at the same time eartagging and/or tattooing is done. Disinfectant/antiseptic practices are important at this time, also.
 13. Immunize all calves against the prevailing clostridial organisms in the area. The use of the three-way or five-way bacterin depends upon the knowledge and experience of the local veterinarian. Give booster at weaning.
 14. Persistent scours in nursing age calves suggests internal parasitism. Fecal exams of a representative number of affected calves and their dams should be done by your local veterinarian.
 15. Implants are not a health procedure except when improperly used. Do not use them in animals except according to the respective product’s label.

Animal Identification _____

Date born _____

Sex _____

VACCINATION DATES

	Blackleg/Malignant Edima Complex	Brucellosis (Bangs)	IBR/P13	BVD	Leptospirosis Complex	Vibriosis	Anaplasmosis 1 st injection - 30 days later 2 nd injection
1.							
2.							
3.							
4.							
5.							
6.							
7.							
8.							
9.							
10.							

Deworming Treatment Dates Spring/Fall	Growth Promotants Implanted with _____ (on product schedule)	Grub/Lice Treatments Products/Treatment Dates Summer/Fall
1.	Treatment Date No. 1 _____ + _____ Days	
2.	Treatment Date No. 2 _____ + _____ Days	
3.	Treatment Date No. 3 _____ + _____ Days	
4.	Treatment Date No. 4 _____ + _____ Days	
5.	Treatment Date No. 5 _____ + _____ Days	
6.	Treatment Date No. 6 _____ + _____ Days	
7.		
8.	FEED ADDITIVE _____	
9.		
10.	DATE STARTED _____	

Fly Control Applications Treatment Dates Spring/Summer	Antibiotic Injection/Vit. A, D, E (When needed) Treatment Dates	Date Dehorned
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		

Fly Control Applications Treatment Dates Spring/Summer	Antibiotic Injection/Vit. A, D, E (When needed) Treatment Dates	Date Castrated
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		

Fly Control Applications Treatment Dates Spring/Summer	Antibiotic Injection/Vit. A, D, E (When needed) Treatment Dates	Know Cattle Weights Before Any Herd Health Treatments!!
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		

PREGNANCY CHECKS - DATES/COMMENTS	OTHER HERD HEALTH ITEMS
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Figure 13. A Suggested Herd Health and Production Record

Marketing

The major objective in a cow-calf program is to produce a superior product as efficiently as possible and to sell it for the highest price available at that time. We have discussed factors associated with efficient production. To make the greatest profit, however, cattle producers must not only produce superior product, they must market it to the best advantage.

Marketing is much easier if a producer has at least a truckload (45,000-50,000 pounds) of calves to sell at one time. If they are uniform in size, age, sex, and quality, it is much easier to get the top dollar.

Most producers probably pay greater attention to production than to marketing. However, factors such as bull selection, controlled breeding, culling, castrating, vaccinating, and dehorning all contribute to effective marketing. No one marketing system is best for all producers, but where possible, all cattlemen should use a system which utilizes the advantages found in uniformity and quantity. There are three major types of marketing programs for feeder calf producers: private treaty, auction, and continued ownership (vertical integration).

Since feeder calf prices are reported on the basis of USDA Feeder Calf Grade Standards, producers should understand these grades.

Feeder Calf Grades

The grade of feeder cattle is determined by evaluating three characteristics — frame size, thickness, and thriftiness. Frame size is divided into three groupings: large framed, medium framed, and small framed. There are three separate groups for thickness: No. 1, No. 2, and No. 3. All unthrifty cattle are graded U.S. Inferior. Unthrifty cattle are not expected to perform normally in their present state because of disease, parasites, or severe emaciation.

Large Frame

Feeder cattle with typical minimum qualifications for this grade are thrifty, have large frames, and are tall and long bodied for their age. Steers and heifers would not be expected to produce U.S. Choice carcasses (about 0.50 inch fat at twelfth rib) until their live weights exceed 1200 pounds and 1000 pounds, respectively.

Medium Frame

Feeder cattle with typical minimum qualifications for this grade are thrifty, have slightly large frames, and are slightly tall and slightly long bodied for their age. Steers and heifers would be expected to produce

U.S. Choice carcasses at live weights of 1000 to 1200 pounds and 850 to 1000 pounds, respectively.

Small Frame

Feeder cattle included in this grade are thrifty, have small frames, and are shorter bodied and not as tall as specified as the minimum for the Medium Frame grade. Steers and heifers would be expected to produce U.S. Choice carcasses at live weights of less than 1000 pounds and 850 pounds, respectively.

No. 1, No. 2, No. 3

Feeder cattle with minimum qualifications for No. 1 grade usually show a high proportion of beef breeding. They must be thrifty and slightly thick throughout. They are slightly thick and full in the forearm and gaskin, showing a rounded appearance through the back and loin with moderate width between the legs, both front and rear. Cattle show this thickness with a slightly thin covering of fat; however, cattle eligible for this grade may carry varying degrees of fat.

Feeder cattle with minimum qualifications for No. 2 grade are thrifty and are narrow through the fore-quarters and the middle part of the rounds. The fore-

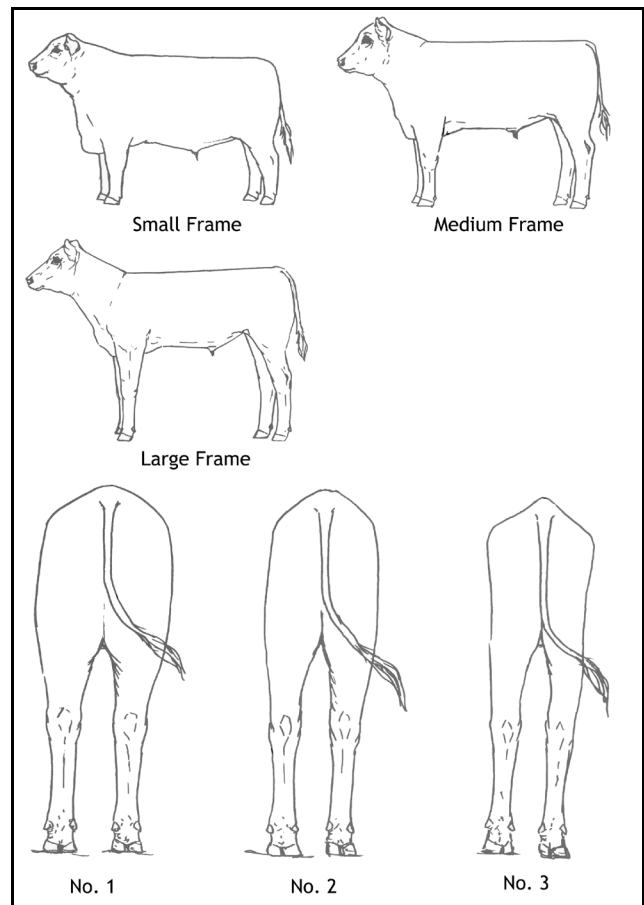


Figure 14. Feeder Calf Grades

arm and gaskin are thin, and the back and loin have a sunken appearance. The legs are set close together, both front and rear. Cattle show this narrowness with a slightly thin covering of fat; however, cattle eligible for this grade may carry varying degrees of fat.

Feeder cattle included in No. 3 grade are thrifty animals with less thickness than the minimum requirements specified for the No. 2 grade.

Marketing Programs

Georgia feeder calves are in good demand, but it is up to the individual cattle producer working with livestock market organizations, cattlemen's associations, and others to promote these calves and to develop markets that will pay a premium price for a superior product.

Private Treaty

Direct Sale. Direct sale of feeder calves from the producer to backgrounders or feedlots is a very desirable marketing system. It is best suited to producers who can provide at least a truckload at one time. A producer should be well-informed of cattle quality and prevailing prices when this system is used.

Order Buyers. Order buyers account for an increasing number of feeder calf purchases each year. Like direct sales, they are best suited to rather large calf producers. Several order buyers should be contacted before a sale is made.

Forward Contracting. Forward contracting may be involved in direct sales or in sales to order buyers. This system can eliminate risk and insure a certain income. When prices are rising, however, it may not bring top dollar. Hedging on the commodity exchange or selling by video can be used as a method of forward contracting in order to insure a certain price.

Terminal Market. The terminal market system suits both small and large producers. There are no well-organized terminal markets in Georgia. They are mentioned here to bring attention to this alternative in case a terminal market is organized.

Auctions

Weekly Sales. The weekly livestock market auctions found in most communities within the state probably account for the sale of more calves than the other systems. The better weekly livestock markets, when properly used, can be a very satisfactory system. This is particularly true for small producers. However, as used by many producers, the weekly auction sale may fail to produce the best results. Enough buyers must be present to produce the desired competitive bidding.

Special Feeder Calf Sales. Co-mingled feeder calf sales sponsored by livestock market auctions, cattlemen's associations, or others are a very satisfactory method of marketing feeder calves. They require organization and good management in order to work properly.

Board or Video Sales. In the board or video sale, which is suitable to larger producers, the calves are advertised and shown to prospective buyers while they are still on the farm. Several producers are usually involved when this sale is held. This is a very satisfactory system of marketing for large producers or for co-mingled calves.

Tele-auction Sales. Tele-auction sales are similar to the board sales, but when the calves are sold, the prospective buyers may be present in person or may be connected on a conference telephone system. This system has produced some of the top prices for Georgia producers in the last few years.

Retained Ownership

Preconditioning. Some producers wean their calves, teach them to eat grain, and give them their necessary treatments in preparation for selling. This program involves extra expense and time for the producer, but may produce dividends if confidence is established between the seller and buyer. Consult your county agent for information on Georgia's Certified Preconditioned Calf Program.

Backgrounding or Stockering. Many Georgia producers retain ownership through a backgrounding program which adds 200 to 300 pounds to calves on a forage or silage program. The calves are then marketed around six months later at 650 to 900 pounds. This has proven to be a satisfactory program for many. (See Extension Bulletin 753, *Forage Systems for Backgrounding and Finishing Cattle in Georgia.*)

Finishing on the Farm. There is growing interest in the state in finishing more calves on the farm. A short drylot phase (60-90 days), following a superior backgrounding program, can make cattle finishing a more attractive alternative for many producers.

Custom Feeding. Some producers retain ownership of their calves after weaning, or they background and assign them to a custom feedlot for final feeding and marketing. This is not being used on a large scale in Georgia, but it may have some advantages for producers who wish to finish their superior calves, but do not have the time, facilities, or expertise to do it themselves.

Cost-Return Analysis

The importance of top management is shown when budgeting costs and estimating returns in a cow-calf operation. The following budget was prepared by

Extension Economists-Farm Management. Use it as a guide only; costs and prices constantly change. The blanks in the column on the right (Table 12) are for producers' estimates for their individual farms.

Table 12. Beef Cow-Calf Estimated Cost and Returns

<i>100 cows and 3 bulls on 150 acres of pasture 90% of calf crop (70 calves sold and 20 kept for replacements)</i>				
<i>Item</i>	<i>Quantity</i>	<i>Price</i>	<i>Value</i>	<i>Your Farm</i>
Cash Costs				
Coastal bermuda pasture	75 A	\$96.00	\$ 7,200	_____
Other permanent pasture	75 A	63.00	4,725	_____
Hay harvesting /1	125 T	25.00	3,125	_____
Protein supplement	150 cwt	12.00	1,800	_____
Salt & mineral	—	—	250	_____
Veterinary & medicine	—	—	700	_____
Repairs & maintenance	—	—	250	_____
Tractor & pickup operation	—	—	600	_____
Labor	700 hr	4.00	2,800	_____
Miscellaneous expense	—	—	200	_____
Interest on operating cap (8 mo.) \$21,650	—	13%	1,876	_____
Marketing cost	90 hd	10.00	900	_____
Total Cash Costs			\$24,426	
Fixed Costs			8,046	_____
Management Charge (5% of cash cost)			1,200	_____
Land Charge	150 A	18.00	2,700	_____
Total All Costs			\$36,372	
Breakeven Prices per CWT of Calf Sold				
<i>(Sell 70 calves, average weaning weight of 475 pounds)</i>				
<i>Item</i>	<i>Total Amount</i>	<i>Price per CWT</i>	<i>Your Farm</i>	
Total Cash Costs	\$24,426			
Less: Value of Cull Cows	8,550			
Net Cash Costs	15,876	\$47.75		_____
Fixed Costs	8,046	24.20		_____
Management Charge	1,200	3.61		_____
Land Charge	2,700	8.12		_____
Total	\$27,822	\$83.68		
Returns for 100-Cow Enterprise at Various Selling Prices				
<i>Price of calves (\$/cwt)</i>	<i>\$70</i>	<i>\$80</i>	<i>\$90</i>	
Receipts:				
70 calves at 475 lb (332.5 cwt)	\$23,275	\$26,600	\$29,925	
18 cull cows at 950 lb (171 cwt)	8,550	8,550	8,550	
Gross Receipts	31,825	35,150	38,475	
Less: Cash Costs	24,426	24,426	24,426	
Return Cash Costs	7,399	10,724	14,049	
Less: Fixes Costs	8,046	8,046	8,046	
Returns to Land & Management	-647	2,678	6,003	

/1 Custom rate for harvesting surplus hay in 1,200-lb round bales (includes mowing, raking and baling at \$15 per bale or \$25 per ton.)

Table 13. Beef Cow-Calf

Item	New	Average	Years of Life	Annual Fixed Cost			
				Depr.	Interest	Taxes & Ins.	Total
100 Brood Cows at 450*	\$45,000	\$40,000	—	—	\$4,800	\$560	\$5,360
17 Replacement Heifers at \$400*	6,800	6,800	—	—	816	95	911
3 bulls at \$1,200*	3,600	2,400	4	600	288	34	922
Corral & Loading Chute	600	300	10	60	36	4	100
Feed racks	500	250	10	50	30	4	84
Miscellaneous Equipment	500	250	5	100	30	4	134
Fencing (150 A)	4,000	2,000	15	267	240	28	535
TOTALS	\$61,000			\$1,077	\$6,240	\$729	\$8,046

* The \$450 price is used because it represents an average expected price for brood cows over the entire beef cattle cycle. Use current prices in estimating your investment and fixed costs.

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Gale A. Buchanan, Dean and Director