MP520

Livestock Care Guidelines

University of Arkansas Department of Animal Science

DIVISION OF AGRICULTURE
RESEARCH & EXTENSION
University of Arkansas System

University of Arkansas, United States Department of Agriculture, and County Governments Cooperating

Contents

Introduction

The purpose of MP520, *Livestock Care Guidelines*, is to provide the minimum standards of care for livestock with respect to acceptable livestock management practices. This publication was developed from the expert opinion of its authors based on their extensive experience and available scientific information on livestock care, health and welfare. The intent of MP520 is to serve as a resource for animal control officers and law enforcement officials addressing neglect and cruelty of livestock by providing recommended minimum standards of care. It is not intended to serve as legal authority for prosecutorial activities. During the investigation of any specific animal cruelty complaint, the authors advise and encourage the use of a veterinarian in assisting with the evaluation and resolution of the complaint. MP520 should be used as a *guide only*.

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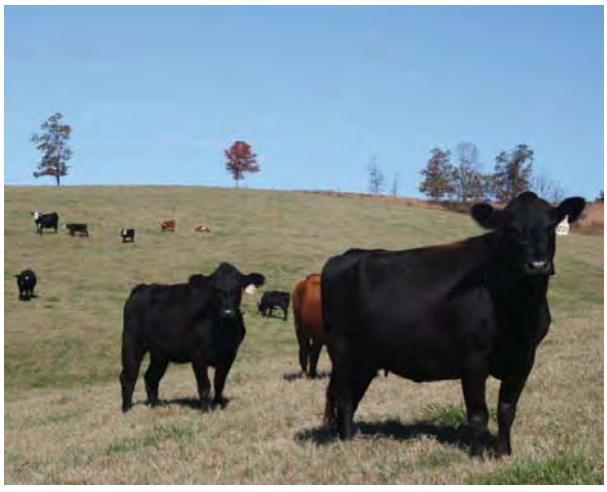

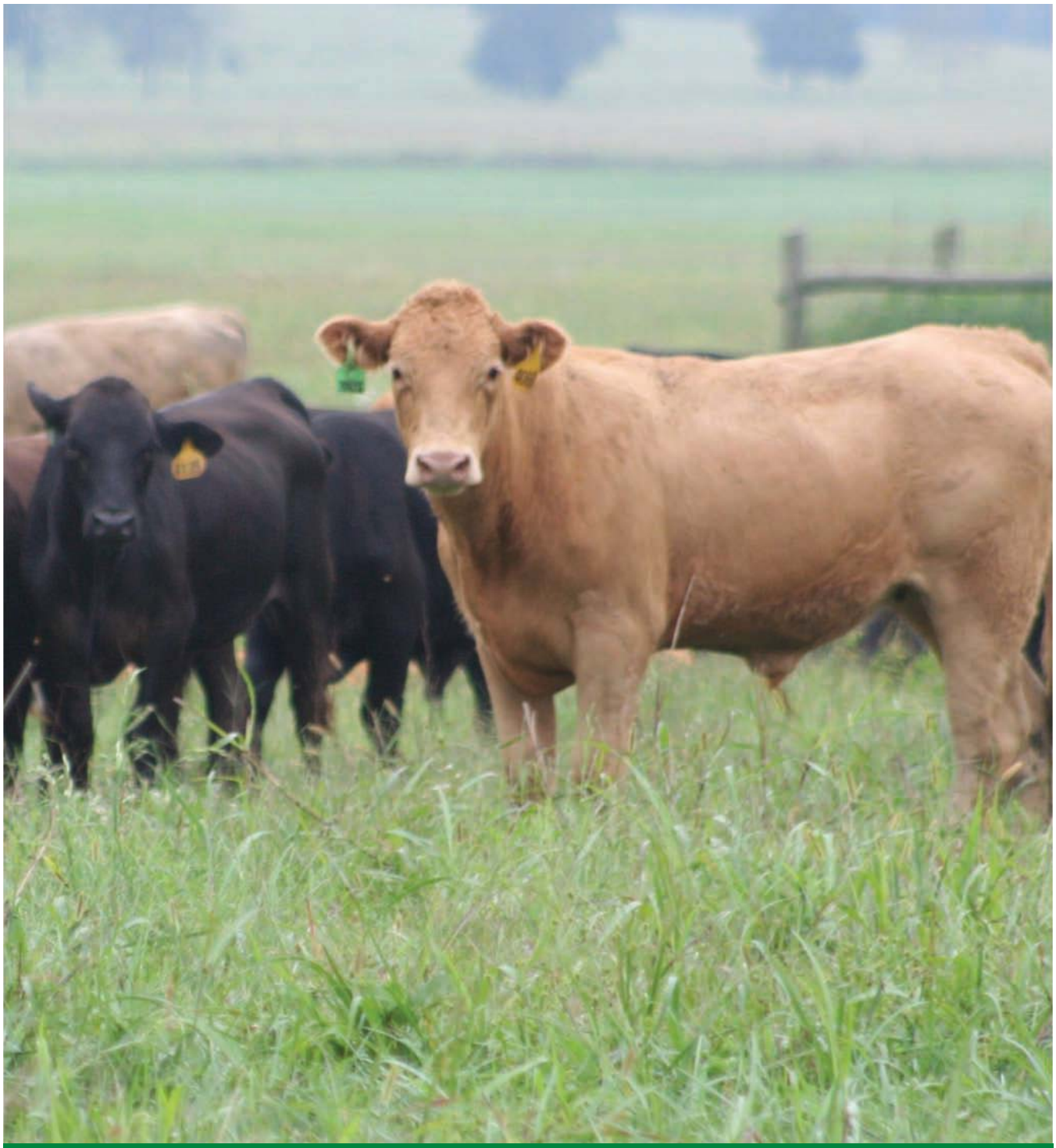

Chapter 1:
Grazing Animal Psychology, Behavior and Stockmanship

Grazing Animal Psychology, Behavior and Stockmanship

The ultimate goal of stockmen is to produce a safe, wholesome product to sell. To achieve this goal, stockmen must provide adequate nutrition, a safe environment for the animal to live, a planned health program and properly designed handling facilities to administer the health program for the safety of the livestock and the stockman. All of these elements require the movement of the animals. Stockmanship is the term we use to define the action of moving animals from one point to another. Low stress stockmanship is a new term being used for a common sense approach that has always had success. Success defined here means safety and welfare of the animals and humans that care for them. The secret to low-stress livestock handling is understanding innate animal behavior – why they react the way they do – and then using that knowledge to ask, not force, them to comply with the handler.

One problem of improper livestock handling is bruising. Bruising is caused by a physical blow and the escape of blood from damaged blood vessels into the surrounding muscle tissue. Bruising can happen at any time during handling or transportation and can vary greatly in size. It is therefore clear that to obtain a high quality meat product, it is necessary for animals to be stress and injury free during handling and transportation.

Stressed animals also incur a higher level of sickness. A stressed animal has a lowered immune system, leaving the animal highly susceptible to disease. The cost of pharmaceuticals used on livestock to combat stress-related effects can have a drastic impact on a producer's profitability. The major contributing factors to this stress are handling and transportation.

Another reason, financial profit aside, is that low-stress livestock handling is safer, not only for the animal but for the handler. Animal handlers are often injured or even killed when frightened, agitated animals run over them. The expense of paying hospital bills and workmen's compensation claims or replacing employees costs the meat industry thousands of dollars every year.

Psychology and Behavior of Livestock

In the animal kingdom, we can simplify species into two groups – *predators* and *prey*. Each group has general characteristics that define them. Predators are carnivores or omnivores, have eyes in front of their head and often hunt alone or in small groups. Prey animals are herbivores (grazing animals) characterized by eyes on the side of the head with a wide peripheral vision that allows for surveillance for potential predators. Prey animals also have evolved to form herds for protection and safety from predators – more eyes and greater numbers increase the odds for predator detection and defensive action toward single predators. Each group has distinctive behavior and psychological characteristics that define their body language. Prey animals instinctively recognize predator behavior, even from a predator species that they have never encountered. This instinct is essential for their survival.

Livestock are prey animals by this definition. There are a few unique differences between cattle, horses, sheep and goats, but the basic psychology and behavior to stimuli are the

same. Fear is the main emotion in livestock. Any little thing that looks out of place, such as a piece of paper blowing in the wind, may cause fear. Objects that make sudden movements are the most fear-provoking. In the wild, sudden movement is feared because predators make sudden movements. Prey species animals, such as cattle and horses, have sensitive ears, and loud noise may hurt their ears. Fear is the main emotion in a prey species animal because it motivates the animal to flee from predators. Fear-based behaviors are complex. Fear can cause livestock to flee or fight.

Animals also tend to make place-specific associations. Therefore, it is important that an animal's first association with something new is a good first experience. In all animals, both genetic factors and experience determine how an individual will behave in a fear-provoking situation. Fearfulness is a stable characteristic of personality and temperament in animals. Animals with high-strung, nervous temperaments are generally more fearful and form stronger fear memories than animals with calm, placid temperaments.

All livestock are herd animals, and they are likely to become highly agitated and stressed when they are separated from their herd mates. Isolation is a strong catalyst for psychological stress for livestock. During handling, isolated animals that become agitated and excited are likely to injure handlers or themselves. Many serious handling accidents have been caused by isolated frantic animals. If an isolated animal becomes agitated, other animals should be put in with it.

Applied Livestock Handling

A common misconception is that "low stress" must mean "no pressure." That is absolutely false. All animals respond to appropriate application and release of pressure. There are times when significant pressure must be applied to get the animals to move how and when you need. Pressure, used appropriately, does not cause long-term, harmful stress.

Understanding Flight Zone and Point of Balance

The point of balance is at the animal's shoulder. All species of livestock will move forward if the handler stands behind the point of balance. They will back up if the handler stands in front of the point of balance. Many handlers make the mistake of standing in front of the point of balance while attempting to make an animal move forward in a chute. Groups of livestock will often move forward without prodding when the handler walks past the point of balance in the opposite direction of each animal in the chute. If the animals are moving by themselves, leave them alone.

Flight distance is an important concept in livestock handling. It can be described as a circle of safety around an animal. When a person penetrates the flight zone, the animal will move away. A good stockman knows when to penetrate this zone and when to retreat so that the animals move quietly in the desired direction.

Make sure the animals can see you. Do not make sharp, loud noises. Do not rush the animals. Use cattle prods and other equipment as little as possible. And yes, try to think like a cow, sheep, goat or horse. Step out of the human world and become a prey animal. If you think like a prey animal, pretty soon you start getting the prey animal to think more like a human. A good handler understands two key principles: (1) flight zone – the "bubble" around an animal that, if invaded by a handler, will cause the animal to move away and (2) point of balance – the point, usually around the front shoulder, at which pressure in front of that point will cause the animal to stop or back up, and vice versa (Figure 1-1.) When a stockman is at the edge of the flight zone and properly balanced, only slight movements are needed to control the animals in a low-stress manner. To make animals speed up, walk against their direction of travel; to make them slow down, walk with them. As you pass the point of balance, notice how each animal responds to your movement and position.

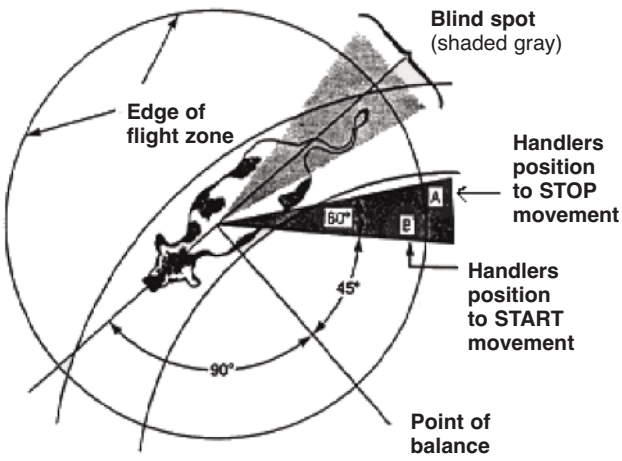

Figure 1-1. Flight zone diagram for starting and stopping animal movement.

A good stockman will stay quiet when working livestock. If animals are not doing what you want, it is not because they can't hear or see you. It is because you are in the wrong place doing the wrong thing. Do not yell and scream, and do not make wild movements. Move calmly, purposefully and in straight lines. Livestock will be able to predict your movements and respond appropriately to them. If you move like a predator (hesitating, followed by sudden movements and in curves around them), the livestock will treat you like a predator (Figure 1-2.)

The most important aspect of handling any livestock is to be able to recognize and interpret an animal's reactions. The animal's "body language" will indicate its probable actions. Livestock remain immobile when first threatened. Their first reaction is to stand and assess the situation. If frightened, their natural instinct is to escape. Livestock try to maintain other animals within their vision. They have a field of view of 330 degrees and have the ability to see threats from almost all directions.

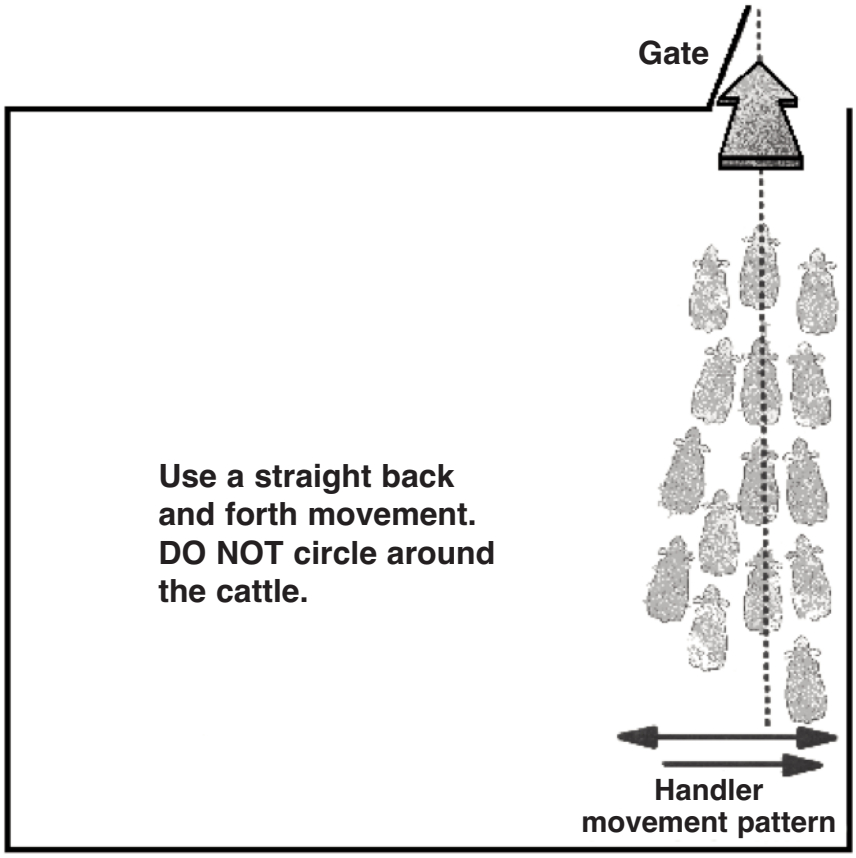

Figure 1-2. Handler movement pattern to keep livestock moving into a designated area.

Social order in the herd is usually established at an early age and maintained by threats and butting. When herds are mixed, social order has to be re-established, so aggression occurs until a new order is established. This may hinder movement of stock. Within a herd, there is an order of dominance. This can be seen in action at the water or feed trough where certain animals are always first to drink or eat. Other animals tend to stand back until the dominant animals have finished. Dominance may also be seen when livestock are on the move. The same animals will usually lead the herd. They will also be the first to enter gateways. Dominance and the need to maintain hierarchy in a group become a problem when the animals are in confined spaces such as working

pens and corrals. This can be a cause of significant stress within a herd. Crowding will also increase aggression as the animals try to maintain personal space. Social behavior varies with age, breed and sex; Bos indicus and Bos indicus-cross cattle are more sensitive/temperamental than British or European breeds.

Arousal is the state of activity of animals and ranges from deep sleep to fight/flight. Handling techniques raise the level of arousal. However, if you control the level of arousal, you control the animal. Problems occur though when this arousal is too high. Highly aroused ("stirred up") animals are more likely to make sudden violent movements, and they behave in a self-protective way either by running away or fighting back. Highly aroused animals are also more responsive to further stimulation (a mature bull,

ram or buck which is highly aroused needs little provocation to attack).

It is desirable to keep animals as calm as possible so they can move quietly. When necessary, however, handlers may temporarily raise arousal for particular purposes, such as forcing lead animals through a gateway.

The usefulness of instinctive behavior is that it is predicable and requires no training of the animals. The instinct to escape is helpful when handling livestock that are raised under extensive conditions and have little contact with people. With infrequently handled animals that are flighty and have less chance of learning the flow system of paddocks and yards, instinctive behavior is used so that animals "escape" to where you want them to be.

To do this, the stockperson must learn the rules of position and movement. A person moving alongside animals at just the right moment can turn a herd exactly when needed, but someone positioned wrongly can cause havoc (Figure 1-3).

Livestock move most effectively if they can see the handler at all times. Attempting to drive animals by standing directly behind them is often not efficient because they turn and look at the handler. An animal is best driven when the handler is situated at a 45-60 degree angle from a line perpendicular to an animal's shoulder. This same principle applies to driving herds of animals. The flight distance varies with the tameness of the animal. The distance may be up

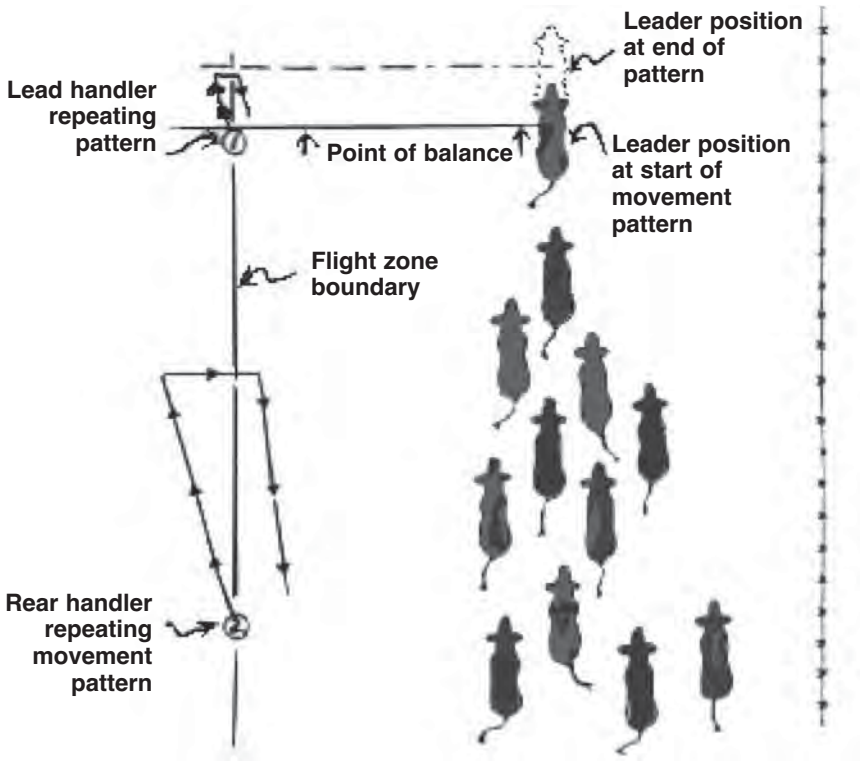

Figure 1-3. To keep animals calm and move them easily, the handler should work on the edge of the flight zone.

to 200-300 yards for feral animals, but for animals handled often, it may be only 1-5 yards. Very tame animals are difficult to move because they no longer have a flight zone. If a handler shouts and excites them, this can enlarge the animals' flight zone.

A good stockman is patient. The animals do not care that you are late for dinner. Keep doing the right things until the animals respond correctly. After you have mastered the art of stockmanship, you can usually move animals quickly when you need to. But realize that if you make livestock do something before they are ready to do it, then it is no longer low-stress handling. Train livestock how to behave every time you are with them. Go to the pen or pasture and use these techniques to just move them around, teaching them to respond. If possible, move livestock through your corrals on their way to feed or to another pasture. Always make your livestock walk past you, single file,

out of a gate. Do not let them run wildly, or they will hurt themselves and you, tear up your gates and be stressed when they finally stop. When moving livestock from a pasture, ignore the few animals that may quit the herd. If you drive the main herd in a low-stress manner and do not chase the few on the edge, they will usually come back to the herd of their own will.

Ranchers who do not follow these guidelines and rush their animals, harass them with noise or prod them unnecessarily risk raising their stress, increasing sickness and lowering production. The basic elements of animal handling are the handler, the stock and the facilities. These elements are all interdependent. An understanding of these dependencies is essential for continued improvement in livestock handling. Research and practical observations have identified factors pertinent to each element.

These are as follows:

1. **Handler** – Desirable attributes for handlers are a positive attitude to stock, an understanding of animal behavior, the ability to recognize and interpret animal actions, and allowing sufficient time for operations. Visual thinking skills are essential to horse training and livestock handling.

2. **Livestock** – Livestock differ in their ease of handling due to factors including previous experiences, breed characteristics, sex and physiological state. Animals think by visual association.

3. **Facilities** – Poorly designed or maintained facilities can lead to confusion and stress on livestock. There is a higher incidence of stress and injury to both stock and handlers in a poorly constructed facility. The basic element of design is to allow for good stock flow. The larger the facility and the more diverse the livestock history, the more important it is to correctly design the facility.

4. **All grazing animals generally respond the same.** Fear is the main emotion of livestock; anger is rare in prey animals. However, there is some specie uniqueness. Goats and cattle respond to stimulus the same way as a herd or individuals. Sheep are more "herd-bound," and when separated, individuals will panic. Horses will handle well in herds, if they have been with a herd. Oftentimes, horses are kept singularly, and when faced with new environments, stimulus or association, may panic. Most horses are halter trained, but not all. Be careful making assumptions.

Since humans are predators, it is imperative that we understand how livestock think, react and communicate as a herd. Armed with this knowledge, we can guide animals to a chosen location and reduce stress of handling in confined areas without invoking fear from the livestock.

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Chapter 2:
Cattle Care Standards

Cattle Care Standards

Water

Educational Information

- Water is the essential nutrient for cattle and can become critical when it is excessively hot. Water should be made available at all times for cattle and calves. Water sources vary from streams and ponds to water troughs or tanks containing domestic (e.g., well or municipal) water on cattle operations.

- Water intakes and requirements for cattle vary tremendously according to environmental temperature, humidity, precipitation, body weight, breed, feed intake, pregnancy, milk production, type and water content of feedstuff, and the physical characteristics of the water itself (i.e., temperature). Table 2-1 contains some estimates of daily water intake; it is for estimation purposes only, and each estimate is highly variable under normal circumstances.

- Much of the necessary water can be supplied by the feed in any given situation. For example, beef cattle on green grass in cool weather will not require much water to drink as the grass may be up to 90% water by weight. Also, dairy cattle are often fed wet feeds, such as corn silage, haylage or green chop, and this will decrease the amount of water they need to drink per day.

- Water intake can be affected by salinity (salt concentrations) or hardness (concentration of calcium and magnesium). Also, water may contain potentially harmful materials such as blue-green algae, nitrates, sulfates and heavy metals. These substances in excess can be harmful to cattle. Water contaminated with dead animals, feces or other noxious materials may be a potential source of toxins or microbial contaminants which can threaten the health of cattle. A licensed veterinarian should always be consulted in cases of suspected problems and can assist in making judgments about cattle health, well-being, water quantity and water quality.

- Water troughs, water containers and any automatic watering devices should be maintained in proper working order and not pose hazards that may result in injury. This includes any device that could result in an electrical current sufficient to harm the animals.

Water Tanks and Ponds

Water is the most important nutrient for general animal well-being. If water or water tanks/sources are not clean, cattle may refuse to drink from them. Cattle that don't use the water tank/source will be stressed, dehydrated and

Table 2-1. Estimated Daily Water Intake for Cattle (gallons/day per animal)*

Body Weight (lbs)	Ambient Temperature				Livestock Type
	40°F	60°F	75°F	90°F	
400	4.0	5.0	6.3	9.5	Beef calves
800	6.3	7.9	9.9	15.0	Stocker calves
1,000	8.7	10.8	13.6	20.6	Feedlot steers
1,100	6.0	7.4	9.0	16.0	Pregnant beef cows
900	11.4	14.5	17.4	19.0	Nursing beef cows
1,300 (45 lbs milk/day)	21	22	28	35+	Lactating dairy cows
1,300 (90 lbs milk/day)	29	30	40	48+	Lactating dairy cows

*Source: NRC, 1996; ARC, 1980.

have decreased feed intake. This is a preventable problem through the regular monitoring and cleaning of water tanks/sources. Newly arriving cattle (calves), often called the receiving period, is a critical time to ensure the adequate supply of fresh water as cattle/calves may be dehydrated when they arrive.

Water Tank Protocol

- Ensure pens/pastures have water tank space that is sufficient and adequate water flow rate to supply the cattle's daily water requirement, or that the cattle have ample access to water from a pond/stream/other source.
- Ensure the water in the tank is accessible by calves (example, sides too tall on tank for nursing calves to reach the water).
- Make sure water tanks are functional and filled with water.
- Are permanent tanks clean?
- Visually inspect the tanks and report any problems immediately to owner.

Cows drinking from a tire tank.

Beef Cattle Health

Healthy calves, cows and bulls will exhibit a good stretch after they get up, then relax to a normal posture. Yet, higher rates of standing, oftentimes with an arched back and with their head and ears lowered, are taken as a sign of discomfort or discontent in studies of cow and calf confinement. Cattle under duress show signs by bellowing, butting or kicking. Behavioral indicators like these are always useful signs that the environment needs to be improved. In some cases, the way animals behave is the only clue that stress is present.

You can get clues to a cow's mood and condition by observing the tail. When the tail is hanging straight down, the cow is relaxed, grazing or walking, but when the tail is tucked between the cow's legs, it means the animal is cold, sick or frightened. During mating, threat or investigation, the tail hangs away from the body. When galloping, the tail is held straight out, and a kink can be observed when the animal is in a bucking, playful mood.

Normal cattle behavior includes:

- Cattle tend to roam in groups of various sizes when a large herd is placed on a pasture.
- Cows seek isolation at calving time.
- Following birth, the cow gets up and begins to dry her newborn calf by licking it. The cow usually hides her calf. During the first day or two, the calf sleeps a great deal while the cow grazes nearby. The cow takes great pains not to disclose the hiding place of her calf.
- Cattle deposit their feces in a random fashion. Although cows can defecate while walking, with the result that their feces are scattered, generally they deposit their feces in neat piles. Most cows hump up to urinate, whereas bulls are inclined to stand squarely on all fours.
- Cattle wrap their tongues around grass and then jerk their heads forward so that the vegetation is cut by the lower teeth.

Table 2-2. Cattle Vital Statistics

Rectal Temperature	101.5 degrees F (38.5 degrees C)
Heart Rate	60 to 70 beats/minute
Respiratory Rate	30 breaths/minute
Estrous Cycle	18 to 23 days
Estrus	12 to 18 hours
Gestation Length	285 days

- Rumination occupies about 8 hours of the cow's time each day.
- Cattle investigate a strange object at close range. They proceed toward it with their ears pointed forward and their eyes focused directly upon it. As they approach the object, they sniff and their nostrils quiver. When they reach the object, sniffing is replaced by licking; and if the object is small and pliable, they may chew it or even swallow it.
- Cattle exhibit investigative behavior when placed in a new pasture or in a new barn. As a result, if there is an open gate in a pasture or a hole in the fence, they usually find it.
- During a severe rain or snow storm, cattle turn their rear ends to the storm and tend to drift away from the direction of the wind.
- During the hot summer months, cattle seek either shade or a water hole during the heat of the day. Then, they graze in the cool of the evening or early morning.

Educational Information

- Medical care should be provided for cattle in significant pain or distress. Medical conditions that may cause such pain or distress include but are not limited to severe bloat, extreme fever (rectal temperature of 104.5°F or higher), limb fractures, serious eye injuries, prolapsed uterus, severe or prolonged calving difficulty, or any injury or condition where an animal cannot bear weight on all four limbs or where the animal is not able to move or is recumbent (cattle that are not able to rise and stand). Euthanasia is an option under these circumstances and should be performed by a trained law enforcement officer, a veterinarian or trained individual (see Euthanasia).
- Veterinary care for severe emergency situations should be obtained by cattle owners or care providers as quickly as possible, but definitely within a few hours of such a condition being discovered.
- Observation of cattle for signs of lameness is an essential practice in the basic care of cattle, and appropriate hoof care should be provided as needed to prevent or treat signs of lameness.
- Preventive cattle health procedures, such as vaccination and parasite prevention and control programs, are an essential part of cattle ownership and management. A program of internal parasite control that involves prevention management practices in combination with appropriate and strategic use of various types of deworming products should be implemented for grazing cattle or cattle that are likely to be exposed to disease-causing parasitic infestations. The existence or effectiveness of any such parasite control program can be evaluated at the direction of the consulting veterinarian by performing laboratory procedures, such as

standardized fecal egg counts from freshly obtained manure sample.

- A program to minimize the presence of flying or biting insects is important to the health and well-being of both the human and animal residents on any given property as well as to those living in nearby areas. Flies, ticks, mosquitoes, midges and other insects can transmit a variety of diseases that can infect animals or humans.

- Vaccinations for prevention of respiratory, reproductive and other infectious diseases are considered as routine preventive health practices. A licensed veterinarian should assist producers and owners in developing a preventive health plan including a vaccine schedule. Preventive health programs may be different for different regions of Arkansas.

- Routine procedures such as castration and dehorning should be performed by a properly trained individual or licensed veterinarian. These procedures will evoke temporary pain. Dehorning and castration should be performed at the earliest possible age. If castration or dehorning procedures are performed on an older animal, a veterinarian should be consulted on the possible use of local anesthesia and analgesics to minimize pain.

- A downer cow is a term for an animal that is disabled due to illness or injury. These animals are banned from entering the food supply chain. Common causes of downer cattle are dystocia, broken/fractured bones, neurological disease, metabolic disease and toxic disease.

Euthanasia

Euthanasia is humane death occurring without pain and suffering. The decision to euthanize an animal should consider the animal's well-being. The producer will most likely perform on-farm euthanasia because a veterinarian may not be immediately available to perform the service.

When euthanasia is necessary, an excellent reference is the "Practical Euthanasia of Cattle Guidelines" developed and published by the American Association of Bovine Practitioners.

Reasons for euthanasia include:

- Severe emaciation, weak cattle that are non-ambulatory or at risk of becoming downers.

- Non-ambulatory cattle that will not sit up, refuse to eat or drink, have not responded to therapy.

- Rapid deterioration of a medical condition for which therapies have been unsuccessful.

- Severe, debilitating pain.

- Compound (open) fracture.

- Spinal injury.

- Central nervous system disease.

- Multiple joint infections with chronic weight loss.

Feeding Beef Cows Based on Body Condition Scores

The amount and type of supplementation required for satisfactory performance in beef herds is greatly influenced by the body condition or body reserves, both protein and fat, of the cattle.

To optimize performance, body condition scores of cows should fall within a range of 5 to 7 (optimum condition) at the initiation of the calving season and remain in this range throughout the breeding season. To achieve this goal, cows should be condition scored when calves are weaned. Feeding programs should be planned for cows of varying condition so they will reach optimum body condition by the start of the calving season.

Drastic changes in body condition should be avoided so that supplementation of the herd may be minimized. To achieve this, cattle should be matched to the forage supply and management available, and body condition evaluations should be made at various times throughout the year. For spring calving herds, the logical times are:

- Midsummer
- Weaning, in the fall
- 60 days before calving
- Calving
- The beginning of breeding in the spring

Changes in management and the use of supplemental feed may be warranted, even during the summer, to prevent drastic body weight changes. There are few economical ways to increase body condition once winter has arrived.

Practical Importance of Body Condition Scoring

Variation in the condition of beef cows has a number of practical implications. The condition of cows at calving is associated with length of post-partum interval, subsequent lactation performance, health and vigor of the newborn calf and the incidence of calving difficulties in extremely fat heifers. Condition is often overrated as a cause of dystocia in older cows. **The condition of cows at breeding affects their reproductive performance in terms of services per conception, calving interval and the percentage of open cows.**

Body condition affects the amount and type of winter feed supplements that will be needed. Fat, gestating cows may need only mineral and vitamin supplementation. Thin cows usually need very good quality forage or large amounts of supplements high in energy (+70 percent TDN), medium in protein (15 to 30 percent), plus mineral and vitamin supplementation.

Body condition or changes in body condition, rather than live weight or shifts in weight, are a more reliable guide for evaluating the nutritional status of a cow. Live weight is sometimes mistakenly used as an indication of body condition and fat reserves, but gut fill and the products of pregnancy prevent weight from being an accurate indicator of condition. Live weight does not accurately reflect changes in nutritional status. In winter feeding studies where live weight and body condition scores have been measured, body condition commonly decreases proportionally more than live weight, implying a greater loss of energy relative to weight.

Two animals can have markedly different live weights and have similar body condition scores. Conversely, animals of similar live weight may differ in condition score. As an example, an 1,100-pound cow may be a 1,000-pound animal carrying an extra 100 pounds of body reserves, or a 1,200-pound cow which has lost 100 pounds of body reserves. These two animals would differ markedly in both biological and economical response to the same feeding and management regime with possible serious consequences.

In commercial practice, body condition scoring can be carried out regularly and satisfactorily in circumstances where weighing may be impractical. The technique is easy to learn and useful when practiced by the same person in the same herd over several years.

Body Condition Scores (BCS)

BCS are numbers used to suggest the relative fatness or body composition of the cow. Most published reports are using a range of 1 to 9, with a score of 1 representing very thin body condition and 9 extreme fatness (Table 2-3). Scoring done by different people will not agree exactly; however, scoring is not likely to vary by more than one score between trained evaluators if a 1 to 9 system is used. For BCS to be most helpful, producers need to calibrate the 1 to 9 BCS system under their own conditions.

Table 2-3. Cow Body Condition Score (BCS).

Condition Score	Appearance of Cow[a]
1	**Emaciated** – Bone structure of shoulder, ribs, back, hooks and pins sharp to touch and easily visible. Little evidence of fat deposits or muscling.
2	**Very thin** – Little evidence of fat deposits but some muscling in hindquarters. The spinous processes feel sharp to the touch and are easily seen, with space between them.
3	**Thin** – Beginning of fat cover over the loin, back and foreribs. Backbone still highly visible. Processes of the spine can be identified individually by touch and may still be visible. Spaces between the processes are less pronounced.
4	**Borderline** – Foreribs not noticeable; 12th and 13th ribs still noticeable to the eye, particularly in cattle with a big spring of rib and ribs wide apart. Full but straightness of muscling in the hindquarters. The transverse spinous processes can be identified only by palpation (with slight pressure) to feel rounded rather than sharp.
5	**Moderate** – 12th and 13th ribs not visible to the eye unless animal has been shrunk. Areas on each side of the tail head are fairly well filled but not mounded. The transverse spinous processes can only be felt with firm pressure to feel rounded – not noticeable to the eye. Spaces between processes not visible and only distinguishable with firm pressure.
6	**Good** – Ribs fully covered, not noticeable to the eye. Hindquarters plump and full. Noticeable sponginess to covering of foreribs and on each side of the tail head. Firm pressure now required to feel transverse process.
7	**Very good** – Abundant fat cover on either side of tail head with some patchiness evident. Ends of the spinous processes can only be felt with very firm pressure. Spaces between processes can barely be distinguished at all.
8	**Fat** – Animal taking on a smooth, blocky appearance; bone structure disappearing from sight. Fat cover thick and spongy with patchiness likely.
9	**Very fat** – Bone structure not seen or easily felt. Tail head buried in fat. Animal's mobility may actually be impaired by excess amount of fat.

[a] Adapted from Herd and Sprott, 1986.

BCS 1

BCS 4

BCS 7

BCS 2

BCS 3

BCS 5

BCS 6

BCS 8

BCS 9

Guidelines for BCS

Keep the program simple. A thin cow looks very sharp, angular and skinny, while a fat one looks smooth and boxy with bone structure hidden from sight or feel. All others fall somewhere in between.

Fat deposits are visible over the back, tail head, pins, hooks, ribs and brisket of cattle (Figure 2-1). A BCS of 5 should look average – neither thin nor fat. Once you have established what a BCS 5 looks like, it is much easier to determine variations from this. For cattle with long hair, handling the cattle over the back and ribs and feeling the flesh over the transverse processes can be helpful. Keep in mind that shrink can alter the look and feel of the cattle as much as one score. Animals in late pregnancy also tend to look fuller and a bit fatter.

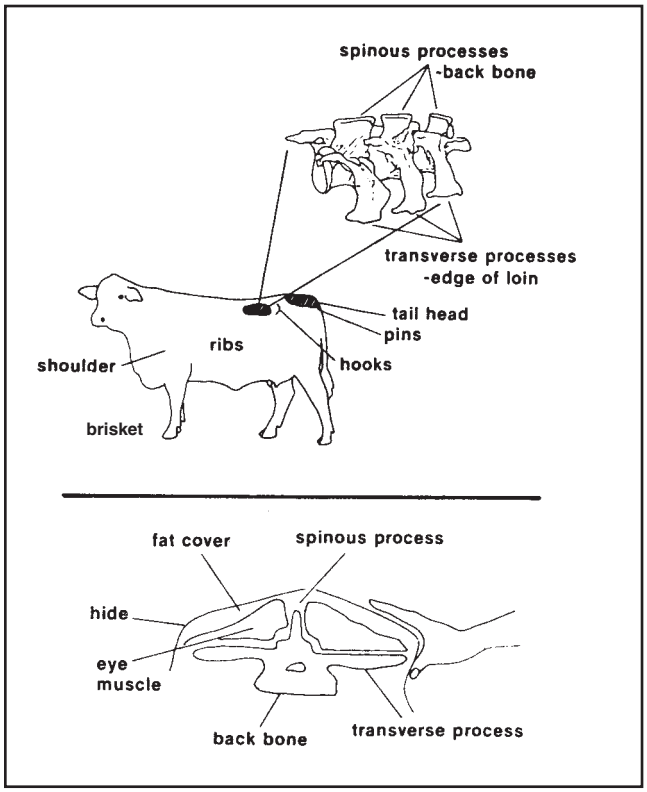

Figure 2-1. Anatomic areas that are used for scoring body condition in beef cows.

Effect of BCS on Body Composition

The body weight change in protein and fat for different body condition scores is illustrated in Figure 2-2. Gain or loss in body condition (energy reserves) primarily involves fat. When body condition score falls below 5, cows will lose muscle tone because less fat is available to supply energy to sustain vital bodily functions and the cow begins to mobilize muscle. Since many factors affect a cow's weight (stage of pregnancy, frame size) in addition to body condition, body condition scoring is a more reliable measure of nutritive reserves than weight alone.

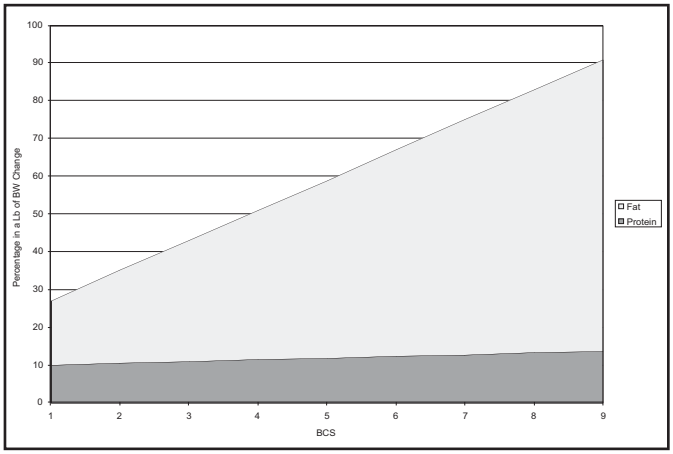

Figure 2-2. Percentage protein and fat in body weight change for each body condition score.

Feeding Terms Defined

Cattle are ruminants that are characterized by a four-compartment stomach and "cud-chewing" behavior. Ruminants obtain a large part of their nutrient intake from fibrous feeds called forages. A simple forage diet may be all that is needed when nutritional requirements of cattle are low. Cattle that are growing fast, pregnant or producing milk (lactating) may require more nutrients. For these animals, forage can be supplemented with other feeds to provide additional nutrients. Following are common feeding terms (Table 2-4):

Table 2-4. Common Feeding Terms.

Forage (fescue, bermudagrass, legumes, etc.)	Forages consist of the stems and leaves of plants that are eaten by cattle. Pasture and rangeland plants are forages that cattle consume by grazing. Some crops, such as alfalfa, are forages that are harvested and stored for future feeding. Forages are high in fiber content.
Hay	Forage that is cut, dried and then compacted into rectangular or round bales for storage. Fescue, bermudagrass and mixed grass are three common types of hay fed to cattle.
Silage	Chopped plant material that is harvested, stacked in large piles, covered with heavy plastic and then allowed to ferment. Acids produced during fermentation preserve the wet forage. Corn silage is common.
Haylage (Green Chop)	Haylage is a term often used to describe alfalfa or wheat silage. It may also describe alfalfa that has been cut and field-wilted (but not completely dried), chopped and fed directly to cattle. This is also known as "green chop."
Straw	Coarse stalks or stems of plants remaining after the mechanical harvesting of grain (wheat, corn, milo and/or rice). These are cut, dried and baled for storage. Wheat straw is primarily used for bedding. Straw nutritional value is moderately low to very low. When hay and other forages are in short supply, straw may be included in a total mixed ration to provide fiber for cattle. In this case, other feed ingredients also are added to ensure that adequate nutrients are available.
Total Mixed Ration (TMR)	Complete, nutritionally balanced ration consisting of forage, concentrates and other supplements. All ingredients are weighed, mechanically mixed together and delivered to cattle one or more times per day. A TMR is often fed to cattle in dry lots or confinement.
Concentrate	High-energy, low-fiber feed primarily consisting of grain and/or oilseed meals (example, soybeans). Often mixed with protein or mineral supplements.
Grain	Starch-filled, seed portion of plants. High in energy, very low in fiber. Common grains for cattle include corn, oats, milo or sorghum and wheat. Grains are fed to provide calories in the diets.
By-Product Feeds	Processing of food for human consumption or fuel ethanol generates enormous volumes of crop residue (plant parts) that can be fed to cattle. Examples include rice bran, soybean hulls, corn gluten feed and distillers grains.

Transportation of Cattle

- Cattle sorting and holding pens should allow handling with minimal stress, be located near the loading or unloading facility and be suitable for herd size (Table 2-5).
- Provide properly designed and maintained loading facilities for easy and safe animal movement. Proper design of loading chutes as well as personnel who are knowledgeable of their proper use can ensure the safety of both cattle and cattle handlers. Ramps and chutes should be strong and solid, provide non-slip footing and have sides high enough to keep cattle from falling or jumping off. A ramp angle of 25 degrees or less will improve cattle movement.
- All vehicles used to transport cattle should provide for the safety of personnel and cattle during loading, transporting and unloading.

Table 2-5. Size and Space Requirements for Cattle Holding and Crowding Areas.

	Calves to 600 lbs	Calves 600 to 1,200 lbs	Cow-Calf and Cattle over 1,200 lbs
Holding area, square ft/head	14	18	20
Crowding pen, square ft/head	6	10	12

- Strictly adhere to safe load levels with regard to animal weight and space allocation.
- Producers hauling cattle in farm and ranch trailers must ensure that adequate space is provided so that cattle have sufficient room to stand with little risk of being forced down because of overcrowding.
- Cattle that are unable to withstand the rigors of transportation should not be shipped.
- When the vehicle is not full, safely partition cattle into smaller areas to provide stability for the cattle and the vehicle.
- Knowingly inflicting physical injury or unnecessary pain on cattle when loading, unloading or transporting animals is not acceptable.
- No gap which would allow injury to an animal should exist between the ramp, its sides and the vehicle.
- Trailer doors and internal gates should be sufficiently wide to permit cattle to pass through easily without bruising or injury.
- Cattle should be loaded, unloaded and moved through facilities with patience and as quietly as possible to reduce stress and injury.

References

Arkansas Beef Quality Assurance Program Handbook. 2012. University of Arkansas Division of Agriculture, Cooperative Extension Service, Little Rock, Arkansas.

Beef Quality Assurance. Assessor's Guide to a Beef Quality Assurance Cow-Calf Assessment. NCBA.

Cattle Care Standards: Recommendations for Meeting California Legal Requirements. 2012. Center for Food Animal Health. School of Veterinary Medicine. University of California, Davis.

Livestock Health Series: Beef Cattle Herd Health Vaccination Schedule. FSA3009. University of Arkansas Division of Agriculture, Cooperative Extension Service, Little Rock, Arkansas.

Table 2-6. Recommended maximum number of cattle* for trailers of different lengths**

Trailer Size	Cattle Weight, lbs							Total Wt.***
	400	600	800	1,000	1,200	1,400	1,600	
(inside dimension)	Number of Head							
16 ft x 6 ft	18	12	9	7	6	5	5	< 7,400
18 ft x 6 ft	21	14	10	8	7	6	5	< 8,400
20 ft x 6 ft	23	15	12	9	8	7	6	< 9,300
24 ft x 6 ft	28	18	14	11	9	8	7	< 11,100
20 ft x 7 ft	27	18	13	11	9	8	7	< 10,800
24 ft x 7 ft	32	22	16	13	11	9	8	< 13,000
32 ft x 7 ft	43	29	22	17	14	12	11	< 17,300

* This chart represents the maximum number of polled/dehorned cattle for trailers of different lengths; when hauling horned/tipped cattle, reduce the number of cattle by 5 percent.

** The number of cattle loaded during hot conditions should be reduced.

*** The maximum weight of cattle for each trailer size with these calculations. Do not exceed the Gross Vehicle Weight Rating for your truck and stock trailer.

Chapter 3:
Dairy Cattle Health and Well-Being

Dairy Cattle Health and Well-Being

The health and well-being of dairy cattle is difficult to objectively determine from a distance. Cruising down the road past a dairy barn or pasture may give you a glimpse of crowds of cows with no feed or a couple of heifers lying motionless in the dirt, and these may be perfectly healthy well-cared-for animals. The situations dairy cattle find themselves in throughout the day, and throughout the year, are extremely variable, so a single snapshot may do little to indicate their well-being. Dairy cattle of all ages are frequently moved to different barns or pastures, brought feed and may undergo one of a number of husbandry practices over the course of a day. They can, therefore, often be seen without feed or water in front of them, in an environment not suitable for permanent housing or out sleeping in a barren field, as they are temporarily kept in these conditions between more typical permanent housing areas. Objective determination of appropriate housing and husbandry would require a more in-depth and lengthy assessment of the facilities and management practices of the farm.

There are, however, a few indicators of general health and well-being that a trained eye can evaluate independent of the housing or environment:

- **Body condition scoring** is an objective assessment of the long-term nutrition of an animal. Using a 1-to-5 scoring system for dairy cattle based on the amount of flesh covering the bony prominences of the animal, we can reasonably judge how well the nutritional needs of that animal have been met in the recent past. The most appropriate body condition score (BCS) for a cow depends on the time of year and the stage of production, but should remain between a score of 2 and 4.

- **Locomotion scoring** (Figure 3-1) is an objective assessment of an animal's stride. Cattle can have poor locomotion for a variety of reasons, most commonly diseases of or injuries to the feet and legs, but also from painful illnesses in other parts of the body. On a 1-to-5 scale, scores of 3 or higher indicate a "clinical lameness" which would require corrective action, and scores of 5 would require immediate attention.

- **General attitude and respiratory rate** can be a somewhat subjective means of evaluation. Cattle should always appear aware and interested in their surroundings, especially when people approach them. Different individuals will have a different tolerance level for how close a person may get to them, but all cattle should be alert with erect ears and a lifted head as someone nears them. Cattle that are lying down normally stand as they are approached. A higher-than-normal respiratory rate (Table 3-1) can be indicative of heat stress, which is a major issue in Arkansas summers, or respiratory disease.

Table 3-1. Normal Values for Adult Dairy Cattle.

Body Temperature	100.5 to 102.5 degrees F
Pulse Rate	60 to 100 beats per minute
Respiratory Rate	15 to 35 breaths per minute

Figure 3-1.

FirstStep

LOCOMOTION SCORING OF DAIRY CATTLE*

Locomotion scoring is based on the observation of cows standing and walking (gait), with special emphasis on their back posture. This system is intuitive and, therefore, easy to learn and implement. Use of locomotion scoring is effective for early detection of claw (hoof) disorders, monitoring prevalence of lameness, comparing the incidence and severity of lameness between herds and identifying individual cows for functional claw (hoof) trimming.

Animal observations should be made on a flat surface that provides good footing for cows. Cows scoring 2 or 3 should be examined and trimmed to prevent more serious problems. Trimming should be done by a competent trimmer with the goal of returning the claws to functional weight bearing and conformation.

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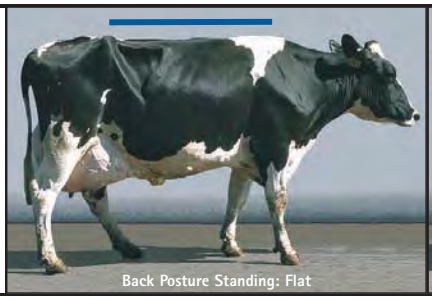
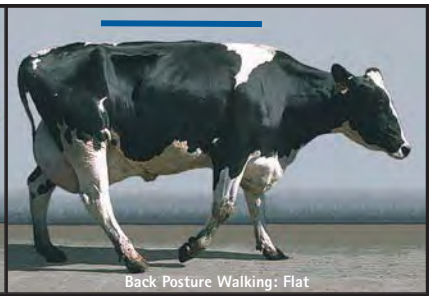
Locomotion Score 1

Clinical Description: Normal

Description: Stands and walks normally with a level back. Makes long confident strides.

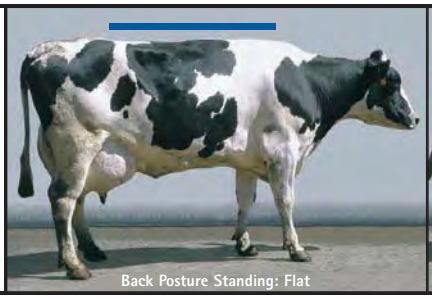

Back Posture Standing: Flat

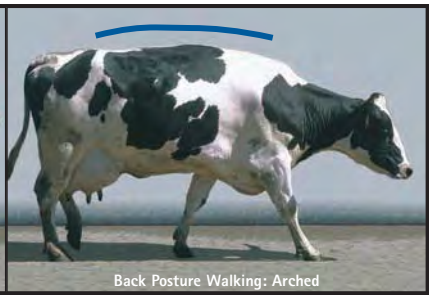

Back Posture Walking: Flat

Locomotion Score 2

Clinical Description: Mildly Lame

Description: Stands with flat back, but arches when walks. Gait is slightly abnormal.


Back Posture Standing: Flat

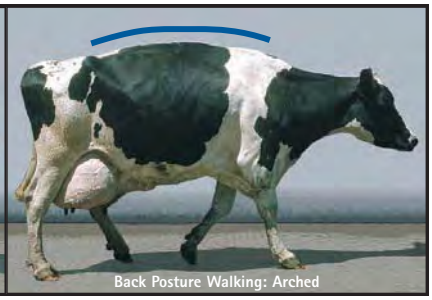

Back Posture Walking: Arched

Locomotion Score 3

Clinical Description: Moderately Lame

Description: Stands and walks with an arched back and short strides with one or more legs. Slight sinking of dew-claws in limb opposite to the affected limb may be evident.


Back Posture Standing: Arched

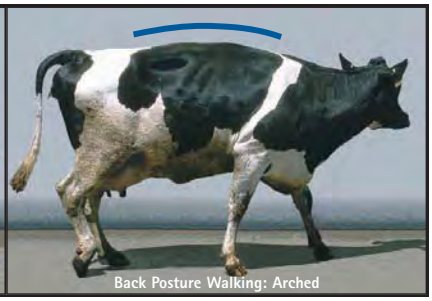

Back Posture Walking: Arched

Locomotion Score 4

Clinical Description: Lame

Description: Arched back standing and walking. Favoring one or more limbs but can still bear some weight on them. Sinking of the dew-claws is evident in the limb opposite to the affected limb.

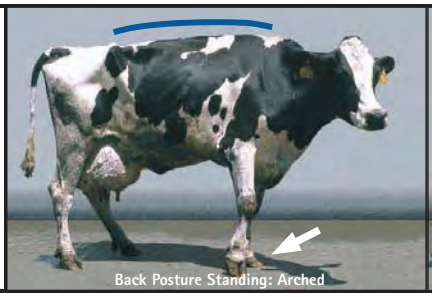

Back Posture Standing: Arched

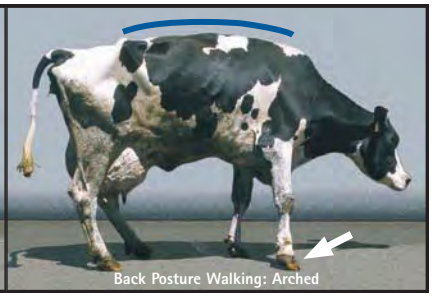

Back Posture Walking: Arched

Locomotion Score 5

Clinical Description: Severely Lame

Description: Pronounced arching of back. Reluctant to move, with almost complete weight transfer off the affected limb.


Back Posture Standing: Arched


Back Posture Walking: Arched

* Adapted from Sprecher, D.J.; Hostetler, D.E.; Kaneene, J.B. 1997. Theriogenology 47:1178-1187 and contribution from Cook, N.B., University of Wisconsin.

Body Condition Scoring With Dairy Cattle

The Importance of Body Condition Scoring

Body condition scores provide an indication of the energy status of dairy cattle. Condition scores can be used on both heifers and cows, although primarily they are used on the lactating dairy herd. Essentially, body condition scoring provides an objective indication of the amount of fat cover on a dairy cow. This evaluation is accomplished by assigning a score to the amount of fat observed on several skeletal parts of the cow. Various point systems are used to score the animal. The most commonly used system ranges from 1.0 to 5.0, in increments of 0.1 or 0.25. One point of body condition equals 100 to 140 pounds gain in body weight. Larger frame cows require additional body weight to increase one point, compared to smaller frame or narrow cows.

Body condition scores show gradual change over a normal lactation. In Table 3-2 entitled "Ranges of Ideal Body Condition Scores," stage of lactation indicates the appropriate score for the cow. Because the cow puts on fat more efficiently while lactating, she should go dry with a body condition score of 3.5 to 4.0. If the cow is in good body condition at drying-off, she should calve at approximately the same body condition score.

Older cows should calve at 3.5 to 4.0 body condition score. Cows should freshen in good flesh with a good reserve of tissue to enable them to produce more milk in early lactation. One pound of extra body fat equals about 7 pounds of 4 percent fat-corrected milk. Because cows cannot eat enough to meet their energy needs in early lactation, this fat is necessary to allow them to mobilize energy for high production in early lactation. However, you should avoid fat cows at calving since they are more prone to metabolic problems, such as dystocia or calving trouble, retained placenta, milk fever, ketosis and downer cow syndrome.

Cows that are too thin are also more prone to metabolic problems and diseases and have decreased milk yield. Studies indicate that cows with lower body condition scores and loss of weight have lower conception rates and decreased efficiency of heat detection, compared to cows that are gaining weight and have higher body condition scores. As cows increase in milk-producing ability, this extra flesh becomes important because cows must eat more in early lactation to produce greater milk. It is usually 50 to 60 days after calving before they are in a positive energy balance (Figure 3-2).

As a result of this negative energy balance, cows have their lowest body condition score at approximately one to two months postpartum (Table 3-2). This body condition score should be approximately 2.5. The goal of a good nutrition program is to minimize the variation between the high body condition score and the low body condition score. In general, the average decrease in body condition score from calving to the lowest score should not exceed one point. However, the body condition score of an individual cow may vary as much as 1.5 without marked effects on the performance of the cow.

Table 3-2. Ranges of Ideal Body Condition Scores.

Stage of Lactation	Score
Drying-off	3.5 - 4.0
Calving (older cows)	3.5 - 4.0
One-month postpartum	2.5 - 3.0
Mid-lactation	3.0
Late lactation	3.25 - 3.75
Calving (first lactation)	3.5

Feeding your herd properly allows you to avoid extremes in body condition score; i.e., 2.0 or less and above 4.0. It is important to balance the ration for the cow in early lactation so that her body condition score is not less than 2.5, while at the same time feeding the cow that is toward the end of her lactation so that her body condition score is not above 4.0. To do this, the feeding program must be fine-tuned so that total mixed rations for one group are balanced for its level of production. Also, if you are feeding your cows as one group or herd out of the

parlor, then you must feed more grain to your higher-producing cows compared to your lower-producing cows.

The graph below shows the typical lactation curve for a lactating cow and the energy intake and body weight for the cow. It is necessary to feed a higher-producing cow more compared to the lower-producing cow. She may not be able to consume enough to meet her energy needs. The higher-producing cow will then be losing weight and will be more apt to be a problem breeder by either not being detected in heat or having a reduced conception rate. In general, a typical cow will be in a negative energy balance until around 50 to 60 days in milk and will begin to gain 4 to 5 pounds of body weight per week. (If one body condition score is 125 pounds and she is gaining 5 pounds per week, then it will take 25 weeks for her to gain one body score.) If she is already 8 weeks into lactation before she gets into the positive energy balance, then she will be near the end of lactation before she completely gains one body condition score.

Sudden changes in body condition scores allow you to detect health problems in your herd. If a cow is sick and quits eating, her body condition score can change dramatically in less than a week. For example, if a cow has a displaced abomasum (a twisted stomach) soon after calving, her body condition score can drop from 4.0 to 2.0 in less than a week if she quits eating and is still producing reasonable quantities of milk. This example would be the extreme

Figure 3-2. Effect of Lactation Stage on Milk Production, Ration Intake and Body Weight.

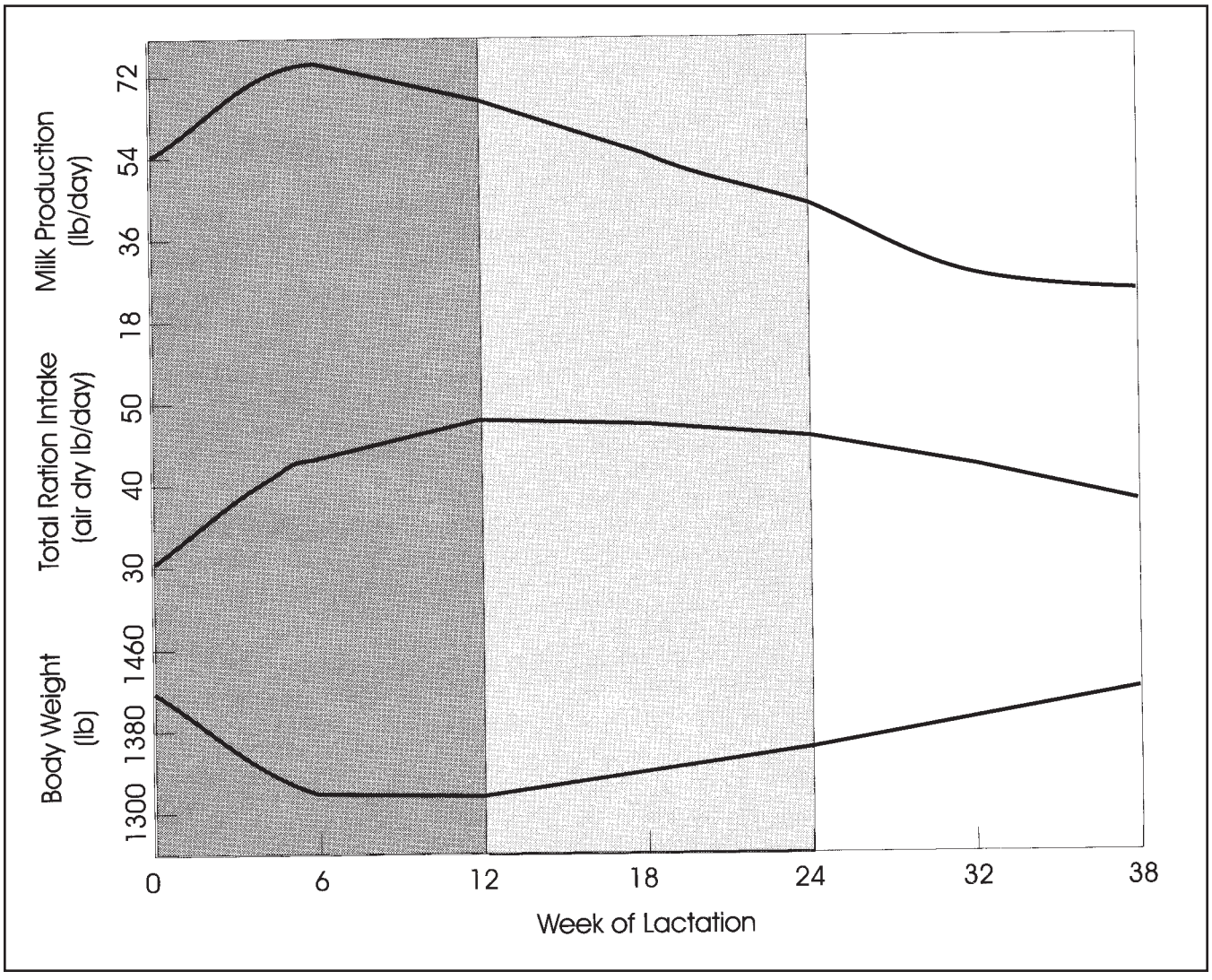


Figure 3-3.

No Matter How You Look At It...

Body Condition Scoring

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In the dairy cow, body condition is an indicator of the amount of stored energy reserves and changes with different stages of lactation. Fresh cows in peak lactation tend to be in a negative energy balance and therefore lose body condition. Late lactation cows, dry cows and low producers are in a positive energy balance and gain condition. There is no one ideal body condition score. There is a range of desirable scores which change for individual cows over the different stages of each lactation.

Dairy farmers should regularly evaluate the body condition of their cows and heifers so they can fine-tune feeding and management practices. Adequate body reserves are necessary to maintain health, production and reproductive efficiency. Underconditioned cows are prone to reduced milk production and poor persistency of lactation. Overly conditioned cows are predisposed to calving difficulties, fatty liver syndrome, impaired reproduction and metabolic disorders.

Body condition scoring of cattle is an essential management tool for the progressive dairy farmer. It can be mastered with a little training and good observation skills, using both sight and touch to evaluate each cow.

BCS = 3

BCS = 1

BCS = 4

BCS = 2

BCS = 5

Photos by Craig Johnson

Figure 3-3 (cont.)

No Matter How You Look At It...

Body Condition Scoring

...Is An Important Part of Modern Dairy Management.

BCS = 1

Deep cavity around tailhead. Bones of pelvis and short ribs sharp and easily felt. No fatty tissue in pelvic or loin area. Deep depression in loin.

BCS = 2

Shallow cavity around tailhead with some fatty tissue lining it and covering pin bones. Pelvis easily felt. Ends of short ribs feel rounded and upper surfaces can be felt with slight pressure. Depression visible in loin area.

BCS = 3

No cavity around tailhead and fatty tissue easily felt over whole area. Pelvis can be felt with slight pressure. Thick layer of tissue covering top of short ribs which can still be felt with pressure. Slight depression in loin area.

BCS = 4

Folds of fatty tissue are seen around tailhead with patches of fat covering pin bones. Pelvis can be felt with firm pressure. Short ribs can no longer be felt. No depression in loin area.

BCS = 5

Tailhead is buried in thick layer of fatty tissue. Pelvic bones cannot be felt even with firm pressure. Short ribs covered with thick layer of fatty tissue.

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Photos by Craig Johnson

in using body condition scores to indicate health problems in the herd. Other examples might include low scores in heifers or cows that have a heavy parasite load. These animals will generally not put on flesh like animals that are in good health. Also, cows or heifers that have a low-grade respiratory infection will not be maintaining or increasing body condition scores like healthy animals. A cow with Johne's disease (paratuberculosis) may be an isolated example in a herd of otherwise healthy cows. Her body condition score of less than 2.0, in extreme cases, would contrast to the remainder of the herd, which should range from 2.5 to 4.0.

Both the herd's health and feeding can be related to low body condition scores. Excessive feeding of concentrate in the ration, especially when feeding low-quality forages, can result in acidosis and a decrease in body condition score.

How to Evaluate Body Condition Score

Body condition scores will range from 1.0 to 5.0, using increments of 0.1, and will vary from one evaluator to the next. The point system itself may vary. As long as the same individual evaluates the animals each time and that person is consistent in assigning scores to a cow, the information will be very useful. Changes in body condition score are what are important.

Several aids are available to assist you in body condition scoring.

Figure 3-3 is a body condition card provided by Elanco Animal Health (Lilly Corporate Center, Indianapolis, IN 46285). For dairy replacement heifers, a body condition scoring guide is available from Roche Animal Nutrition and Health, Hoffmann-LeRoche, Inc., 340 Kingsland Street, Nutley, New Jersey 07110-1199, Attention: Agridex.

Arm and Hammer (Church and Dwight Company, Inc., 469 N. Harrison Street, Princeton, NJ 08543; phone 1-800-526-3563) also provides an excellent booklet on body condition scoring. It has pictures and descriptions of animals that can be used for body condition scoring. These descriptions are as follows:

Body Condition Score

1.5 The cow with a body condition score of 1.5 is ideal for demonstrating the key indicators, but little else. Each vertebra is sharp and distinct along the backbone. The short ribs are also visible as individual bones. The ligaments connecting the sharp and well-defined hook and pin bones to the backbone are easily seen. Her thurl is extremely dished in, and the area on either side of the tailhead is sunken and hollow. There are folds of skin in the depression between the tail bone and pin bone.

2.0 The cow is too thin. She may be in good health, but her reproduction and milk production may suffer from a lack of body condition. Her backbones are easily seen, but they do not stand out as individual vertebra. The short ribs are also distinct and the scalloping at the edges is very apparent. The thurl is very hollow, with prominent hook and pin bones. The ligaments holding these bones to the back are very sharp and distinct. The spot where the thigh bone meets the pelvis is obvious, but unlike the BCS 1.5 cow, there is a little flesh here. The area on either side of the tailhead is hollow with folds of skin in the depression formed by the pelvis and tail.

3.0 This cow is in ideal condition for most stages of lactation. The vertebra are rounded, but the backbone can still be seen. There is between a half-inch and an inch of tissue covering the short ribs. The edges of the ribs are rounded and not as sharp as the BCS 2.0 and 2.5 cows. Hook and pin bones are easily seen, but are round instead of angular. The ligaments connecting them to the backbone form clear boundaries between the forward and rear pelvic areas, but the fat covering makes them appear smooth and round. The thurl is dished, but not to the same extent as in the thinner cows. The area on either side of the tailhead is hollow, but the folds of skin are not as distinct.

4.0 Although many producers want their cows to be heavy at calving, research here and in England shows that fat cows lose

more condition, eat less and have more post-calving problems than cows that freshen at half a condition score lower. A BCS-4 cow looks fleshy. Her back appears almost solid, like a table top. The short ribs still form a shelf, but they cannot be seen as individual bones and only felt with deep palpation. The hook and pin bones are rounded and have obvious fat padding. The area on either side of the tailhead is not hollow, and there are no skin folds.

5.0 An obese cow is at high risk for metabolic problems, lameness, and will most likely remain open for months at a time. Her backbone and short ribs cannot be seen and only felt with difficulty. The shelf formed by the short ribs is well-rounded. Her thurl is filled in. The hook bone looks like a ball and the pin bone is buried in flesh. Fat deposits at the tailhead give her a dimpled appearance.

The body condition score 1.0 indicates a very thin cow – a cow that is skin and bones. Generally, you will not see cows scored with a body condition score of 1.0 if you're using increments of 0.1 or 0.25. A body condition of 2.0 is also too thin. She may be a cow milking well, but her reproduction may suffer from her lack of body condition. Also, her milk production may later be sacrificed or she may have a health problem which has caused her to have a body condition score of 2.0. If you have a cow that is between 1.0 and 2.0, you would determine the amount of difference between the two. If she is halfway between the two, her body condition score would be 1.5. Ideally, no cow in the herd should be less than 2.0.

A body condition score of 3.0 indicates the ideal condition for cows in mid-lactation. These cows have already passed the stage of negative energy balance, have been gaining weight for several weeks and have begun to accumulate flesh covering the hooks, pins and vertebrae. If a cow is halfway between 2 and 3, then her body condition score is 2.5. Less than 10 percent of the herd should score 2.5 or below. A body condition score of 4.0 indicates a cow that is heavy at calving or is getting ready to go dry. Generally, cows should not score above 4.0 because they are fat and the fat can interfere with reproduction as well as depress their appetite. A body condition score of 4.0 indicates cows are very fleshy, and some might consider them fat.

If a cow scores above 4.0, she is too fat. If she scores 5.0, she is a very obese cow – at high risk for many metabolic problems, decreased fertility and is more prone to go off feed at the time of calving. Essentially, a cow with a 5.0 body condition score is round and covered with fat.

How Often Should Body Condition Score Be Evaluated?

Body condition scores can be recorded at various times throughout lactation, depending on the amount of information needed. One system used by the Dairy Records Management System (DRMS) records body condition score at calving, at first breeding, just past mid-lactation or about 90 to 100 days before going dry and at dry-off. These condition scores provide an indication of the feeding status of the herd as well as any health problems they might have. Other times may be more appropriate in your herd.

How to Record Body Condition Score

Data for body condition scores may be recorded manually on cow cards or entered into a computer, which allows for quick summaries if needed. Data from the records at the dairy records processing center may also be accessed by your on-farm computer or through copies of Dairy Herd Improvement (DHI) records.

Heifer Body Condition Scoring

Heifer body condition scoring can also be a useful tool for monitoring the energy status of heifers. Heifers that are too fat deposit fat in the udder, which might later inhibit formation of milk-secreting cells. If heifers get too fat, they may accumulate fat in their reproductive tract, which will decrease fertility and increase the likelihood of dystocia. Older heifers that get too fat are more prone to have the same metabolic problems as lactating cows at the time of calving. Heifers that are too thin will have decreased fertility and other health problems compared to

heifers that are thrifty and growing well. Elanco Animal Health publishes a booklet, "Body Condition Scoring for Replacement Heifers," which shows heifers in various condition scores.

Generally, heifers will have slightly lower body condition scores than cows. For heifers less than six months old, their body condition score should range from 2.0 to 3.0. Usually heifers should not exceed 3.5 in body condition score. It is recommended that older heifers freshen at a 3.5 body condition score. A body condition score of 2.5 to 3.0 is desirable for heifers from six months old up to breeding age. At breeding, and shortly thereafter, their body condition scores may gradually increase from 3.0 to 3.5. Use caution in adding extra flesh to heifers in late gestation since the extra feed may contribute to large calves and thus calving problems.

In summary, body condition scoring can be a useful management tool for dairy producers to manage the nutrition of their herd. In turn, this improvement in nutritional status should improve milk production of the cow as well as reproductive performance and health of the animals. Thin cows in a negative energy balance are unable to perform at maximum capacity in the herd. Cows that are too fat are more prone to metabolic problems and more easily go off feed. Using body condition scores can allow the dairy producer to more accurately achieve adjustments in the nutritional status of the herd.

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Chapter 4:
Sheep and Goats

Sheep and Goats

Sheep and goat production is popular with many beginning farmers and is a new enterprise for some experienced farmers. Sheep and goat production offers many advantages for farmers. Because they are small, prolific and productive ruminants, they are well-suited to grass-based and small-scale agriculture. Sheep and goats are relatively inexpensive animals to purchase and feed compared to larger animals, a critical advantage for limited-resource farmers. Sheep and goats can be raised with very little grain, which is advantageous at a time when grain prices are on the rise. Return on investment (ROI) is quick for sheep and goats because they reproduce at a young age and have a high incidence of twinning, are marketed within 6 to 10 months of birth and can be raised economically on pasture. Due to their smaller size, they are not intimidating or dangerous animals and are good enterprises for women, youth and aging farmers. As excellent weed and brush controllers, sheep and goats improve pastures and often work synergistically with cattle and other livestock and cropping operations. Recent increases in the ethnic populations in the United States have improved demand for sheep and goat meat, and artisan cheese makers and fiber businesses have also seen increased enthusiasm for their products, so there are several options for using sheep and goats in profitable businesses.

Small Ruminant Nutrition

Feed is the single largest cost associated with raising small ruminants, typically accounting for 60 percent or more of total production costs. It goes without saying that nutrition exerts a very large influence on flock reproduction, milk production and lamb and kid growth. Late gestation and lactation are the most critical periods for ewe and doe nutrition, with lactation placing the highest nutritional demands on ewes/does. Nutrition level largely determines growth rate in lambs and kids. Lambs and kids with higher growth potential have higher nutritional needs, especially with regard to protein. Animals receiving inadequate diets are more prone to disease and will fail to reach their genetic potential.

Small ruminants require energy, protein, vitamins, minerals, fiber and water. Energy (calories) is usually the most limiting nutrient, whereas protein is the most expensive. Deficiencies, excesses and imbalances of vitamins and minerals can limit animal performance and lead to various health problems. Fiber (bulk) is necessary to maintain a healthy rumen environment and prevent digestive upsets. Water is the cheapest feed ingredient, yet often the most neglected.

Many factors affect the nutritional requirements of small ruminants: maintenance, growth, pregnancy, lactation, fiber production, activity and environment. As a general rule of thumb, sheep and goats will consume 2 to 4 percent of their body weight on a dry matter basis in feed. The exact percentage varies according to the size (weight) of the animal, with smaller animals needing a higher intake (percentage-wise) to maintain their weight. Maintenance requirements increase as the level of the animal's activity increases. For example, a sheep or goat that has to travel a farther distance for feed and water will have higher maintenance requirements than animals in a feed lot. Environmental conditions also affect maintenance requirements. In cold and severe weather, sheep and goats require more feed to maintain body heat. The added stresses of pregnancy, lactation and growth further increase nutrient requirements. A sheep or goat's nutritional requirements can be met by feeding a variety of feedstuffs. Feed ingredients can substitute for one another so long as the animal's nutritional requirements are

being met. Small ruminant feeding programs should take into account animal requirements, feed availability and costs of nutrients.

Pasture, forbs and browse are usually the primary and most economical source of nutrients for sheep and goats, and in some cases, pasture is all small ruminants need to meet their nutritional requirements. Pasture tends to be high in energy and protein when it is in a vegetative state. However, it can have high moisture content, and sometimes it may be difficult for high-producing animals to eat enough grass to meet their nutrient requirements. As pasture plants mature, palatability and digestibility decline, thus it is important to rotate pastures to keep plants in a vegetative state. During the early part of the grazing season, browse (woody plants, vines and brush) and forbs (weeds) tend to be higher in protein and energy than ordinary pasture. Sheep are excellent weed eaters. Goats are natural browsers and have the unique ability to select plants when they are at their most nutritious state. Sheep and goats that browse have fewer problems with internal parasites.

Digestive System

Hay is the primary source of nutrients for small ruminants during the winter or non-grazing season. Hay varies tremendously in quality, and the only way to know the nutritional content is to have the hay analyzed by a forage testing laboratory. Hay tends to be a moderate source of protein and energy for sheep and goats. Legume hays – alfalfa, clover and lespedeza – tend to be higher in protein, vitamins and minerals, especially calcium, than grass hays. The energy as well as protein content of hay depends upon the maturity of the forage when it was harvested for forage. Proper curing and storage is also necessary to maintain nutritional quality of hay.

It is sometimes necessary to feed concentrates to provide the nutrients that forage alone cannot provide. This is particularly true in the case of high-producing animals. There are also times and situations where concentrates are a more economical source of nutrients. Many feed companies offer "complete" sheep and/or goat feeds –pelleted or textured – which are

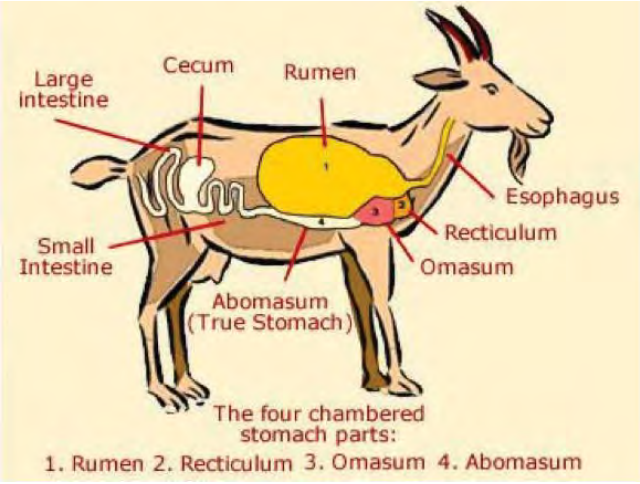


Figure 4-1. Goat digestive system.

balanced for the needs of the animals in a particular production class. Pelleted rations have an advantage in that the animals cannot sort feed ingredients. While complete sheep feeds have been available for many years, it has only been in recent years that meat goat rations have been introduced to the marketplace. Complete feeds come in 50- or 100-lb sacks and tend to be much more expensive than home-made concentrate rations.

Many minerals are required by small ruminants. The most important are salt, calcium and phosphorus. The ratio of calcium to phosphorus should be kept around 2:1 to prevent urinary calculi. Vitamins are needed in small amounts. Small ruminants require vitamins A, D and E, whereas vitamin K and all the B vitamins are manufactured in the rumen. A free-choice salt-vitamin-mineral premix should be made available to small ruminants at all times, unless a premix has been incorporated into the grain ration or TMR (total mixed ration). In the very least, ewes and does should be fed pre-choice mineral during late gestation and lactation. Either a loose mineral or mineral block may be offered. Force-feeding minerals and vitamins is actually better than offering it free-choice since animals will not consume minerals according to their needs.

Small ruminants should have access to clean, fresh water at all times. A mature animal will consume between ¾ to 1½ gallons of water per day. Water requirements and intake increase greatly during late gestation and during

lactation. Water requirements increase substantially when environmental temperatures rise above 70 degrees F and decline with very cold environmental temperatures. An animal's nutrient requirements will increase if it has to consume cold water during cold weather. Rain, dew and snowfall may dramatically decrease free water intake. Inadequate water intake can cause various health problems. In addition, water and feed intake are positively correlated.

Body Condition Scoring

The body condition score (BCS) has been shown to be an important practical tool in assessing the body condition of cattle, sheep and goats. This is because BCS is the best simple indicator of available fat reserves that can be used by the animal in periods of high energy demand, stress or suboptimal nutrition.

Goats

Scoring is performed in goats using a BCS ranging from 1.0 to 5.0 (Figure 4-2), with 0.5 increments. A BCS of 1.0 is an extremely thin goat with no fat reserves, and a BCS of 5.0 is a very over-conditioned (obese) goat. In most cases, healthy goats should have a BCS of 2.5 to 4.0. A BCS of 1.0, 1.5 or 2.0 indicates a management or health problem. A BCS of 4.5 or 5 is almost never observed in goats under normal management conditions; however, this BCS can sometimes be observed in show goats.

Figure 4-2. Body Condition Scoring of GOATS.

BCS 1.0 – Visual aspect of the goat: Emaciated and weak animal, the backbone is highly visible and forms a continuous ridge. The flank is hollow. Ribs are clearly visible. There is no fat cover, and fingers easily penetrate into intercostal spaces (between ribs). The spinous process of the lumbar vertebrae can be grasped easily between the thumb and forefinger; the spinous process is rough, prominent and distinct, giving a saw-tooth appearance. Very little muscle and no fat can be felt between the skin and bone.



BCS 2.0 – Visual aspect of the goat: Slightly raw-boned, the backbone is still visible with a continuous ridge. Some ribs can be seen, and there is a small amount of fat cover. Ribs are still felt. Intercostal spaces are smooth but can still be penetrated.



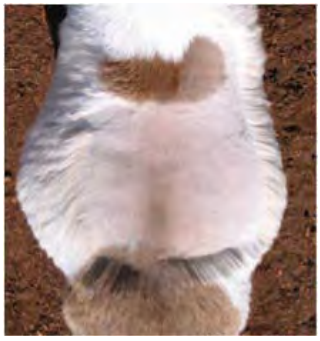
Figure 4-2. Body Condition Scoring of GOATS (cont.)

BCS 3.0 – Visual aspect of the goat: The backbone is not prominent. Ribs are barely discernible; an even layer of fat covers them. Intercostal spaces are felt using pressure.



BCS 4.0 – Visual aspect of the goat: The backbone cannot be seen. Ribs are not seen. The side of the animal is sleek in appearance. It is impossible to grasp the spinous process of the lumbar vertebrae, which is wrapped in a thick layer of muscle and fat.





BCS 5.0 – Visual aspect of the goat: The backbone is buried in fat. Ribs are not visible. The rib cage is covered with excessive fat. The thickness of the muscle and fat is so great that reference marks on the spinous process are lost.



It is important to note that BCS cannot be assigned by simply looking at an animal. Instead, the animal must be touched and felt. The first body area to feel in determining BCS is the lumbar area, which is the area of the back behind the ribs containing the loin. Scoring in this area is based on determining the amount of muscle and fat over and around the vertebrae. Lumbar vertebrae have a vertical protrusion (spinous process) and two horizontal protrusions (transverse process). Both processes are used in determining BCS. You should run your hand over this area and try to grasp these processes with your fingertips and hand. The second body area to feel is the fat covering on the sternum (breastbone). Scoring in this area is based upon the amount of fat that can be pinched. A third area is the rib cage and fat cover on the ribs and intercostal (between rib) spaces.

Sheep

While it is easy to see the body condition of sheep when it is freshly shorn, it becomes impossible to do that by sight as the wool/hair grows. A woolly sheep can easily look in a lot better condition than it actually is. Many ranchers are shocked at the poor condition of their sheep when they are shorn. Therefore, it is necessary to palpate (feel) each individual for accurate assessment of body condition. The animal should be standing in a relaxed position. It should not be tense, crushed by other animals or held in a crush. If the animal is tense it is not possible to feel the short ribs and get an accurate condition score. Place your thumb on the backbone just behind the last long rib and your fingers against the stubby ends of the short ribs.

A body condition score estimates condition of muscling and fat development. Scoring is based on feeling the level of muscling and fat

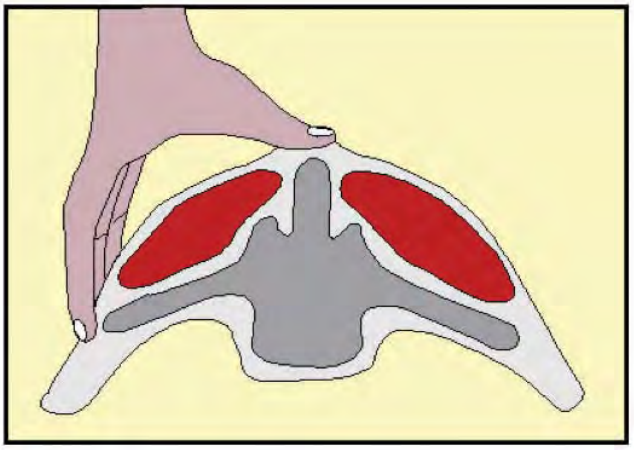


Figure 4-3. BCS of sheep is based on feeling the amount of muscle and fat present on the vertical and horizontal protrusions over the loin.

deposition over and around the vertebrae in the loin region (Figure 4-3). In addition to the central spinal column, loin vertebrae have a vertical bone protrusion (spinous process) and a short horizontal protrusion on each side (transverse process). Both of these protrusions are felt and used to assess an individual body condition score. The system used most widely in the United States is based on a scale of 1 to 5. The five scores are shown in Figure 4-4.

Body condition scoring is a subjective way of measuring the level of muscle and body fat carried on your sheep. BCS can give you a good indication of the health, nutritional state and potential reproductive success of your flock in a single easy measurement. Despite its subjectivity, BCS is a very reliable indicator when conducted by a trained scorer (Figure 4-5). Most sheep on most farms will have a BCS of between 2 and 4. Age, pregnancy status and wool coat are a few of the variables that can affect the outcome or interpretation of your ewes' BCS.

Figure 4-4. Body Condition Scoring of SHEEP

Condition 1 (Emaciated):
Spinous processes are sharp and prominent. Loin eye muscle is shallow with no fat cover. Transverse processes are sharp; one can pass fingers under ends. It is possible to feel between each process.

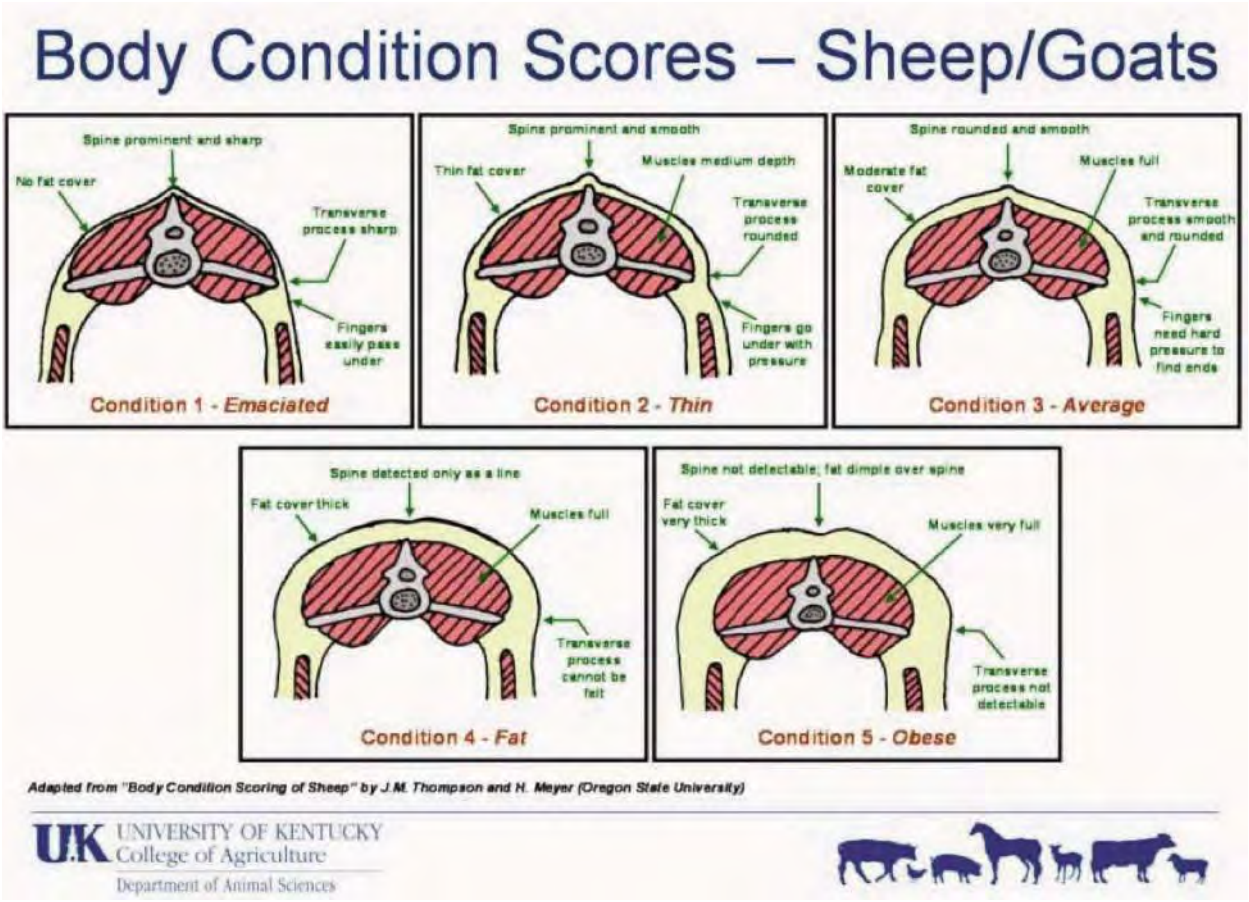
Condition 2 (Thin):
Spinous processes are sharp and prominent. Loin eye muscle has little fat cover but is full. Transverse processes are smooth and slightly rounded. It is possible to pass fingers under the ends of the transverse processes with a little pressure.

Condition 3 (Average):
Spinous processes are smooth and rounded and one can feel individual processes only with pressure. Transverse processes are smooth and well covered, and firm pressure is needed to feel over the ends. Loin eye muscle is full with some fat cover.

Condition 4 (Fat):
Spinous processes can be detected only with pressure as a hard line. Transverse processes cannot be felt. Loin eye muscle is full with a thick fat cover.

Condition 5 (Obese):
Spinous processes cannot be detected. There is a depression between fat where spine would normally be felt. Transverse processes cannot be detected. Loin eye muscle is very full with a very thick fat cover.

Figure 4-5.



Small Ruminant Health

A sound management program to keep animals healthy is basic to production of both sheep and goats. Producers must observe animals closely to keep individual animals and the whole herd or flock healthy and productive. If the health status of a herd is compromised, that operation will not be as efficient as possible. There are some human health risks when dealing with diseased animals. While most diseases affecting sheep and goats do not pose any human health risks, some are zoonotic and it is important to protect not only caretakers but anyone else that may come in contact with diseased animals. To recognize clinical signs of diseases common to sheep and goats, it is important to be familiar with what is normal. Producers should assess the herd or flock's general health on a regular basis, including vital signs and body condition (Table 4-1).

Table 4.1. Normal Range for Goat and Sheep Physiological Parameters

	Goat	Sheep
Temperature, rectal	101.5 -103.5 degrees F	101.5 - 103.5 degrees F
Heart rate	70 - 80 beats per minute	70 - 80 beats per minute
Respiration	12 - 25 per minute	15 - 30 per minute
Rumen movement	1 - 2 per minute	1 - 2 per minute
Estrous	18 - 21 days	14 - 20 days
Estrus	48 - 72 hours	24 - 48 hours
Gestation	145 -155 days	144 - 151 days

The most common procedures done by producers are listed below with a brief explanation of correct methods.

- **Taking temperature – rectally** – The first procedure usually performed on an animal suspected to be ill is to take its temperature. In goats, this is performed rectally. Either a digital or mercury thermometer can be used. Plastic digital thermometers do not break and may be considered safer to use than a mercury thermometer. A small amount of lubricant may be put on the thermometer, and it should be inserted with a twisting motion.

- **Respiration rate** – Respiration is detected by watching movement of the flank or chest. A normal range is 12 to 20 per minute.

- **Rumen movements** – Adequate rumen function is essential for a goat/sheep health. One sign of adequate function is regular ruminal movement. This can be detected by placing the hand on the left flank of the animal. If the rumen feels soft and water-filled, this should be noted and reported to your veterinarian. Rumen contractions should be easily felt and should occur 1-2 times per minute.

- **Checking mucous membranes** – Paleness of the mucous membranes in the mouth (gums), vagina and prepuce can be an indicator that the animal is in hypovolemic shock, meaning that there is a decrease in the blood volume circulating in the animal. The color of the conjunctiva around the eyes can be an indicator of anemia that could be caused by a heavy internal parasite burden. Roll down the lower eyelid to look at the color. A pale, whitish color indicates anemia. This color can be scored using the FAMACHA System. Remember that irritation of any type causes membranes to turn red.

Animals should exhibit a healthy hair coat or fleece, while maintaining a body condition score appropriate to their production stage. Both coat and body condition score are good indications of nutritional adequacy and overall health. Signs of an unhealthy animal include isolation from the rest of the herd/flock, abnormal eating habits, depression, scouring or diarrhea, abnormal vocalization, teeth grinding or any other abnormal behavior.

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Chapter 5:
Equine Care and Considerations

Equine Care and Considerations

Overview

1. **Observe your animals.**
   a. Alive?
   b. Alert? Are their ears erect and do they appear alert?
      – Ears forward is a good sign. If ears are constantly back, there is some type of agitation, anger or pain.
   c. Are horses with the herd or alone?
      – Occasionally horses will venture away from the herd. However, if constantly alone, may need to check health.
   d. Normal stance?
      – Horses will stand with back legs out from under them when experiencing discomfort.
   e. Resting one hind leg on toe not abnormal.
   f. Moving normally?
   g. Standing or down?
   h. Lying down not necessarily abnormal.
      – Especially on warmer days, it is common for adult and young horses to lie down and be content and happy.
   i. Are all animals similar in health and body fat?
      – Are there one or two horses in the herd that aren't satisfactory?

2. **Observe the facilities.**
   a. Feed?
   b. On premises?
   c. Available to horses?
   d. Quality?
   e. Water?
   f. Available?
   g. Shelter?
   h. Cleanliness?

3. **Why horses are thin?**
   a. Old – poor metabolism, poor or missing teeth.
   b. Lactating – heavy milker.
   c. Parasites.
   d. Too lame to get to feed.
   e. Lowest ranking horse in herd.
   f. Disease.
   g. Lack of proper nutrition.

Check Body Condition Score

Areas to look for condition of horse are shown below in Figure 5-1:

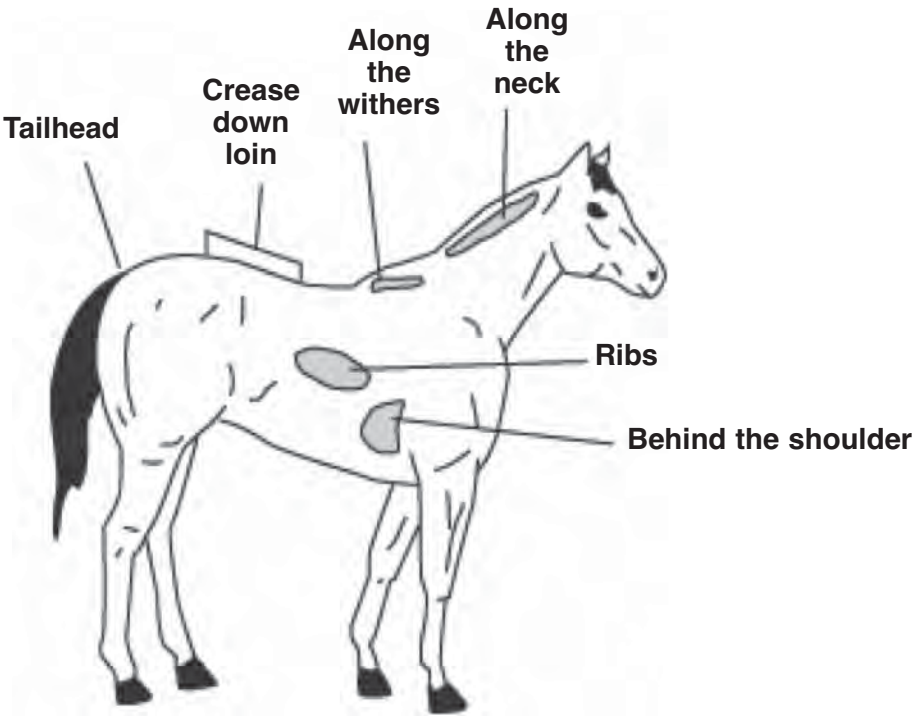

Figure 5-1.

Figure 5-2. Body Condition Scores for Horses.

BCS 1

1. Poor ("walking death").
2. Extremely thin.
3. Bones very prominent and defined.
4. No fatty tissues.
5. Needs immediate care to survive.

BCS 3

1. Ribs and backbone easily seen; some fat covering.
2. Point of hip rounded.
3. Usually not immediately life threatening; needs proper nutrition.

BCS 5 or 6

1. Ribs can be felt, but not seen.
2. No backbone visible.
3. Fat deposited around tailhead.
4. Middle of back level to slightly creased.
5. Healthy BCS.

BCS 8 or 9

1. Ribs difficult to feel.
2. Crease down middle of back.
3. Fat all over.
4. Not healthy, but usually not in any immediate danger.

Feeding Horses

1. Water – 10-12 gallons daily
   a. Potable, available.
   b. Survive only 5-6 days without water.

2. Grass/hay – minimum 1% body weight daily.
   a. Grass/hay availability very important.
   b. No weeds! No mold!
   c. Green ≠ grass.

3. Salt – provide free choice.

4. Grain – not required by all horses (if fed, strive for 1%-2% of body weight).

5. **NEVER** abruptly offer large amount of grain to a horse that is not accustomed to eating grain.

Examine the Pasture

1. What is the average height of the grass?

2. Are there large bare spots and high clumps of grass around manure piles?

3. Has the bark been chewed from trees and bushes?

4. Is hay present, and is there evidence of continuous hay feeding?

Shelter

1. Most horses healthier/happier outside.

2. Need shade and windbreak.

3. Acres needed/horse varies with management.

4. Stall size needed varies with horse size and management.

Normal Activity for a Horse

1. Part of herd.

2. Lying down for short time periods.
   a. Usually roll after nap; then rise and shake off dirt.
   b. Sick horse rolls, gets up, goes down again.

3. Standing with one hind leg cocked.

4. Eating.

5. Active.
   a. Need daily exercise opportunity.

Handling/Restraints

1. Safe zone – around shoulder
   a. Avoid rear end and directly in front of horse
   b. Horses move fast!

2. Move quietly, slowly, deliberately.

3. NO flashing lights.

4. NO sirens.

5. Avoid sudden noises/movements.

6. It is a common/recommended practice to use some sort of restraint when performing management procedures.

7. Provides protection and safety for the horse.

8. Provides security and safety for the handler/worker.

9. Common types of restraints: Stock, Twitch, Hobbles.

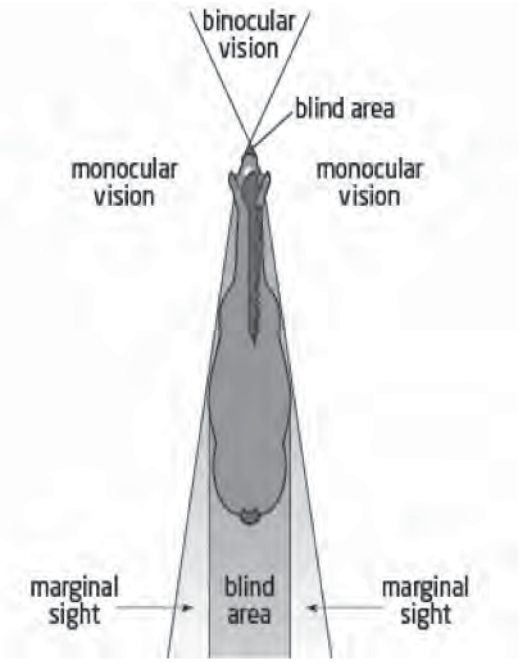

Figure 5-3. Field of vision.

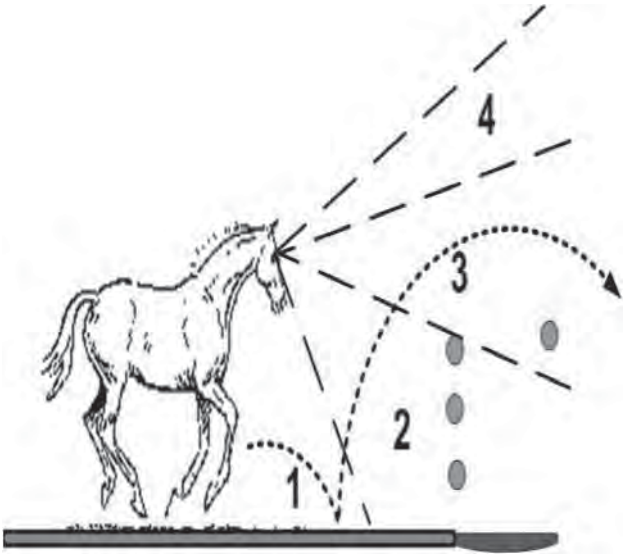

Figure 5-4. Forward field of vision.

Herding/Moving

1. Balance point at the star in Figure 5-5.
   a. Stay behind it – horse moves forward.
   b. Step in front of it – horse slows, or turns away.

Figure 5-5. Balance point.

2. Several horses – usually follow the lead horse.
   a. Figure out which horse that is.

3. Too excited – give them time to settle.

4. Move away from gate after you open it.

5. Keep your head lowered – less threatening.

6. Become bigger and louder if horses run at you.

Table 5-1. Internal Parasites/Worming

Parasite	Organs Affected	Ages Affected	Injury and Symptoms
Strongyles (Bloodworms)	Larvae – arteries, liver and gut wall Adults – large intestine	All ages, but young is especially susceptible	Retarded growth Loss of weight Poor appetite Rough hair coats General weakness Anemia Diarrhea Recurrent colics Death
Ascarids (Roundworms)	Larvae – liver and lungs Adults – small intestine	Young (under 2 years of age)	Retarded growth Pot bellied Rough hair coat Digestive upsets Pneumonia Death (ruptured intestine)
Bots	Eggs – on hair Larvae – tongue and gums Bots – stomach	All ages	Excitement (by flies) Digestive upsets
Pinworms	Larvae – large intestine Adults – large intestine and rectum	Larvae affect all ages	Tail rubbing
Strongyloides (Threadworms)	Larvae – lungs and small intestine Adults – small intestine	Foals	Diarrhea Dehydration Weight loss
Tapeworm	Larvae – small intestine Adults – large intestine and cecum	All ages	Retarded growth Weight loss Colic

Vaccinations

The American Association of Equine Practitioners (AAEP) suggests the following vaccinations for adult horses. (Many of these can vary depending on history of vaccination and if broodmare. Please consult with your local veterinarian.)

- Anthrax – Annual. Not recommended during gestation for broodmares and should not be administered concurrently with antibiotics.
- Botulism – Annual.
- Equine Herpesvirus (EHV) – Annual.
- Influenza – Horse with ongoing risk of exposure: Semiannual. Horses at low risk of exposure: Annual.
- Potomac Horse Fever – Semiannual to annual.
- Rotavirus (Broodmares) – Three-dose series: 1st dose at 8 months gestation; 2nd and 3rd doses at 4-week intervals thereafter.
- Tetanus.
- Rabies.
- West Nile.

Vitals

1. Temperature = 99.5 – 101.5 (ave. 100.5) degrees…at rest.
2. Pulse = 28-42 bpm (ave. 35)…at rest.
3. Respiratory rate = 8-20 (ave. 12) breaths/min…at rest.

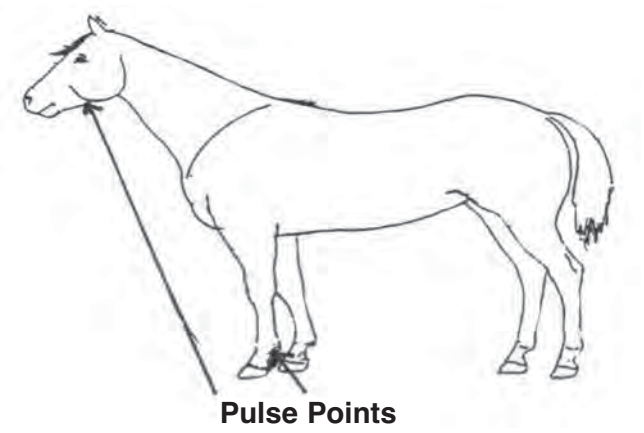

Figure 5-6. Location of pulse points.

Summary

1. Good pastures will meet the needs of most horses except during peak activity or production.
2. Fresh water must be available at all times.
3. Body condition scores provide an indicator of animal well-being.
4. Signs of injury, disease or other medical issues require veterinary care.

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