

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
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 pink eye. (Figure 5.01)

Flies (pictures are not to scale)

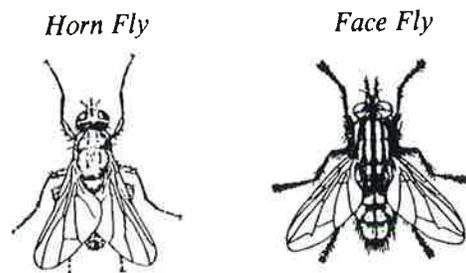


Figure 5.01

- **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)

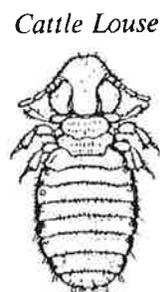


Figure 5.02

- **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)

Grubs

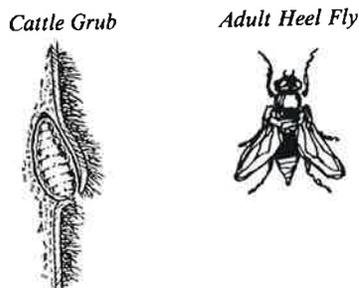


Figure 5.03



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.

- **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, horse, 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 place 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.



Beef Cattle Diseases

- **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.

- **Pink eye** — Pink eye 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 pink eye 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 scaly 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.



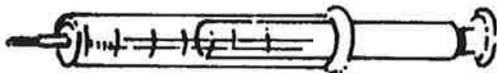
Vaccinations and Injections

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.

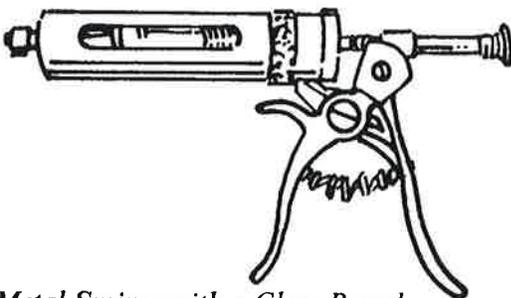
Learning How to Vaccinate

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, 1¼ 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 ($\frac{3}{4}$ 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

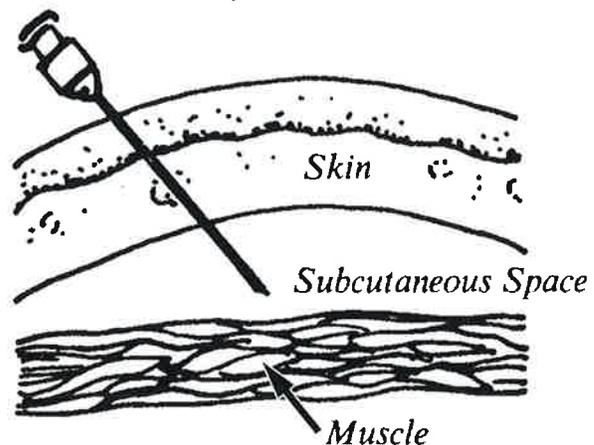


Figure 5.05

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 cannot;
- Digest large amounts of grass and hay;
- Use many types of feeds.

Parts of the Ruminant Digestive System

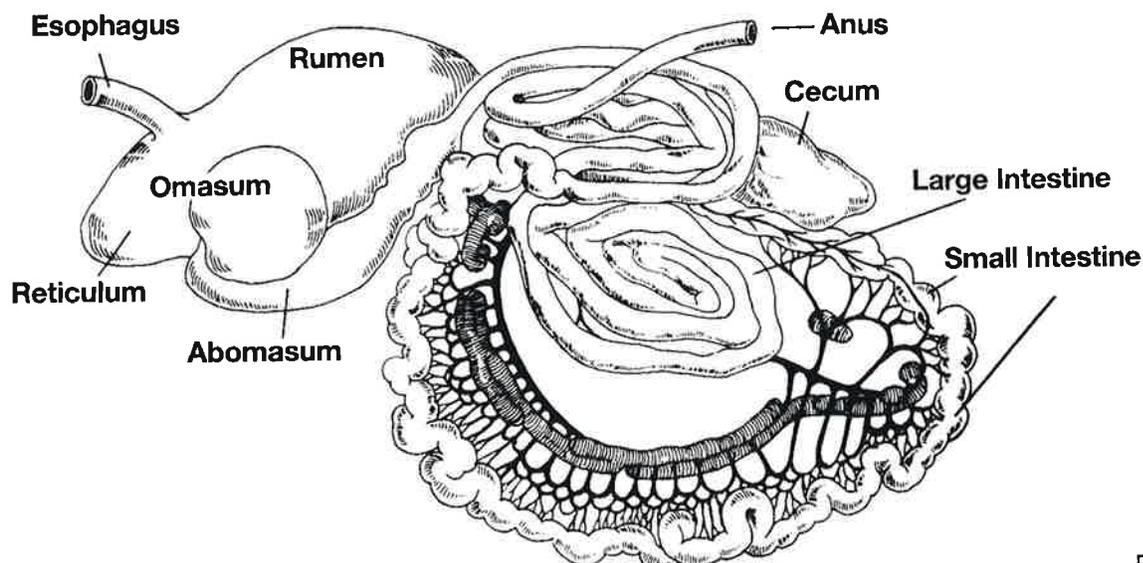


Figure 7.01

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 three months old. Because cattle are ruminants, they digest feeds that humans cannot.



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 $\frac{1}{2}$ salt and $\frac{1}{2}$ 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 Stagers	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%			

^a Breeding season

^b Before and after breeding season, growing livestock

^c Grass tetany prevention

^d Grain-based diets

^e Grazing 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 every day.
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	Proteins ¹
Whole Grain Barley	Cottonseed Meal
Whole Grain Oats	Soybean Meal
Wheat	Linseed Meal
Wheat Middlings*	Corn Gluten Feed*
Corn	Corn Gluten Meal
Milo	Distillers Grain
Beet Pulp	Brewers Grain
Hay and Hay Cubes*	Blood Meal
Molasses	Fish Meal
Whole Grain Rye	Dehydrated Alfalfa Meal Pellets*
Whole Cottonseed*	Urea (is a non-protein nitrogen source that is used in small amounts for protein in ruminant diets).
Buckwheat	
Soybean Hulls	
Dried Whey	

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.

Minerals	Vitamins
Dicalcium Phosphate	No feed listed is a vitamin-only pre-mix.
White Salt	
Trace Mineral Salt	
Ground Limestone	

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 Photos 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%	-----

^a All feeds are reported on an as-fed basis or with the moisture included.

^b Megacalories per pound.

Table 7.04

2. Contact your local Extension educator, 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 in 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	Crude Content	Net Energy Protein	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%.

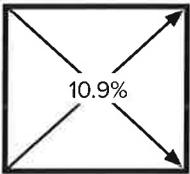
Third Calculation

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 equal 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

Available Intake

$$16.6 \text{ lbs.} \times 5.6\% \text{ Soybean Meal} = 1.0 \text{ lbs.}$$

$$16.6 \text{ lbs.} \times 94.4\% \text{ Corn} = 15.6 \text{ lbs.}$$

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
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.
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
Daily Nutrition Requirement of an 800 pound steer gaining three (3) pounds per day	19.9 lbs.	2.07 lbs.	9.8	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	15.4 lbs.	1.371 lbs.	8.93	0.003 lbs.	0.048 lbs.
Limestone	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	Product Name
	50% Beef Start	
Purpose of Feed	Formulated protein supplement for Starting/Preconditioning Beef Cattle	
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	Medicated*
	Active Drug Ingredients Chlorotetracycline Hydrochloride 350 mg/lb. Sulfamethazine.....0.077%	Active Drug Ingredient(s) and Amount(s)*
Minimum Crude Protein Content	Guaranteed Analysis Crude Protein..... min 50.00%	Guaranteed Analysis
Non-Protein Nitrogen	[This includes not more than 19.70% equivalent crude protein from non-protein nitrogen (NPN).]	
Minimum Crude Fat	Crude Fat..... min 0.50%	
Maximum Crude Fiber	Crude Fiber.....max 10.00%	
Minerals	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%	
Vitamins (optional)	Vitamin A..... 50,000 U.S.P. Units/lb. Vitamin D ₃ 10,000 U.S.P. Units/lb. Vitamin E..... 20 I.U./lb.	
	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 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 do not 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 will not know if you are 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” does not 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, for example, “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.**



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.

Adventure Mills 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 (Ca) min 0.50%
 Calcium (Ca) max 1.00%
 Phosphorus (P) min 0.60%
 Selenium min 0.45 PPM
 Vitamin A min 15,000 IU/lb.
 Vitamin D min 4,000 IU/lb.

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 D₃), Niacin, Vitamin B₁₂ Supplement, Riboflavin, d-Calcium Pantothenate, Menadione Dimethylprymidinol Bisulphate (source of Vitamin K Activity), d-Biotin, Thiamine Mononitrate, Pyridoxine, Hydrochloride, Folic Acid, Zinc Sulfate, Ferrous Sulfate, Maganous Sulfate, Copper Sulfate, Ethylene Diamine Dihydriodide, Cobalt Sulfate, and Sodium Selenite

Feeding Directions

Feed 1.6 lbs. per 100 lbs. body weight per day to deliver 22.7 mg Deconquinatate 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.		Age, 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 separately 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

	Ration 1	Ration 2	Ration 3	Ration 4
Growing Heifer Calves	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, ½ lb. soybean meal, full feed of grass hay	4 lbs. cracked corn, full feed of mixed grass and legume silage
Growing Yearling Heifers	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 grass hay	4 lbs. grain, ½ lb. soybean meal, full feed of mixed forage silage
Wintering Bred Heifers	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. Midsummer
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 (Fisher and Dugan, 2017, ANR-54).

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 Photos 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
Wintering Bred Cows	full feed of grass hay	1 lb. soybean meal, 4 lbs. legume hay, 30 lbs. corn silage	8 to 10 lbs. of legume hay, 10 lbs. of grass hay	3 to 4 lbs. hay, full feed of grass silage

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 ensure 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 ensuring 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) An 8 to 12 percent salt mixture may be included to limit the amount of feed eaten daily.

Creep Rations for Beef Calves

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

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 $\frac{1}{2}$ – $\frac{2}{3}$ 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 calves access to some long stem grass hay. The starter ration may include some molasses, $\frac{1}{2}$ rolled corn, $\frac{1}{2}$ 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 $\frac{1}{2}$ 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 a high trough will cause a calf to have a low back and making a calf 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 will not 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 at approximately 7 a.m. and 6 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 ½ 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 cannot 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*

<p>Creep Ration (Calves 200–600 lbs.)</p> <ul style="list-style-type: none"> 60.0% rolled or whole oats 20.0% cracked corn 20.0% wheat bran 	<p>Show Ration (Over 800 lbs.)</p> <ul style="list-style-type: none"> 40.0% rolled corn 30.0% rolled or ground oats 10.0% beet pulp soaked with molasses and water until covered 10.0% protein supplement (pellets preferred) 7.0% wheat bran 1.5% limestone 1.5% molasses
<p>Growing Ration (Calves 500–800 lbs.)</p> <ul style="list-style-type: none"> 50.0% rolled corn 25.0% rolled oats 18.0% protein supplement 5.0% molasses 2.0% limestone 	<p>Finishing Ration (Over 800 lbs.)</p> <ul style="list-style-type: none"> 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
<p>Growing Ration (Calves 500–800 lbs.)</p> <ul style="list-style-type: none"> 25.0% rolled corn 25.0% ground barley 25.0% rolled or ground oats 18.0% protein supplement 5.0% molasses 2.0% limestone 	

* 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 up your calf 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. Do not 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 checkmark 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

(continued on next page)

Feedstuffs Commonly Fed to Beef Cattle (continued)

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

Table 7.17

(continued on next page)

Feedstuffs Commonly Fed to Beef Cattle (continued)

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

*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 Photos section of this book.



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Glossary

—Terms to Know



A

Accuracy (Acc.). The amount of reliability that can be placed on a trait that is being evaluated. Accuracy is expressed as a figure between 0.0 and 1.0 — a figure close to 1.0 means a higher reliability.

Adjusted 365-day yearling weight. The yearling weight of an animal adjusted to 365 days and for the age of the dam.

Adjusted 205-day weaning weight. The weaning weight of a calf adjusted to 205 days of age and for the age of the dam.

Afterbirth (placenta). The membrane in which the calf develops and through which it receives nourishment. After calving, the placenta is expelled by the cow.

Antibiotics. Substances made from organisms that can kill bacteria. They are used to fight diseases caused by bacteria.

Artificial Insemination (A.I.). Placing the semen from a bull into a cow's reproductive tract using a non-natural method.

B

Backgrounding. A practice of grazing cattle up to about 800 pounds before placing them on a high-concentrate finishing diet in a feedlot. Cattle are fed only to gain approximately 1 to 1.5 pounds a day during the backgrounding phase.

Bloat. Abnormal condition in ruminants due to accumulation of gasses; usually seen on the animal's upper left side.

Bowlegged. When viewed from the front or rear, the toes turn in toward each other. More cattle become unsound because of being bowlegged (pigeon toed) than splay footed.

Breeding season. The period of time when the females are bred by the herd bull or through an artificial method.

Breeding value. The value of an animal as a parent, indicating the ability of bulls and cows to pass on desirable traits to their calves.

Breeds. Groups of cattle with similar traits such as coat color, horns, or body and head shape that are passed from generation to generation (from parent to calves).

British Breed. A breed of cattle which originated in the British Isles.

Brood Cow. Female kept to produce calves.

Buck Kneed. When the calf is “over at the knees” or buck kneed, full extension of the knee cannot occur when observed from the side. This is usually seen in cattle that are also too straight in the shoulder.

Bull. An intact (non-castrated) male.



Calf. A young beef animal less than one year of age.

Calf crop. The percentage of calves produced in a herd in a year relative to the number of females that were bred at the beginning of the breeding year.

Calf Kneed. This is the opposite extreme of buck kneed where the calf stands “back at the knees” when viewed from the side.

Calving Ease. Refers to the lack of difficulty in giving birth. Opposite of dystocia, which describes calving difficulty.

Carbohydrates. Nutrient group which includes starch, sugar, and cellulose.

Carcass. The muscle, bone, and fat associated with the slaughter of an animal; left after removal of the head, hide, and internal organs.

Carcass cutability. The percentage of boneless, closely trimmed, retail cuts from the round, loin, rib, and chuck of the carcass.

Carcass Traits. Characteristics of cattle such as muscling and leanness, which can be estimated on live animals but accurately measured only on beef carcasses.

Castrate. To remove the testes from a bull so that it cannot reproduce.

Cervix. The neck of the uterus. The cervix serves as a passageway for the sperm at breeding time and for the calf as it is being born.

Chromosome. Molecules where genes are located. Cattle have 30 pairs of chromosomes.

Club Calf. A special type of feeder calf which is thought to have excellent potential.

Colostrum. The first milk produced by the dam after she calves. Colostrum is high in antibodies that give the calf protection against diseases. It is also higher in protein and vitamins than regular milk from the dam.

Commercial crossbreeding program. A system in which producers select for breeding from the best animals available from at least two breeds.

Conception. The time when the male sperm fertilizes the female egg.

Conformation. The general shape or structure of a beef animal's build.

Contemporary group. A group of cattle of the same breed and sex that have been raised in the same management group (same location on the same feed and pasture).

Cow Hocked. When viewing the rear legs from the rear, the hocks are turned in or placed too close together.

Creep feeding. Supplementing calves with feed while they are still nursing their dams.

Crossbreeding. The mating of animals of different breeds. Crossbreeding takes advantage of heterosis.

Cud. The bolus (ball) of feed that cattle regurgitate from the rumen and chew. This process helps to digest the feed.

Custom feeding. Cattle producers that maintain ownership of their feeder cattle but place them on feed at another operator's feedlot until they are ready for slaughter.

D

Dam. The mother of a calf.

Dark cutter. Condition in which the lean meat of a beef carcass has a darker than normal color. This condition results from cattle being subjected to stressed conditions just prior to processing. Carcasses that are classified as dark cutters tend to have a higher pH. A higher pH can lead to a metallic (less desirable) flavor and a shorter shelf life (because the increased pH allows for more bacterial growth).

Dehorn. To remove the horns.

Diet. Nutritionally balanced mixture of feed ingredients.

Dominant gene. A gene(s) that determines the way an animal looks (the characteristics of an individual). They are present in a homozygous or heterozygous form.

Dressing Percentage. The proportion of carcass weight relative to live weight of an animal; carcass weight divided by live weight. The average dressing percentage of beef cattle is 62%.

Dual-Purpose Breed. A breed which can be raised for beef as well as milk production.

Dystocia. Refers to difficulty in giving birth.

E

Embryo. A term for the fertilized egg during the early part of the pregnancy. This term is used until body parts develop.

Embryo transfer. Surgically removing fertilized eggs from a donor cow and placing them in a recipient cow.

Estrogen. A hormone that brings a female into heat and prepares her for breeding.

Estrous cycle. The reproductive cycle of the female that prepares an egg for fertilization. In the cow, the average length of a cycle is 21 days.

Estrus (heat). The part of the estrous cycle when a female may be successfully bred. It occurs just before the ripened egg is released from the ovary and is ready to be fertilized by the sperm cell.

Estrus synchronization (heat synchronization). A technique using hormones to bring a group of females in heat at the same time, to breed all of them within a short period of time.

Exotic Breed. A breed of cattle which originated on the continent of Europe.

Expected Progeny Difference (EPD). The estimate of how future offspring of a sire are expected to perform in various traits. EPD's are expressed in pounds and they are not comparable among different traits.

External parasites. Parasites that live on the outside of beef cattle. Examples of external parasites are flies and lice. (See "internal parasites" and "parasites".)

F

F₁. Offspring that results from mating a purebred (straightbred) bull to a purebred (straightbred) female of another breed.

Fat Thickness. The typical linear measurement of fat taken over the rib eye between the 12th and 13th rib.

Feed concentrate. Grain mixtures, such as corn, oats, and soybean meal, fed in a ration.

Feeder Calf. A young calf, 5 to 9 months of age, that is weaned and started on a feeding program. The calf may be fed to slaughter weight or used as a replacement heifer.

Feedlot. A cattle facility which feeds immature beef cattle to the point of harvest (processing/slaughter).

Fertility. The description of how productive a breeding animal will be in terms of reproductive abilities.

Fertilization. When the egg from the female and the sperm from the bull join and begin to form a calf embryo.

Finish. Amount of fat cover on an animal.

Flight Zone. The animal's safety zone. The size of an animal's flight zone varies, depending upon its degree of wildness or tameness.

Forages. Plants used as feed for livestock.

Frame Score. A way of estimating what weight cattle will be when they have reached slaughter condition. It is based on the hip height of the animal at different ages.

Free Choice. Allowing cattle to have access to a feed at all times.

Freemartin. The female calf born as a twin to a bull calf. Approximately 90% of all freemartins are infertile (will not be able to conceive).



Gene. The basic unit of heredity found in pairs on chromosomes. Genes are transmitted singly (one of the genes at random of each pair) from each parent to their offspring.

Genetics (heredity). The passing on of genetic or physical traits of parents to offspring.

Gestation. The period of time from when the cow is bred (conceives) until she calves. This pregnancy period lasts about 283 days, depending on the breed.



Heat (estrus). The part of the estrous cycle when a female may be successfully bred. It occurs immediately before the ripened egg is released from the ovary and is ready to be fertilized by the sperm cell.

Heat synchronization (estrus synchronization). A technique using hormones to bring a group of females in heat at the same time to breed all of them within the short period of time.

Heifer. A young, female beef animal that has not calved.

Heredity (genetics). The passing on of genetic or physical traits of parents to offspring.

Heritability. The amount of differences among cattle, measured or observed, transmitted to the offspring. The higher the heritability of a trait, the more accurately individual performance predicts breeding value and the more rapid the animals' responses should be due to selection for that trait.

Heterosis (hybrid vigor). The amount by which crossbred animals exceed the average for the two purebreds that are crossed to produce the crossbreds.

Heterozygous. Carrying unlike genes for the same trait.

High-priced cuts. Loin, rib.

Homozygous. Carrying identical genes for the same trait.

Hormone. A body-regulating chemical secreted by a gland into the bloodstream.

Hybrid vigor (heterosis). The amount by which crossbred animals exceed the average of the two purebreds that are crossed to produce the crossbreds.



Immunity. When the body builds up a resistance (protection) from a disease organism.

Inbreeding. Production of offspring from parents more closely related than the average of a population. Inbreeding increases the proportion of homozygous genes. Also, inbreeding increases prepotency (the ability of a parent to pass on its characteristics so offspring resemble the parents more than usual) and uncovers recessive genes (desirable and undesirable).

Internal Parasites. Parasites that live inside the body of beef cattle. Examples of internal parasites are worms. (See “external parasites” and “parasites”.)

K

KPH Fat Percentage. The amount of fat contained in the regions of the kidney, pelvis, and heart relative to the carcass weight.

Knock Kneed. When viewed from the front or rear, the feet toe out away from each other.

L

Legume. A non-grass plant that produces nitrogen in its roots. Because of this nitrogen production, a legume is a plant that is higher in protein and minerals.

Line breeding. A form of inbreeding in which an attempt is made to concentrate the inheritance of an outstanding ancestor in a herd.

Low-priced cuts. Brisket, flank, plate, shank.

M

Market Steer. Finished cattle that are ready for marketing.

Maternal Breed. Breed or breeds kept to produce calves in a cow/calf herd.

Medium-priced cuts. Chuck, round.

Minerals. Elements required by cattle to build bones and teeth and to support other life processes.

Most Probable Producing Ability (MPPA). An estimate of a cow's future productivity for a trait, such as her future calves' weaning weight, based on her past productivity.

N

Nutrients. Ingredients that make up a ration. The five groups of nutrients are energy, protein, minerals, vitamins, and water.

 O

Open cow or heifer. A cow or heifer that is not pregnant.

Out crossing. The mating of individuals that are less closely related than the average of the breed. It is used primarily by purebred breeders as a way to introduce new, unrelated sires to the herd.

Ovary. The female organ that produces eggs. There are two ovaries in the reproductive tract.

Ovulate. To release an egg from the ovary. In cattle, this occurs 10 to 16 hours after the end of standing heat.

 P

Parasites. Organisms that live off another organism.

Pedigree. A summary of ancestral names of three to five generations.

Performance pedigree. A pedigree that includes performance records in addition to usual pedigree information. Performance and progeny records are included on the performance pedigrees of some breed associations.

Pigeon Toed. When viewed from the front or rear, the toes turn in toward each other. More cattle become unsound because of being pigeon toed than splay footed.

Placenta (afterbirth). The membrane in which the calf develops and through which it receives nourishment. After calving, the placenta is expelled by the cow.

Polled Breed. Cattle that do not grow horns.

Postlegged. The hock has too little angle or set. The calf is too straight through the joint, resulting in a very stiff, constricted movement because of the lack of flexibility. More cattle become unsound because of being postlegged than sickle hocked.

Preconditioning. A systematic method of reducing stress. It includes vaccinating for the major infectious agents, treating for internal and external parasites, weaning, castrating and dehorning the animals well in advance of sale and movement to the feedlot.

Progeny. The offspring of animals.

Progesterone. A female hormone that maintains pregnancy in the female.

Prostaglandin. A compound that is naturally produced in the reproductive system of the cow. It is also commercially produced and used to synchronize estrus.

Protein. A dietary nutrient that supplies amino acids to the calf.

Purebred. An animal whose parents are from the same breed.

Q

Quality Grade. The factors associated with palatability characteristics of the edible portion of meat; including color, texture, firmness, marbling, and age.

R

Ratio. An indication of how well or how poorly cattle compare in a certain trait to others in the group.

Ration. A daily mixture of feed ingredients given to cattle. A balanced ration provides all the proper nutrients in the proper amount.

Recessive gene. A gene(s) that affect the way an animal looks (phenotype) when present as a homozygous pair. Recessive genes must be passed on from both parents before the recessive gene can be expressed in the offspring.

Registered cattle. Cattle of a certain breed that are registered by having the animal's name, and the name and number of both parents, recorded by the breed association.

Replacement heifer. A female that is being kept for use in the breeding herd.

Residue. A residue is the amount of a substance that remains in an animal's body tissue after exposure to a substance. The substance can enter the animal's body when it is used as a feed or water additive, as an injectable or external treatment, or by accident.

Resistance. Protection from a disease organism.

Retail Cuts. The cuts of meat that the consumer buys at the meat counter.

Retained ownership. The practice of a feeder cattle producer that keeps or retains his cattle until they are ready for slaughter.

Rib Eye Area. The surface area of the longissimus dorsi muscle between the 12th and 13th rib of a beef carcass.

Roughage. Coarse or bulky feeds that are high in fiber. Examples are corn silage, pasture, and hay. Roughage is needed in the diet of beef animals to keep the rumen working properly.

Ruminant. An animal that has four stomach compartments (rumen, reticulum, omasum, and abomasum).

 S

Semen. Sperm mixed with the fluids from the accessory glands of the male.

Sibling. A brother or sister of an individual.

Sickle Hocked. When viewing the rear legs from the side, the hock has too much angle or set. This causes the animal to stand too far underneath itself. Often these calves also will droop excessively from hooks to pins.

Sire. The father of a calf (bull).

Sire summary. The published results of national sire evaluation programs that compare sires on different economically important traits.

Sperm. The male sex cells produced in the testicles.

Splayfooted. When viewed from the front or rear the feet toe out away from each other.

Standing heat. The window of time during estrus (heat) when a female is receptive to mating.

Steer. A castrated male calf.

Structural soundness. The condition of the skeleton, especially the feet and legs, of cattle.

Superovulation. A process of treating a cow with hormones to cause her to release several eggs from an ovary at one time. The eggs are then fertilized and later removed and placed into recipient cows (called embryo transfer).

Supplement. A feed ingredient added to the ration or provided to the cattle free choice. (See “free choice”.)

 T

Terminal Sire. A bull used in a commercial beef herd where all calves are sold.

Total Digestible Nutrients (TDN). An estimate of the energy requirements of beef cattle. TDN is used to formulate rations and to show the feed values of different types of feed.

U

Uterus. The female reproductive organ where the embryo develops during pregnancy. During calving the uterus contracts to force the calf out of the birth canal.

V

Vitamins. Dietary nutrients needed in very small amounts for the health of eyes, nasal passages, and lungs; for strong bones; for blood clotting; and for other body functions.

Vulva. The external opening to the female's reproductive system.

W

Wean. To take the calf from its mother. Calves can be weaned at any age but are typically weaned in beef cattle between 6 and 8 months of age.

Wholesale Cuts (primal cuts). Beef wholesale cuts include the chuck, rib, loin, round, shank, brisket, plate, and flank.

Withdrawal Time. In the case of meat animals, it is the period of time that must elapse between the last treatment and the harvest (slaughter) of the animal. For milk-producing animals and egg-laying poultry, it is the time that must elapse between the last treatment and the point where the milk and eggs can again be collected for use as human food. This time period allows the medication to be eliminated from the animals' body so that meat, milk, and eggs harvested after that time do not contain unsafe residues.

Y

Yield Grade. Refers to the percentage of a carcass which can be sold as boneless meat. There are five yield grades — 1 — 2 — 3 — 4 — 5. The highest percentage (most desirable) is represented by 1 and 5 designates the lowest percentage (least desirable).

Z

Zoonotic Diseases. Diseases that can be transmitted from animals to humans.



The information in this **Glossary** was:

-
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Breeds of Beef Cattle



Angus



Beefmaster

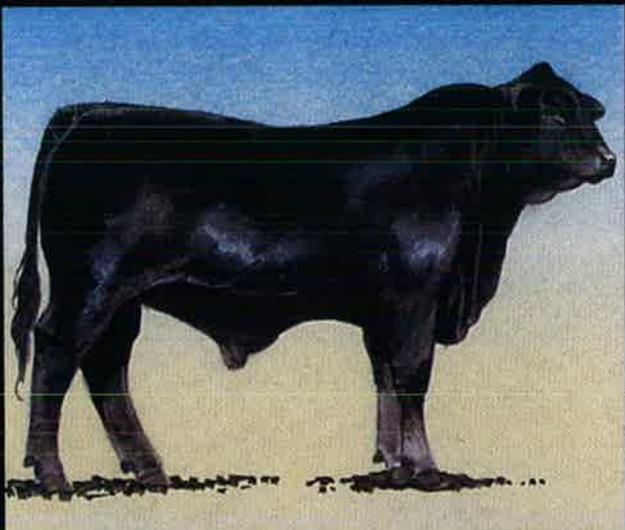


Belgian Blue



Brahman

Images provided courtesy of Ohio Beef Council, created by Galen Struve.



Brangus



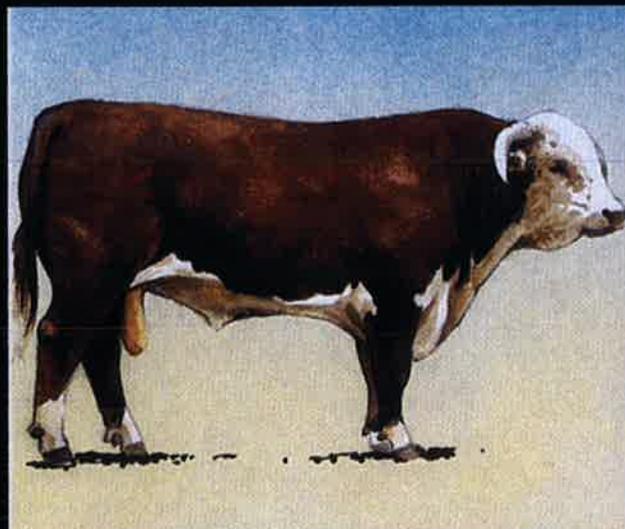
Charolais



Chianina



Gelbvieh



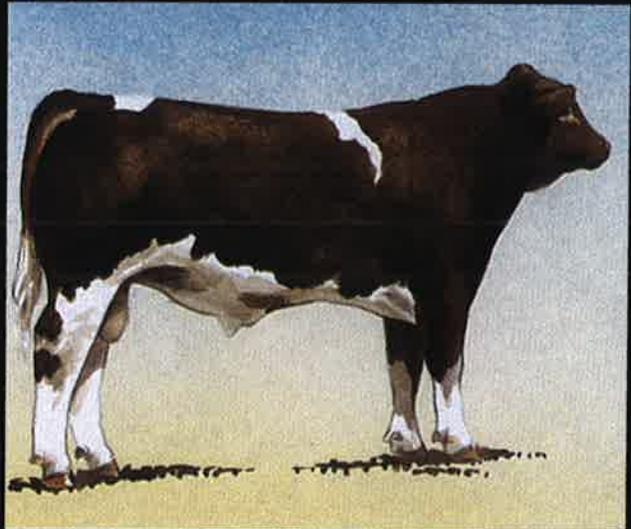
Hereford



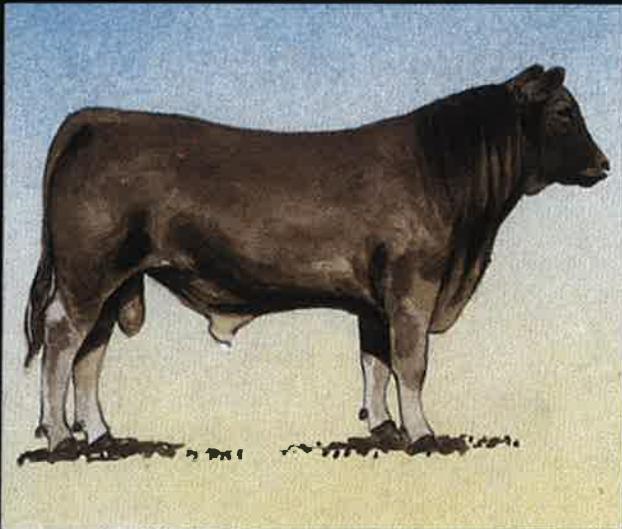
Limousin



Texas Longhorn



Maine-Anjou



Murray Grey



Piedmontese



Pinzgauer



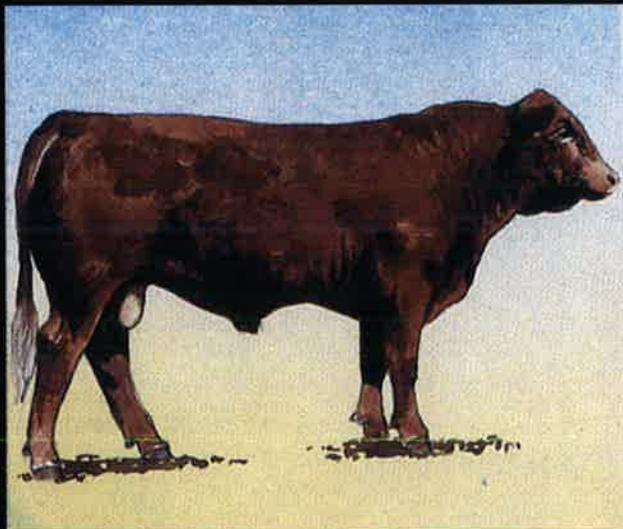
Polled Hereford



Red Angus



Red Poll



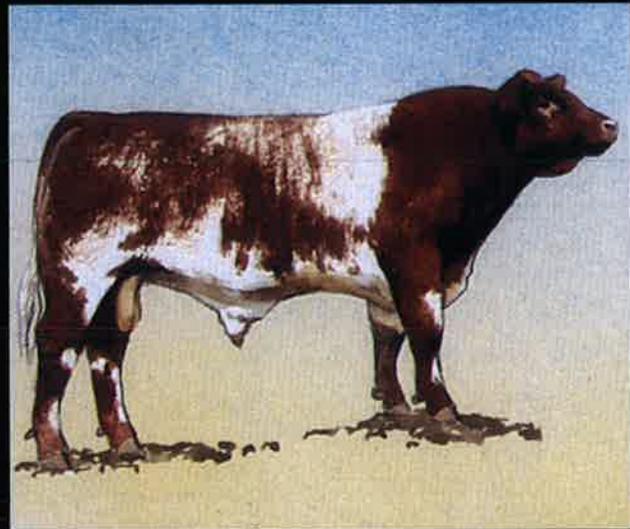
Salers



Santa Gertrudis



Scotch Highland



Shorthorn



Simmental

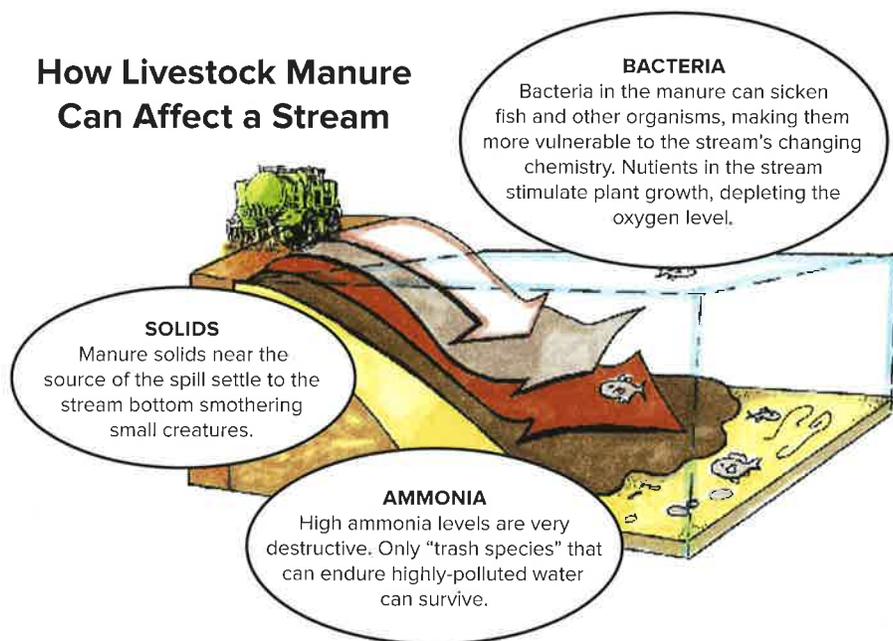


Tarentaise

Water Quality—Environmental Awareness Within the Beef Industry

How Livestock Waste Can Impact a Stream

How Livestock Manure Can Affect a Stream



POTENTIAL DANGERS

Nutrients in the manure can stimulate algae growth. Decaying algae can deplete dissolved oxygen and cause more fish kills. Manure can also harbor dangerous bacteria, such as *giardia* and *Cryptosporidium*. These pathogens are a risk for seafood, seafood eaters, and swimmers.



Breeds of Dairy Cattle



Ayrshire



Brown Swiss



Guernsey



Holstein-Friesian



Jersey



Milking Shorthorn

Images provided courtesy of Select Sires Inc. — photos by Remsberg

Body Condition Scoring—Group Descriptions

Thin



1 Emaciated—Little muscle left.



2 Very Thin—Bones visible; no fat; considerable muscle loss.



3 Thin—Foreribs visible; some muscle loss.



4 Borderline—Forerib not visible; 12th and 13th ribs visible.

Moderate



***5 Moderate**—All bones covered; neither thin nor fat.



***6 Good**—Smooth appearance; some fat on back and tail.



***7 Very Good**—Smooth appearance with fat over back and tail head.

Fat



8 Fat—Blocky appearance bone over back not visible.



9 Very Fat—Tail buried and in fat.

* Optimum BCS level for reproductive performance

Feed Sample Photographs



Whole Grain Oats



Cracked Corn



Soybean Meal



Complete Pelleted Feed

E Energy
Nutrient Group

M Mineral
Nutrient Group

P Protein
Nutrient Group



E

Dry Molasses



E

Whole Kernel Corn



E

Steam Rolled Oats



E

Dried Whey



M

Trace Mineral Salt



M

Ground Limestone



Dried Sugar Beet Pulp



Steam Rolled Barley



Hay Cube



Wheat Middlings



White Salt



Fish Meal



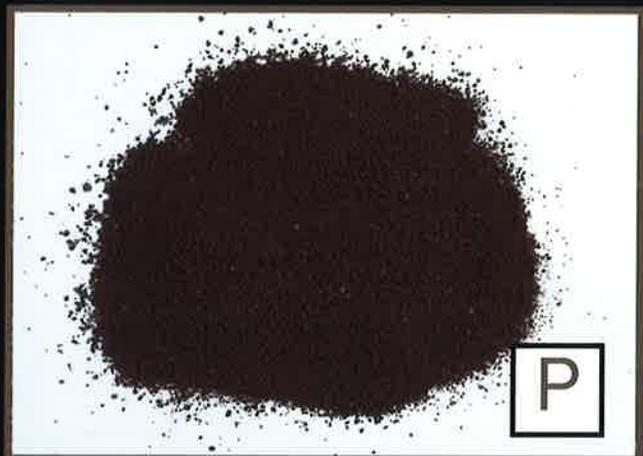
Distillers Grains



Soybean Hulls



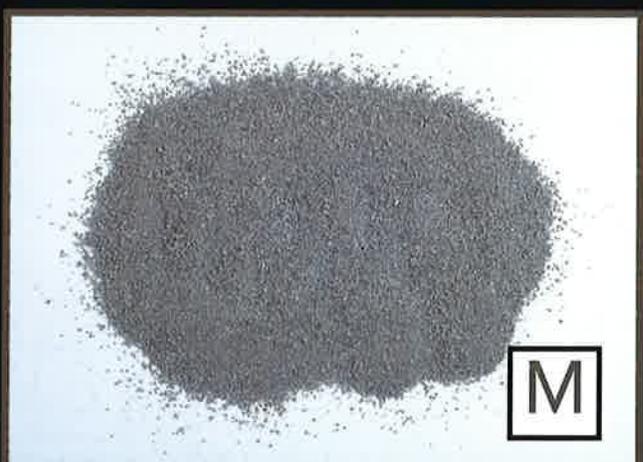
Corn Gluten Meal



Blood Meal



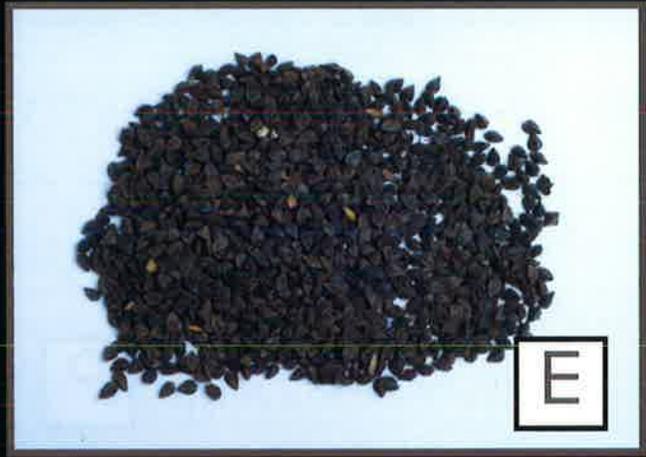
Dehydrated Alfalfa
Meal Pellets



Dicalcium Phosphate



Urea



Buckwheat



Whole Grain Wheat



Corn Gluten Feed



Milo
(Whole Grain Sorghum)



Brewers Grain



Whole Cottonseed



Cottonseed Meal



Whole Grain Rye

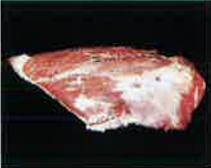
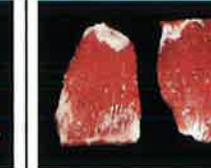
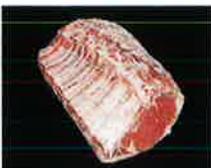
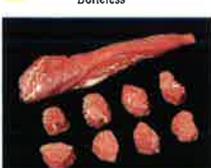
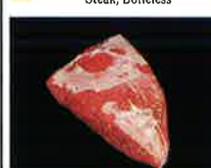
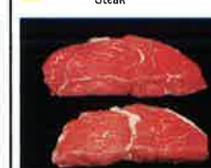


Ground Corn

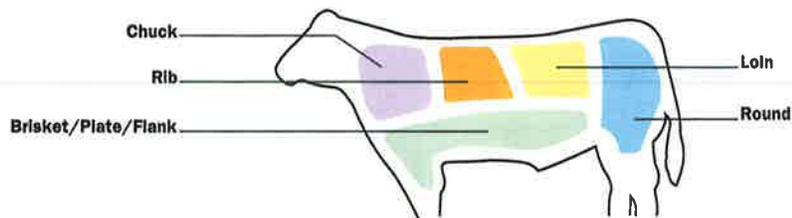


Whole Grain Barley

FOODSERVICE CUTS OF BEEF

				
114 Beef Chuck, Shoulder Clod	116A Beef Chuck, Chuck Roll	120 Beef Brisket, Deckle-Off, Boneless	121D Beef Plate, Inside Skirt	193 Beef Flank, Flank Steak
				
109 Beef Rib, Roast-Ready	109D Beef Rib, Roast-Ready, Cover Off, Short Cut (Export Style)	112A Beef Rib, Ribeye, Lip-On	1112 Beef Rib, Ribeye Roll Steak, Boneless	1103A Beef Rib, Rib Steak, Boneless
				
180 Beef Loin, Strip Loin, Boneless	1180 Beef Loin, Strip Loin Steak, Boneless	1173 Beef Loin, Porterhouse Steak	189A Beef Loin, Tenderloin, Full, Side Muscle On, Defatted	1189A Beef Loin, Tenderloin Steak, Side Muscle On, Defatted
				
1190A Beef Loin, Tenderloin Steak, Side Muscle Off, Skinned	184D Beef Loin, Top Sirloin, Cap	1185B Beef Loin, Bottom Sirloin, Butt, Ball Tip Steak	169 Beef Round, Top (Inside)	1169 Beef Round, Top (Inside) Round Steak
				
166B Beef Round, Rump and Shank Partially Off, Handle On	170A Beef Round, Bottom (Gooseneck), Heel Out	135A Beef for Stewing	136 Ground Beef	1100 Beef Cubed Steak

The above cuts are a partial representation of NAMP/IMPS items. For further representation and explanation of all cuts see *The Meat Buyers Guide* by the North American Meat Processors Association.



NAMP/IMPS Number (North American Meat Processors Association/Institutional Meat Purchase Specifications)

©1997 North American Meat Processors Association



American Meat Science Association



North American Meat Processors Association



National Cattlemen's Beef Association

06-706

Meat charts and photographs provided by the North American Meat Processors Association, 1920 Association Drive, Suite 400, Reston, VA, 20191-1547 (703) 758-1900.

Beef Retail Cuts

Beef

• RETAIL CUTS •
WHERE THEY COME FROM
HOW TO COOK THEM



ROUND

Round Steak
Braise, Panfry

Top Round Roast
Roast

Top Round Steak
Broil, Panbroil, Panfry

Boneless Rump Roast
Roast, Braise

Bottom Round Roast
Braise, Roast

Tip Roast, Cap Off
Roast, Braise

Eye Round Roast
Braise, Roast

Tip Steak
Broil, Panbroil, Panfry

SIRLOIN

Sirloin Steak, Flat Bone
Broil, Panbroil, Panfry

Sirloin Steak, Round Bone
Broil, Panbroil, Panfry

Top Sirloin Steak
Broil, Panbroil, Panfry

FORE SHANK & BRISKET

Shank Cross Cut
Braise, Cook in Liquid

Brisket, Whole
Braise, Cook in Liquid

Corned Brisket, Point Half
Braise, Cook in Liquid

Brisket, Flat Half
Braise

CHUCK

Chuck Eye Roast
Braise, Roast

Boneless Top Blade Steak
Braise, Panfry

Arm Pot Roast
Braise

Boneless Shoulder Pot Roast
Braise

Cross Rib Pot Roast
Braise

Mock Tender
Braise

Blade Roast
Braise

Under Blade Pot Roast
Braise, Roast

Short Ribs
Braise, Cook in Liquid

7-Bone Pot Roast
Braise

Flanken-Style Ribs
Braise, Cook in Liquid

THIS CHART APPROVED BY
NATIONAL LIVE STOCK & MEAT BOARD

SHORT LOIN

T-Bone Steak
Broil, Panbroil, Panfry

Boneless Top Loin Steak
Broil, Panbroil, Panfry

Porterhouse Steak
Broil, Panbroil, Panfry

Tenderloin Roast
Roast, Broil

Tenderloin Steak
Broil, Panbroil, Panfry

RIB

Rib Roast, Large End
Roast

Rib Roast, Small End
Roast

Rib Steak, Small End
Broil, Panbroil, Panfry

Rib Eye Roast
Roast

Rib Eye Steak
Broil, Panbroil, Panfry

Back Ribs
Braise, Cook in Liquid, Roast

FLANK & SHORT PLATE

Flank Steak
Broil, Braise, Panfry

Flank Steak Rolls
Braise, Broil, Panbroil, Panfry

Skirt Steak
Braise, Broil, Panbroil, Panfry

OTHER CUTS

Ground Beef
Broil, Panfry, Panbroil, Roast (Bake)

Cubed Steak
Panfry, Braise

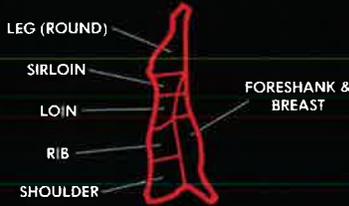
Beef for Stew
Braise, Cook in Liquid

Cubes for Kabobs
Broil, Braise

Veal Retail Cuts

Veal

• RETAIL CUTS •
WHERE THEY COME FROM
HOW TO COOK THEM



Rib Roast
Roast

Boneless Rib Roast
Roast

Crown Roast
Roast

Boneless Rib Chop
Braise, Panfry, Broil

Rib Chop
Braise, Panfry, Broil

Short Ribs
Braise, Cook in Liquid

RIB

Blade Roast
Braise, Roast

Arm Roast
Braise, Roast

Blade Steak
Braise, Panfry

Arm Steak
Braise, Panfry

Boneless Shoulder Arm Roast
Braise, Roast

Boneless Shoulder Eye Roast
Braise, Roast

SHOULDER

Boneless Rump Roast
Braise, Roast

Round Steak
Braise, Panfry

Top Round Steak
Braise, Panfry

Leg Cutlet
Braise, Panfry, Broil

LEG (ROUND)

Breast
Braise, Roast

Boneless Breast Roast
Braise, Roast

Cross Cut Shank
Braise, Cook in Liquid

Riblet
Braise, Cook in Liquid

Shank
Braise, Cook in Liquid

FORESHANK & BREAST



Loin Roast
Roast

Boneless Loin Roast
Roast

Loin Chop
Braise, Panfry, Broil

Kidney Chop
Braise, Panfry

Top Loin Chop
Braise, Panfry, Broil

Butterfly Chop
Braise, Panfry, Broil

LOIN

Sirloin Roast
Roast

Boneless Sirloin Roast
Roast

Sirloin Steak
Braise, Panfry, Broil

Top Sirloin Steak
Braise, Panfry, Broil

SIRLOIN

Veal for Stew
Braise, Cook in Liquid

Ground Veal
Panfry, Broil

Cubes for Kabobs
Braise

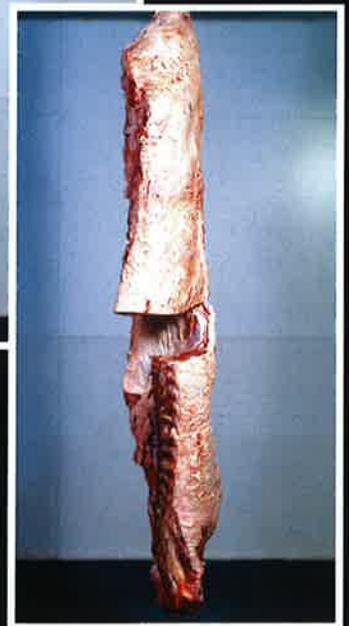
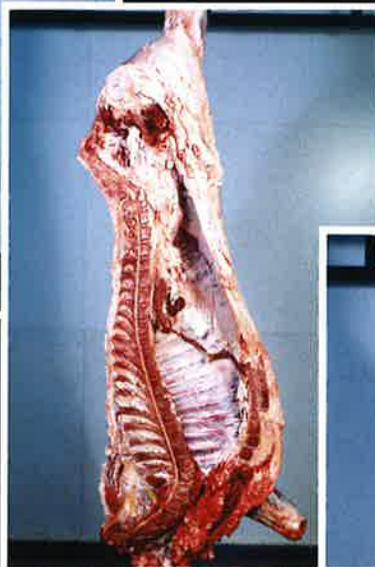
Cubed Steak
Braise, Panfry

OTHER CUTS

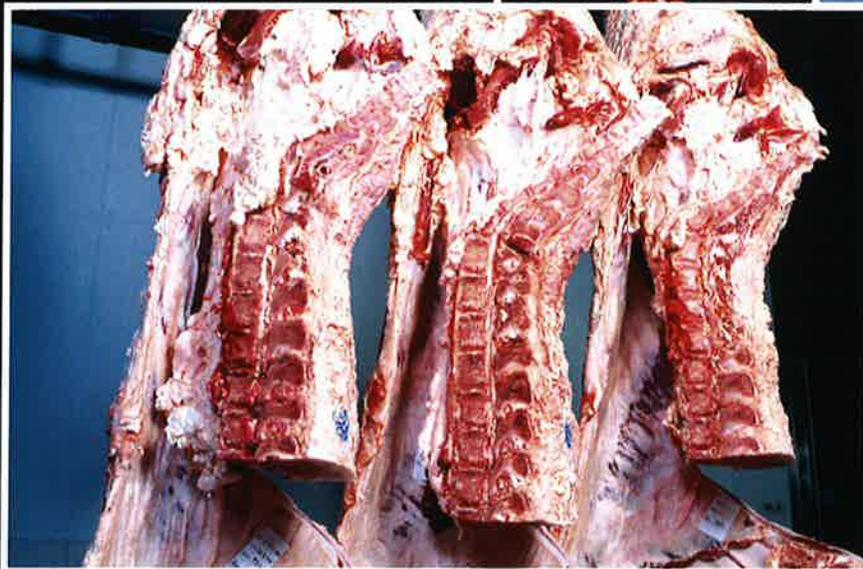
Beef Carcass Evaluation



Examine the rib eyes above; note the one on the left is smaller and has less external fat.



Examine the carcasses below and inspect the differences in the KPH.

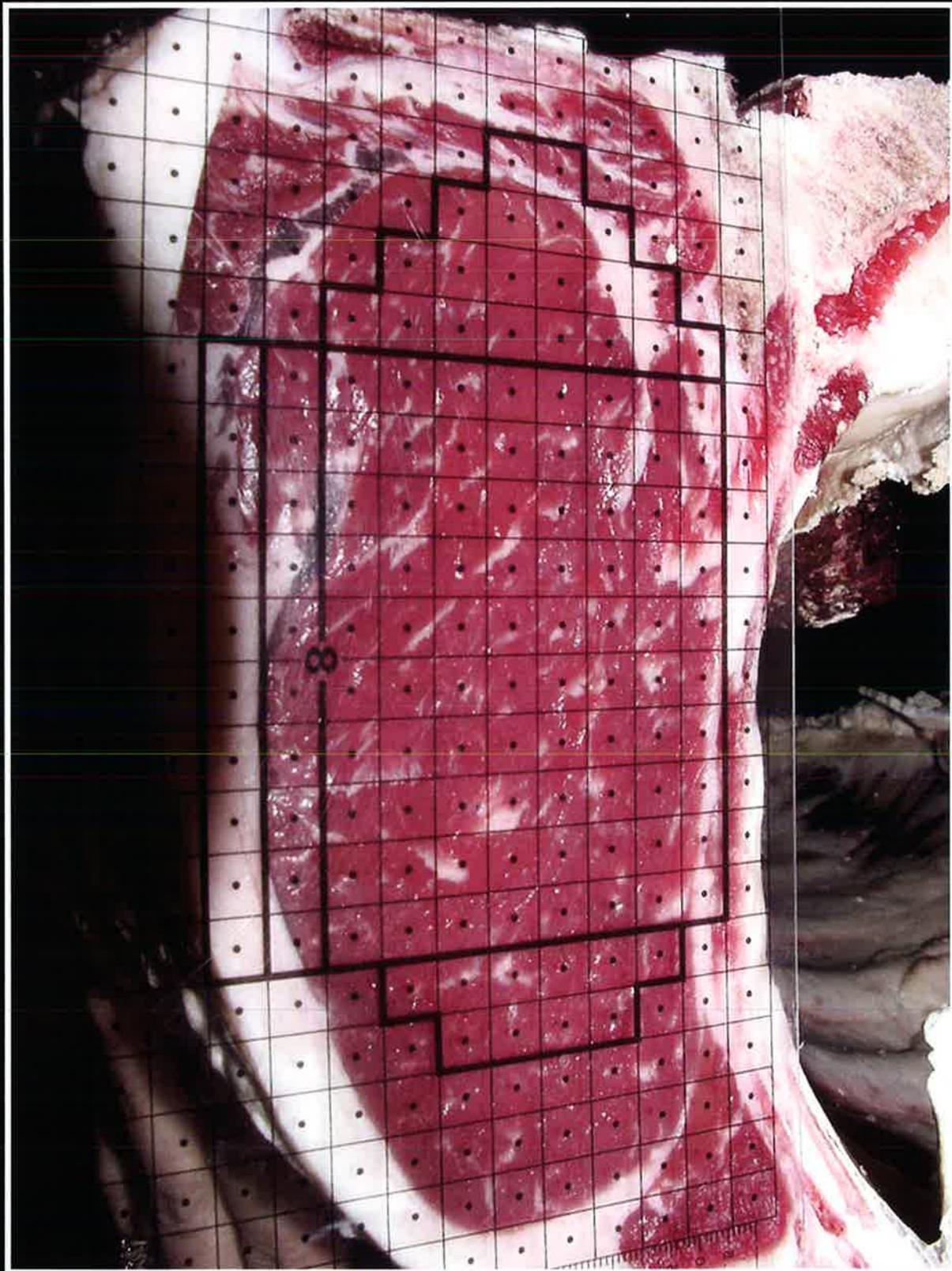


4.0%

2.5%

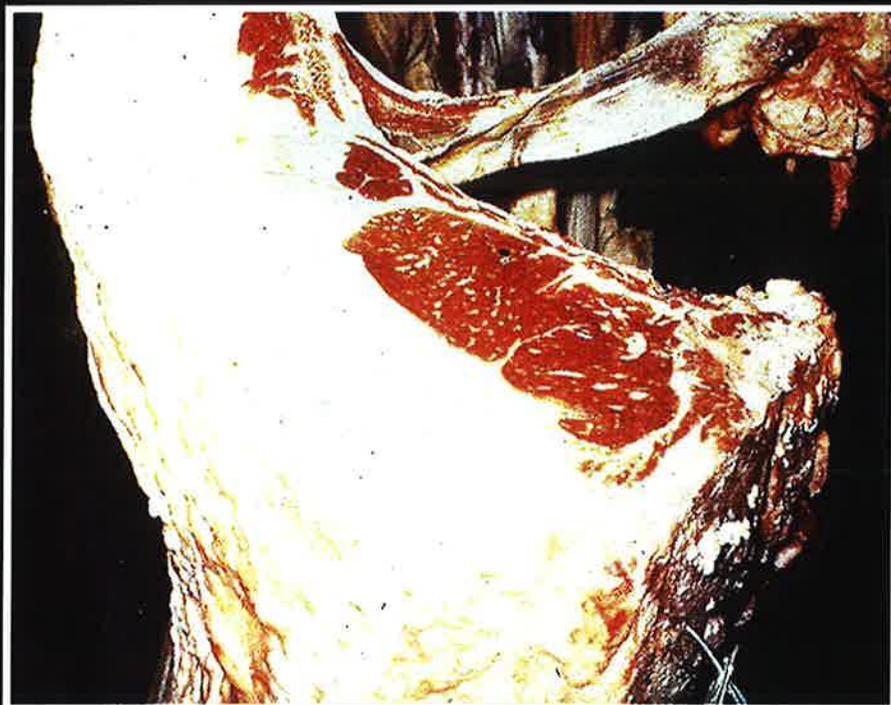
1.0%

Beef Carcass Evaluation—Measuring the Rib Eye Area



This “Choice” rib eye measures 13.0 sq. in.

Beef Carcass Evaluation—Factors of Quality and Yield



<<<

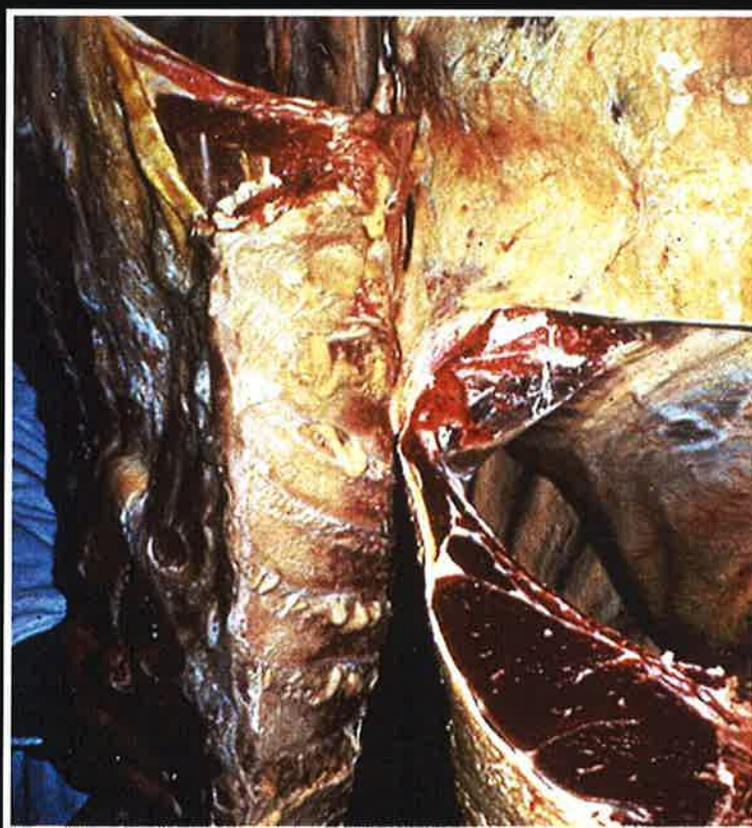
High-quality carcass with excessive fat cover

>>>

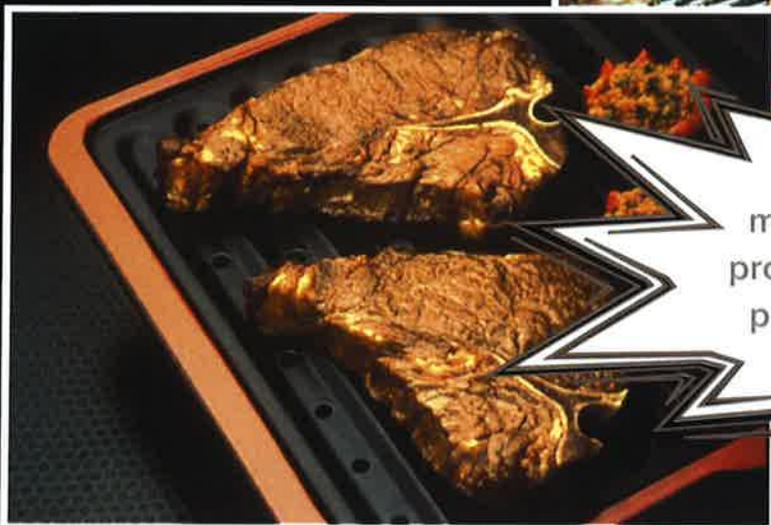
Low-quality
“dark cutter” carcass

The dark muscle color in this picture is representative of a “dark cutter.” Carcasses that are classified as dark cutters tend to have a higher pH. A higher pH can lead to a metallic (less desirable) flavor and a shorter shelf life (because the increased pH allows for more bacterial growth).

For more information see “Suggestions For Minimizing Dark Cutting Incidence” in the *Marketing* chapter.



Consumers will not accept anything less than safe, high-quality, and wholesome food products.



As a cattle producer, make the commitment of producing wholesome beef products for meeting the consumer's demand!

Choose the Proper Injection Site

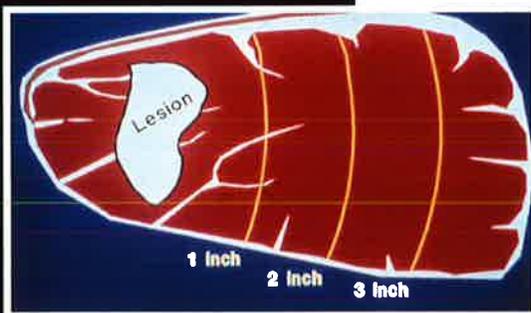
>>> Injection Site Blemishes Are Costly



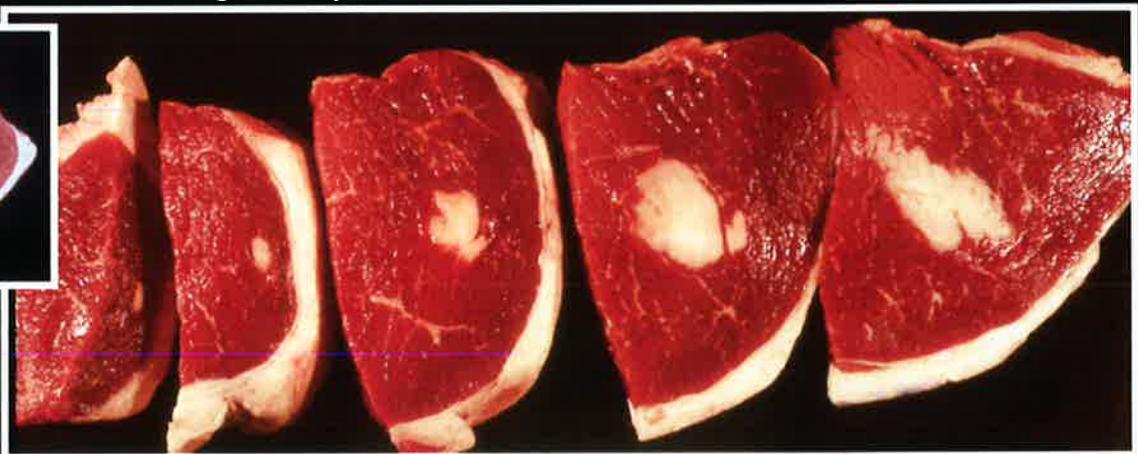
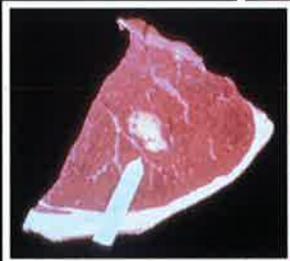
>> Injections are not the only sources of medications <<

Be sure to record all medicated feeds with a withdrawal time on your treatment record form.

Choose the proper injection site (the blue triangular area as indicated in the diagram to the right).

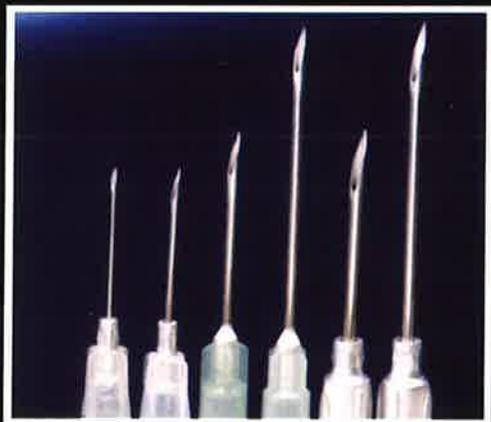


Lesions resulting from injections may negatively impact meat tenderness within a 3-inch area surrounding the injection site.



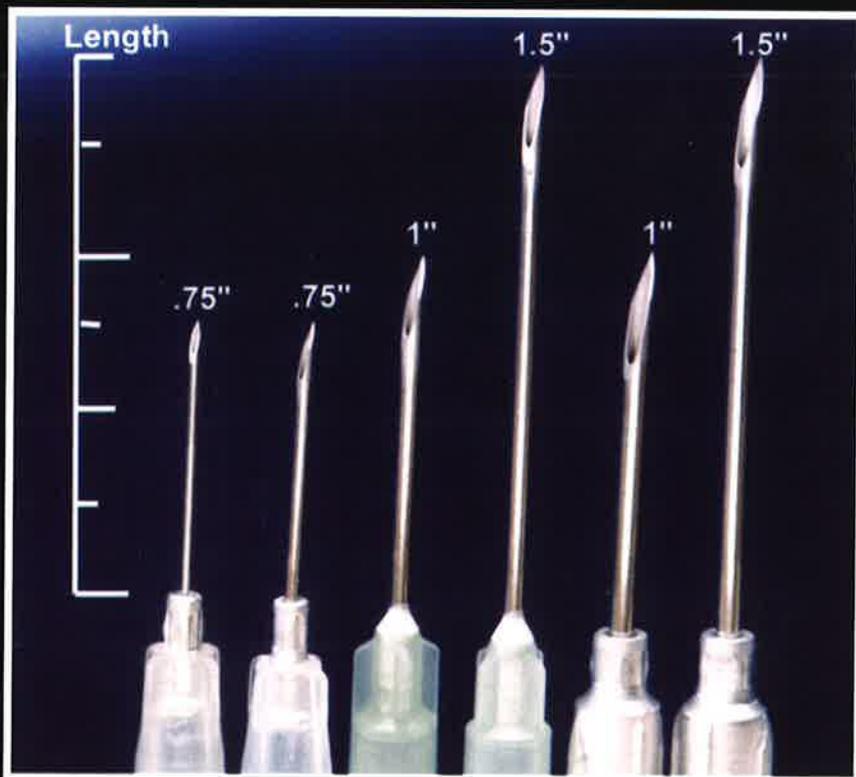
Injection site lesions like this one, which resulted from an intra-muscular injection, cost the beef industry \$7.05/head.

Needles Used for Administering Injectable Medications



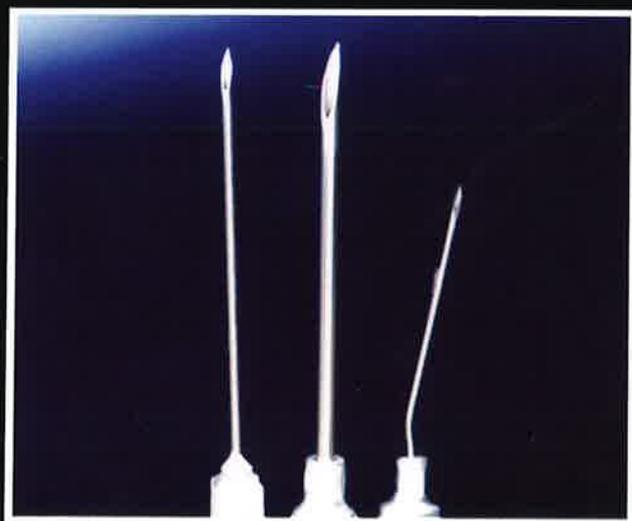
Actual size

Choose the correct needle and appropriate injection technique.

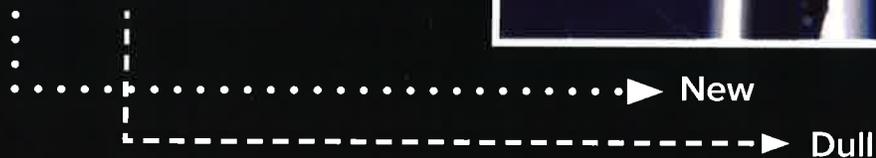


Gauge 23 20 18 18 16 16

Never use a dull or bent needle.



New Dull Bent





The items and information presented in this **Color Photos** section were:

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