

**The following information is from Iowa State University Extension Beef Program Specialist Denise Schwab**



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## **1. Feeding 4-H Calves**

Getting 4-H calves off to a good start is critical for success in the 4-H beef program. It takes some planning to determine your feeding program goals. Here are some tips to help successfully feed your market beef animal.

First, estimate the final market weight you would like your animal to weigh at show time, and calculate the number of days between beginning weigh-in and show date. Using your animal's beginning weight, calculate the average daily gain he needs to meet your end weight. Remember that this is the goal for the entire feeding period, and they need to gain a little more in the early part of the feeding period because their gain will slow as they get heavier and the weather gets hotter.  $(\text{End Wt} - \text{Beg. Wt})/\text{days} = \text{Average Daily Gain}$

Second, it is best to work with a nutritionist to develop rations based on your expected gain and feedstuffs you have available. A general guideline is that grower rations are about 50-55 Mcal/lb NEg and finishing rations are about 55-60 Mcal/lb NEg. The protein requirements for calves are about 12-14% depending on the stage of production and gain. How much will a calf eat? That also depends on his weight and the ration, but a good rule of thumb is that a calf will eat 2.5% of his body weight in dry matter each day. Young calves will eat a little more and heavier cattle will eat a little less. For example, a 600 pound calf will eat 15-18 pounds of dry matter (2.5-3% of body weight) and a 1000 pound calf will eat 20-25 pounds of dry matter per day (2-2.5% of body weight).

A few other tips:

- change rations gradually over several days, and never more than about a half-pound increase over a couple days.
- always provide plenty of fresh, clean water. Cattle will drink 8-10 gallons of water in the winter and 20-25 gallons in the summer.
- feed twice a day to keep the feed fresh.
- feed at the same time every day to keep them on schedule.

- feed animals individually if possible to ensure each animal gets their fair share of feed.
- consider using implants and feed growth promotants such as Bovatec or Rumensin.

Finally, keep your animal healthy by vaccinating as needed and providing a clean, comfortable environment free from drafts and protected from the wind, snow, rain and sun. The more comfortable your calf is the more he will eat and the faster he will grow!

## **2. The Ruminant Digestive System**

Why can cows, goats and sheep eat grass and other farm animals can't? Did you know that beef cattle have a different type of digestive system than swine or chickens? Rather than a small stomach like you have, a cow has a very large stomach with four parts call the rumen, reticulum, omasum and abomasum. Each of these compartments is responsible for helping to digest feed such as hay and corn cobs.

The digestive system has five functions; food intake, storage, digestion, absorption, and elimination of waste.

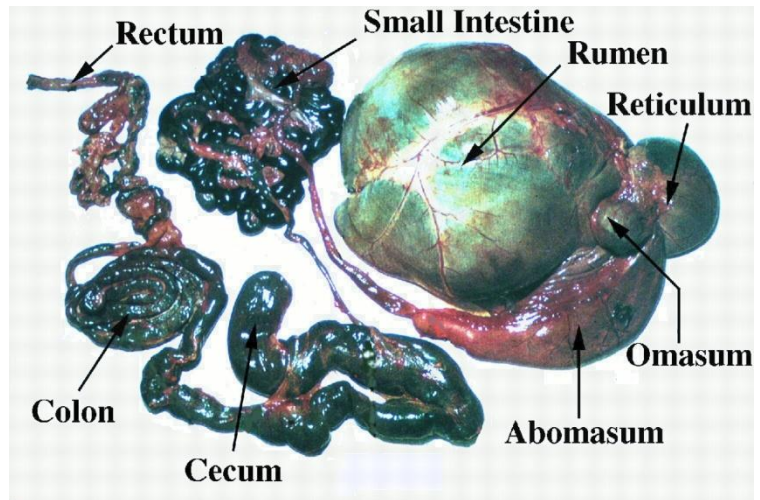
As the food moves through the digestive tract all feedstuffs are broken into smaller and smaller units so they can be used or eliminated. Much of this "breakdown" is done by the microbial pollution (bugs) in the ruminant's stomach. Normally, about four days are required for feed to pass through the digestive tract of ruminants.

Remember that major nutrients are not made by a beef animal's body and must be provided daily by you in the form of pasture, forage, hay, grain mix or supplements. If the right combination of nutrients are not provided, cattle develop deficiency symptoms like slow gains, weight loss, hair loss, brittle bones or many other potential problems.

### 3. The Digestive System

The ruminant digestive system consists of the mouth, esophagus, four-compartment stomach (rumen, reticulum, omasum, abomasum), small intestine and large intestine.

The first part of the digestive tract is the **mouth**. This is where feed enters the digestive system and is broken into small pieces by the teeth. Cattle have no upper incisor or canine teeth, so they depend on the dental pad in front of the hard palate, lower incisor teeth, lips and tongue to take food into their mouths. Chewing is the first step in processing the feed. This is no small task as the cow makes 40,000 to 60,000 jaw movements per day as it chews and rechews regurgitated feed.



Chewed feed then passes down a 2 ½ to 3 foot tube called the **esophagus** which carries the food from the mouth to the stomach.

The function of the **stomach** is to digest feed. Animals such as the dog, cat, chicken, pig and man have a simple stomach. Cattle, sheep and goats have a ruminant stomach. The simple stomach animal can digest only food that is low in fiber. Ruminants have digestive tracts with a four-compartment stomach. This very specialized stomach allows the beef animal to take coarse feeds such as hay and pasture and turn them into beef. You'll learn more about the ruminant stomach next month.

The next stop in the digestive process is the **small intestine**, a 130 foot-long, 2 inch-wide tube. As the feed enters the small intestine, it mixes with secretions from the pancreas and liver which elevate the pH from 2.5 to between 7 and 8. This higher pH is necessary for enzymes in the small intestine to work. These enzymes break down any remaining proteins to amino acids, starch to glucose, and complex fats into fatty acids. Absorption of these nutrients occurs in the lower half of the small intestine. The intestinal wall contains numerous "finger-like" projections called villi that increase the surface area of the intestine to aid in the absorption process.

The cecum, colon, and rectum make up the rest of the digestive tract. They are collectively referred to as the **large intestine**. At this junction is the "blind gut" or cecum. It has little function in the ruminant, but in the horse and rabbit it is the

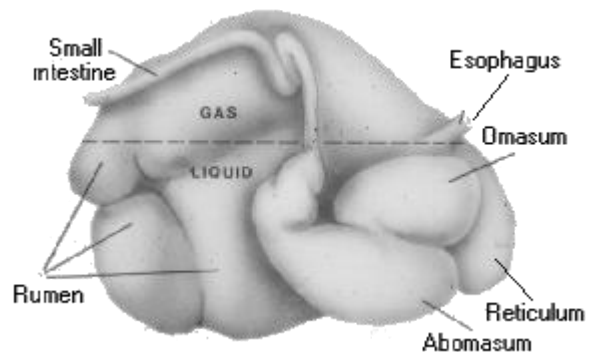
place where roughages are digested. The primary purpose of the large intestine is to absorb water from the digested feed. Bacteria living in the intestine work at digesting any feedstuffs which escaped digestion earlier. Between these bacteria and those which passed out of the rumen, up to half of the dry weight of the feces can be microbes.

It takes up to 4 days from the time the feed enters the mouth until the waste passes through the anus and is eliminated. This compares to 1 day for the pig.

## 4. The Ruminant Stomach

The beef animal is an amazing animal, belonging to the group of animals called "ruminants".

Each of the four compartments of the ruminant's stomach plays a different role in the digestion of the high fiber feeds. The **rumen**, also known as the 'paunch', is the largest of the four stomach compartments. In the mature animal the rumen may hold 40 to 50 gallons of water and feed. The rumen is sometimes called a "vat". Its purpose is to store large quantities of feed, keep the feed mixing by strong contractions, and provide a suitable environment for the bacteria and protozoa to live. This environment is kept agreeable to the microorganisms by maintaining a relatively constant temperature and pH. Here digestion of feed goes on by 500,000 billion bacteria and 50 billion protozoa. These microbes break down fiber into volatile fatty acids (acetic, propionic, and butyric acids). These volatile fatty acids are absorbed through the rumen wall and provide up to 80 percent of the total energy requirements of the animal. They are absorbed by thousands of "finger-like" projections lining the bottom and sides of the rumen wall. Rumen microorganisms also convert components of the feed into the essential amino acids, the B vitamins, and vitamin K. Finally, the microorganisms themselves are digested further in the digestive tract.



The next compartment is the **reticulum**. This compartment, also known as the 'hardware stomach' or 'honeycomb', is located just below where the esophagus enters the stomach. The muscles of the rumen and reticulum work together to move the feed around and break it into smaller pieces. The reticulum helps bring boluses of feed back up to the mouth for rechewing. After the feed is rechewed it is swallowed again and goes back into the rumen. This process is called rumination or sometimes "cud chewing". The reticulum also 'catches' heavy foreign objects that are accidentally eaten. A condition known as "Hardware Disease" may occur if a metal object such as wire or a nail is swallowed and punctures the reticulum wall. This condition may prove deadly for two reasons. First, the bacteria and protozoa can contaminate the body cavity resulting in peritonitis and second, the heart and diaphragm may be punctured by the object.

The third compartment is the **omasum**. This compartment, also known as the 'manyplies', consists of many folds or layers of tissue that grind up feed and remove some of the water. It looks like the pages of an open book and can have up to 100 of these folds. These folds have small papillae on them which absorb the volatile fatty acids that were not absorbed through the rumen wall. Water and electrolytes such as potassium and sodium are absorbed here as well.

The fourth compartment is the **abomasum** or "true" stomach as it is called because it functions in a very similar way to the stomach of a man or pig. It contains hydrochloric acid and digestive enzymes that break down food particles before they enter the small intestine. The abomasum also contains many folds to increase its surface area, and to be in contact with the large amounts of feed passing through it daily. The walls of the abomasum secrete enzymes and hydrochloric acid. The pH of the digested feed coming into the abomasum is around 6.0 but is quickly lowered to about 2.5 by the acid. This creates a proper environment for the enzymes to function. The chief digestive function of the abomasum is the partial breakdown of proteins by the enzyme pepsin.

## 5. Young Calves

The digestive tracts of calves are more like humans than cows. They have no functioning rumen with bacteria and protozoa. In a young calf (1 month or less), the abomasum is the largest compartment of the stomach. It makes up approximately 50 to 70% of the total stomach area.

When the calf suckles from the dam or a bottle, the milk bypasses the rumen and reticulum by going through the **esophageal groove**. During the suckling process, impulses from the brain send messages to the esophageal groove, causing the sides of the groove to curve upward forming a tube. This allows a direct flow of milk into the abomasum. At this point, the enzyme rennin is secreted from the walls of the abomasum, causing the milk to coagulate or curdle. This slows the passage of milk through the abomasum to allow ample time for the milk to be digested.

As the calf gets older and starts to consume grain and hay, the rumen begins to develop. This growth is due to the volatile fatty acids produced by the digestive action of microorganisms in the rumen. This also stimulates the growth of the papillae which are developing. By the end of the fourth week, the calf should be able to utilize grain and quality hay to a large extent. At eight weeks of age, the abomasum comprises only 30% of the total capacity of the stomach, and only 9% when the stomach reaches full mature size.



## 6. Basic Nutrition

The basics of nutrition are similar for humans and animals, so I'm going to use the food pyramid to help you learn about basic beef nutrition. The basic nutrients required for animals are water, protein, carbohydrates, fats, minerals and vitamins.

The biggest wedge (orange) of the pyramid is carbohydrates. Carbohydrates provide energy for maintenance, growth, and exercise. Sugars and starches are carbohydrates. Grains such as corn, oats, wheat, and milo contain a lot of sugar and starch. Cellulose is one more of the complex carbohydrates, and is provided by grasses and hays.



The next two wedges of the pyramid are water (blue) and protein (green), because they are needed in larger amounts than vitamins and minerals. Water is not necessarily a nutrient, but is essential for life. Most animals' bodies are about 2/3 water. Without water many bodily functions shut down. Water is needed for digestion of feeds, movement of nutrients to body cells, removal of waste products, joint lubrication, and cooling of the body. Animals can live longer without feed than without water! Water needs to be fresh, and animals should have as much water as they like.

Proteins are broken down into amino acids which are the building blocks of muscle, internal organs, bones, and blood. Protein is also needed for hair, hooves, skin and many other body parts. Some amino acids must be fed, while others can be produced within the animal's body. Excess protein is utilized as energy. All feeds have some protein in them, however we classify the following feeds as high-protein feeds; soybean meal, corn gluten feed, corn distillers grain, cottonseed meal, linseed meal. Often times alfalfa hay is also fed as a protein source.

Vitamins (red) are also critical for animal nutrition, however they are needed at a much smaller level. Vitamin A is needed for healthy eyes, nasal passages, and lungs. Vitamin D is necessary for strong bones and healthy blood. Vitamins are often provided as a supplement or mixed in a commercial protein supplement.

Minerals (purple) are needed to build bones and teeth and support life processes. Calcium and phosphorus are called macrominerals because they make up the largest percentage of minerals in the animal's body. Minerals that are needed in very small amounts are called trace minerals or micro-minerals.

Some trace minerals are copper, iron, zinc, and iodine. Minerals are often provided as a supplement or mixed in a commercial protein supplement.

Fats and Others (yellow) also provide energy for movement and body heat. Fats are needed to help digest certain vitamins. Many diets contain enough fat so it may not be added. However some hog diets do add fat for additional energy. Some also add fat to the ration to reduce the dustiness of a ground feed. Most fats are either oils like soybean oil, or animal fats.

## 7. Beef Grades

Every market steer is evaluated for its end product using the grade standards for quality and yield as set by the U.S. Department of Agriculture (*USDA*).

**USDA Quality Grades**—Quality grade in young cattle is basically determined by the total amount of intramuscular fat, or *marbling*, in the ribeye, but it is difficult to predict in a live animal. The quality grades for young cattle are Prime, Choice, Select, and Standard. Your goal for your steer should be USDA Choice Grade. The rule of thumb: A steer that possesses a uniform degree of finish, measured at 0.35 to 0.45 inch of fat over its rib cage, is likely to grade Choice.

**USDA Yield Grades**—Yield grades are used to estimate carcass cutability or percent lean yield. Cutability is the percentage of boneless, closely trimmed retail cuts. Basically, less fat and more muscle equals higher cutability. Yield grades are YG 1, 2, 3, 4 or 5, where USDA Yield Grade 1 is much leaner than USDA Yield Grade 5. Four measured factors are used to formulate yield grades: fat thickness, ribeye area, carcass weight, and kidney, pelvic and heart fat. Fat thickness (FT) is measured between the 12th and 13th ribs, and is the major factor when figuring yield grades. The ribeye area (REA) is measured using a grid and is taken between the 12th and 13th ribs. Ribeye areas are measured in square inches and an average 1,200-pound steer has a ribeye area of about a 13.2 square inches. The hot carcass weight (HCW) is the weight of the carcass after harvest. Light and heavy carcasses both are price-discounted severely. An average dressing percent for slaughter steers is 63.5 percent. Multiply the weight of a live steer by the dressing percentage to get the resulting hot carcass weight (1,300 pounds x 63.5 percent = 826 pounds). The final factor is kidney, pelvic and heart fat (KPH). This is a measurement of the internal fat surrounding vital internal organs. KPH usually ranges between 2 to 3 percent.

## 8. Feeding Suggestions

An adequate amount of a properly formulated ration is essential to develop the genetic potential of show cattle. You need to be familiar with the basics of nutrition, nutrient composition of feeds, digestion and diet formulation.

### Nutrients

*Nutrition* is the process by which animals consume, digest, absorb and use their food for either maintenance, growth, fetal development or milk production. Protein, minerals, vitamins, water, carbohydrates and fat are *nutrients*.

### Nutrient requirements

The amount of each nutrient needed by cattle have been determined by years of research, and are published by the National Research Council. Measures of energy are expressed as percent TDN (Total Digestible Nutrients) or as NEM (Net Energy of Maintenance) and NEG (Net Energy of Gain). Both are measured as Mega calories (Mcal) per pound or 100 pounds of feed. The dry part of a feed, not the moisture, contains the nutrients. To standardize values, nutritionists usually adjust nutrient requirements and feed composition to a complete dry matter basis. It is important to know the basis on which nutrient values are expressed when you are reviewing information and making comparisons.

### Types of Feeds

Types of feeds used in rations are classified as grains, roughages, protein, concentrates, minerals, vitamins and additives.

**Grains**—Feeds high in energy will fatten cattle. *Corn* is the best fattening grain because it is more consistent in nutrient content and processing properties. *Oats* are excellent for growth and development of steers or heifers. Energy density of the diet, not the type of feed, is the main factor controlling rate of gain and degree of growth and fattening. Lean tissue development is maximized when daily rates of gain are less than 2.25 pounds. Fattening is increased when rate of gain increases above 2.25 pounds.

**Protein supplements**—Feeds such as cottonseed meal, soybean meal and linseed meal increase the protein content of the diet. Young, lightweight cattle need higher concentrations of protein in their diets than older, heavier cattle. Adequate levels of protein are critical for digestion, maintenance of feed intake and lean growth, but the feeding of excess protein is expensive, can cause more heat stress and may result in more digestive problems. Urea can substitute for natural protein in high corn diets for heavy cattle (greater than 800 pounds).

**Roughages**—A small slab (3 inches thick or less) of medium-quality grass hay daily will help keep calves on feed by reducing the chances of digestive upsets. In finishing diets, a small amount of hay is recommended for the physical properties it adds to the diet and not its nutrient contribution; thus, medium quality hay works better than poor or excellent quality. Hay is your insurance measure when feeding cattle. At the first sign of any digestive problems, increase hay while reducing concentrate. Once the problem is corrected, gradually decrease hay while increasing concentrate, but do not try to eliminate all hay,

because this greatly increases the likelihood of nutritional ailments of *acidosis*, *bloat* and possibly *founder*. Hay should be free of mold, dust and bad odors. Alfalfa hay is nutritious but increases the odds of bloat.

### **Supplements and additives**

**Vitamin A**—Feedlot cattle require 1,000 International Units (IU) of vitamin A per pound of feed. Because it is inexpensive and subject to loss during storage, vitamin A is typically added to the diet. Vitamin A toxicity can result when vitamin A is fed at 20 to 30 times the requirement.

**Vitamin D**—Cattle that are outdoors and exposed to sunlight receive ample vitamin D.

**Vitamin E**—Vitamin E requirements are not well established, but are considered to range from 5 to 30 IUs per pound of feed. Because of its antioxidant properties, higher levels of vitamin E are known to reduce sickness in receiving cattle, decrease stress from toxins, and improve meat color and shelf life of retail case beef.

**B-Complex vitamins**—These vitamins are normally *synthesized* by rumen microbes in adequate amounts and do not need to be added to the ration.

**Minerals** —Minerals are required for structure (hooves, bones and teeth) and regulation of physiological processes in the body. High-grain diets are deficient in calcium, salt and certain trace minerals. Feed-grade limestone is a good source of calcium; dicalcium phosphate is a good source of calcium and phosphorus. Adequate copper, zinc and selenium are required for good health. Salt should be available free-choice at all times.

**Antibiotics** —Antibiotics such as Aureomycin, can prevent some feedlot stress problems. This low-level feeding will help control low-level infection, but has little effect on increasing weight gain. It is important not to use antibiotics too close to the time of slaughter. Follow instructions and withdrawal times for the product used.

**Growth promoters**—Growth implants increase the rate and economy of gain. Because implants tend to reduce fat deposition and increase lean muscle growth, the carcass quality grade may be lowered very slightly. Implants must be used according to the manufacturer's recommendations; various restrictions exist on the time of slaughter after implanting.

**Ionophores**—Several feed additives, collectively referred to as ionophores, improve feed efficiency when added to the diet. In addition to improving feed efficiency, the products vary in their capacity to control acidosis, bloat and coccidiosis. An ionophore is definitely recommended in show steer diets. Some ionophores are extremely toxic to horses, so feed only to cattle and at the rates recommended for the product used.

**Buffers**—A buffer such as *sodium bicarbonate*, can be useful during the transition period from forage to grain diets or following a bout of acidosis and off-feed. Since cattle produce enough natural buffers once they become adjusted to a diet, feeding a buffer all the time may decrease feed intake (because it is not palatable) and can increase the incidence of *urinary calculi*.

**Direct-fed microbials and enzymes**—Well-fed and well-managed cattle probably will not benefit from the addition of bacterial, fungal (yeast) or enzyme products to their diets. These additives aren't harmful to the animal but they are costly. Cattle normally have most of the enzymes and microbes they need unless they have been starved, have had acidosis or have been treated with antibiotics or other drugs that kill or depress *rumen microbes*. In such instances, targeted use of microbials may be effective.

**Commercial show additives**—There are more products promoted for show cattle than you can count. Many have catchy names and good-sounding claims. They contain everything from nutrients such as protein, fats, vitamins and minerals to enzymes, yeast, bacteria, mined earth products and unidentified stimulants. It is wise not to use any of these products until you recognize a need. Remember that the diets formulated by top feed manufacturers are designed by professional nutritionists to be complete. Adding extra minerals, vitamins, fat, etc., can actually unbalance the diet and decrease performance!

## 9. Starting cattle on grain diets

Feed new calves a good-quality grass hay free-choice. Start by feeding 0.5 percent of the animal's weight in concentrate feed. If a "starter" feed is used, it can be increased fairly rapidly to a point of full feed in 10 to 14 days. If a high-energy feed (grower) is being used, gradually increase the amount so that full feed will not be reached for 2 to 3 weeks. Do not limit hay until the cattle are safely on full feed.

### Types of diets or rations

Most commercial feed manufacturers have three major basic feed mixes: starter, grower and finisher rations. These mixes are fed at different stages of growth and development as cattle mature. The beginning ration is the starter, receiving or preconditioning mix. A *starter* mix is low in energy, high in roughage and fiber, and high in protein relative to the energy content. It is commonly medicated with antibiotics or *coccidiostats*. A high-roughage mix is bulky and fills up the rumen, preventing young calves from overeating grain while the rumen bacteria adjust from forages to grain diets. A starter ration would normally be used only for the first 2 to 4 weeks before being switched to a grower ration.

A *grower* mix is exactly what the name implies, a diet for cattle that are in a growing stage of 500 to 900 pounds. The mix should have at least 12 percent protein, moderate fiber and moderate energy content. The moderate energy content will properly develop the frame and muscle and help prepare the growing steer for a finishing ration. When limited to 1 to 2 percent of the animal's live weight, grower diets are good for developing show heifers. Breeding heifers should receive additional amounts of forage in the form of hay or pasture. Large-framed, later maturing steers need to be moved to a finishing diet 100 to 150 days before show, or when they weigh 800 to 1,000 pounds.

A *finisher* ration is the last feeding stage. Finishing diets are high in energy, usually at least 50 percent corn. Finishers should be fed carefully, particularly at the beginning. Slowly move calves to a full finisher ration by adding this mix to a grower diet in one-fourth portions every 7 to 14 days. Following this recommendation should enable you to change to an all-finisher ration over a 4- to 6-week period. Realize that adding much more corn to a finisher is asking for trouble.

Breeding heifers need to have a moderate degree of body condition (less than that of steers). Excessive fattening of heifers at young ages diminishes future milk production potential.

## 10. Feeding Management

**Manure observation**—Each animal differs in its capacity to consume and digest feed. The recommendations for feed intake based on percentage of body weight are simply general ranges. A better way to determine the optimal amount of feed for each steer is to observe its droppings. A consistent, firm manure patty that does not splatter when dropped to the ground indicates that the steer is on full feed with the proper amount of concentrate. A watery stool (scours) usually means that the animal is taking in too much energy, and either the amount of feed or the energy level (corn) portion of the ration should be reduced. If this problem persists, severe acidosis usually results, and the steer goes off feed. If the droppings are too firm and dry, the steer needs more feed or a higher energy concentration (more corn) in the ration.

**Daily feeding routine**-Cattle should be fed twice daily, 12 hours apart for best gains. Feeding cattle in groups reduces labor and increases intake, however, you must observe each steer closely, because individual feeding varies. Some steers are dominant eaters and will eat another steer's calculated portion, which results in some overfed and some underfed individuals. Some steers are slow eaters and when fed together with fast eaters uneven portions are consumed. Individual feeding requires some time and labor, but ensures that the proper amount is being consumed.



## 11. Metabolic disorders

Poor nutrition and feeding management can cause health problems referred to as “metabolic disorders.” Although these are not diseases, they still can cause severe health problems.

**Acidosis**—Acidosis is when the rumen microbes shift and produce lactic acid. Lactic acid is a much stronger acid; when it accumulates, it causes acidosis. This acidosis causes loss of appetite, decreased rumen activity, rumen ulceration, liver abscess, founder and even sudden death. Mild acidosis is first observed as erratic intake of feed and possibly mild bloat, followed by scouring. Acidosis, sometimes referred to as “grain overload,” usually results from introducing grain too rapidly into the diet of animals coming from forage diets. The types of microbes that ferment forages are different from those that ferment grains. It normally requires 2 to 3 weeks to allow for the shift in microbial populations of the rumen and a safe transition from forage to grain diets.

To prevent acidosis, start grain feeding slowly. Be consistent in the amount of feed fed by weighing the feed. Make feeding changes gradually. Do not give extra feed to make up for the missed meal. Avoid dust and fines (very small particles) and limit feeds such as molasses that are rapidly fermented. Feeding hay will provide some measure of protection. Feed one of the more effective ionophore feed additives.

Because of the lost time and condition on cattle, it is important to prevent acidosis. Treatment involves an oral administration of antacid or buffering compounds such as sodium bicarbonate, together with intravenous administration of electrolyte solutions. This counters the acid effects and prevents further dehydration. Getting cattle back on feed following severe acidosis is just like starting on feed initially. Give lots of hay and little concentrate.

**Bloat**—Bloat occurs when gas accumulates and the animal is not able to belch it out. Signs of bloat are swelling high on the upper left side behind the ribs and in front of the hip bone. A popping-out away from the general contour of the body, which looks like a basketball high on the left side, is a definite sign of serious bloat.

To treat minor bloat, keep calves on their feet and walking, or drench with mineral oil. With acute bloat, calves also can froth at the mouth, fight for breath and go down in convulsions. A severely bloated animal may die a few minutes after it falls. As soon as you see acute bloat symptoms, call a veterinarian and administer the following treatments. Keep the animal walking, preferably uphill, with the head held up. A large stomach tube or 1/2-inch-diameter water hose can be passed through the *esophagus* (be careful not to enter the *trachea*). As the last resort (with acute bloat only), your veterinarian may puncture the animal's

distended rumen. The wound is hard to heal because of infection from the rumen contents.

The best preventive measure is to avoid feeds and management practices that encourage bloat. These include too many fines and dust, too much molasses, too much very high protein forage such as alfalfa or excellent grass hay and lack of any long-stemmed forage in the diet. A little dry hay that encourages cattle to salivate helps prevent bloat. Rumensin® mixed in rations is more effective in preventing minor bloat than other forms of ionophores.

**Scours**—Scouring from any cause leads to dehydration of the animal. Causes, prevention and treatment for scours resulting from acidosis have been discussed previously. Bloody scours may be caused by a severe case of internal parasites, bacterial infections or coccidiosis and should be treated with appropriate medication. It is important to keep pens, feeders and water troughs clean in an effort to prevent infections.

**Founder**—Eating too much grain, which would be expected to cause severe acidosis, frequently causes a condition known as founder. The animal's hooves grow rapidly and there is an increased blood flow to the hooves that causes them to become tender. This cripples the animal and severely reduces feeding performance.

**Urinary calculi**—Kidney stones, water belly or urinary calculi can sometimes affect steers but they usually are not a problem in heifers. The condition is caused by mineral imbalances and/or diets that are too alkaline. The problem is often observed in animals fed diets high in phosphorus within adequate calcium supplementation. Diets should contain 1.5 to 3.0 times as much calcium as phosphorus.

## 12. Handling the calf

It takes proper skills, patience and practice to correctly train a calf for show. It is important to work slowly and calmly during the early part of the training stage. Never work alone when first breaking cattle to lead. Always have a helper in case the calf becomes unruly. Start slowly. Try rubbing and scratching the animal while moving quietly. This should allow the calf to become familiar with your mannerisms. Begin scratching around the top (back) or tail head of the animal, not the head or face.



**Halter breaking**—The calf should be halter broken as early as possible to keep everyone and the calf from getting hurt. Place the halter on the calf and adjust it to fit correctly, the nose piece should be up over the nose just under the eyes. The halter should be moderately loose. Tightness can cause sores behind the ears. Allow the animal to drag the lead rope on the ground. As the calf walks, it will step on the lead rope and pull its head around. This should teach the calf to respond to pressure. The animal may be allowed to wear the halter and drag the lead rope for several days. Always remove the halter each evening. After the calf is broken to halter, do not leave the halter on unless the calf is tied or held.

**Training to stand**—To train a calf to stand when haltered, secure an inner tube to a post. Tie the calf to the inner tube. As the calf pulls back, the inner tube will stretch and as the calf comes forward, the inner tube will relax. The calf learns to stop the pressure on its head by stepping forward. Never leave the calf unattended when tying the first several times! It is also a good idea to place feed, hay and water in front of the calf to reward it for doing a good job.

**Training to lead**—When training a calf to lead, pull on the lead rope and then give slack and allow the calf to move forward. Do not apply continuous pressure. Always pull and then release the pressure as the calf responds. When the animal learns that the rope loosens when it walks, it will lead.

**Training for the show ring**—As soon as the calf starts to lead, begin daily exercise and practice proper show ring procedures. Daily exercise is important for both the condition of the animal and its response to you, the handler. Using a show stick with a blunt point on the end, teach the calf the use of a show stick by stroking its underside while it is tied. Stroke the animal, then place the foot in the correct place. After the calf moves its feet properly when tied, it is ready to be led and have its feet placed while you hold its halter lead. Begin by setting up the beef animal's front feet. Push the feet back with the end of the show stick and pull them forward with the hook. After the front feet are set squarely in line with the shoulders, set the back ones in the same manner. Slight backward or forward pressure on the halter lead also is useful in positioning feet. The feet should be set squarely under the calf. One leg should be under each corner of the body. The calf should appear natural in its stance. Teach the calf to stand in one place for 10 to 15 minutes to help it build stamina for the show ring. When a calf is

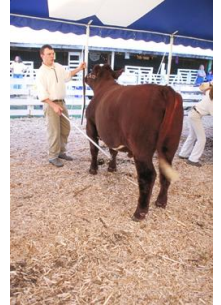
standing correctly, use the show stick to rub under the belly. The calf will associate standing still with getting its belly rubbed.

**Daily activity**—After the initial halter breaking, you should tie up your heifer or steer for a few hours each day. The animal should be rinsed off to remove dirt and encourage healthy skin and hair coat. Then, brush or blow dry the animal's coat to condition and train the hair. Walk the steer to develop familiarization and confidence between yourself and the calf. Practice showing the calf with someone acting as the judge. Walk the steer in a circle to simulate a show. For best exercise and relaxation, the calf should be turned into a large lot for the night. The more you work with your calf, the more effectively it will respond to feed, training and showing while developing the healthy skin and hair coat that proper grooming encourages.

### 13. Preparing for the show

Here are some tips for preparing calves for the show ring:

- Cattle are creatures of habit and have good memories. Develop a routine and follow it each day. For example, exercise the calf, show it by *setting it up* and make it stand properly; then brush and feed it last.
- Weigh the calf periodically to monitor its gain. Decide which weight class you will show your calf in, and shoot for that weight.
- To be a good showman, you need a well-trained calf. Teach the calf to stop and lead with its head up. A good daily practice is to pull the animal's head up to a stop so both front feet are placed squarely under the front end. Teach the calf to keep its top level and to lead and walk freely. Work often for several minutes at a time, rather than a few long, drawn-out periods.
- When training a calf or working and brushing hair, tie the calf to a high rail rather than placing it in a blocking chute. Working cattle in this manner tends to make them easier to handle and makes them more accustomed to strange movements at the show. Before washing the calf, remove dirt and manure from the hair with a comb or brush.
- Two weeks before the first show of the season, start handling the calves just as you will at the show. A good practice is to make some type of "tie outs" at home along a fence and tie the calves as you will at the show. The bedding should be the same type you will use at the show. Calves should be tied in the barn all day and exercised each morning and afternoon. Feed and water the calves just as you would at the show—twice a day out of the same feed and water buckets you will use at the show.



#### Show Box Supplies

Every show box needs the basic livestock supplies:

Brushes	Combs
Shampoo	Rinse or conditioner
Feed pans	Water buckets
Rags or towels	Short water hose
Extra halter or lead rope	Safety pins (for exhibitor number)
Show halter/ stick/ bat	Scissors/ clippers
Fan	Padlock
Fly spray	Magic Markers/pens
Small first aid kit	Extension cords
Your Fairbook!	broom, shovel, fork
Wash pants and footwear--boots	washing brushing
neck ties for cattle	electrical box with multiple outlets
electrical ties for securing cords away from animals	reach
other show supplies-adhesives, oil, grooming supplies	
FEED and HAY	

At least someone from your club should also have the “extras”:

Hammer, nails & staples

Screwdrivers

Wire

Pliers

Club signs

Some helpful hints to make a showbox more ‘friendly’.

- A sliding tray for small items prevents them from disappearing in the bottom of the box.
- Some clips or folders on the underside of the lid are great for storing the fair book, exhibitor number, or other important papers. It keeps them dry and out of the way of other things. Some combs may also be clipped on the underside of the lid for quick retrieval.
- Install coat hooks on the sides of your box for halters, ropes, cords or hoses. They are easier to grab and don’t get tangled up on the bottom of the box.
- Plastic crates work great for holding spray cans, bottles, shampoo, and other stuff. They are easy to pick up and take to your chute or grooming area, keeps all your supplies together, and is quick to put back away. They also keep the bottles from rolling all over the bottom of the box.
- Don’t forget a shovel or pitch fork to keep your stalls looking their best. But, remember safety first, so make sure you have a safe place to store those items.

## **Reduce the Stress**

No matter how many year’s your family has been in 4-H and exhibiting livestock, we all experience additional stress from fairs. A few basic pre-fair preparations can help to reduce some of the stresses we all encounter at the fair.

- Practice with the animals at home. Tie them up just like at fair, and remember to give them daily exercise. Practice showing them with other 4-H’ers or brothers and sisters. Have strangers come to your facilities so they get used to more people. Play a radio in the barn so they get used to a lot of noise. Practice handling the animals like a judge would. Practice grooming them also, so they are used to blowers, spray cans, and all the ‘stuff’ you will use on them at fair.
- Practice washing and drying the animals at home. It will get them used to the process, and also makes them cleaner for their first bath at the fair.
- Read through the fair rulebook in advance. Know the rules that apply to your exhibit. Also, highlight or mark the events and times of the activities you are involved with. Be sure to include times to help set up, clean the grounds, help with food booth, etc.
- Check all show needs well in advance, including clothes, boots, show supplies, extra safety pins, etc. Allow enough time to find and purchase needed supplies. Not all small communities carry youth size boots, clothes, or animal supplies!

- Remember that timing is everything! Know how long it will take you to get both your animal and yourself ready for the show. Know the show order and the approximate time that you will be in the show ring. Plan your time and time your plan! Reduce the stress by reducing the rush.

A little time spent on these things two or three weeks before fair, will make the fair experience more fun and enjoyable for everyone.

## 14. Understanding the Iowa 4-H Steer Test Evaluation

Participation in the Iowa 4-H Steer Test Program is the first step to better understanding the type and quality of cattle you produce. The Steer Test Program has provided you with valuable information to help improve your 4-H project. The next step is to understand the information you received and use it to make improvements next year.

The ranking of the entire contest is based on the formula for Retail Value per Day on Feed. The formula is:  $((\text{Hot carcass weight} - (0.55 * \text{On-test wt.})) * \% \text{ Retail Product} * (\text{Carcass price, } \$/\text{lb.}/0.68)) / \text{Days on Feed}$ . Let's look at what goes into this formula and what it tells us.

The first part of the equation,  $((\text{Hot carcass weight} - (0.55X \text{ on-test weight}))$ , is calculating the how fast the steer gained carcass weight. We know the carcass weight from the harvest information. That is the weight of the carcass after the internal organs and head have been removed. But our beginning weight was a live weight. That is like comparing apples and oranges. So we adjust the beginning weight by a factor of 55% to calculate a carcass weight from when they were weighed in December. Now we can calculate how many pounds of carcass the animal added between the December weigh in and the fair harvest date.

The second part of the equation, % Retail Product, is looking at how much meat can be sold from the carcass. Percent Retail Product is calculated by this formula =  $65.69 - (9.931 * \text{Fat cover, inches}) + (1.2259 * \text{Rib eye area, sq. in.}) - (.013166 * \text{carcass wt., lb.}) - (1.29 * \% \text{ Kidney, pelvic \& heart fat})$ . There are four measurements that are included in this formula; fat cover, ribeye area, carcass weight, and kidney, pelvic, heart fat (KPH). The rest of the numbers are called constants, and they are based on a lot of research to determine this formula. Notice that fat cover is subtracted from the constant, so the fatter an animal is, the lower the % retail product will be. The %KPH is also subtracted from the formula, so again, the fatter the animal the lower the % retail product. But look at the numbers these two measurements are multiplied by. Fat cover is multiplied by 9.931 and KPH is multiplied by 1.29. That means the fat cover is weighted about 8 times more than KPH in determining the % retail product. Carcass weight is also subtracted from the formula, but is weighted much less than either fat cover or KPH. That means heavier carcasses have less retail product, because slightly more of the carcass is bone than a smaller carcass. Finally, rib eye area is added to the formula, so the bigger the rib eye area, the more muscle and more total saleable meat is in the carcass.

The third part of the equation is,  $(\text{carcass price}/0.68)$ . The carcass price is the price per pound of carcass that the animal is priced at, including any yield grade or quality grade premiums. The 0.68 is because 68% is the average % retail



product of the beef industry. This is a way to compare the carcass price of your animal to the national average.

All three of these items together give us the retail value of the carcass, or the dollar value of the meat that can be sold from that carcass. Finally, all of this is divided by the days you have been feeding your animal. By using the value of the carcass divided per day on test, we can better calculate the profitability of the animal, since fast gain is an important factor in profitability. Using this formula we can account for 88% of the profitability of feedlot cattle!

You are also likely to hear some other terms related to beef carcass evaluation; cutability and quality. Cutability is referring to the amount of saleable meat in a carcass. Animals with large rib eye areas and low fat cover would be considered high cutability. In other words, there is a lot of saleable meat in that carcass. High quality carcasses are ones that have a high degree of marbling, or tiny flecks of fat in the rib eye muscle. Marbling is used to determine the Quality Grade of the carcass (Prime, Choice, Select, Standard). Marbling is also what makes beef tender, juicy and flavorful.

Now that you better understand the carcass evaluation formula, how can you use it to improve your 4-H project for next year?

What were the strengths of your animal?

What measurements were above the average for your county?

What measurements were in the top 15% for your county?

What were the weaknesses of your animal, where it was below the county average?

What measurements are based on the genetics of the animal?

What measurements are influenced by your care and management?

What type of animal will you select for your 4-H project this winter?

How will you feed, care for, and manage them differently for the next year?