

Health Maintenance

In this chapter

- *Preventing Diseases*
- *Internal and External Parasites*
- *Controlling Parasites*
- *Beef Cattle Diseases*
- *Vaccinations and Injections*

Preventing Diseases

The health of any beef cattle herd should be based on prevention of disease and parasite problems. There are several ways to prevent or control health problems.

1. Keep your animal's surroundings clean. Livestock perform better in clean areas, and clean surroundings help keep livestock from picking up organisms that cause disease. Always keep the calving area as clean as possible.
2. Separate new animals on the farm from the rest of the herd for 30 to 60 days. Also separate animals you have taken to a show from the animals left at the farm because show animals have been in contact with other animals and could have contracted a disease organism. Ask your veterinarian to help you determine which diseases should be tested for in animals you purchase.
3. Include vaccinations in your health program. Some diseases for which veterinarians recommend vaccinating include clostridial diseases (such as blackleg), brucellosis, infectious bovine rhinotracheitis (IBR), bovine virus diarrhea (BVD), parainfluenza (PI-3), and leptospirosis.
4. Feed a proper ration. Some health problems are caused by a lack of certain nutrients or the proper amounts in the ration.
5. Disease organisms can be carried on the clothes and shoes of people, and the feet, hair and manure from birds and other animals. Try to keep visitors and other animals out of the lot and pasture area.

6. Use clean tools and equipment (including needles, syringes, dehorning and castrating tools, etc.).
7. Check with your veterinarian about planning a herd health program for your herd. Refer to the Animal Health section in the Caring for Animals Chapter of this book.

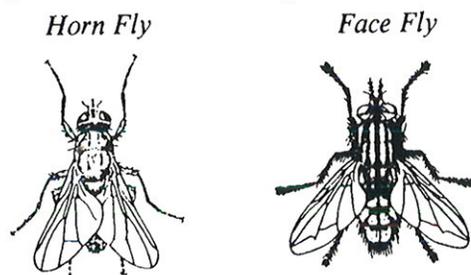
Internal and External Parasites

Parasites are organisms that live off another animal. There are two types of parasites: those living inside the body (internal) and those living outside the body (external). For example, internal parasites include stomach worms and lung worms, while external parasites include flies, lice, and grubs. Parasites may cause reduced weight gain, poor appetite, diarrhea, and other health problems.

- **Worms** — Worm eggs are passed in the manure of cattle and picked up when cattle graze. Calves should usually be dewormed at weaning time. Mature cows are generally resistant to worms. You may need to deworm heifers and young cows, especially if they graze in the same pasture area the entire season.

- **Flies** — There are two types of flies that are major pests to cattle: the horn fly and the face fly. Horn flies are about 1/8-inch long and are biting flies. They appear in spring and continue through autumn. Horn flies feed primarily on the back and down the withers and belly. Face flies do not bite and are the same size as house flies. They cluster around the head and face, and they irritate the eyes. Face flies may also spread the infection called pinkeye. (Figure 5.01)

Flies (pictures are not to scale)



(Figure 5.01)

- **Lice** — There are two types of lice: biting and sucking. Lice cause cattle to rub and lose their hair, and sucking lice feed on the blood from cattle. Lice are a bigger problem during cold weather. Signs that cattle have lice include rubbing, patches of bare skin, and anemia in very severe cases. (Figure 5.02)

Lice (biting lice)



(Figure 5.02)

- **Grubs** — Heel flies (warble flies) lay their eggs on cattle while cattle graze in the spring and summer. Larvae hatch from the eggs, burrow through the skin, and travel through the body for about eight months. They chew through the skin on the animal's back and drop to the ground in the spring. About five weeks later, the adult fly emerges from the larva that was dropped on the ground. Grubs can cause significant economic loss as a result of reduced weight gain, damage to the carcass (loss due to excessive trim of meat), and lower hide values (due to holes in the hide). (Figure 5.03)

Controlling Parasites

Internal and external parasites can be controlled. For internal parasites use injectables, oral larvicides and feed additives. For external parasites use ear tags or ear tape, dust bags, back rubbers, sprays or dips, pour-ons, oral larvicides, injectables, or diet supplements. The details of these treatments are listed below.

To treat beef cattle for internal parasites, select one of the following:

- **Injectables** — Tend to be higher in cost and require more labor, but provide good control of some worms.
- **Oral larvicides** (Drench, Paste, Bolus) — Can provide good control if properly used.
- **Pour On** — Require less labor but may be more costly.
- **Feed additives and medicated feedblocks** — Require less labor, but the amount each animal receives is not exact.

The following treatments control external parasites:

- **Ear tags and ear tape** — For control of face flies and help in the control of horn flies. This treatment lasts from two to five months and requires minimum labor, but it is expensive. There is minimal stress to cattle. Tags or tapes should be removed when recommended by the manufacturer to prevent a resistance to the insecticide in future years.

Grubs

Cattle Grub



Adult Heel Fly



(Figure 5.03)





Beef Cattle Diseases

- **Dust bags** — For control of horn, face, horse, and deer flies. Dust bags require checking and refilling every two weeks. Minimum labor is required, and treatment is inexpensive with minimal stress on cattle. Dust bags must be placed in an area though which cattle must walk.
- **Back rubbers** — For control of horn and face flies. Back rubbers require checking every one to two weeks. Refill with liquid insecticide when needed. Minimum labor is required with minimum stress on cattle. Place them in areas though which cattle must walk.
- **Sprays or dips** — For control of horn, face, stable, horse, and deer flies, grubs, and lice. Effectiveness of sprays may last three weeks, unless washed away by rain. High labor requirement is necessary.
- **Pour-ons** — Some newer pour-on insecticides control both internal and external parasites.
- **Oral larvicides** — For control of horn, face, house and stable flies by killing the larvae in the manure. They should be available to cattle throughout the fly season. They require minimal labor and have minimal stress on cattle. Oral larvicides do not provide control of adult flies and do not work if neighbors do not use fly control.
- **Injectables** — For control of grubs and sucking lice only.



- **Blackleg** — Blackleg usually occurs in young cattle between six months and two years of age. Blackleg causes a high temperature and gas formation under the skin (a crackling sound can be heard if you rub your hand over the legs and shoulders). Animals become lame and die quickly. When the hide is opened, the inside of the carcass is dark. Once the bacteria are on the farm, they will live in the soil for many years. Vaccination is the only known protection. Calves should be vaccinated at 2-4 months and a booster shot given 3-6 weeks later
- **Bloat** — Bloat is caused by a build up of gas inside the rumen. Sometimes, gas builds up too quickly in the rumen and cannot be released fast enough. When this happens, cattle bloat. The left side of the body swells.

The Prevention of Bloat

Bloat happens more often when cattle are grazing fast-growing legume plants. Examples of legume plants in the pasture are clover and alfalfa. To prevent bloat, select a pasture with a mix of legume plants and grasses such as orchard grass. Feeding cattle some hay before turning them out to new pasture will keep them from eating a lot of pasture at once. Another way to prevent bloat is to place bloat blocks out in the lot or pasture for cattle to lick. They look like salt blocks and contain poloxalene. Some blocks even have ingredients in them that help cattle improve their performance, such as monensin and lasalocid.

The Treatment of Bloat

The following are four ways that are helpful in the treatment of bloat

1. Place a stick or rope across the mouth so that the animal will chew on it. This will help the animal to get rid of the gas.
2. Walk the animal.
3. Run a smooth hose down the throat to relieve gas.
4. Call your veterinarian.

• **BVD** — Bovine virus diarrhea (BVD) is a contagious virus that causes diarrhea, abortions, weak calves, high temperature, discharge from the nose, and problems in the intestine.

• **Brucellosis** — This is also called Bang's disease and is caused by bacteria. Brucellosis can cause abortions, retained placentas, and the premature birth of calves. It can be spread to humans (called undulant fever). There is no treatment for brucellosis. Prevention begins by a veterinarian's vaccinating young heifers before breeding. Test new breeding stock before bringing them into the herd.

• **Calf Scours** (diarrhea) — Calf scours occur when the calf's resistance is low because of stress, allowing bacteria or viruses to start an infection. Examples of stress in calves include: chilling from wind, being wet, big changes in the outside temperature, overfeeding, and not feeding enough. With calf scours, calves become dehydrated (they lose fluids from the body).

Vaccination of pregnant cows before they calve may help prevent scours. The cow will pass this protection to her calf in her colostrum milk.

• **Coccidiosis** — Coccidia are bacteria that may cause scours (diarrhea) in older calves. These scours may contain blood. Infected animals release the Coccidia through their manure. These Coccidia form spores, which are ingested by susceptible calves. The Coccidia then infect and destroy the cells lining the calf's intestine, which causes bleeding and scours. The best prevention is a clean feeding area and dry bedding.

• **Foot Rot** — Foot Rot causes swelling and lameness. The skin between the toes and around the foot turns red, and the foot will have a foul odor. A good treatment is a copper sulfate footbath. It should be put where the cattle will walk through it a few times a day. Antibiotics are also used to treat foot rot. For prevention, keep cattle in a dry, clean area.

• **Grass Tetany** — Grass tetany occurs when there is a low level of magnesium in the bloodstream of the cow, usually when cattle are turned out onto fresh pasture and are nursing a calf. Symptoms are muscle twitching, a staggering walk, and finally death. Often, the first time a problem is noticed is when a cow is found dead. To prevent the disease, cattle should have magnesium oxide included in their mineral supplement or mixed in the feed concentrate.

- **Hardware Disease** — This term means a cow has swallowed metal while eating and it is caught inside the stomach. A nail, wire, or any other object will settle to the bottom of the stomach (in the reticulum). It may then pierce the wall, causing damage to the abdominal cavity, lungs or heart. Old fences and nails from old roof replacements are common sources of hardware. Prevent this problem by keeping metal objects picked up around the farm and around the feeding area. You may insert a magnetic bolus, using a balling gun, to collect metal in the reticulum compartment of the stomach.

- **I.B.R** — Infectious bovine rhinotracheitis (I.B.R) is a contagious virus that causes respiratory infections, encephalitis, abortions, and infection in the reproductive tract. Vaccination can control I.B.R.

- **Leptospirosis** — Leptospirosis is a disease from bacteria that can cause abortion, weak calves, other reproductive problems, and sometimes death. Male and female cattle of any age can be infected.

- **PI-3** — Parainfluenza (PI-3) is a virus that causes respiratory problems, especially when cattle are under stress.

- **Pinkeye** — Pinkeye is a bacterial infection usually seen when cattle are on pasture during the summer. It is spread by face flies that gather around the eye. The first sign of pinkeye is that the eye starts to water. The eyelids begin to close and may become cloudy. In severe cases, cattle go blind. They can be successfully treated if diagnosed early enough.

- **Ringworm** — Ringworm is a fungus that gets into the skin and develops a rough skin condition where the hair drops out in patches. To treat, scrub off the scalp, skin and paint the area with seven-percent iodine, or use a fungicide on the skin. Ringworm is worst in the winter and spring months and usually disappears in the summer. You can get ringworm on your skin by handling infected cattle; wear gloves when handling infected cattle.

- **Shipping Fever** — Shipping fever is caused by a combination of viruses, bacteria, and stress. Younger cattle usually experience stress when hauled long distances, during weaning, and in severe weather. These stress factors, plus bacteria and viruses, can cause shipping fever. Signs of this disease are difficult breathing, runny eyes, coughing, reduced appetite, drooping ears, and discharge from the nose. Vaccinating two weeks before the cattle are put under stress (for example, before they are marketed) will help prevention. Contact your veterinarian for help.

- **Warts** — Warts are caused by an infectious virus. Serious cases are unsightly and painful, but do not cause death. Vaccines are available for prevention. Treatment usually requires surgical removal. As a calf gets older, warts will usually disappear on their own.



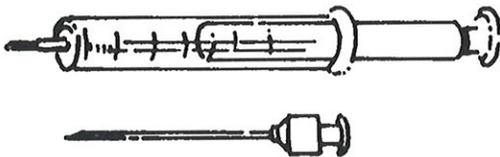
Vaccinations and Injections

Vaccinating is an important part of disease prevention. Vaccines are usually made from the organism that causes the disease. By putting them in the body in a certain way, they help to produce **immunity** against the disease.

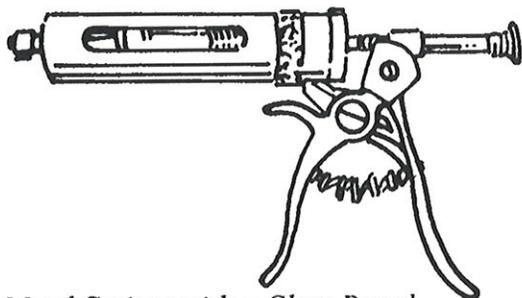
Learning How to Vaccinate

First, find an experienced adult who can help teach you the proper method. Next, you need a way to hold the cattle in place. A head gate or a chute works well. Then you will need a glass or plastic syringe, some needles (usually 16 or 18 gauge, 1 1/4 inches), and the vaccine. A metal syringe with a glass barrel works well. It does not easily break and is better for someone without much experience in vaccinating. (Figure 5.04)

Syringe and Needle



Syringes



Metal Syringe with a Glass Barrel

(Figure 5.04)

Clean the syringe with detergent and water and boil it for 10 minutes after each use. This will remove all old vaccine, dirt, blood, and any other organisms that might be caught inside.

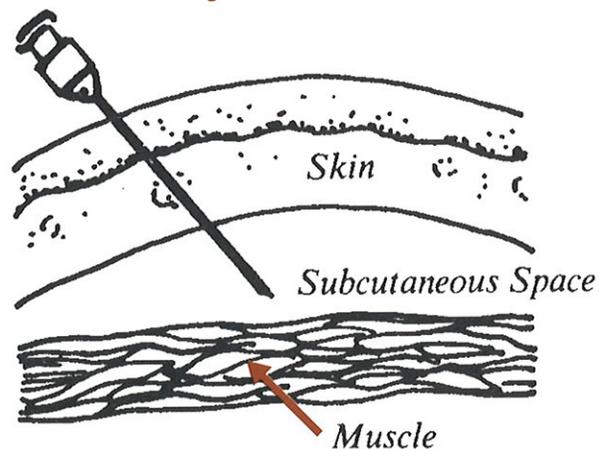
Place the needle on the syringe. Draw air into the syringe (about the same amount as the amount of the vaccine that you will use). Then, hold the bottle upside-down, and insert the needle into the bottle. Push the air into the bottle, and draw the vaccine into the syringe by pulling back the plunger.

Read the label to see if the vaccine should be put under the skin (subcutaneous) or in the muscle (intramuscular).

Subcutaneous Injection

Pick up the fold of skin on the neck or shoulder between your fingers (to make a tent) and insert the needle into the space just beneath the skin. After the needle has gone through (3/4 to 1 inch), push the syringe plunger until it is empty. Keep a firm hold on the syringe when giving a shot because the animal may jump, jerk, and try to get away. After the syringe is emptied, take the needle out of the skin. (Figure 5.05)

Subcutaneous Injection



(Figure 5.05)

Intramuscular (IM) Injection

Use a longer needle, about 1.5 inches for an IM shot. This injection is usually given on either side of the neck just ahead of the shoulder. For more information refer to the *Caring for Animals* chapter.

Some vaccines cause swelling that will usually go away. Sometimes, a bacterium will get into the injection site (due to dirty skin and needles) and an abscess will form. If this causes problems, contact your veterinarian.

Keep good records of health problems and treatments used.

If you follow preventive medicine techniques, you should be able to avoid most of these diseases. Prevention is much easier and less expensive than treatment.



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Nutrition and Feeding

In this chapter

- Ruminant Anatomy
- Nutrition and Feeding
- Formulating Rations
- Feed Label Information
- Feeding Replacement Heifers
- Feeding the Beef Cow
- Feeding from Weaning to Finish

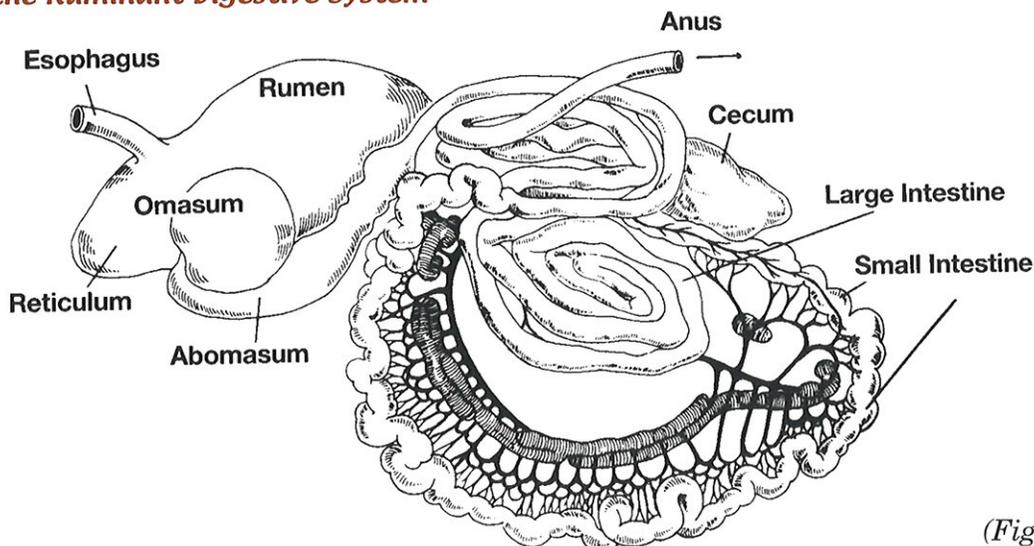
Ruminant Anatomy

Cattle are called ruminants because they have a four-compartment or ruminant stomach. The four parts are the **rumen**, **reticulum**, **omasum**, and **abomasum**

(Figure 7.01). Sheep, goats, and deer are examples of other ruminant animals. Due to the action of ruminal bacteria ruminants can:

- produce vitamins B and K in the rumen;
- digest low-quality feeds that other animals can not;
- digest large amounts of grass and hay;
- use many types of feeds.

Parts of the Ruminant Digestive System



(Figure 7.01)

The rumen is a big fermentation vat that allows cattle to digest cellulose. Cellulose is found in plants. Microorganisms, such as bacteria, found inside the *rumen*, digest the roughage feed and process nutrients the animal will absorb. The *reticulum* is a part of the rumen and works to help digest feeds. It is also called the *honeycomb* because it looks like a honeycomb made by bees. The *omasum* is also called *manyplies* because it has many folds and helps digest the feed and squeeze water from the feed. The *abomasum*, also called the *true stomach*, is the fourth compartment and is similar to the human stomach. Digestive juices are produced in the abomasum. It helps pass the feed to the small intestine and then into the large intestine. If you are standing behind a cow, the rumen and reticulum would be on the left side and the omasum and abomasum would be on the right side.

When a calf is born, it has a small rumen and uses the abomasum to digest the milk it drinks. The rumen develops so that the calf can digest roughage. Most of the rumen is developed by the time the calf is 3-months-old. Because cattle are ruminants, they digest feeds that humans can not.



Nutrition and Feeding

The Essential Nutrients

All feeds are made up of nutrients. Just like people, cattle must have certain nutrients in their daily feed to remain healthy and continue to grow. The essential nutrients for beef cattle are:

- **Water**
- **Energy**
- **Protein**
- **Minerals**
- **Vitamins**

Water

Water is an extremely important part of an animal's diet. It is found in every cell in the body. It helps keep the body cool and carries other nutrients throughout the body. Water also helps the body form waste material.

Be sure cattle have plenty of fresh water every day. Limitations on water intake depress animal performance more quickly and more drastically than any other nutrient deficiency. Domesticated animals can live about sixty days without food but only seven days without water. Hearing and sight are impaired without water.

Cattle will drink up to 20 gallons or more of water in one day, depending on their weight and the environmental temperature. For example, a calf that drinks three gallons a day in the winter, will drink nine gallons a day in the summer.

Water should be at a comfortable temperature. Drinkable water is usually between 40°F and 65°F. Steers that have access to cool drinking water will gain between 0.3 to 0.4 pounds more per day than those drinking warm water.

Therefore, you may want to occasionally check water temperature. Dip a thermometer into the water. Do not allow the thermometer to rest on the bottom. Touching the heated bottom of the pan can result in higher temperatures. Check the temperature over several cold days. Water temperatures of at least 40°F should minimize mechanical water system problems and maintain animal performance.

Energy

Energy is used for growing and also for producing a calf. Carbohydrates and fats give beef cattle most of the energy they need. Examples of carbohydrates that you eat are bread and potatoes. Grains cattle eat which are high in energy include corn, barley, wheat, and oats. Other feeds, like hay, are intermediate in energy while corn stalks are low in energy.

There are several different ways to measure energy levels. The two most common methods are Total Digestible Nutrients (TDN) and the Net Energy (NE) systems. The Net Energy system is becoming more common. While you may still use the older TDN system, some labs are now only reporting feed energy in Net Energy values.

Protein

Beef cattle use protein to build muscles, hair, hooves, and tissues inside their bodies. Protein works with carbohydrates so the animal will grow properly. Proteins are made up of small building blocks called “amino acids.” We eat meat and eggs, which are high in protein. Soybean oil meal and alfalfa hay (legumes) are examples of livestock feeds that are high in protein.

Cattle protein supplements may be composed of a natural protein source or may contain some Non-Protein Nitrogen (NPN). For example, a common natural

protein supplement is soybean meal, and a common NPN source is urea. Urea is better suited for older cattle on higher energy diets.

Note: Urea cannot be given to calves until their rumens are developed, so calves must be older than four months. Animals under 450 pounds generally gain more efficiently on natural protein sources. The amount of urea fed in the rations should not exceed one percent of the total ration or three percent of the concentrate mixture.

Minerals

Minerals are needed to build strong bones and teeth and to make blood, muscle, and nerves. Some minerals may need to be supplemented directly in the ration. Salt, calcium, and phosphorus are minerals needed in larger amounts than other minerals. (*Table 7.01*) Cattle should have a salt-mineral box to supply them with the extra minerals they do not get from their feed. This box should be accessible to cattle at all times.

Minerals needed in smaller amounts are called trace minerals. Examples of trace minerals are calcium and phosphorus. We eat cheese and drink milk to get calcium and phosphorus. For beef cattle, grass and hay can be a source of calcium, while grains are high in phosphorus. Beef is an excellent source of many trace minerals for us.

Salt

Feeds generally do not contain adequate amounts of salt, the main source of sodium. Sodium can be supplemented as sodium chloride or sodium bicarbonate, and both forms are easily absorbed by the animal. Iodized salt should always be used to avoid an iodine deficiency. Cattle fed maintenance rations while confined in a drylot often consume high levels of mineral mixtures, perhaps from boredom.

Calcium and Phosphorus

A calcium to phosphorus ratio of less than 1:1 or more than 8:1 may reduce performance. The typical calcium to phosphorus ratio is 1.5 to 2.0:1 for beef cattle. However, high levels of calcium from legumes do not appear to depress gains in growing rations. Calcium supplementation will probably be needed for growing steers and heifers receiving some grain.

Phosphorus

Phosphorus is often deficient in forage diets. Around calving time, cows should have free-choice access to 10-12% phosphorus mineral. An example would be 1/2 salt and 1/2 dicalcium phosphate. At other times of the year, cows and stockers would need a mineral consisting of 25-35% dicalcium phosphate or 7-8% phosphorus.

Magnesium

A mineral that may be deficient in feed is magnesium. The result of such a deficiency is called grass tetany, grass staggers, or magnesium tetany.

Magnesium tetany results when cattle, particularly cows that are milking and grazing on lush pastures, use up their existing body supplies of magnesium without a steady replacement from their diet. Another likely group to get magnesium tetany is cows in late gestation because of the nutritional requirements of the growing fetus. However, any animal that is grazing lush, green pastures of either grass or small grain is running the risk of magnesium tetany. A high level of calcium will also tie up the availability of magnesium. Therefore, you should use dolomitic lime if magnesium is deficient in your area.

Symptoms of magnesium tetany include nervousness and irritability. Often, muscle twitching, usually in the face, eyelids, ears or flanks, will occur. Animals may bellow loudly while in the pasture or do some frenzied galloping. Later, animals will exhibit a staggering gait and fall down. After falling, they go into convulsions and eventually die. Mineral supplements containing magnesium and grain should be readily available to encourage consumption.

Free-choice Mineral Supplementation

Salt is very palatable and is considered a valuable carrier for other minerals. Mineral mixtures that contain 30-40% salt are generally consumed on a free-choice basis.

Characteristics of a mineral supplement:

1. The mixture needs to contain at least 30-40% salt for it to be consumed free-choice.
2. Mixture contains 6-8% total phosphorus. In areas where forage is consistently lower than 0.2% phosphorus, mineral supplements in the 8-12% range are preferred.
3. Calcium: phosphorus ratio not substantially over 2:1 (this recommendation applies to forage supplements only).
4. Provide about 50 percent of the trace mineral requirements for Co, Cu, I, Mn, zinc (Zn), Fe, and Se. Iron (Fe) levels may be adequate in acid soil regions. In known deficient regions, 100 percent of specific trace minerals should be provided.
5. Use high-quality mineral salts that provide high biological availability.
6. Include other products to improve palatability if needed.

Minerals for Beef Cattle

| Mineral | Function | Deficiency Signs | Ways to Provide in Diet |
|----------------------------------|---|--|--|
| Major Minerals | | | |
| Salt (NaCl) (Sodium Chloride) | Necessary for many body functions. It helps transport material across cell walls and serves as a carrier for mineral supplementation. | Eating anything containing salt, lack of appetite, poor feed efficiency, lower milk production, weight loss. | Free choice in the form of loose trace mineralized salt or mixed in grain ration. |
| Calcium (Ca) | Proper skeletal structure and muscle contraction. | “Rickets” (bones bow and joints enlarge) and milk fever in dairy cows develop. | Legume forages are excellent sources. Dolomitic limestone, dicalcium phosphate, or Biofos® are good supplements. |
| Phosphorus (P) | Reproductive functions, sound bones, and teeth. | Lack of appetite, rundown, unthrifty appearance. Rickets in young animals. Depraved appetite (eats bones, rags, dirt, wood), silent heats in females. | Grains are naturally high in phosphorus. Steam bone meal, dicalcium phosphate, and Biofos® are good supplements. |
| Magnesium (Mg) | Healthy bones and teeth, muscle relaxation, needed for normal nervous system. | Grass “Tetany” or Grass Staggers | Magnesium is found in dolomitic limestone. However, close to calving, cows need a higher amount—2 oz. of magnesium oxide per day mixed with salt or placed in a grain mixture. |
| Potassium (K) | Muscular activity, osmotic pressure of body fluid, and other functions. | Deficiencies are found in cattle on high concentrate rations, lower feed efficiency, feed consumption, growth rate, and stiffness. | Forages are high in potassium. High concentrate rations for feedlot cattle should be supplemented with potassium chloride. |
| Sulfur (S) | Essential part of the amino acids that make up protein in the body. | Occur when high urea supplements are fed. Slow growth, poor feed efficiency. | Natural protein sources provide sulfur needed in diet. |
| Minor or Trace Minerals: | | | |
| Cobalt (Co) | Needed to synthesize vitamin B ₁₂ and helps in the fermentation process in the rumen. | Look starved and have loss of appetite. Becomes a problem on poor quality roughages. | Trace mineralized salt |
| Copper (Cu) | Helps in hemoglobin formation and in enzyme systems. | Depraved appetite, stunted growth, rough hair coat, diarrhea, anemia. Soils that have very high levels of molybdenum and sulfur may tie up copper availability. | Trace mineralized salt |
| Iodine (I) | Needed by thyroid gland to produce thyroxin (controls metabolism). | Calves born with big neck, goiter, or born dead. | Trace mineralized salt |
| Iron (Fe) | Needed for hemoglobin development and for enzyme systems. | Anemia | Trace mineralized salt |
| Manganese (Mn) | Activator in enzyme systems. | Reproductive problems in cows (delayed estrus, lowered fertility, abortions, calves born with deformed legs, and weak and shorted bones). Poor growth in calves. | Trace mineralized salt |
| Molybdenum (Mo) | Works in enzyme systems. | Deficiency and toxicity problems occur. High levels of molybdenum will tie up availability of copper. | Trace mineralized salt |
| Selenium (Se) | Acts as a carrier of vitamin E. | Deficiency is known as White Muscle Disease—heart failure and paralysis in calves. Excess of selenium causes blind staggers. | Trace mineralized salt with selenium added. Injections are also available for use in calves to prevent white muscle disease. |

Table 7.01

Basic Mineral Mixes for Beef Cattle

| Mineral Mix | 1 ^a | 2 ^{ab} | 3 ^b | 4 ^c | 5 ^d | 6 ^d | 7 ^e |
|------------------------|----------------|-----------------|----------------|----------------|----------------|----------------|----------------|
| Trace Mineralized Salt | 33% | 50% | 67% | 25% | 33% | 32% | 33% |
| Dicalcium Phosphate | 67% | 50% | 33% | 25% | 33% | 28% | 33% |
| Magnesium Oxide | | | | 25% | | 40% | |
| Limestone | | | | | 33% | | 33% |
| Ground Corn | | | | 25% | | | |

^aBreeding season

^bBefore and after breeding season, growing livestock

^cGrass tetany prevention

^dGrain-based diets

^eGrazing corn stalks

Table 7.02

Vitamins

There are two categories of vitamins, water-soluble and fat-soluble. Produced in the rumen of the animal, B complex vitamins are water soluble. Fat-soluble vitamins of importance in cattle are A, D, E, and K. Cattle usually receive enough vitamin D from sunlight or from sun-cured hay. Vitamin E is usually received through feed, while vitamin K is produced in the rumen.

Vitamin A may need to be supplemented if green, leafy forages are not available.

Vitamin A can be supplemented in the diet or by an injection. One million

International Units of vitamin A palmitate injected intramuscularly (for example, when cows are palpated for pregnancy)

will meet their vitamin A needs for two to four months. In the mineral mix, add

10,000 to 50,000 International Units per 0.1 to 0.2 lbs. of mineral mix. Be very

cautious if you are mixing your own vitamin-mineral mix. Only a very small

amount of vitamin A pre-mix is needed and mistakes in mixing can lead to

toxicity situations. Vitamin A will not remain stable very long in homemade

mineral mixes (approximately 2-3 weeks). Utilize or request protected forms of vitamin A for your vitamin-mineral mix.

Note: Newborn calves should receive colostrum milk soon after birth.

Colostrum milk contains high amounts of vitamins that are necessary for a calf's health.

General Rules For Feeding Cattle

For feeding cattle, always follow the general rules listed below:

1. Provide clean, fresh water at all times.
2. Feed at the same time everyday.
3. Change feeds or increase grain slowly over a few days.
4. When feeding grain, do not grind too fine.
5. Keep feed fresh, remove old feed that is moldy or stale.
6. Do not overfeed. This will put excess fat on steers and heifers and waste money. Plus, an overweight heifer will be difficult to breed.
7. Provide salt and minerals at all times.
8. Be sure your animal has an area that is large enough for exercise.





Classifying Feed Ingredients Into Nutrient Groups

Energy (Carbohydrates and Fats)¹

Whole Grain Barley
Whole Grain Oats
Wheat
Wheat Middlings*
Corn
Milo
Beet Pulp
Hay and Hay Cubes*
Molasses
Whole Grain Rye
Whole Cottonseed*
Buckwheat
Soybean Hulls
Dried Whey

Proteins¹

Cottonseed Meal
Soybean Meal
Linseed Meal
Corn Gluten Feed*
Corn Gluten Meal
Distillers Grain
Brewers Grain
Blood Meal
Fish Meal
Dehydrated Alfalfa Meal Pellets*
Urea (is a non-protein nitrogen source that is used in small amounts for protein in ruminant diets).

¹ A protein supplement is usually defined as a feed containing greater than or equal to 20% crude protein (dry matter basis). Some feeds (for example, those marked with an “*”) may be described as protein or energy because they are moderate in fat (energy) and protein or because their concentration of protein may vary to being less than or greater than 20% crude protein. Therefore those feeds marked with an “*” are most commonly classified as listed above.

Minerals

Dicalcium Phosphate
White Salt
Trace Mineral Salt
Ground Limestone

Vitamins

None of the feeds listed is a
is a vitamin-only pre-mix

Water

The complete pelleted feed is not listed under a specific category because it contains carbohydrates, proteins, minerals, and vitamins.

Reference: *Feeds & Nutrition*, 1990, M.E. Ensminger, J.E. Oldfield, and W.W. Heinemann.
Ensminger Publishing Company, Clovis, CA.

Table 7.03

Examples of feed ingredients are in the color photo section of this book.



Formulating Rations

Formulating rations for beef cattle is not difficult if you have two sources of information, the nutrients required of the animal and the nutrient composition of the feeds to be used. It is best to have a laboratory analyze your feeds to determine nutrient content. Let us balance a ration using an 800 pound medium-frame yearling steer.

1. Itemize the feedstuffs you are putting into the ration. (Table 7.04)

Formulating Rations --- Step 1

| Feeds ^a | Dry Matter Content | Crude Protein | Net Energy Gain (Mcal/lb) ^b | Calcium | Phosphorus |
|--------------------|--------------------|---------------|--|---------|------------|
| Corn | 88% | 8.9% | 0.62 | 0.02% | 0.31% |
| Corn Silage | 33% | 2.7% | 0.15 | 0.08% | 0.07% |
| Soybean Meal | 89% | 44.4% | 0.57 | 0.29% | 0.63% |
| Limestone | 100% | ---- | ---- | 34.00% | ---- |

^aAll feeds are reported on an as-fed basis or with the moisture included.
^bMegacalories per pound.

Table 7.04

2. Contact your local Extension agent, feed company representative, or someone else knowledgeable in beef cattle nutrition to obtain the nutrient requirements of the cattle you are feeding. An 800 pound, medium-frame steer will eat about 16.8 pounds of dry matter a day. His nutrient requirements for three pounds a day gain are shown here. (Table 7.05)

Formulating Rations --- Step 2

| | Dry Matter Intake | Crude Protein | Net Energy Gain (Mcal) | Calcium | Phosphorus |
|--|-------------------|---------------|------------------------|-----------|------------|
| Daily Nutrition Requirement of an 800 pound steer gaining three (3) pounds per day | 19.9 lbs. | 2.07 lbs. | 10 | 0.08 lbs. | 0.04 lbs. |

Table 7.05

3. In this example, you may first want to decide how much silage you want to feed. We will initially formulate the diet assuming the calf will be provided 10 pounds of corn silage per day. Next, we calculate how much of the nutrients are provided by 10 pounds of silage (multiply the nutrient values of corn silage by 10). (Table 7.06)

Formulating Rations --- Step 3

| | Dry Matter Content | Crude Protein | Net Energy Gain (Mcal/lb.) | Calcium | Phosphorus |
|------------------------|-----------------------|------------------------|----------------------------|--------------------------|--------------------------|
| Corn Silage 10 lbs. | 3.3 lbs. (10x0.33) | 0.27 lbs. (10x2.7%) | 1.5 (10x0.15) | 0.008 lbs. (10x0.08%) | 0.007 lbs. (10x0.07%) |

Table 7.06

4. Next, subtract the amount of nutrients provided by the 10 pounds of silage from the total nutrient requirements of the animal. (Table 7.07)

Formulating Rations --- Step 4

| | Dry Matter Intake | Crude Protein | Net Energy Gain (Mcal) | Calcium | Phosphorus |
|--|-------------------|---------------|------------------------|-------------|-------------|
| Daily Nutrition Requirement of an 800 pound steer gaining three (3) pounds per day | 19.9 lbs. | 2.07 lbs. | 10 | 0.08 lbs. | 0.04 lbs. |
| Corn Silage 10 lbs. | 3.3 lbs. | 0.27 lbs. | 1.5 | 0.008 lbs. | 0.007 lbs. |
| Difference | -16.6 lbs. | -1.8 lbs. | -8.5 | -0.072 lbs. | -0.033 lbs. |

Table 7.07

5. From this difference we determine that our grain-based supplement must be 10.9% crude protein. This is calculated by dividing the 1.8 pounds of crude protein needed by the 16.6 pounds of available animal intake of dry matter.
 $(1.8 \text{ lbs.} \div 16.6 \text{ lbs.}) \times 100 = 10.9\% \text{ crude protein}$

You can use the Pearson square method to calculate the ratio of corn and soybean meal to provide 10.9% crude protein. (Table 7.08)



Pearson Square Method

(Table 7.08)

First Calculation

Draw a square and place the percent of crude protein required in the center (10.9%). Then draw two arrows from the top left corner to the bottom right and from the bottom left to the top right (Draw an "X"). At the top left corner (outside the box) place "**Soybean Meal**" and its' percent crude protein, 44.4% (refer to Table 7.04). Then, subtract diagonally down through the square ($44.4 - 10.9 = 33.5$) and place your answer at the bottom right hand corner. (*This answer will be used in further calculations for corn.*) Place "**corn**" and its' percent protein, 8.9% (refer to Table 7.04), at the bottom left corner of the square. Subtract diagonally up the square ($8.9 - 10.9 = 2.0$). **Ignore all negative signs throughout all calculations.** Write your answer at the top right corner of the square. (*This answer will be used in further calculations for soybean meal.*) Next, add down the right column to get the total parts needed ($2.0 + 33.5 = 35.5$).

Second Calculation

For soybean meal, take the answer from the first calculation (2.0), divide by the total parts needed (35.5) and multiply by 100 to get the percent of soybean meal needed in your total ration (5.6%). Follow the same procedure for corn. Take the answer from the first calculation (33.5), divide by the total parts needed (35.5) and multiply by 100 to get the percent of corn needed in your total ration (94.4%). These two percentages added together should equal 100%.

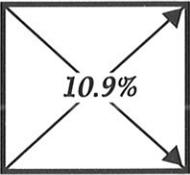
Third Calculation

To find the actual weight of soybean meal needed, multiply the total pounds of dry matter available (16.6 lbs. from Table 7.07) by the percent of soybean meal required (5.6%). Follow the same procedure for corn. Multiply the total pounds of dry matter available (16.6 lbs.) by the percent of corn required (94.4%). When you add the two answers together, it should total the dry matter intake required for this animal (16.6 lbs.).



Formulating Rations --- Step 5

First Calculation

| | | | |
|--------------|-------|---|------|
| Soybean Meal | 44.4% |  | 2.0 |
| Corn | 8.9% | | 33.5 |
| | | | 35.5 |

Second Calculation

$$(2.0 \div 35.5) \times 100 = 5.6\%$$

$$(33.5 \div 35.5) \times 100 = 94.4\%$$

100%

Third Calculation

| | | | | | |
|-------------------------|---|-------|--------------|---|-----------|
| <i>Available Intake</i> | | | | | |
| 16.6 lbs. | x | 5.6% | Soybean Meal | = | 1.0 lbs. |
| 16.6 lbs. | x | 94.4% | Corn | = | 15.6 lbs. |
| | | | | | 16.6 lbs. |

Table 7.08

6. Now we add the corn silage, soybean meal, and corn together and evaluate the diet. (Table 7.09)

Formulating Rations --- Step 6

| | Dry Matter Intake | Crude Protein | Net Energy Gain (Mcal) | Calcium | Phosphorus |
|---|-------------------|---------------|------------------------|-------------|------------|
| <i>Daily Nutrition Requirement of an 800 pound steer gaining three (3) pounds per day</i> | 19.9 lbs. | 2.07 lbs. | 10 | 0.08 lbs. | 0.04 lbs. |
| Corn Silage 10 lbs. | 3.3 lbs. | 0.27 lbs. | 1.5 | 0.008 lbs. | 0.007 lbs. |
| Soybean Meal | 1.0 lbs. | 0.444 lbs. | 0.57 | 0.003 lbs. | 0.006 lbs. |
| Corn | 15.6 lbs. | 1.388 lbs. | 9.67 | 0.014 lbs. | 0.061 lbs. |
| Difference | | | | -0.066 lbs. | |

Table 7.09

7. Upon evaluation we observe that there is still a deficiency of calcium. We have a little extra protein but more extra energy. If we add a small amount of limestone (high calcium) and remove a small amount of corn (high energy, low protein) we should still be able to meet all the nutrient requirements. The following method is based upon the actual calcium deficiency. (Table 7.10)

Divide the calcium deficiency by the calcium content of limestone
 ($0.066 \div 0.34 = 0.2$)

We could add 0.2 lbs. of limestone and remove 0.2 lbs. of corn and reevaluate the diet.

Formulating Rations --- Step 7

| | Dry Matter Intake | Crude Protein | Net Energy Gain (Mcal) | Calcium | Phosphorus |
|---|--------------------------|----------------------|-------------------------------|----------------|-------------------|
| <i>Daily Nutrition Requirement of an 800 pound steer gaining three (3) pounds per day</i> | 19.9 lbs. | 2.07 lbs. | 9.8 | 0.08 lbs. | 0.04 lbs. |
| <i>Corn Silage 10 lbs.</i> | 3.3 lbs. | 0.27 lbs. | 1.5 | 0.008 lbs. | 0.007 lbs. |
| <i>Soybean Meal</i> | 1.0 lbs. | 0.444 lbs. | 0.57 | 0.003 lbs. | 0.006 lbs. |
| <i>Corn</i> | 15.4 lbs. | 1.371 lbs. | 8.93 | 0.003 lbs. | 0.048 lbs. |
| <i>Limestone</i> | 0.2 lbs. | | | 0.068 lbs. | |
| Total | 19.9 lbs. | 2.09 lbs. | 11.0 | 0.082 lbs. | 0.061 lbs. |

Table 7.10

The calcium to phosphorus ratio should be greater than 1.2 calcium to 1.0 phosphorus. This diet's calcium to phosphorus ratio is 1.3 ($0.082 \div 0.061$).

Computerized Ration Formulations

Software packages for balancing rations are available through universities and private feed companies. Such programs provide the lowest cost, balanced diet. Contact your Extension office to access these computer programs.



Brand Name

Adventure Mills
50% Beef Start

Product Name

Purpose of Feed

Formulated protein supplement
for Starting/Preconditioning Beef Cattle

Medicated*

Purpose of Medication*

Medicated
{ For beef cattle as an aid in maintenance of weight gains in the presence of respiratory disease, such as shipping fever

Active Drug Ingredient(s) and Amount(s)*

Active Drug Ingredients

Chlorotetracycline Hydrochloride ... 350 mg/lb.
Sulfamethazine 0.077%

Minimum Crude Protein Content

Non-Protein Nitrogen

Minimum Crude Fat

Maximum Crude Fiber

Minerals

Vitamins (optional)

Guaranteed Analysis

Crude Protein min 50.00%
[This includes not more than 19.70% equivalent crude protein from non-protein nitrogen (NPN).]
Crude Fat min 0.50%
Crude Fiber max 10.00%
Calcium (Ca) min 2.00%
Calcium (Ca) max 3.00%
Phosphorus (P) min 0.70%
Salt (NaCl) min 1.50%
Salt (NaCl) max 2.50%
Iodine (I) min 0.007%
Vitamin A 50,000 U.S.P. Units/lb.
Vitamin D₃ 10,000 U.S.P. Units/lb.
Vitamin E 20 I.U./lb.

Guaranteed Analysis

Ingredients

Soybean Meal, Linseed Meal, Brewers Dried Grain, Cottonseed Meal, Wheat Middlings, Alfalfa Meal, Cane Molasses, Vitamin A Palmitate, D-Activated Animal Sterol (source of Vitamin D-3), Vitamin E Supplement, BHT (a preservative), Ground Limestone, Salt, DiCalcium Phosphate, Magnesium Sulfate, Iron Sulfate, Iron Oxide, Copper Oxide, Calcium Carbonate, Zinc Oxide, Ethylene Diamine Dihydriodide, and Urea.

Ingredient Statement

Feeding Instructions

Feeding Directions for Beef Cattle

{ Feed one pound per head per day for 28 days to starting cattle weighing between 400 - 800 pounds. In addition to the above, feed hay, silage, and/or grain free choice.

Precautionary Statement*

Name and Address of Distributor

Warning: DISCONTINUE USE 7 DAYS PRIOR TO SLAUGHTER.

Manufactured By:
{ Adventure Mills Livestock Feeds
{ Cowtown, OH 43210
Net Weight 50 pounds
(22.7 Kilograms)
or as shown on shipping document

Net Weight Statement

(Figure 7.02)

* These items will appear only on the tags of feeds that are medicated and/or contain an active drug ingredient. Medicated feeds or feeds that contain an active drug ingredient may or may not require a precautionary statement or withdrawal period.

Feed Label Information

Feed tags provide us important information about nutrients and ingredients, helping us choose a feed that will meet the animal's needs and give us the performance we expect. Anyone selling feed commercially must supply a label or tag with each bag or bulk shipment of feed. You should always read the tag to make sure you are getting what you want in the product and that you are not getting something that you don't want - such as a long withdrawal time or an ingredient that is toxic to your animal. Unless you can understand what is written on these tags, you won't know if you're providing your animal with the proper products.

Livestock feeds can be classified or grouped as either complete feeds or supplements. Complete feeds are those products containing all of the nutrients (except water and roughages) required by your animal. You can open the bag and empty the contents directly into the feeder. Supplements are products that are added or mixed into feed. They supply things such as additional protein, vitamins, minerals and other ingredients that may be lacking in the base feed. Supplements are usually added in small, specified amounts and are not to be fed as the total ration.

The law requires that feed manufacturers provide the following labeling information on every bag or package of product:

1. **Product Name & Brand Name.** A product name is always present and a brand name may also be present. A feed tag usually contains a unique name to identify the feed. (Beef Start, Calf Starter, MGA Heifer Supplement, etc.)
2. **Purpose of Feed.** The purpose of the feed is a statement specifying the species and animal classes for which the feed is intended. (Starting/Preconditioned Beef Cattle, Growing/Finishing Beef Heifers, etc.)
3. **Purpose of Medication & Active Drug Ingredients.** If a drug is used in the feed, the word **MEDICATED** must appear below the name with a statement and purpose of medication (claim statement), followed by a listing of the active drug ingredients and the amount of drug in the product. (For example: For beef cattle as an aid in the maintenance of weight gains in the presence of respiratory disease, such as shipping fever - Chlorotetracycline Hydrochloride - 350 mg/lb.)
4. **Guaranteed Analysis.** Guaranteed analysis of the product will give information on various nutrients present in the feed. This will include:
 - a. Minimum percentage of crude protein
 - b. Minimum percentage of crude fat
 - c. Maximum percentage of crude fiber

- d. Minimum and maximum percentage of calcium
- e. Minimum percentage of phosphorus
- f. Minimum and maximum percentage of salt
- g. Minimum Vitamin A in International Units (IU) per pound

Depending on the product and/or species, additional guarantees may be included for various trace minerals, vitamins, specialty ingredients or other nutrients.

What Guaranteed Analysis does not tell you. The guarantees do not reflect the quality or feeding value of a feed. There is a difference in quality of various feed sources. For example, copper sulfate is 80 to 90 % digestible, whereas copper oxide is only 0 to 10 % digestible. Even different sites where the same mineral is collected will vary in digestibility.

5. **Ingredient Statement.** The list of the ingredients starts with the ingredient present in the highest concentration and lists in order of decreasing concentration to the item that has the smallest concentration. Actual ingredients, such as corn, wheat, soybean meal, etc. may be listed, or “collective” terms may be used. Some recognized “collective” terms include “Grain Products”, which allows any or all grains to be used in the feed product, or “Plant Protein Products”, which allows inclusion of any or all of the protein ingredients like soybean meal, cottonseed meal, etc. Collective terms represent a general

classification of ingredients with a similar origin that perform a similar function, but do not imply equal nutritional or digestibility values.

The list of ingredients can be very useful or very deceptive. A collective term such as “Processed Grain by-products” doesn’t really tell you the specific protein source. Therefore, it is difficult to determine the quality and digestibility of the product.

6. **Feeding Instructions & Precautionary Statement.**

Feeding Instructions provide information on how the product is to be used. Warnings or precautionary statements should be included. For example, any product containing monensin must carry the warning that it should not be fed to horses (i.e. “Ingestion of monensin by equines has been fatal.”) **If a feed does not contain a medication that has a withdrawal time, it is not required to have a precautionary statement.** Therefore, even a feed that is medicated may not require a precautionary statement.

7. **Name and Address of Distributor.**

The name and mailing address of the company responsible for making or distributing the feed. (Adventure Mills Livestock Feeds, Cowtown, OH)

8. **Net Weight Statement.** The net weight statement serves to tell the purchaser the weight of the feed in the bag or bulk shipment. This may be listed in pounds, although many companies are also listing net weights in the metric system. A kilogram is equal to 2.2 pounds, thus a 50 pound bag may be listed as 22.7 kg (kilograms).

Read the tags on the products you intend to use and fully understand what you are doing before you start using a product. Many potential problems can be avoided if you know you are getting a suitable product and are feeding the correct amount to your livestock. Make sure withdrawal times are noted and will not prevent you from showing or selling your animal as planned.

Did you know that....

- Feeds with more fat will have higher energy values, assuming fiber levels are equal.
- In general, the higher the fiber content the lower the energy content.

Feeding Replacement Heifers

Goals of a Heifer Management Program:

1. We want to get the heifer big enough to cycle and breed within the first 25 days of the breeding season.
2. We want the heifer to give birth to a live calf with little difficulty.
3. We want the heifer to raise the calf to an average weaning weight.
4. The heifer should breed back within the first 45 days of the next breeding season.
5. The heifer should continue to produce calves every year for six to nine years, or longer.

Calf Starter

Formulated for Starting Calves

Medicated

For the prevention of coccidiosis in ruminating and non-ruminating calves including veal calves, and cattle caused by *Eimeria bovis* and *Eimeria zuernii*. Feed for at least 28 days during periods of coccidiosis exposure or when experience indicates that coccidiosis is likely to be a hazard. Coccidiostats are not indicated for use in adult animals due to continuous previous exposure.

Active Drug Ingredients

Decoquinatate 27.2g/ton

Guaranteed Analysis

Crude Protein min 20.00%
 Crude Fat min 3.00%
 Crude Fiber max 6.00%
 Acid Detergent Fiber (ADF) min 7.00%
 Calcium min 0.50%
 Calcium max 1.00%
 Phosphorus min 0.60%
 Selenium min 0.45 PPM
 Vitamin A min 15,000 IU/lb
 Vitamin D min 4,000 IU/l

Ingredients

Corn, Corn Distillers Grains with Solubles, Dehulled Soybean Meal, Wheat Middlings, Dried Whey, Dehydrated Alfalfa Meal, Dicalcium and Monocalcium Phosphate, Calcium Carbonate, Salt, Potassium Sulfate, Magnesium Sulfate, Choline Chloride, Vitamin A Supplement, Vitamin E Supplement, D-Activated Animal Sterol (source of Vitamin D-3), Niacin, Vitamin B-12 Supplement, Riboflavin, d-Calcium Pantothenate, Menadione Dimethylpyrimidinol Bisulphite (source of Vitamin K Activity), d-Biotin, Thiamine Mononitrate, Pyridoxine Hydrochloride, Folic Acid, Zinc Sulfate, Ferrous Sulfate, Manganese Sulfate, Copper Sulfate, Ethylene Diamine Dihydrochloride, Cobalt Sulfate, and Sodium Selenite

Feeding Directions

Feed 1.6 lbs. per 100 lbs. body weight per day to deliver 22.7 mg Decoquinatate per 100 lbs. body weight per day. Feed this complete calf starter pellet free-choice along with hay and milk replacer for the first month. For the second through the third month, feed this starter free-choice with water and hay. Starting at 120 days of age, gradually change from this starter feed to a growing program.

Warning: DO NOT FEED TO COWS PRODUCING MILK FOR FOOD.

Manufactured By:

Adventure Mills Livestock Feeds
 Cowtown, OH 43210
 Net Weight 50 pounds
 (22.7 Kilograms)
 or as shown on shipping document

Feeding Prior to Weaning

The effect of creep feeding replacement heifers depends on frame size and creep intake. Feeding a high energy creep to medium frame suckling heifers may decrease subsequent milking ability because of the fat deposition in the developing udder. However, data collected on large frame heifers is unclear as to the effect of creep feeding on milking ability. It is safe to say that creep feeding will decrease milking ability in any frame size heifer if excessive fleshiness becomes apparent.

Feeding After Weaning and Prior to Breeding

Puberty

Puberty is defined in heifers as the time when they first ovulate and show estrus or a heat period. Puberty occurs when heifers reach about 65 percent of their mature weight. Puberty is influenced by age, weight, and breed. *Table 7.11* contains estimated ages and weights for crossbred heifers.

Conception or pregnancy rates are higher on the third estrus compared to the first. Getting heifers to target weights a month prior to the breeding season may increase the percentage conceiving early in the breeding season.

Target Weight Concept

The Target Weight Concept is one method to control the amount of gain. Thereby, we assure the heifer attains enough gain to reach puberty but also avoid getting her too fat. Rates of gain between one and two pounds per day reflect the needs of most of the current cattle population. For example, a heifer weighs 450 lbs. at weaning and has a target puberty weight of 675 lbs. There are 200 days between weaning and breeding. We would actually prefer her to reach puberty weight at least two to three cycles before breeding (160 days).

$$(675-450) \div 160 = 1.4 \text{ lbs of gain per day.}$$

Rations can be formulated to meet the nutritional requirements for this amount of gain. The rate of gain need not be constant over the entire period, as long as the target weight is reached.

Feed breeding heifers mainly roughage feeds such as pasture, hay, or silage. During the winter, your heifer may need between four and five pounds of grain a day and all the hay she will eat. During the summer, be sure your heifer has high quality pasture to graze. If the pasture is good quality, you only need a small amount of hay or grain.

Age and Weight at Puberty for Crossbred Heifers of Different Breeds

| | Age, Days | Weight, lbs. | | Ages, Days | Weight, lbs. |
|-----------------|-----------|--------------|-----------------|------------|--------------|
| Jersey - X | 308 | 518 | Angus - X | 357 | 622 |
| Gelbveih - X | 326 | 626 | Maine-Anjou - X | 357 | 672 |
| Brown Swiss - X | 332 | 615 | Simmental - X | 358 | 666 |
| Pinzgauer - X | 334 | 611 | Limousin - X | 384 | 679 |
| Red Poll - X | 337 | 580 | Chianina - X | 384 | 699 |
| Tarentaise - X | 349 | 622 | Charolais - X | 384 | 703 |
| South Devon - X | 350 | 639 | Sahiwal - X | 414 | 642 |
| Hereford - X | 357 | 622 | Brahman - X | 429 | 712 |

Table 7.11

Prior to Calving

A 2-year-old heifer should weigh about 85 percent of her mature weight at first calving. They have approximately 280 days to gain the weight from breeding to calving. Heifers may reach the target weight coming off good pasture in the fall. A heifer needs to maintain her weight through the winter. Feed levels have to be increased if she has not reached her target weight by fall. A bred heifer requires at least 20 to 25 pounds of hay per day. About two months prior to calving, she should have access to higher quality feed or hay. It is important to provide enough feed without getting the heifers too fat at calving time. Heifers should be at condition score six at calving. Condition scores are discussed more fully in *Table 7.13*

Calving to Re-breeding

The greatest portion of females being culled for failure to re-breed are first-calf heifers. The main reason for this failure is nutritional stress. First-calf heifers need more energy, protein, and minerals after

calving than mature cows because they are still growing. Research has demonstrated that the average interval from calving to first estrus is 49 days in older cows and 67 days in young cows with suckling calves. Heifers should be maintained separate from the cow herd, receiving quality feed until after breeding.

Important Notes

In any ration, be sure to supply salt and minerals. This can be fed free choice (available at all times). A trace mineralized salt with added selenium is recommended. Other minerals of concern are calcium, phosphorus, and to lesser extent, magnesium. Vitamins may also be of benefit for stressful periods and if feeding low quality feeds.

Example Rations

Some example rations are provided in *Table 7.12*. However, to accurately feed your heifers, feed analysis of your feed should be done. You should work with someone knowledgeable in cattle feeding to develop a diet specific for your animals.

Sample Daily Heifer Rations

| | <i>Ration 1</i> | <i>Ration 2</i> | <i>Ration 3</i> | <i>Ration 4</i> |
|--|--|---|--|--|
| <i>Growing Heifer Calves</i> | 3 to 4 lbs. cracked corn, full feed of legume hay | 2 lbs. cracked corn, 1 lb. soybean meal, 2 lbs. hay, full feed of corn silage | 3 to 4 lbs. cracked corn, 1/2 lb. soybean meal, full feed of grass hay | 4 lbs. cracked corn, full feed of mixed grass and legume silage |
| <i>Growing Yearling Heifers</i> | 4 lbs. grain, full feed of legume hay | 1 lb. soybean meal, 3 lbs. hay, full feed of corn silage | 4 lbs. grain, 1 lb. soybean meal, full feed of grass hay | 4 lbs. grain, 1/2 lb. soybean meal, full feed of mixed forage silage |
| <i>Wintering Bred Heifers</i> | 5 to 8 lbs. legume hay or a legume grass hay, 5 lbs. grain mixture and pasture | 1 lb. soybean meal, 40 to 45 lbs. corn silage | | |

Table 7.12



Feeding the Beef Cow

Monitoring Body Condition

Most reproductive failures in beef females can be attributed to improper nutrition and thin body condition. Monitor the effectiveness of the nutrition program in the long term by herd performance records. In the short term, monitor by keeping an eye on the flesh or body condition score (BCS) of the cows. (Table 7.13)

When To Evaluate BCS

1. Mid-Summer
2. Weaning
3. 60 days before calving
4. Calving
5. Beginning of the breeding season

The cow's priorities for nutrition are maintenance, lactation, growth (young females), and reproduction. Consequently, reproduction is the first to go and the last to return in cases of inadequate nutrition.

Obesity can be a problem in heifers during the growing phase. Fat heifers normally have lower than average reproductive rates. It is less serious in mature cows. Ohio State University Extension has published a fact sheet with pictures corresponding to the body condition scores (Mangione 1992, L-292).

Immature cows continue to grow until approximately four years of age. These young cows should be maintained through the yearly cycle about one BCS higher than mature cows to achieve the same reproductive performance.

Body condition changes are a more reliable guide than body weight changes for evaluating the day-to-day nutrition status of a beef cow. Body condition scoring also has an advantage over body weight in that scales or corrals are not needed.

BCS Group Description

| | |
|---|--|
| 1. Emaciated - Little muscle left | 6. Good - Smooth appearance; some fat on back and tail |
| 2. Very Thin - Bones visible, no fat; considerable muscle loss | 7. Very Good - Smooth appearance; fat over back and tail head |
| 3. Thin - Foreribs visible; some muscle loss | 8. Fat - Blocky appearance; bone over back not visible |
| 4. Borderline - Foreribs visible; 12th and 13th ribs visible | 9. Very Fat - Tail buried in fat |
| 5. Moderate - All bones covered; neither thin nor fat | |

Table 7.13

Photographed examples of the BCS Group Descriptions listed in Table 7.13 may be reviewed within the color photo section of this book.

Body Condition Scoring During Summer

The normal grazing program can be followed if cows appear to be in adequate body condition. However, thin cows during midsummer will likely be thin cows at weaning. When adequate amounts of low quality forage are available, feeding a small amount of protein supplement during late summer can efficiently increase cow body condition. Feeding 0.6 pounds/head/day of protein supplement such as soybean meal (about 1.5 lbs. per head, three times per week) during late summer months (August and September), can increase cow weight by 25 pounds and condition score by 0.5 units. It has been indicated by some scientists that a supplement level of 1.0 to 1.5 pounds/head/day may be more desirable to provide greater weight gains.

Body Condition Scoring Prior to Calving

Ideally, sort cows by condition at weaning or 90 to 100 days before calving. Continue monitoring cow condition because weather and feed quality affect condition. Group cows by condition score and feed them to reach condition scores of 5-7 by calving. An example would be placing all of the BCS 1, 2, 3, and 4 cows in one pen or pasture and allowing them access to higher quality feed. The BCS 5, 6, and 7 cows can be fed as usual (maintain BCS). The BCS 8 and 9 cows could be grouped together and fed a lower quality diet during the middle 1/3 of gestation.

Sample Daily Winter Rations for Bred Cows

| | Ration 1 | Ration 2 | Ration 3 | Ration 4 |
|----------------------------|-------------------------------|---|---|---|
| <i>Wintering Bred Cows</i> | <i>full feed of grass hay</i> | <i>1 lb. soybean meal, 4 lbs. legume hay, 30 lbs. corn silage</i> | <i>8 to 10 lbs. of legume hay, 10 lbs. of grass hay</i> | <i>3 to 4 lbs. hay, full feed of grass silage</i> |

Table 7.14

Body Condition Scoring After Calving

Body condition at calving is the most critical factor in determining reproductive performance. High pregnancy rates will not occur in first-calf heifers unless they are able to gain some fat cover during the breeding period. Correcting deficiencies prior to calving is easier and cheaper than after calving.

BCS 4 or lower

If a cow is BCS 4 or thinner, she will be slow to return to heat and may not re-breed on time. Feeding a high level of nutrition after calving can sometimes shorten the postpartum interval from calving to first heat in thin cows (BCS 3-4), but the postpartum interval will usually be longer than if the cows had calved in good condition (BCS 6-7).

BCS 5

If a cow is a BCS 5, continue to feed hay or grain and protein supplement to insure she does not lose condition before the breeding season.

BCS 6 or higher

If she is a BCS 6 (or even fatter), continue with normal management and feeding. While good body condition at calving time is an indication that re-breeding should proceed without difficulty, good condition at calving does not guarantee acceptable re-breeding performance. Cows losing condition after calving have lower conception rates than do cows maintaining condition.

Body Condition and Weaning Time

The key to cow management in winter is insuring that moderate body condition is achieved before the onset of cold weather. Studies have shown it is very difficult to put body condition on a thin cow during cold conditions. Cows can make substantial recovery in body condition during the postweaning period if temperatures are moderate and the forage is readily available. These conditions can be accomplished by weaning calves by early to mid-October. Weaning calves later may not be conducive to a year-round grazing program.

Supplemental Mineral Program

In any ration, be sure to supply salt and minerals. They should be fed free choice (available at all times). A trace mineralized salt with selenium is highly recommended. Beef cows also require phosphorus and magnesium.

Creep Feeding

Creep feeding provides young calves extra feed while they are still nursing their dams. Creep feeding is not economically justifiable in all situations, but sometimes may be beneficial. Consider creep feeding when:

- Dams are first calf heifers.
- Calves are born in the fall.
- Cows and calves are kept in confinement.
- Amount and quality of forages is low.
- Feeder calf prices are high and feed prices are low.
- A premium is paid for calves that have extra weight or bloom, such as those sold as breeding cattle or club calves.

Do not creep feed when:

- Feed prices are high and feeder calf prices are low.
- You feed out your own calves through the winter on a high roughage diet.
- Heifers are to be kept as replacements, because this will cause extra fat to develop under the udder, preventing adequate formation of the milk secreting tissue.

Calves may be started on creep at about three to four months of age and continued until they are weaned. Rations are commonly made up of shelled corn and whole oats, with a protein supplement added if pastures are poor. (*Table 7.15*) A 8 to 12 percent salt mixture may be included to limit the amount of feed eaten daily.

Creep Rations for Beef Calves

| <i>Feedstuff</i> | <i>Rations (for mixing 100 lbs. of creep feed)</i> | | | | | | |
|-----------------------------------|--|-----------------|----------------|----------------|----------------|----------------|----------------|
| | <i>1</i> | <i>2</i> | <i>3</i> | <i>4</i> | <i>5</i> | <i>6</i> | <i>7</i> |
| <i>Cracked Shelled Corn</i> | <i>85 lbs.</i> | | <i>65 lbs.</i> | | <i>90 lbs.</i> | | <i>38 lbs.</i> |
| <i>Oats</i> | | <i>100 lbs.</i> | <i>35 lbs.</i> | <i>70 lbs.</i> | | | <i>30 lbs.</i> |
| <i>Processed Barley</i> | | | | <i>30 lbs.</i> | | <i>40 lbs.</i> | |
| <i>Protein Supplement</i> | <i>10 lbs.</i> | | | | <i>10 lbs.</i> | | |
| <i>Dehydrated Alfalfa Pellets</i> | | | | | | <i>60 lbs.</i> | |
| <i>Soybean Meal</i> | | | | | | | <i>20 lbs.</i> |
| <i>Cane Molasses</i> | <i>5 lbs.</i> | | | | | | <i>10 lbs.</i> |
| <i>Dicalcium Phosphate</i> | | | | | | | <i>1 lb.</i> |
| <i>Trace-mineralized Salt</i> | | | | | | | <i>1 lb.</i> |

Table 7.15

Feeding from Weaning to Finish

Livestock feeds are divided into two major classifications, concentrates and roughages. Concentrate feed or grain sources, such as corn, are high in energy and low in fiber, or indigestible materials. In contrast, roughages, such as hay, are lower in energy and higher in fiber.

Receiving the animal

Find out what the calf was being fed and blend that diet as part of the new ration. Calves will suffer less stress if you reduce their feed and water intake by 1/2–2/3 on the day they are shipped. Another calf of similar age and weight in the pen will help make the new arrival feel more at home. Always make changes in diet ingredients and amounts gradually over time.

Initially including at least 30 percent roughage in the diet can reduce digestive problems. Give them access to some long stem grass hay. The starter ration may include some molasses, 1/2 rolled corn, 1/2 rolled or crimped oats, plus a protein supplement, vitamins, and minerals.

Calves that have already been weaned and are consuming grain are easier to start on the finishing ration. Calves that have not been weaned or were weaned only recently need to be brought on the finishing ration gradually over a two to three week time period. You may want to start with three to six pounds of grain mix per feeding (6-12 lbs. per day). Increase the amount of grain they get by a 1/2 pound per day over the next two to three weeks.

Facilities

The barn or shed where you keep your project does not need to be elaborate. Provide about 75 square feet of shelter for each calf. If the feed and water troughs are outside the shelter, then 45 square feet per calf is adequate. Usually a 100 x 20 foot lot is more than enough exercise space for two calves.

The feed trough should be six to eight inches deep, 12 inches wide, and 20–24 inches long for each calf. The top of the feed trough should be 12–20 inches from the ground, depending on the size of the calf. Some exhibitors feel that a high trough will cause a calf to have a low back and making calves eat off the ground will cause the calf to have rough shoulders. The following are some additional specifications for the pen:

1. Clean and dry with good drainage;
2. Area should be free of rocks, junk, and exposed nails or sharp edges;
3. Clean bedding;
4. Adequate ventilation;
5. Electricity;
6. Clean feeding area and feed storage area;
7. Access to catch pen and head chute;
8. Fence of wood planks, metal, cable, or woven wire preferable to barbed wire;

Weighing Feed

One of the most important aspects of feeding animals is how much they eat. Have a measuring scale so you can weigh how much feed you are giving your calf. This is especially important if you are mixing your own feed. Just using a feed scoop won't give you an accurate measurement. A feed scoop of corn is a different weight than a feed scoop of oats. It can be helpful to weigh your calf periodically to check his progress.

Water

Clean, fresh water should be available at all times. Dry feed intake is closely associated with how much water a calf consumes. Water sources should be cleaned at least weekly.

Bunk Management

The total amount of feed fed per day should be divided into at least two meals per day. Feed approximately at 7:00 a.m. and 6:00 p.m. You can feed approximately half their daily allowance of feed in the morning and the other half in the evening. During particularly hot weather, cattle may not feel like eating much during the day. The daily feed allotment can be changed to approximately 40 percent of the feed fed in the morning and 60 percent in the evening if daytime feed intake is a problem.

Clean out feed or feces found in the feed bunk prior to feeding. Feed should not be allowed to accumulate from one feeding to the next. Dry matter intake and performance will decline if this is allowed to occur for very long. Be careful if large accumulations occur because this indicates a decrease in feed intake. Upon cleaning out large accumulations of stale feed, cattle may engorge themselves on the new, fresh feed and a case of grain bloat may occur. You may also want to weigh the feed you remove from the bunk. Feed efficiency can be estimated if you know the amount of feed actually consumed and know the periodic weight of the animal.

Feeding Concentrates

An animal that is gaining weight at a moderate rate needs about 1.5 percent of body weight in concentrates per day. Rapidly growing cattle, such as steers and bulls can be safely fed up to 2.0–2.25 percent of their weight in concentrates. (High levels of concentrate can be used when needed.) Dusty or moldy feed should not be used. Coughing can sometimes be an indication of dusty feeds. If the problem persists, consider feeding steam flaked grain, steam rolled grain, or whole grain. The grain should not be ground too fine. If it looks like hog feed (too powdery), it is ground too fine.

Energy Feeds

Corn, oats, barley, and sometimes milo and wheat are the main energy sources. Corn and oats are the most widely used in show diets. Oats are normally too expensive to be included in standard diets except for creep diets and starting cattle on feed. However, oats can be a useful supplement to corn for show cattle diets.

Many rations will contain molasses. Molasses (approximately 1/2 cup/head/day) may be added to increase the palatability of a ration and reduce dust problems. Water can be added to the molasses to improve its mixing characteristics. Ideally, add wet products to the feed just before feeding or only mix up enough for that day. The goal is to keep the feed fresh, especially during hot weather, and not cause a mold problem.

Protein Feeds

Soybean meal is the most commonly used protein supplement. Another preferred natural protein source is linseed oil meal. Normally, natural protein sources are preferred over those containing nonprotein nitrogen (urea or biuret) for show cattle. However, this does not mean that moderate levels of urea-containing supplements can not be used effectively.

Commercial Protein Supplements

Commercial protein supplements are usually very palatable and contain added vitamins and minerals compared to homemade supplements.

Minerals

The minerals you will need to add are salt, calcium, and to some extent phosphorus. Beef steers rarely need phosphorus but an added calcium source should be considered. A suitable calcium source is feed-grade limestone. A minimum calcium to phosphorus ratio is 1.2:1, but 2:1 or 3:1 is preferable. The higher ratios might be needed when feeding fat sources such as vegetable oil (fat interferes with calcium absorption). Use trace mineral salt to avoid possible deficiencies of other minor minerals. A 50:50 mix of limestone and salt, available free choice, may be adequate if feed mixing facilities are limited. Alfalfa meal pellets can be a source of protein and calcium. Commercial feed companies produce complete mineral mixes which are available from your local feed dealers.

Vitamins

The major vitamin requirement is for vitamin A. Vitamin A can be provided in the feed or by injection. However, in beef steers it is preferable to feed vitamins rather than inject vitamins. Normally vitamin supplements are provided in a vitamin A-D-E complex. Using high quality feeds can reduce some of the concern about the other vitamins. Make sure the cattle receive 20,000 to 30,000 international units (IU) of vitamin A per head daily. A commercial protein supplement, fortified with vitamins, can reduce the chances of a deficiency.

Yeast products can be a good source of B vitamins. B vitamins can be useful during times of stress.

Feeding Roughage

Feed at least two to four pounds of hay daily. Feeding high quality alfalfa may promote diarrhea. A good quality grass hay will be a better choice or blend two pounds of alfalfa with two to three pounds of grass hay. Wheat bran or dried beet pulp are good feeds for adding bulk to a diet. However, neither should be fed at over 20 percent of the diet.

Hay less than a year old is normally preferred to hay that is over two years old. The main benefit is that younger hay has less dust. Always investigate your hay source for spots of mold.

Corn silage is a good growing roughage but is lower in crude protein and calcium than legume hay. Some silage may prevent bloat, but feeding excessive silage

too long into the finishing period can cause a heavy middle on the calf and inadequate finish.

If a large belly is a problem, reduce the bulk in the diet. However, at home, cattle should carry some belly to insure adequate growth. Deworming the steer will improve animal performance and efficiency.

Various Diets

Many feed companies have complete diets that can be fed to calves at various stages of development. Ideally, work with someone knowledgeable in cattle nutrition to develop a specific diet for your calf with your available feeds. **The following are examples and may not be the specific diet you need for your calf.** Consider providing access to trace mineral salt as well.

Sample Winter Rations for Steers*

Creep Ration

(Calves 200-600 lbs.)
60.0 % rolled or whole oats
20.0 % cracked corn
20.0 % wheat bran

Growing Ration

(Calves 500-800 lbs.)
50.0 % rolled corn
25.0 % rolled oats
18.0 % protein supplement
5.0 % molasses
2.0 % limestone

Growing Ration

(Calves 500-800 lbs.)
25.0 % rolled corn
25.0 % ground barley
25.0 % rolled or ground oats
18.0 % protein supplement
5.0 % molasses
2.0 % limestone

Show Ration

(Over 800 lbs.)
40.0 % rolled corn
30.0 % rolled or ground oats
10.0 % beet pulp soaked with molasses
and water till covered
10.0 % protein supplement (pellets preferred)
7.0 % wheat bran
1.5 % limestone
1.5 % molasses

Finishing Ration

(Over 800 lbs.)
50.0 % rolled corn
30.0 % ground barley
10.0 % protein supplement
7.0 % ground oats or wheat
(can substitute as corn)
1.5 % limestone
1.5 % molasses

* It is assumed that some hay is also available.

Table 7.16

Holding Cattle : Trying to hold a steer can reduce marbling and increase the incidence of dark cutters (dark color meat). Ideally, work with someone knowledgeable in cattle feeding. Estimate what the finished weight of your calf will be. Set up a diet or diets that produce economical body weight gains that match the dates when cattle need to be ready. This is done by varying the amount of roughage and grain fed during different periods of the feeding program.

Prior To Exhibiting Your Beef Steer

About one week before going to the show, tie your calf up while he eats. The next day, put his feed in the feed pan he will use at the show. Continue to feed the calf out of the feed pan and water him out of a bucket. The last two feedings before you leave, reduce the amount of feed to $\frac{2}{3}$ the normal amount. This will help him travel better and relieve stress during transport.

Feeding and Watering at the Exhibition

You should not feed your animals immediately upon arrival at the show, but rather allow them time to rest. This is particularly true of hauls longer than one to two hours.

It is usually recommended to allow cattle only $\frac{1}{2}$ to $\frac{2}{3}$ of their normal concentrate feed at their first feeding following arrival. You can gradually increase their feed at each feeding. Many people slightly increase the amount of good dry hay at shows as it keeps them on feed better and also keeps their manure firmer, making it easier to keep both your animal and the stall clean.

Water should be limited initially. Animals may not drink water to which they are not accustomed. Adding a cup of molasses or $\frac{1}{2}$ cup of salt, sugar, or Jell-O per five gallons of water might be considered. Ideally, this should be started five to seven days before you leave for the show.

If your calf does not eat well, try the following:

1. Don't bother him while he eats.
2. Adjust the rope length.
3. Lack of exercise can decrease a calf's appetite.
4. Change his feed or water.

If your calf still refuses to eat, try giving him some hay and water. If your calf refuses to drink, try adding a little molasses to his water. If he goes more than a day without water, put a small handful of salt in his mouth, and give him some water.

1. Feed offered but not cleaned up in 30 minutes should be removed.
2. Feed pans should be cleaned after each feeding.
3. Concentrate should be fed first and then the hay.
4. Some people prefer to feed hay only at night in the tie outs, keeping the indoor stall cleaner.
5. Water is usually not offered until after the animals have eaten their morning or evening feeding.
6. One or two flakes of grass hay are usually laid out in front of the tie outs so animals can eat during the night.
7. Keep on their same feeding schedule as when they were at home.



Feedstuffs Commonly Fed to Beef Cattle

Listed below are feedstuffs commonly used throughout the livestock industries.
Those items identified with a check-mark are ingredients used within a variety of beef rations.

| Used in Beef Diets | Feed Name | Color | Texture | Other Identifiable Characteristics |
|-------------------------------|------------------------|-------------------------------|-------------------------------------|---|
| ✓ | Whole Grain Oats | Brown | Slightly rough with irregular edges | Common cereal grain fed for its fiber |
| ✓ | Cracked Corn | Yellow/White | Rough | Whole corn kernels that have been broken; starch may stick to fingers |
| ✓ | Soybean Meal | Light Brown | Granular to flaky | By-product resulting from the removal of oil from oilseeds; 44% crude protein (CP) soybean meal = soybean meal plus soybean hulls; 48% CP = soybean meal without hulls |
| ✓ | Complete Pelleted Feed | Light Brown with Yellow spots | Smooth | Tubular shaped materials that may be of varying lengths because of breakage of the pellets |
| ✓ | Dry Molasses | Dark Brown | Flaky and/or Granular | Sweet smell; high in sugar; made from sugar beets (most common source) or sugar cane |
| ✓ | Whole Kernel Corn | Yellow | Smooth | Most common cereal grain in Ohio |
| ✓ | Steamed Rolled Oats | Light Brown | Flaky | Whole oats that have been steamed and rolled; look for creases in the kernel caused by the roller |
| ✓ | Dried Whey | Light Brown | Powdery | Smells sweet like milk replacer; by-product from making cheese |
| ✓ | Trace Mineral Salt | Bronze | Granular, Grainy | Looks like tiny, uniform crystals |
| ✓ | Ground Limestone | Light Gray | Granular | Looks like small rocks of various sizes |
| ✓ | Dried Sugar Beet Pulp | Grayish-Brown | Rough | Looks like a dried root; by-product from processing sugar from beets |

Table 7.17
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Feedstuffs Commonly Fed to Beef Cattle continued

| <i>Used in Beef Diets</i> | <i>Feed Name</i> | <i>Color</i> | <i>Texture</i> | <i>Other Identifiable Characteristics</i> |
|---------------------------|--|-------------------------------|----------------------------|--|
| ✓ | <i>Steamed Rolled Barley</i> | <i>Brown</i> | <i>Flaky</i> | <i>Whole barley that has been steamed and rolled; look for creases in the kernel caused by the roller; darker color and shorter in length than rolled oats</i> |
| ✓ | <i>Hay Cube</i> | <i>Green</i> | <i>Rough</i> | <i>Large cube with noticeable hay particles pressed within it</i> |
| ✓ | <i>Wheat Middlings</i> | <i>Brown with White spots</i> | <i>Flaky</i> | <i>By-product from removing starch from wheat; looks like crumbled bran cereal</i> |
| ✓ | <i>White Salt</i> | <i>White</i> | <i>Granular, Grainy</i> | <i>Looks like tiny, uniform crystals</i> |
| ✓ | <i>Fish Meal</i> | <i>Brown</i> | <i>Powdery</i> | <i>Smells like fish; look for tiny bone chips; by-product from fisheries or removal of oil from fish</i> |
| ✓ | <i>Distillers Grains</i> | <i>Brown</i> | <i>Flaky to Powdery</i> | <i>Sweet smell; by-product from making alcohol for liquor or fuel</i> |
| ✓ | <i>Soybean Hulls</i> | <i>Light Brown</i> | <i>Flaky</i> | <i>Look for dark specks from the outer coat of soybeans; by-products of removing oil from soybeans</i> |
| ✓ | <i>Corn Gluten Feed</i> | <i>Brown</i> | <i>Flaky to Powdery</i> | <i>By-product from corn milling. Contains corn bran and soluble protein.</i> |
| ✓ | <i>Corn Gluten Meal</i> | <i>Yellow</i> | <i>Granular to Powdery</i> | <i>By-product from removing starch, oil, and germ from corn</i> |
| ✓ | <i>Blood Meal</i> | <i>Dark Brown to Dull Red</i> | <i>Granular to Powdery</i> | <i>By-products from meat processing industry</i> |
| ✓ | <i>Dehydrated Alfalfa Meal Pellets</i> | <i>Green</i> | <i>Smooth</i> | <i>Tubular shaped particles that may be of varying lengths because of breakage of pellets</i> |

Table 7.17
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Feedstuffs Commonly Fed to Beef Cattle continued

| <i>Us. in Beef Diets</i> | <i>Feed Name</i> | <i>Color</i> | <i>Texture</i> | <i>Other Identifiable Characteristics</i> |
|--------------------------|-----------------------------------|--|--|---|
| ✓ | <i>Dicalcium Phosphate</i> | <i>Gray</i> | <i>Granular</i> | <i>Looks like small rocks of uniform size</i> |
| ✓ | <i>Urea</i> | <i>White</i> | <i>Granular</i> | <i>Small bead-like particles; used as a source of non-protein nitrogen for ruminant animals</i> |
| ✓ | <i>Buckwheat</i> | <i>Brown to Light Black</i> | <i>Smooth with Sharp Edges</i> | <i>Grain grown in limited quantities</i> |
| ✓* | <i>Whole Grain Wheat</i> | <i>Brown</i> | <i>Smooth with Round Edges</i> | <i>Look for crease along the middle of one side</i> |
| ✓ | <i>Corn Gluten Feed</i> | <i>Light Brown</i> | <i>Flaky</i> | <i>By-product from removing starch, oil, germ, and gluten from corn</i> |
| ✓* | <i>Milo (Whole Grain Sorghum)</i> | <i>Reddish-Brown</i> | <i>Smooth</i> | <i>Round, bead-like grain</i> |
| ✓ | <i>Brewers Grain</i> | <i>Brown</i> | <i>Flaky</i> | <i>By-product from making beer from grains; particles more oblong than for soybean hulls</i> |
| ✓ | <i>Whole Cottonseed</i> | <i>White</i> | <i>Fuzzy</i> | <i>By-product from removing cotton lint from seeds</i> |
| ✓ | <i>Cottonseed Meal</i> | <i>Brown</i> | <i>Granular to Powdery</i> | <i>By-product from removing oil from cottonseeds</i> |
| ✓* | <i>Whole Grain Rye</i> | <i>Brownish-Gray</i> | <i>Smooth with Round Edges</i> | <i>Particles are longer than wheat</i> |
| ✓ | <i>Ground Corn</i> | <i>Yellow</i> | <i>Powdery</i> | <i>Whole corn ground very fine</i> |
| ✓ | <i>Linseed Meal</i> | <i>Varies from Light to Dark Brown</i> | <i>Granular</i> | <i>By-product from removing oil from flaxseed; not commonly used in most areas of the U.S.</i> |
| ✓* | <i>Whole Grain Barley</i> | <i>Brown</i> | <i>Slightly Rough with Irregular Edges</i> | <i>Particles are shorter than oats</i> |

*Indicates that this feedstuff must be processed to be used within beef rations.

Table 7.17

Photographed examples of the feedstuffs listed in Table 7.17 may be reviewed within the color photo section of this book.



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