AHCA Highland Breeder's Guide

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FOREWORD

This Highland Breeder's Guide was developed to help owners of Highland cattle make a success of their enterprise. Highland cattle are special. They are cattle, however, with disease and management problems and nutritional requirements similar to other beef breeds. A motivated Highland breeder needs to develop a network of information sources including successful Highland producers, a good veterinarian, beef extension specialists, animal husbandry books and other written information. There is also no substitute for intense management effort and observation.

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HIGHLAND BREED CHARACTERISTICS

Angus Mackay

What are Highland Breed Characteristics?

I am of the opinion that they can and should be divided into two distinct categories.

The first and most important category is for characteristics that have evolved over many hundreds of years: hardiness and longevity. Neither of these are mentioned in the Breed Standard, published in 1885 in the first Highland cattle herd book of Scotland.

The second category is for fashionable characteristics, which man has created over many years through the use of genetic modifications. These characteristics are adequately described in the Breed Standards, already referred to above. Most of these characteristics can be used to describe any breed of beef cattle.

In order to fully appreciate what I consider to be the Highland breed's unique characteristics of hardiness and longevity, you must first of all consider the land, climate and conditions (the habitat) in which the Highland breed evolved over many centuries.

The Highlands of Scotland are the most northern and inhospitable part of the British Isles, as up until 200 years ago there were few roads, no bridges over rivers and the only way to travel was on foot or by boat around an equally dangerous and inhospitable coast line.

This is the land the Romans came to conquer, saw the Grampian mountains and decided to go home or at least back to England's green and pleasant land.

This is also the land that the Vikings sailed around the coast of, where they occasionally landed to rape and plunder! It was only after their defeat at the Battle of Largs in 1263 that King Haakon of Norway on his way home and refusing to leave empty-ended, stole 300 cattle from the Island of Islay. Suffice to say, just like the Romans they did not stay.

So who were the people who lived in this remote and inhospitable land? They were hardy-like warriors, rearing cattle as best they could in conditions where only the very hardiest could survive. They utilized to the best advantage lush summer pastures in the high mountains for milk and cheese production and struggled through the long harsh winter to keep as many cattle alive as possible, even though on occasion, they would have to bleed their cattle and use the blood to supplement the family's meager rations of oatmeal. They lived in very close proximity to their cattle and in the winter, they shared the same low turf roof dwelling, known as "Black House". There the temperament of the cattle would never have been a problem and where these people developed an understanding of cattle that we in the twenty-first century could never hope to attain. It was in an environment such as this that hardiness evolved in the cattle that became known as the Highland breed.

It was hardy Highland cattle that first brought commerce to the Highlands of Scotland. Arguably, it could be said that cattle brought about the end of the clan system and the traditional Scottish way of life.

There are accounts of the droving trade in Highland cattle as early as 1359 and this was to continue well into the nineteenth century. This highly lucrative and dangerous trade was at its height from 1760 to 1820. At that time, tens of thousands of 2 - 3 year old cattle left the Highlands and Islands throughout the autumn and made their long and treacherous journey south to the great cattle fayres in Muir of Ord in the northeast Highlands. From there, they went on, gathering in numbers, to the major fayres in the towns of Crieff and Falkirk in the southern Highlands and then travelled a further 300 miles south, across the border to be fattened in the lush pastures of England. Eventually, these cattle were sold as prime beef in ever expanding cities such as Manchester and London.

Good feet and legs were essential as the cattle were expected to travel between ten and fifteen miles in one day over the roughest terrain and even, on occasion, swim rivers that had swollen after days of torrential rain. The drovers were every bit as hardy as the cattle under their care. They slept with their droves at night just in case they should stray or be stolen in the dead of night by the likes of Rob Roy MacGregor or the Stewarts of Ardvorlich, to name but a few. They also drove the hardest of bargains when selling their cattle to English dealers at the annual fayres.

The drover's descendants helped to establish the great cattle trails of the western United States, through the long journeys to the rail heads during the nineteenth century, at a time when only the very toughest men and cattle would survive. One of the earliest pioneers in America to develop commercial cattle droving was called John Chisholm whose forefathers drove cattle from the Isle of Skye to the Lowlands.

With regard to longevity, I personally believe that three hundred years ago all cattle would have had much longer productive lives, as they were allowed to develop at a more natural rate. It was only when livestock improvers began to select local types of cattle for particular traits, whether for beef or milk production, that longevity became affected.

Hardiness was also affected following rigorous selection and line breeding in the quest to develop, what we now know to be Scottish beef breeds, such as the Aberdeen Angus, Beef Shorthorn and Galloway. While at the same time, in the south west of Scotland, the Ayrshire breed evolved purely for milk production.

In order to encourage the further development and improvement of the various breeds of cattle, sheep and horses, the Highland and Agricultural Society of Scotland awarded prizes at local agricultural shows for improved livestock. As early as 1789, judges at district shows were told to pay particular attention to the shape of bulls and not their size, in order, as they put it, "to encourage true breeding".

In 1840, the Lorn Agricultural Society, situated at the heart of 'Highland Cattle Country' applied the following judging points:

Carriage	25 points
Back and Ribs	20 points
Head and Horns	15 points
Hind Quarters	15 points
Hair	10 points
Neck	5 points
Legs	5 points
Size	5 points

And so began the development of the Highland breed as we know it today.

The show ring was to dictate the supposed ideal type, depending on the fashion at the time. With the formation of the Highland Cattle Society in 1884 and the publication of the first herd book the following year, that set out breed standards, which I believe to be merely a guide to standardizing a breed that was as diverse in size and conformation as it was in colour. However, thankfully they did not try to standardise colour.

How important are breed characteristics? Some of them were developed in order to identify more easily one breed from another - such as black and polled in the Aberdeen Angus and the distinctive white face of the Hereford breed.

When it comes to the Highland breed, it usually starts with the head, as no other domesticated cattle breed is quite like it - with their open wide horns and long flowing hair they are truly majestic. Just as the Kings of Old would wear on their heads diamond studded crowns of grand proportions to signify their importance and enhance their stature, which more often than not left much to be desired through generations of inbreeding, the animal with the grandest and most majestic head would usually find itself at the top of the line in any show ring and as most pedigree breeders will tell you, the only way to assess true breeding is to look at the head. If this is so, then all cattle breeders must ask themselves if showing is having a harmful effect on cattle breeding? How should the judge evaluate the Highland breed's unique characteristics?

Hardiness is impossible to judge visually in the show ring as it takes many years of practical experience to truly evaluate cattle.

When it comes to longevity there are several fundamental factors that should be taken into account, which can be visually assessed. If your cattle are to have long productive and profitable lives, good feet are essential, as good structure and conformation can only be built on sound, well-shaped feet.

When assessing breeding cattle, more attention should be paid to udder construction and teat size.

Young bulls should display early and even testicular development as all of the above will help to ensure a long productive life.

Personally, I consider that the breed standards, as written in 1885, were meant as a guide. It was never meant to be the bible of good Highland cattle breeding. If that was so, then the breed should be kept in a museum!

We, as Highland cattle breeders of today, have a duty to the breed and to the producers of tomorrow. We must allow the most versatile of all beef breeds to continue to evolve and improve, thus ensuring its survival.

Finally the best advice I can give you is to lay down your herd book, switch off your computer, leave your mobile phone at home and spend an hour or two amongst your cattle quietly… and allow the hand of nature to be your guide in discovering the Highland breed characteristics.

STRUCTURAL CORRECTNESS IN BEEF CATTLE

Harlan Ritchie, Ph.D. & Peter Anderson, Ph.D.

Introduction

A minimum degree of structural correctness is needed in all species of animals. However, it assumes greater importance in some classes of livestock than in others. For example, it is of utmost importance in the horse because its activity (racing, working cattle, draft, etc.) generally places a greater degree of stress on the skeleton than is the case with other species. In beef cattle, structural correctness is of greater importance in the bull for several reasons: (1) he is heavier than the female; (2) in range country, he must travel relatively long distances to cover cows in heat; (3) he transmits his structural traits to his daughters who will eventually become herd replacements (unless he is in a terminal sire breeding program). Structural correctness is also important in the female for several reasons: (1) it contributes to longevity, a trait which recent research at Montana and MARC (Kress et al., 1988) has shown to be highly related to cow herd efficiency; (2) working on cows with structural problems is costly in terms of time and money; (3) unsound cows transmit problems to their progeny just like bulls, although they obviously do not have the impact on the herd that a heavily used sire does.

Structural soundness is not an all-or-none proposition. These traits usually occur in varying degrees from slight to severe. In most traits, there is a "range of acceptability" within which the animal can function efficiently. Furthermore, some structural defects are more apt to impair function than are others. Developing a feel for this range of acceptability, as well as knowing which defects are most serious, is something that livestock breeders and judges should strive for. A common mistake made by some beginning judges is to overreact and place too much emphasis on relatively minor faults in structure. It should be remembered that beef cattle are raised to produce meat, not to compete at the race track with the Thoroughbred! Conversely, overlooking serious defects in structure is just as much a problem.

Most structural defects are heritable to some degree and should be particularly discriminated against in maternal and general purpose breed bulls whose daughters will be kept for replacements. On the other hand, certain problems can be tolerated in bulls of terminal sire breeds if they do not affect longevity or the ability to mate.

The purpose of this paper is to characterize the structural problems that are most commonly encountered in beef production and to discuss their importance and relationship with function. The World Simmental Federation (WSF) has developed ranges of acceptability for a number of structural traits. Although their guidelines may not be totally applicable to all breeds in all environments, they will be referred to in this paper because they represent a conscientious and united effort on the part of a large association of breeders to address the subject of structural correctness.

Skeletal Structure

In order to consider correct structure, one should be familiar with the bovine skeleton. The drawing on the following page lists the primary bones and joints that are implicated in structural soundness, including their Latin and common names. A discussion of skeletal structure will be presented in the sections to follow.

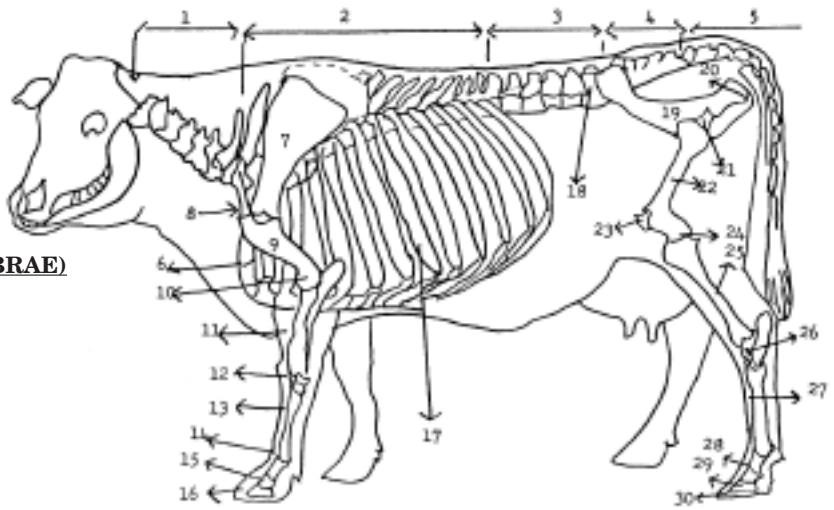
Feet and Pasterns

In general, the feet and pasterns of a sound animal should exhibit the following characteristics:

1. Normal rate of hoof growth.
2. Adequate size (area) of foot.
3. Even-sized claws (toes).
4. Toes held together and not spread.
5. Adequate depth of heel.
6. Correct slope to pastern and foot as viewed from the side.
7. Relatively straight as viewed from the front.
8. Hard, dense hoof.

Defects of the feet and pastern are covered in the following sections.

BOVINE SKELETON



VERTEBRAL COLUMN

1. Neck - Cervical Vertebrae (7)
2. Back & Shoulder - Thoracic Vertebrae (13)
3. Loin - Lumbar Vertebrae (6)
4. Rump - Sacral Vertebrae (5)
5. Tail - Coccygeal Vertebrae (18-20)

6. **BREAST BONE - STERNUM (7 STERNEBRAE)**
17. Ribs (13) Attached to Thoracic Vertebrae

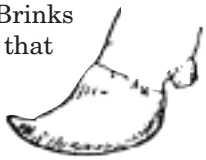
FORELEG - THORACIC LIMB

7. Shoulder Blade - Scapula
8. Point of Shoulder - Shoulder Joint
9. Arm - Humerus
10. Elbow Joint
11. Forearm - Radius & Ulna
12. Knee - Carpus (6 bones)
13. Cannon - Metacarpals
14. Ankle - Fetlock Joint
15. Pastern - 1st & 2nd Phalanx
16. Foot - 3rd Phalanx, Pedal or Coffin Bone

HIND LEG - PELVIC LIMB

18. Hip - Tuber Coxae
19. Rump - Pelvis
20. Pin Bones - Tuber Ischii
21. Hip Joint
22. Thigh - Femur
23. Patella
24. Stifle Joint
25. Gaskin - Tibia, Fibula
26. Hock - Tarsus (5)
27. Cannon - Metatarsals
28. Long Pastern - 1st Phalanx
29. Short Pastern - 2nd Phalanx
30. Coffin or Pedal or 3rd Phalanx

Excessive Hoof Growth (Beak Claw)



Excessive hoof growth, referred to in many countries as "beak claw", is a common defect in cattle. Brinks et al. (1979) reported hoof growth to be a highly heritable trait, although it is well-known that management factors can play a large role in accentuating the problem. For example, full-feeding of high energy grain - such as corn, barley and wheat - can lead to various degrees of founder which in turn results in excessive hoof growth. Furthermore, stabled cattle are more apt to show excessive hoof growth than those on pasture or range country.

Beak claw can also develop with sickled hind legs. This incorrect position of the hind limb causes less wear on the front of the foot, resulting in turned up toes and the formation of the so-called "beak". This causes undue wear on the hind part of the foot and heel. Also, the corium, which lies underneath the horny wall of the foot is squeezed, resulting in overgrowth.

Rolled (Corkscrew) Claws

This condition can occur on either end, although it is more common on the hind limb. In this defect, the outer sidewall of the outside claw overgrows the sole. Putrefaction of the horn may develop in the formed niches. Rolled claws are often associated with bowed legs because more weight is brought to bear on the outside of the foot, causing the outside claw to roll under.

Scissor (Curled) Claws

This defect is usually associated with cattle that are knock-kneed and splay-footed. The outside claw which carries less weight tends to recess. The point of the inside claw grows outward and upward and "curls" in front of the point of the outside claw. Similar to the corkscrew claw, the sidewall of the inside claw rolls under, which squeezes the corium causing further overgrowth.

Small Feet

Small feet tend to be associated with the larger breeds and also with steep pasterns and straight hocks. Small feet have to bear a greater weight load per area resulting in a disproportionate relationship between body mass and foot size, which causes greater abrasion of the sole. There is also reduced blood circulation in the corium which can eventually lead to a regression of tissue. In severe cases in large bulls, the feet can no longer carry the weight and the bull must be culled. In South Africa, Massman (1986) reported that small feet is the biggest single foot problem in Simmental cattle. Schneller (1984) has suggested that normal dimensions of the claws of cattle weighing 1100 to 1200 lbs. should be 11-13 x 5-6 centimeters (55 to 78 sq. cm.).

Uneven Claw Size

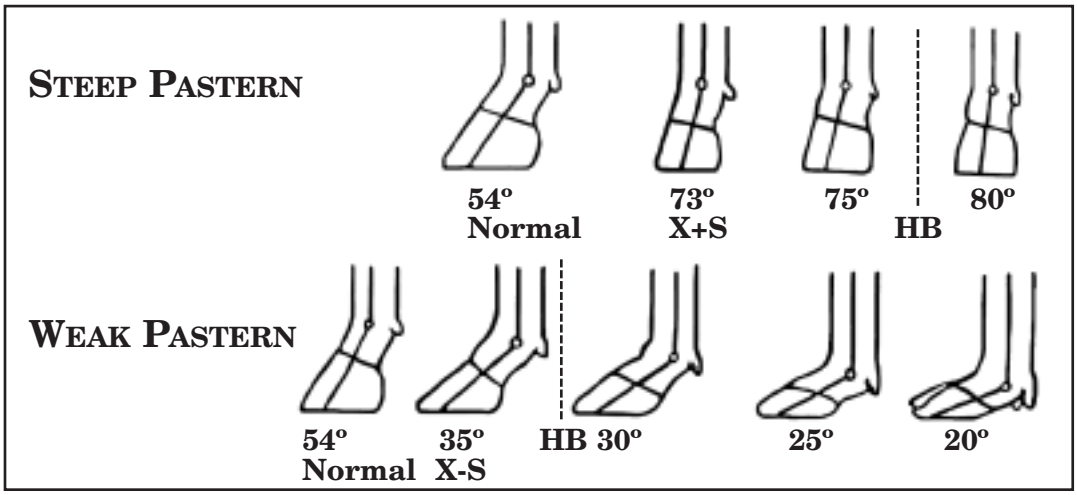
Ideally, the two claws should be close to the same size, although slight irregularities in size are of little or no concern.

Spread Toes (Splayed Toes)

Spread or splayed toes result from a weakness of the tendons between the toes. The claws are pushed apart which stresses the soft tissue, leading to cracks which may become inflamed. Interdigital granuloma (corns) may also be formed. Sieber et al. (1986) reported splayed toes to be moderately heritable.

Steep Pasterns and Weak Pasterns

Steep pasterns place stress on the skeleton because the shock absorbing ability of the front limb is reduced. This is generally considered to be a more serious defect in all species of livestock than slightly weak or "soft" pasterns. Based upon Swiss and German research as well as a 1983 survey of 19 member countries, the World Simmental Federation (WSF) established guidelines for several structural traits. The drawing below suggests that a slope of 54º is considered to be average (x), "normal" or "ideal". The notation, x ± s, represents the average ± one standard deviation, a range within which 68% of the animals are found in a normally distributed population. As shown below, this range for the pastern slope would be 35º to 73º. The notation, "HB", together with the dotted line, indicates the suggested limit for acceptance into the herd book. The range of acceptability for pastern slope was determined to be from 35º to 75º.



Shallow Heels

As shown in the figure on the following page, the WSF used the ratio of length of toe to depth of heel to establish guidelines for the latter trait. For the front limb, the normal or ideal ratio is 1.7 and the acceptable limit is 3.5. For the hind limb, the ideal is 1.9 and the acceptable limit is 3.5.

Splay-Footed (Toed-Out)

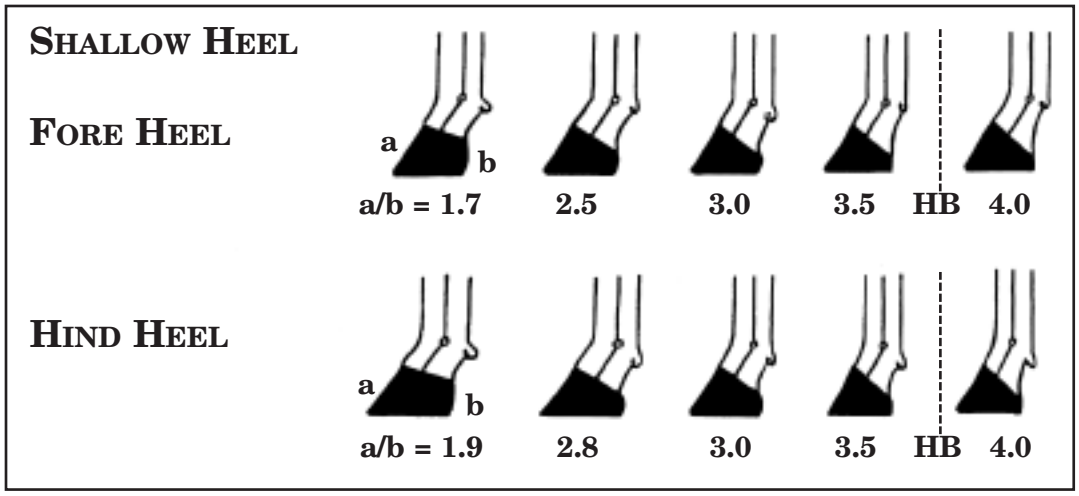
WSF guidelines for the splay-footed condition are shown on the following page. This defect is usually associated with knock knees. An angle of 10º is considered normal or ideal, and the acceptable limit was set at 40º. However, some countries, notably Australia, felt that 30º should be the maximum tolerable angle.

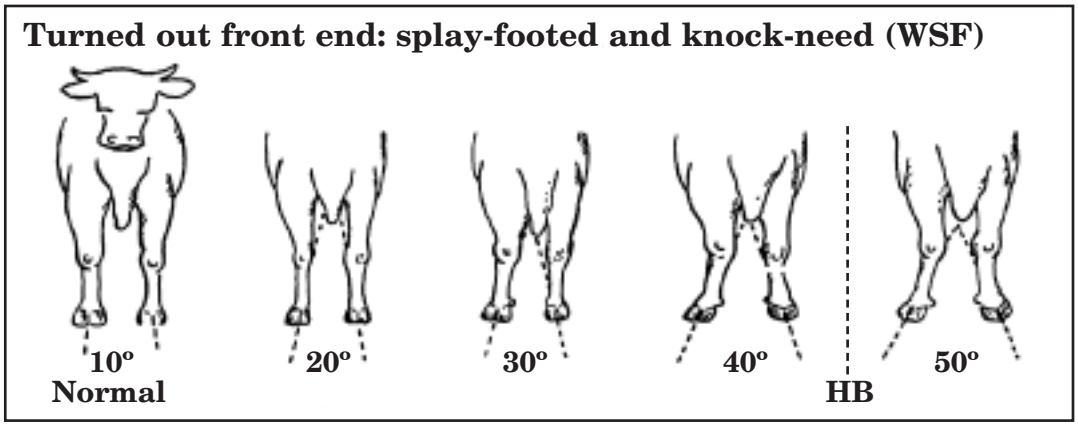
Pigeon-Toed (Toed-In)

The pigeon-toed condition is not as common as the splay-footed defect. However, it can be a more serious problem when it becomes extreme. It is usually associated with a base narrow stance and uneven weight distribution on the outside claw. When pigeon-toed animals move, they often wingout or "roll" on their front end.

Cracked Hooves

Cracked hooves can result in lameness that may require treatment. It is usually not observed in younger cattle unless they have been foundered.





Soft Hooves

Dense, tough feet wear better than porous, soft feet. Many livestock breeders believe that dark hooves are tougher than light-colored hooves. However, research by Pflug (1978) showed that pigmentation is not related to density. He reported that traits such as moisture content and microstructure (number and diameter of tubules) of the horny wall of the hoof are the primary factors affecting strength.

Summary of Foot Problems

If any of the foot defects discussed above are severe enough in a yearling animal to prevent the toes from making solid contact with the ground and wearing normally, he may experience real problems later on. If they are only slight to moderate, he should perform satisfactorily (Blockey 1981).

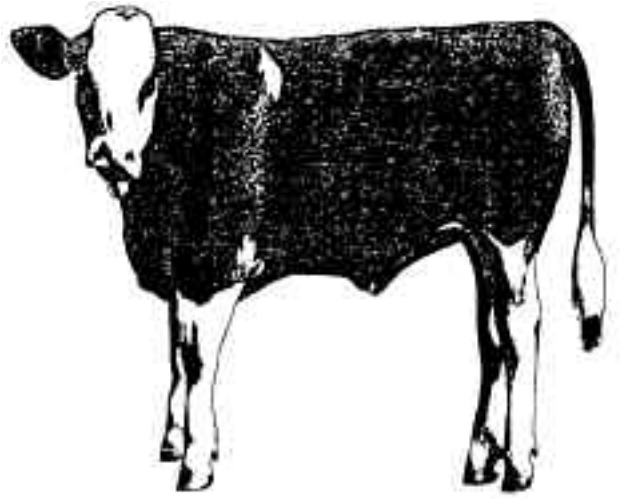
In a summary of South African Simmental cattle, Massman (1986) reported that foot and pastern problems accounted for 6% of the cattle that were rejected by inspectors for registration in the herd book.

THE HIND & FORE LIMBS

The Hind Limb

The hind limb of the ideal animal should exhibit the following characteristics:
1. Acceptable set to the hock, as viewed from the side.
2. Straight hind legs, as viewed from the rear.

In South African Simmental herds, hind leg problems are the biggest single reason (15%) for the rejection from the herd book (Massman, 1986). Common defects of the hind limb are discussed in the following sections.



Results of inadequate angulation: posty hind legs, puffy hocks, steep pasterns, steep shoulder, buck knees and small feet.

Post-Legged (Straight Hocks)

The post-legged condition is perhaps the most serious skeletal defect in beef cattle, especially in bulls. Post hind legs are often associated with steep pasterns. In severe cases, the animal is apt to become arthritic in any one or all of the joints of the hind limb - hock, stifle or hip (Blockey, 1981).

In a study on the pathogenetic relationship between straight hocks and the genetic defect, spastic paresis, Rieck & Leipold (1964) measured the hock angle of over 200 cattle. The average angle was 143º. Animals affected with spastic paresis showed an angle in excess of 158º. As a result of this and other research, the WSF developed guidelines for the angle of the hock joint. The range of acceptability was from 120º to 155º, with an ideal of 140º. In contrast, the ideal hock joint angle for the horse is 175º, which would be much too straight for the bovine.

Sickle-Hocked

The sickle-hocked condition is a serious problem if it reaches extreme proportions, especially when associated with weak hind pasterns. Severe sickle hocks have been reported to impair the serving capacity of bulls (Blockey, 1981).

Cow-Hocked

The cow-hocked condition is relatively common but seldom has a detrimental effect on function. In extreme cases, it can result in a long, flat outside claw on the hind feet.

Bow-Legged

The bow-legged condition is not as common as cow hocks but is more serious than the latter. It is associated with a base narrow stance and a disproportionate amount of weight on the outside claw, often resulting in rolled or corkscrew claw. Extreme cases may result in puffy hocks and lameness.

Front Limb

A steep shoulder reduces the shock absorbing ability of the front limb. It may also cause a short choppy stride and reduce the animal's ability to move long distances in extensive range country. When combined with buck knees and steep pasterns, the problem becomes more serious. Guidelines for the slope of the shoulder have not been established in cattle. In the horse, the ideal slope appears to be about 51º. The shoulder of the bovine should probably be no steeper than that of a horse.

Buck-Kneed (Over at the Knees)

A correct animal's knee should be straight up and down and in line with the forearm and cannon. A knee that pitches forward of a line perpendicular to the ground is said to be buck-kneed. This is a very minor defect that has little or no effect on function. In fact, in animals confined to concrete feedlots, calf knees may possibly work to their advantage because it could have a cushioning effect and thereby reduce stress on the front limbs.

Knock-Kneed

This is a common defect in many populations of cattle. It is usually associated with the splay-footed condition which was discussed before. A straight line is considered normal. The maximum tolerable deviation is a matter of debate.

Bow-Legged

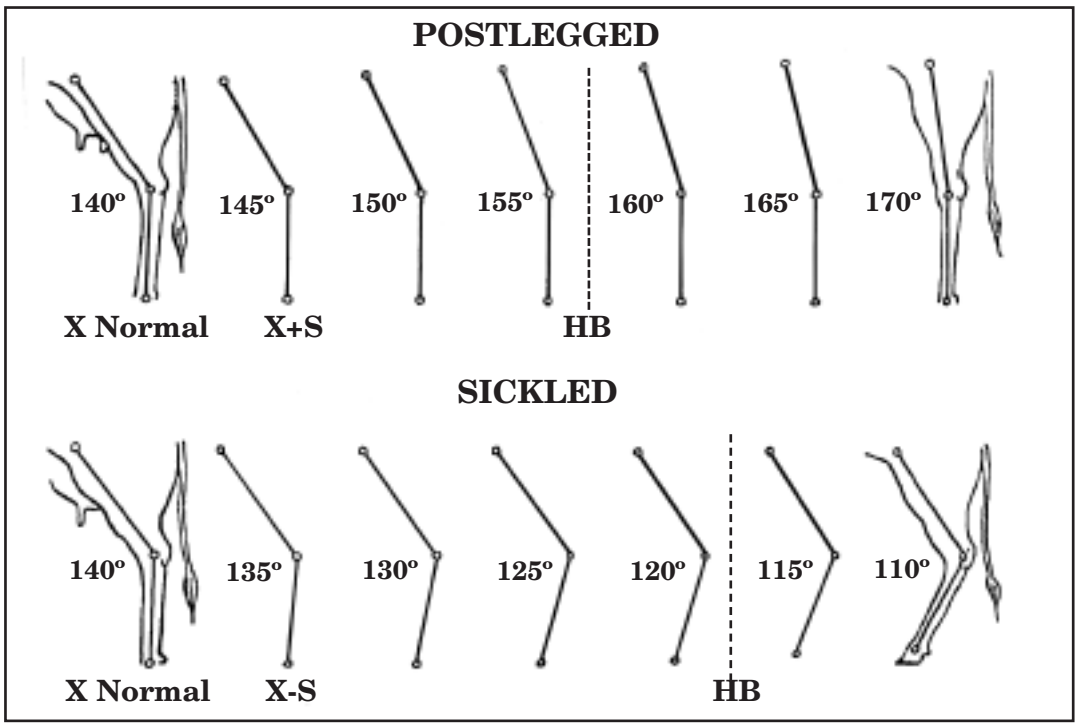
This is not as common as knock-knees but is probably a more serious defect when it does occur. It is sometimes associated with a condition in which the animal is out at the elbow or "wing-shouldered". Bow-legged animals are often base narrow, pigeon toed and "roll" in front when they walk.

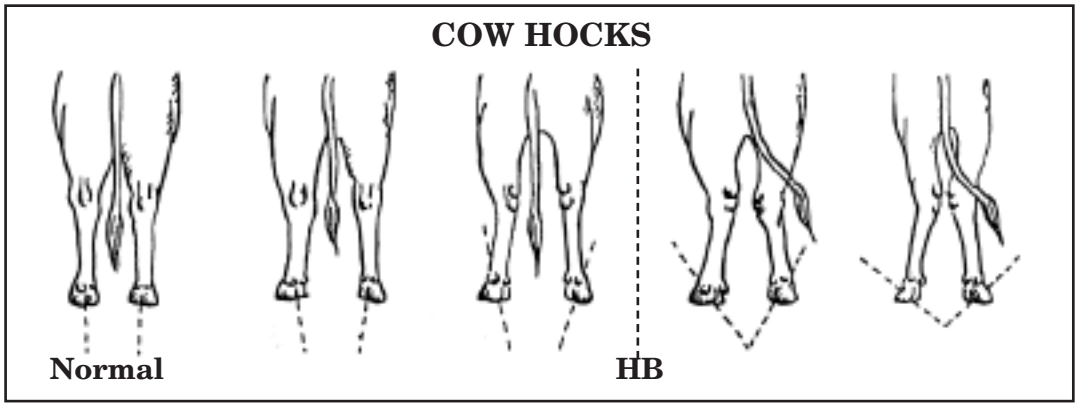
Wing-Shouldered

This is not a common problem in beef cattle but is observed occasionally, especially in situations where the animal is severely bow-legged in front. This combination can severely impair function and longevity.

Coarse, Open Shoulders

Excessive coarseness and/or openness through the shoulders is not considered desirable, particularly in the females because it is believed to run contrary to a feminine appearance. Although it has not been well documented by research, it is generally believed that extreme coarseness in bulls may increase the incidence of dystocia in their calves.





THE TOPLINE, HEAD, SHEATH, PREPUCE AND MAMMARY SYSTEM

The Topline

Cattle breeders in North America prefer a topline (spinal column) that has the following appearance:
1. As viewed from the side, a strong, level back, loin and rump and a flat tailhead.
2. As viewed from behind, a square rump with wide pinbones.

In South Africa and several other countries, researchers and breeders take issue with North Americans on their evaluation of the topline.

Rump and Tailhead

As noted above, the majority of North American cattle breeders and judges prefer a flat, level, square rump. However, South African animal scientists (Maree, 1977; McFarlane, 1976) content that a slightly sloping rump, whereby the pinbones are lower than the hipbones, is conducive to greater ease of calving. They have concluded that, as you reduce the vertical opening the cow has for calving; that is, you lessen the distance between the pelvic floor and the base of the tail. Some North Americans have accepted this concept but many others have not.

A tailhead that is set too far up into the rump is considered undesirable. In females, this condition is sometimes associated with a vulva that slants forward, which is not desirable from a hygienic and/or fertility standpoint.

Loin and Back

It had been suggested by South African scientists that weakness in the spine, just ahead of the hip, will cause difficulty in the birth of the fetus. This defect, coupled with high pinbones, may compound the calving problem. It would appear that nearly all breeders can agree that strength in this area (loin) is desirable. North Americans insist on a strong, straight spinal column all the way from the hipbones to the top of the shoulder. A weak or sagging back is more aesthetic than functional, however.

Inter-Relationships Between Skeletal Defects

Feet, pasterns and legs cannot be separated. They all carry weight and it is important for that weight to be evenly distributed. The feet and pasterns tend to be the primary shock absorbers. If they fail to function properly, structures higher up may be affected. The reverse is also possible. If something is wrong with the leg or shoulder structure, the load sharing is distributed. What is thought to be a foot problem may actually be a leg problem and visa versa.

Inadequate Joint Angulation

As suggested above, a number of skeletal problems are inter-related. The most serious problems are those that arise from too little angulation of the skeleton. For example, a post legged animal will often be too straight in the shoulder and knee and too steep in the pasterns. Such an animal will often move very stiffly. There are two reasons for this.

First, the animal's structure will not permit a long free stride. When the shoulder is too straight, the front leg cannot reach far enough to take a long step. Moreover, neither the knee nor the hock will allow a long reach and the steep pasterns will not permit a long follow-through. The result is a very short choppy stride.

Secondly, movement is often painful for animals with inadequate angulation. When the joints are too straight, they must absorb a disproportional amount of the stress of a step down. With proper angulation, stress is distributed more evenly over the bones, tendons, ligaments and muscles. In the animal that is extremely straight, stress on the joints can become very severe. Flexing joints can be painful and he will take short strides to minimize the pain. The animal is predisposed to early arthritis and reduced longevity in the herd.

Selection for extreme height and straight legs may have led us into a greater incidence of the correlated structural problems (Long, 1988; Anderson and Ritchie, 1988). Bulls exhibiting these characteristics to an extreme degree may sire market progeny which will not hold up under confined feedlot conditions. If daughters of these bulls are kept for replacements, their life in the herd may be shortened if they inherit these traits.

Over-Angulation

On the other side of the coin, extreme over-angulation of the joints (sickle-hocked, weak pasterns, etc.) can result in abnormal hoof growth and reduce the ability to cover ground. However, the problems associated with these defects are seldom as severe as those related to the lack of angulation. The figure below represents the three kinds of skeletal structure: (1) too much angulation; (2) correct angulation; and (3) not enough angulation.

Bowed Legs, Base Narrow, etc.

It should be obvious from the previous sections that the following defects are often inter-related.

1. On the hind limb; bowed hocks, base narrow stance and rolled or corkscrew outside claws.
2. On the front limb; bowed legs, base narrow stance, pigeon-toed and "rolling" at the walk; such animals may also open up at the elbows.

The Head

Different breeds have different head characteristics that are primarily aesthetic and not necessarily related to function. However, certain defects of the eyes and the jaw can be related to function.

The Eyes

Pigmentation of the eyelid and the skin around the eye is a desirable trait because research has indicated that cattle with no pigmentation are more predisposed to cancer eye. Pigmentation is a moderately heritable trait (0.3 to 0.4) and will respond to selection.

In regions where there is a great deal of sunlight and a high incidence of cancer eye, there is a functional advantage for animals who exhibit a strong orbital ridge or eyebrow ("hooded eye"), protecting the eye against ultraviolet rays. Cattle with extremely open eyes ("pop eyes") are more susceptible to eye problems than those with a hooded eye.

The Jaw

It is considered important for cattle that must forage in extensive range country to have a strong, deep jaw. Weak-jawed cattle are generally discriminated against.

Perhaps more importantly, the upper and lower jaws should be of equal length so that the incisor teeth in the lower jaw squarely meet the dental pad in the upper jaw. If not, foraging ability may be reduced. The most common defect of this type is "parrot mouth", whereby the upper jaw is longer (over-shot) than the lower jaw.

The Sheath and Prepuce

An extremely heavy, funnel-shaped sheath and prepuce is a detriment to bulls that have a lot of ground to cover in rough country. Obviously, this is more likely to be a problem for those breeds with Brahman influence. Seedstock producers in these breeds are placing strong selection pressure against sheath problems.

The Mammary System

The two most common problems observed in the mammary system of beef cows are: (1) over-sized and/or balloon teats; and (2) weak, pendulous udders. Numerous research studies have indicated that these traits are low to moderately heritable (0.2 to 0.3). Therefore, over time, they will respond to selection.

The American Polled Hereford Association (Gibb, 1984) has adopted the udder scoring system based on teat size and udder suspension. AHCA has also adopted these guidelines.

Too Much Angulation | **Correct Angulation** | **Not Enough Angulation - Stilted**

Degrees of Angulation of Joints in the Bovine Skeleton

Fertility Indicators

Bulls

The importance of scrotal circumference as an indicator of fertility is very well documented by research. At 1 year of age for most breeds of bulls, the bare minimum acceptable scrotal circumference is 30 centimeters (preferable 32-34 cm). For Brahman bulls, the minimum may be 28 cm. at 1 year.

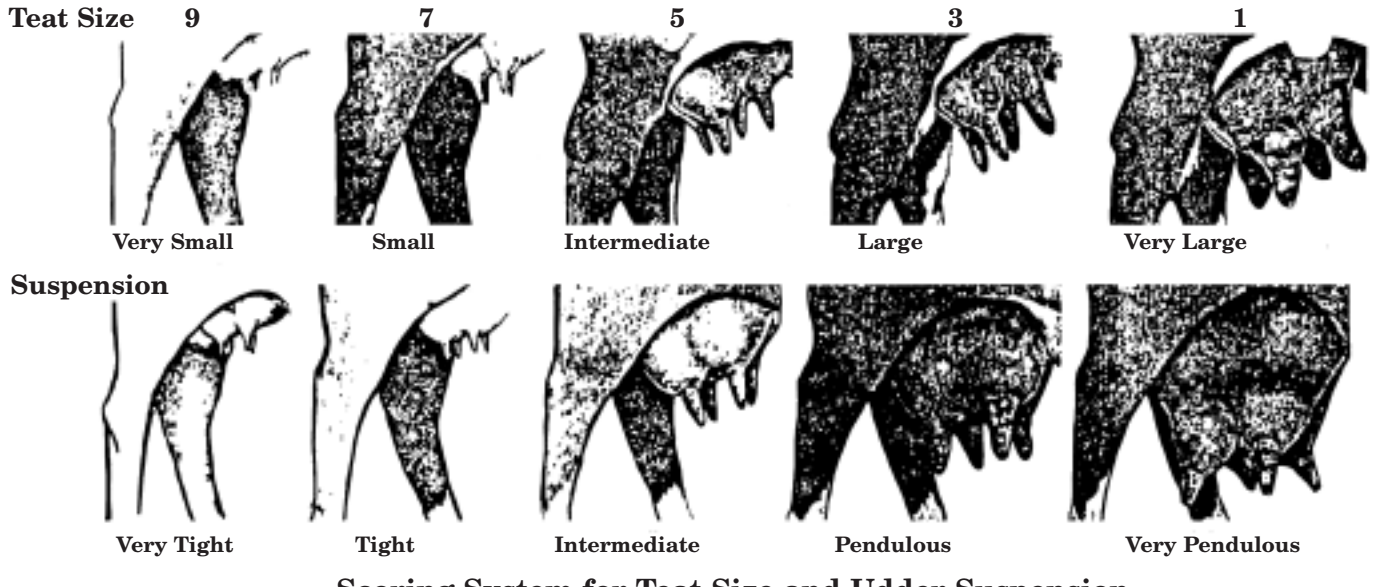
Even though it is a purely subjective decision, cattlemen generally agree that feminine-appearing bulls should be discriminated against.

Females

Obviously, calving records are the best indication of fertility in the producing cow. In virgin heifers, it is generally agreed that coarse, masculine females should be discriminated against, although there is little or no research data to support this approach. Like many traits, there is quite likely a reasonably wide range of acceptability. Extremely small external genitalia (vulva) should be strongly discriminated against.

Summary

It should be obvious by now that there are numerous structural traits which can have varying degrees of influence on how beef cattle function. The amount of emphasis to be placed on them depends largely upon the environment (feed and other resources), the mating system and the marketplace.



Scoring System for Teat Size and Udder Suspension

Genetics 101

Scott Barao, Ph.D.

Over the years, I have noticed that breeding time brings with it a number of questions related to genetics and selection as beef producers buy bulls and/or select semen for use in their cow herd. The basis for most of the questions I get is a general desire to improve herd performance and make positive genetic change. The following information should help clarify the issues related to genetic change and help beef producers set realistic expectations for their breeding and selection program.

Genetic change is dependent upon four major factors as described in the following formula:

$$\text{Genetic Change} = \frac{\text{Accuracy of Selection} \times \text{Selection Intensity} \times \text{Genetic Variation}}{\text{Generation Interval}}$$

Accuracy of Selection: Refers to our ability to select animals that truly are genetically superior for a given trait. It is dependent upon the use of consistent and accurate genetic evaluation techniques.

Selection Intensity: Is dependent upon the proportion of animals kept as parents for the next generation. Intensity also includes the superiority of those animals compared to the genetic average of the overall unselected population. Refers to the relative differences among animals that are controlled by genetic factors. It is measured as the heritability of the trait.

Genetic Variation: A common phenomenon, manifesting itself as dominant and recessive genetic traits.

Generation Interval: Is the average age of a parent when the offspring is born.

To achieve rapid genetic change, accuracy of selection must be high and parents must be genetically superior when compared to the average population. In addition, more progress will be achieved with more highly heritable traits and shorter generation intervals. By keeping these four factors in mind, genetic progress can be maximized.

Genetic Terms

In addition to understanding the components of "Genetic Change," producers must also have a working knowledge of some important genetic terms.

Cell - All animals are made up of thousands of cells. Genetic material is located in the nucleus of each body cell. Chromosomes are the structures within the nucleus that contain the genes. Genes are hereditary units that determine a portion of the animal's appearance, performance, behavior and other characteristics.

Chromosome - In beef cattle, 30 pairs of chromosomes are located in each cell's nucleus. The number of chromosomes varies among animals. Humans have 23 pairs of chromosomes.

Genes - Genes are hereditary units that influence the expression of specific traits.

Allele - An allele is one component of the gene pair which is located at a given locus or position on the chromosome.

Locus - The locus is the region of the chromosome where a particular gene is located.

DNA - Chromosomes are chemically composed of DNA (deoxyribonucleic acid). DNA is a nucleic acid arranged in a double helical structure.

Mendelian Segregation - Sperm and eggs are created by a process called meiosis or cell division. The number of chromosomes in the sperm and egg are half of that found in all other cells. One chromosome of each pair is passed to the sperm or egg. A random sample of one allele from each locus is found in the sperm and eggs. The sperm and egg unite to form a zygote or fertilized egg. The resulting zygote contains an equal number of chromosomes from each parent.

Mendelian segregation is the random process which occurs during meiosis and determines which allele of each gene is contained in a given sperm or egg. Variation among individuals, including offspring of a given animal, results from this process.

Phenotype - The phenotype of the cow is what you observe or measure. It is the individual's actual performance such as a 205 day weaning weight or yearling weight.

Genotype - The genotype is the actual genes that the animal possesses for a given trait. In qualitative traits, the genotype identifies the exact alleles that an animal has for a specific trait. In quantitative traits, the genotype is expressed as the breeding value, which is an accumulation of the effects of all genes.

Dominant-Recessive - At each locus there are two alleles for a specific trait, one from each parent. In some cases, one allele is dominant over the other allele in determining the trait. For example, a single gene controls coat color in Angus cattle. The black gene is dominant and the red gene is recessive. Genes are expressed as "B" (big B) for the dominant black gene and "b" (little b) for the recessive red gene. The combination from the parents will determine if the offspring is black or red.

The three possible genotypes for coat color are: BB, Bb and bb; with one gene coming from each parent. Since B is dominant over b, the presence of at least one B allele results in black coat color. Red coat color is only possible with bb genotype.

Differences exist among species. In Shorthorn cattle, coat color is expressed differently for each of the three possible genotypes: RR - red, Rr - roan (red and white mix) and rr - white. No dominance is present between the red and white alleles. Therefore, in the Rr genotype, the animal is a mix of the two colors.

Heterozygous - An animal is heterozygous for a certain gene when the two alleles at a given locus are not the same. For example, an Angus coat color gene may be the heterozygous combination, Bb. The animal carries one gene for red coat color and one gene for black.

Homozygous - An animal is homozygous for a certain gene when both alleles at a given locus are the same. For example, if an Angus coat color gene is BB, it is homozygous for black coat color. A Red Angus is homozygous with a genotype of bb.

Qualitative Traits - Qualitative traits are generally controlled by one pair of genes. In addition, a given genotype (genetic make-up) will generally result in the same phenotype (actual expression of trait). Examples of qualitative traits are sex, hair color and horns. Qualitative traits also include undesirable recessive traits such as Mule-Foot (Syndactylism).

Quantitative Traits - Quantitative traits are controlled by many genes, with each gene generally having a relatively small influence on the expression of the trait. Collectively, these genes can have large effects. One such example is milk production. These traits can be significantly influenced by the environment. In recent research in gene mapping, there is now evidence that several "major" genes may have larger effects on traits than do most of the genes influencing the trait.

Environment - The environment that an animal lives in has a large influence on production as well as on other quantitative traits. In fact, environment contributes more to the difference among cows' production than does genetics. By many estimates, 75% of the difference among cows' production is attributed to environment, while only 25% is based on genetics.

Environmental Variance - Environmental variance is the differences in the performance of animals that are caused by environmental effects. Genetic evaluations are designed to account for differences in production due to environmental variance.

Selection Intensity - Selection intensity measures the relative superiority of the group of animals allowed to reproduce. The selection intensity in bulls is high because fewer bulls are needed in relation to the base cowherd. In cows, however, it is low because producers usually need to keep about 75% of their females to produce herd replacements. Higher selection intensity results in more rapid genetic improvement.

Heritability - Heritability is the proportion of variation in a trait that is due to genetic factors. Heritabilities range from 0.0 to 1.0 (or zero to 100%). A higher number means the trait is more heritable. By selecting for a high heritability trait, faster genetic progress will be made. Low heritability, less than .10, does not offer much opportunity for rapid improvement in that trait.

Generation Interval - The average age of a parent when offspring are born is the generation interval. Genetic change increases when the generation interval decreases.

Inbreeding - Inbreeding occurs when two animals that are more closely related than the average population are mated. One form of inbreeding, line breeding, occurs when progeny are repeatedly mated to ancestors or close relatives. A goal of inbreeding is to increase the frequency of the good genes that are found in the common ancestor.

Several unwanted effects of inbreeding may also occur. Since homozygosity increases, a greater probability of having a homozygous recessive condition for undesirable qualitative traits exists. This concentration of undesirable genes may reduce health, vigor and growth and increase calf mortality. Production and reproduction are also negatively affected.

Crossbreeding - Crossbreeding occurs when two purebreds from different breeds are mated. Its purpose is to produce a generation that will have greater performance than expected, considering the transmitting abilities of the parents. Crossbreeding generally increases health, vigor and reproductive performance.

Variation - Variation or differences in genetic merit, exists in all animals because of the random sampling of alleles during mendelian segregation.

By graphing the genetic merit or actual performance of all animals in a population, one would observe a normal distribution or a bell-shape curve. A normal distribution is centered on the average measurement for that particular trait. Approximately equal numbers of individuals (50%) are above and below the average. Standard deviation is the number that when added to and subtracted from the population average, gives a range that includes about two-thirds of the population.

As you consider this brief but fundamental genetic lesson the take-home message should be clear. Breeding beef cattle is both an art and a science. It relies on both the careful, considerate and discriminating eye of the breeder and a detailed and thoughtful study of the performance characteristics of your herd and potential future breeding prospects. Above all, beef producers must focus on production traits that ultimately improve the profitability and sustainability of the beef operation and seek to improve these traits in a patient and strategic manner.

Approximate Heritabilities of Some Common Traits in Beef Cattle Production

	Heritability (%)
Low Heritability Traits (0-20%)	
Calving Ease	**10**
Conception Rate	**5**
Medium Heritability Traits (20-40%)	
Birth Weight	**40**
Weaning Weight	**30**
Milk Yield	**25**
High Heritability Traits (40-100%)	
Average Daily Gain (post-weaning)	**45**
Yearling Weight	**40**
Carcass Quality Grade	**40**
Tenderness	**50**
Scrotal Circumference	**50**

GETTING STARTED GRAZING

Ohio State University Extension

The ruminant animals we work with on today's farms have practiced grazing since before mankind discovered fire. Animals herded together for protection from predators and rotationally grazed to find new sources of forage. Rotational grazing on farms perhaps had its beginning with staking the animals out in a different location each day. Recorded history of the benefits of rotational grazing goes back at least to the 1700's.

Today we use the term Management-Intensive Grazing (MIG) to describe the art of grazing based on scientific principles. MIG is one of the most promising concepts in agriculture today! It promises to lower costs while increasing productivity and has proven to be one of the most environmentally friendly agricultural enterprises currently practiced.

Well managed grazing operations can produce returns per acre equal to or greater than row crop income, without government subsidies. Your net return per acre will depend on your debt load, value of your land, intensity of management and value and pounds of product sold per acre. While a beef cow may produce 100 pounds of calf per acre, and it takes 5 acres to keep one cow, this produces gross income of $60 per acre if calves are worth 60 cents per pound. If you are able to keep a cow on 1.5 acres, using a more intensive system, a 500 pound weaned calf will produce 333 pounds of calf per acre and $200 gross income. Additional fence and water development costs will have to be covered but it is apparent that becoming more intensive has the potential to increase net return due to lower fixed costs in land.

Cow and calf benefitting from MIG.

Environmental Benefits of Management-Intensive Grazing

The environmental benefits of Management-Intensive Grazing (MIG) include reduced soil erosion, improved air and water quality, better plant diversity, vigor and production, and improved fish and wildlife habitat. Improving grazing management results in more complete vegetative cover and improved soil structure, that allows a higher percentage of the rainfall to infiltrate the soil where it can be used for plant growth rather than running off where it can result in soil erosion and sedimentation problems. Many ecological processes accelerate including decomposition of manure. Nutrients can then be recycled several times during the growing season. This improves overall soil quality.

Water quality improves as the pasture vegetation becomes more dense and the soil condition improves. A University of Wisconsin study showed that pastures are the best "crop" for reducing runoff, erosion and phosphorous pollution over any other land use. A similar study done by USDA-Agricultural Research Service, North Appalachian Experimental Watershed at Coshocton, Ohio revealed that both surface and ground water quality in a pastured watershed was just as good or better than water leaving an adjacent pristine wooded watershed. Pasture soils are a terrific biological filter to recover nutrients passing through the soil. Grass roots are active nearly year-round and

thus can recover nutrients efficiently from pasture soils that may be lost from other crops. Pasture systems reduce the time livestock spend in confinement, thus reducing the concentrated manure control problems. Manure is more evenly distributed with MIG than with feedlots, where there are potential manure odor control concerns or on un-managed pastures where animals concentrate manure near shade or watering sites.

Pasture, because of its permanent and diverse plant cover, provides increased shelter and food for wildlife as well as the grazing animal. Properly managed pastures can provide nesting habitat by delaying mowing and leaving adequate plant reserves for rapid growth. Most ground nesting birds and rabbits prefer the MIG system over a traditional pasture system. Research is showing that grazing animals can be used to manage the vegetation on stream banks to enhance fish populations. Studies done in Minnesota and Wisconsin have resulted in MIG becoming the recommended practice to manage stream banks on farms to control overgrowth and enhance fisheries. Fish numbers were 2 to 3 times higher where cattle grazed in a MIG system than where cattle were totally excluded from the stream.

Management-Intensive Grazing provides management to preserve the important preferred forage species by improving plant nutrient distribution, plant health and plant vigor.

Forage Species Selection for Pastures

Seldom are more than four or five species needed in most pasture and hay land seedings. Prepackaged "shotgun mixtures" of many grasses and legumes usually have no advantage over simpler mixtures that are carefully designed by the producer to match specific grasses and legumes to the soil, climate and management conditions in the particular field to be planted.

The Ohio Agronomy Guide has detailed information on selecting forage species. They are available from OSU Extension offices for a nominal fee.

Time of Maturity. The species in a mixture should mature at about the same time in order to obtain palatable forage of good quality. If one species is to mature later than the other, it should be the grass component so that the legume can be grazed at the proper stage of development.

Management Considerations. Grazing management can affect the compatibility of species in a mixture. Short growing species are generally more tolerant of frequent grazing than tall-growing species. Thus, tall-growing species are better suited to hay production and rotational grazing with adequate rest periods, while short-growing species such as Kentucky bluegrass and white clover are better suited for frequently or continuously grazed permanent pastures.

Class of Livestock to Use the Forage. Some forages such as the warm season grasses provide adequate nutrients for beef animals but are not of high enough quality for producing dairy animals. Match the forage quality to the class of livestock. Consider having several forage mixtures in different pasture areas to provide animal harvested feed in as many months as possible to reduce your stored feed costs.

Managing Plant Growth in Pastures

Management-Intensive Grazing (MIG) matches the plants need for rest with the animals need for high quality forages. This section covers how to manage the plants to allow them quick regrowth, while harvesting them at peak quality.

Energy Sources for Regrowth

Plants get the energy needed for growth from the sun through a process called photosynthesis which occurs in green leaves. In the presence of sunlight, plants use carbon dioxide and water to manufacture carbohydrates (sugars) and oxygen. The carbohydrates supply energy for growth. The greater the leaf area present, the greater the amount of sunlight that is intercepted, with more carbohydrates produced. As the plant grows and leaf area increases, photosynthesis increases to the point where production of carbohydrates is greater than what is needed for plant growth. Surplus carbohydrates are stored in tissues at the base of plants, such as lower stems and roots.

Plant regrowth after grazing depends on energy (carbohydrates). There are two primary sources of energy for regrowth: 1) carbohydrates that are produced by the remaining leaf area and 2) carbohydrate reserves stored in plant tissues at the base of the plant (e.g. orchard grass). Some plants depend more on residual leaf area for regrowth (e.g. white clover and birdsfoot trefoil) while others depend more on stored reserve carbohydrates (e.g. alfalfa and red clover). Grazing management affects both the level of reserve carbohydrates and the amount of leaf area present.

Leafy Stage

Advantages - Feed quality and palatability are very high.
Disadvantages - Reserve carbohydrate levels are low and regrowth will be slow especially in mid-summer. Additionally, the plant is too short for rapid grazing. The animal will spend too much time grazing and may not be able to eat adequate dry matter to sustain its production level.
Recommendation - Do not graze at this stage. Allow for a longer rest period.

Boot - Pre-bud Stage

Advantages - Feed quality of the plants is high and carbohydrate reserves (energy for regrowth) have been restored. Regrowth of these plants should be rapid which will allow for more rotations through the growing season.
Disadvantages - Total dry matter yield has not peaked.
Recommendation - Graze plants at this stage to benefit the plant with ample rest period and the animal with high quality feed.

Heading - Bud Stage

Advantages - Total dry matter yield is increasing.
Disadvantages - Carbohydrate reserves are increasing but some of the energy is going into the seed and stem production, not the roots for rapid regrowth. Fiber and lignin is increasing in the plant which makes nutrients less available.
Recommendation - As seed heads appear, speed up the grazing rotation to get ahead of the growth or set aside some paddocks for hay or silage harvest. A key is to harvest the set aside paddocks soon. This will keep them near the same maturity as the other paddocks during the next rotation. Plants that are allowed to reach maturity will regrow much slower.

Bloom Stage

Advantage - Dry matter yield has reached its maximum.
Disadvantages - Increasing lignin (undigestible cell wall) makes proteins, minerals and digestible fiber less available. Tall plants are difficult for the animal to graze rapidly.
Recommendation - Try not to allow forages to mature to this stage. If they have, mechanically harvest them to allow new growth to begin.

Remember - Animals should stay in paddocks no more than three days to prevent re-grazing of new growth. Attempt to have 2 to 4 inches of leaf remaining in the paddock after the animals are removed. This will increase the rate of regrowth of the forages and increase total production over the year.

The Challenge

It's easy to see why grazing forages in the boot or pre-bud stage maintains quality and quantity of the plants. However, most forages don't grow at the same rate throughout the year. Use weekly pasture walks to monitor the growth of all paddocks and determine if you need to speed up or slow down your rotation.

Stay Flexible

As you walk the paddocks, keep your mind open to options you have that maintain pastures productivity. These options include: changing the size of the paddock, changing the length of the grazing period for a paddock, changing the number of animals in a paddock, adding second grazers, adding supplemental feed, using annual forages, grazing hayfields during dry periods. **Flexibility is a goal of successful graziers which allows them to manage most of the change that weather provides.**

Feeding Livestock on Pasture

Nutritional Requirements

A grazing system needs to meet the nutritional requirements of the livestock. Animals require water, energy, protein, vitamins and minerals. These nutrients are used to meet the requirements for reproduction, body growth, wool or hair growth, lactation and general body maintenance. Environmental conditions, such as hot and cold weather, can increase maintenance requirements. An animal's priorities for nutrition are maintenance, lactation, growth (young animals) and reproduction. Consequently, reproduction is the first to go and the last to return in cases of inadequate nutrition.

Forage Quality and Intake

Forage sources vary in nutrient content and nutrient availability (digestibility). As forage plants mature, energy availability and protein content decrease. Forage intake decreases as nutrient availability or digestibility decreases. Intake of forages accounts for over 75% of the differences observed in animal performance between various forages.

Ideally, the livestock manager would like the forage plants to have a high leaf area compared to stems. Leaves are more digestible than stems. Livestock will selectively graze leaves and petioles, before grazing stems. Leaves also decline more slowly in digestibility than stems. In a rotational grazing system, regrowth will be more leafy and thus maintain higher digestibility longer.

Monitoring the Animals

Producers can monitor the effectiveness of the nutrition program in the long term by herd performance records. In the short term, it can be monitored by keeping an eye on the "amount of milk in the bucket" and by monitoring the flesh or body condition score of the livestock.

Dairymen can quite easily assess changes in forage quality by reading the dipstick in the bulk tank. Body condition changes can be a more reliable guide than body weight for evaluating the day-to-day nutrition status of beef cows or ewes. This system also had an advantage compared to body weight in that scales or corrals are not needed for body condition evaluation. Body condition scoring tools are available at your county extension office.

Monitoring the Forage

Accurately measuring pasture nutritional value involves collecting samples for laboratory analysis. Sample close to where animals graze, not spots that are avoided. With rotational grazing, taking random samples in the pasture will work better than with continuous grazing system. Most feeds should be placed in a sealable container and frozen prior to mailing. County extension offices have bags and forms for forage samples. Extension personnel can recommend the most appropriate analysis to be conducted at the laboratory.

Admittedly, the information from the laboratory may be "after the fact" since the samples are taken when or near the time the animals are actually grazing the forage. However, such information will give you a base to start evaluating forage quality. A combination of grazing management experience and laboratory analyses will allow you to make better day-to-day estimates of forage quality and determine if there is a need for supplementation.

Paddock Layout and Design

When considering developing a management-intensive pasture system, one of the first major concerns is "How big do I make the paddocks?" Many beginning "grass farmers" would like a "recipe" to help determine paddock size and fencing needs. However, experienced graziers will confirm that Management-Intensive Grazing is an art driven by biological science. Plant yield, forage species and fertility needs will NOT be constant and will vary with temperature, soil moisture, plant rest period, season of year, etc. **Therefore, flexibility will need to be built into any effective grazing system.** The following guidelines should be considered before fence building begins.

HOW BIG SHOULD MY PADDOCKS BE?

To answer this question you must first determine the animal requirements from the pasture and available forage.

Daily Animal Dry Matter Requirements
Beef & Sheep - 3% of their Body Weight
Dairy - 3.5% - 4%

Animal Requirements from Pasture = (A X B) - C
A = Total Body Weight of All Animals
B = DM Requirements Per Day
C = Supplemental Feeds (silage, hay, grain)

Available Forage = [(D - E) X F] X G
D = Forage Height in Paddock
E = Remaining Stubble
F = DM Yield Per Acre (see chart below)
G = Utilization Rate (75% - 90%)

Dry Matter Yield/Acre (approximate)
Range - 100 - 500 pounds of DM per inch of growth
* Dependent upon plant density/acre
* Average figure is 300 pounds per inch of growth

Example:
34 cows @ 1,100 pounds each = 37,500 pounds of body weight
37,500 X 3% = 1,125 pounds of dry matter (DM) needed
Pasture at 6" tall X 350# DM = 2100# DM
Leave residual forage 600# (2 inch height)
2100# - 600# = 1500# available for grazing
1500# DM X 75% (25% wastage) = 1,125# available DM

Therefore, 1 acre with 1,125# of available DM will supply the DM requirements of the 34 cows for one day.

The above guidelines should help a grazing manager plan a flexible, useful grazing system.

Guideline #1: Design with flexibility in mind. Since livestock needs and plant growth patterns change throughout the year, a management-intensive pasture system will need to gear for these changes. A manager can make changes in size of paddock, length of grazing period for a paddock from 1 to 3 days etc., number of animals, add second graziers, use supplemental feed, move to hay fields during dry weather or use annual forages.

Guideline #2: Design the system on paper first. An aerial photo can be a real asset in helping to layout possible fence patterns. An aerial photo can assist in locating trees, ponds, ridges, etc. and help look at livestock flow patterns. In fields which livestock have pastured previously, existing paths can help identify movement patterns. If paths are prominent, ask why? Will livestock be able to adapt to a change in flow? Remember, milking dairy cows need to return to the barn at least twice each day.

Guideline #3: Each grazing system should contain at least 10 paddocks or subdivisions for good forage management. The more subdivisions that are included, the greater the level of management that is needed to obtain a positive return. Ten paddocks will allow the manager to graze in a 20 day rotation (2 days per paddock) or 30 day rotation (3 days per paddock). Flexibility can be maintained by using larger "permanent" paddocks which can be subdivided by portable fencing. These larger permanent paddocks can allow easy mechanical harvest of hay if needed. Paddocks should be as square as possible. It takes less total fence for relatively square paddocks. Also, there is better grazing utilization and manure distribution in square paddocks.

Guideline #4: Fencing should be inexpensive and electric, energized by a low impedance, high voltage energizer. The perimeter fence should be sufficient to allow the manager (and family) confidence that the livestock will not "escape". Internal divisions should be just enough to keep livestock from challenging them. One electrified wire will maintain cattle but two or three will be needed for sheep. If the manager is bringing in stocker calves which may not be familiar with electric fence, the first paddocks to be used should have more wires to help with "training". You may also train the animals to electric fencing in a corral or secured area.

Guideline #5: In rough, hilly land, slope aspect and location of hill crests should be considered. Land with south facing slopes which tend to warm earlier in spring and get drier in summer, should be fenced separately if areas are large enough. Conversely, north facing slopes should also be handled separately. Livestock tend to "camp" on hill crests and as a result fertility is transferred to these locations because of the additional manure. Fencing which limits access to these areas help eliminate this "build up".

Guideline #6: Each paddock in a system should contain enough land to produce approximately the same amount of forage dry matter. In varying soil types paddock size may need to vary due to the land's productive capabilities. System management is easier to control when dry matter quantity is similar For example, one and one-half acres may be needed to equal one acre of pasture from soil of higher productivity.

Guideline #7: When slopes are greater than 15 percent, fence paddocks so that livestock will graze on the contour. Livestock grazing patterns more readily conform to the contour rather than up and down the slope. Soil erosion will be reduced by grazing on the contour.

Guideline #8: Establish lanes or walkways on the higher, drier soils. Concentrated livestock traffic will cause paths and bare ground. With paths going up and down slopes, considerable erosion can occur. Additional practices such as "water bars" (ditches which carry water across roads to a grassed area) or graveling may be necessary.

For species other than dairy, lanes may not be needed when water is supplied in the paddock. Temporary lanes can be constructed with poly-wire or tape when needed to move livestock long distances.

Any gates should be in the corner of the paddock. It should be so that lead animals can find it or be driven to it, and thus other animals will follow them down the lane. Driving relatively large herds through small gates and alleys can be difficult.

Guideline #9: Try to establish paddocks which will allow you to graze plant species which are similar in maturity. For example, bluegrass will be ready to regraze in 20 days in spring, while alfalfa will be ready in 32-35 days. These two cannot be grazed correctly together. If the manager concentrates on bluegrass, the alfalfa will be too young and will "die out" from the stand. On the other hand, if grazing is programmed for alfalfa, the blue grass will be too mature (low feed value) and will not be grazed willingly. A grazier needs to determine the species to be managed correctly and manage to have it grazed prior to seed head formation.

Guideline #10: Where possible, limit the livestock's access to streams where banks are low and use gravel and/or geotextile cloth in these areas. For example, try to fence so that the stream is available for watering of livestock from one side of the stream. Long term planning should include goals to eliminate watering from streams on a constant basis.

Guideline #11: Plan to have additional land near your grazing system for use with temporary fencing during hot, dry summer months. As the season gets drier and warmer, forage growth slows. Also, spring born livestock get larger and need more forage. Nearby hay fields can then be included in the grazing plan. Producers should also consider crop residues, sacrifice paddocks, holding areas and warm season grasses in their grazing plans.

Call Before You Dig, Pound or Slice!

There are many buried utilities along roads and even across fields. Before you drive posts or lay waterlines, contact your local utilities protection service to make sure you are safe from danger and liability to damaged utilities.

Providing Water for Grazing Systems

Within any grazing system, water must be provided to livestock in adequate quantity and quality. Clean water and ample high quality forage are essential for improved livestock production. Inadequate livestock water developments in pasture areas can contribute to serious livestock losses, prevent efficient use of forages, encourage overgrazing near existing water supplies and under-grazing away from the water sources.

The following table (taken from the University of Wisconsin "Pastures for Profit") can be used as a general guideline for daily water requirements of grazing animals:

Animal	Gallons Per Day
Beef	8-10
Dairy Cows (in milk)	30
Sheep	1
Horses	8

Keep in mind that these are average figures. Water needs vary greatly with air temperature, relative humidity, animal size and percent moisture of the diet. For example, water needs are higher on hot, dry days or when grazing dry forage. Water needs decrease on cool, rainy days or when livestock graze lush forage. Young, lush forage will have a moisture content of 70% to 90% and can account for a large percentage of an animal's water needs.

Does it Pay to Put Water in Each Paddock?

Providing adequate water to livestock is usually seen as one of the biggest obstacles to starting a rotational grazing plan. Many graziers use lanes to provide access to a central watering location but the ideal situation is to have water available in every paddock. Economic analysis of grazing systems indicate that money spent to provide water to several central locations or to each paddock generates rapid repayment due to increased animal productivity and better utilization of pasture forage which decreases feed costs. Jim Gerrish and co-workers at the Forage Systems Research Center in Missouri have researched the distance beef cattle have to travel to water and how that affects grazing distribution and pasture utilization. In a study involving 160 acres, these researchers found that animal carrying capacity could be increased an additional 14% simply by keeping livestock within 800 feet of water. Carrying capacity was increased due to better pasture utilization, which permitted more forage to be harvested as compared to systems where livestock had to travel more than 800 feet to water. At the time of the study, that additional carrying capacity resulted in an additional $35 of gross income per acre annually.

Researchers in Wyoming have conducted similar studies under rangeland conditions. Results there showed that cattle did 77% of their grazing within 1,200 feet of the water source. Although approximately 65% of the pasture was more the 2,400 feet from the water source, it supported only 12% of the grazing usage.

The researchers at Missouri concluded that for the humid, temperate zone of the U.S., water sources should be closer to livestock than under rangeland conditions. For optimal land use efficiency, water should be provided within 600 to 800 feet of all grazed areas.

Sources of Water

Ponds

Water for livestock from a pond can best be developed by installing floating inlets and piping the water with gravity flow, or pumping to a tank or a series of tanks below the dam. Water located two feet below the surface has been found to be the highest quality water in a pond.

Springs

Springs will generally supply higher quality water than a pond. The water tank should be located where it can be accessible to the livestock but away from the spring box and collection system. The overflow should be piped away. The water can be piped by gravity to one or a series of tanks.

Streams

Many producers are fencing livestock out of streams or restricting their access to the stream for drinking only. Limiting the animals to small areas that have been protected from erosion allows them a watering site without disturbing the entire stream bank. Some producers are restricting all access and pumping the water from the stream into tanks for the livestock.

Wells

A few livestock producers are utilizing a well or public water and are pumping and piping the water to tanks or frost proof fountains.

Pumps

Pump alternatives where there is no electricity include the pasture pump, ram pumps and sling pumps.

Pipes

If the water system is gravity flow, use a linear low density polyethylene (LLDPE) pipe. For pressurized systems, use a rolled high density polyethylene (HDPE). The size of the pipe needs to be matched to the demand placed on it. Gravity flow and siphon systems will typically require 1 1/4 inch pipe. One inch pipe should be sufficient for most pressurized systems. In situations where large numbers of livestock are running together, professional assistance will be useful in sizing tanks and water pipes for mains and laterals.

Hauling Water

"Water wagons" are low cost from a materials stand point but expensive from the extra labor that is required. However, it does allow a producer to keep expenses to a minimum during the start up phase of a grazing operation. Water wagons can also be useful in severe droughts when normal water sources fail.

Installation

Portable piping systems seem to be a good alternative for many farms. These systems can either be above or below ground pipes with occasional risers. First of all, design with flexibility in mind especially when you are just starting your pasture system. It may be best to lay the pipe above ground until you have gained enough experience to know where the fences and water lines should be placed.

There will always be concern with black plastic pipe getting too hot in July and August. Water consumption in cattle is highest when the water is at room temperature (90-100 degrees F). That is not to say that the water will not get hotter than room temperature. Locate the pipe under a fence where shading from tall grass will keep it as cool as possible. Dumping the water tubs in mid-afternoon on hot days will allow cooler water to flow into the tank. Small tanks have an advantage in that near constant flow of water for a large group of livestock will maintain a more consistent temperature.

The area around all permanent tanks should be raveled with egg sized stone or otherwise treated to provide all weather access. The large stones are uncomfortable to stand on and help to prevent boss cows from dominating a water source. Temporary or portable tanks are best when placed under an electric fence wire to help control the access and prevent tank damage or upset by the animals.

Livestock watering facilities such as tanks, pumps and pipe should be sized to meet the needs of all the livestock that will be using the system. If the water source yields less than what is needed for a watering period but can provide the daily needs, a storage tank can be used. Buried pipe needs to be placed at least 30 inches deep for freeze protection during severe winters. If the pipeline is delivering gravity flow water, eliminate all the humps in the line where air could become trapped and stop the flow. Plastic or polypipe should not be laid in a straight line in the bottom of the trench. It should be curved back and forth to allow for contraction in the cold weather. A general rule is to install 101 feet of pipe for every 100 feet of trench. Stones should be removed from the bottom of the trench so the pipe is not laying on or next to potential line breakers. Most graziers feel the cost of water development was some of the best money they have spent. Costs do need to be kept to a minimum and preferably less that $20 per acre.

Winter Feeding

William Lipsey

Weaned calves at their feed bunk.

Throughout the summer, the cows have been out on pasture doing what they do best – grazing. As fall rolls around, the pastures slow down, then stop growing and for most Highland breeders, it's time to feed cows for the next several months. How and what to feed your beasties depends greatly on their ages, what part of the country you are in and your general philosophy towards raising cattle.

When thinking about caring for your cattle over the winter, the first thing to do is take inventory of the animals you have and think of them as at least three groups based on their nutritional requirements: high, medium and low.

High Requirement Group

This group will contain your weaned calves and any cow/calf pairs that are still nursing. Most Highland calves are weaned at 6-8 months of age and at 300-400 lbs. At this point in their lives they are growing animals and need fairly high quality feed, particularly protein and energy, to meet their needs. You need to consider your goals for the animal. For example, if you have a weaned 400 lb. bull that you want to be able to breed cows next spring, he will need to be gaining at least 1.5-2 lbs./day to reach the appropriate size. A weanling heifer that you are planning to breed at 2 years of age may only need to gain 1 lb. per day, while if you are considering showing her, you probably want her to gain more.

If you have cows that calved in the summer or fall and are still nursing their calves they have tremendous nutritional needs. Protein once again is extremely important.

Medium Requirement Group

This group contains your yearlings, bred heifers, young cows and any thin cows. The goal for all these animals will be to gain weight over the winter.

Low Requirement Group

This group contains your mature dry cows that are in good condition (BCS 5-7). A dry, mature cow in good condition can maintain herself on feed that is considerably lower quality than what is needed for growth. Keep in mind that in her last 90 days before calving her needs will increase.

Round bale hay is a convenient method for feeding Highlands. Use a good feeder to reduce waste.

Let's say that you have a herd of Highlands that consists of 10 brood cows (6 older cows and 4 first calf heifers), one bred heifer, a 3 year old bull and 9 weaned calves (5 heifers, four steers – your 10th calf you sent off to the bull test). If you are in the southern part of the country where you have short, open winters, grazing stockpiled pastures may be an option. In order to stockpile a pasture, cattle should be removed from it 75-90 days prior to the end of the growing season. If you are going to graze your whole herd then you may consider testing the forage, and if it's low in protein, consider supplementing the weanlings. Also, make sure you wait at least 30 days before returning weaned calves with their mothers.

Another option for those in areas where snow cover is not a problem is grazing corn stalks. Dry cows can graze corn stalks for 60 days with appropriate mineral supplements and some additional hay. Contact your local extension agent for guidelines to grazing corn stalks.

In most parts of the country, grazing through the winter is not an option, feeding your cattle is a must. Generally it is best to divide your cattle up into at least three different groups so that each group can receive the correct feed. In our example herd, you would have your weaned calves (heifers and steers) in one pen, your 4 three-year-old heifers (the first calf heifers), your bred heifer and perhaps your bull in another; and finally the 6 mature cows in a third. Now you need to decide what to feed them. The weanlings require the best quality feed. If you are a grass fed operation consider second cutting hay, high quality first cutting or haylage. If you are not a grass fed operation, then a combination of hay and grain would be appropriate, feeding the grain at a rate of 1 lb. per hundred pounds of body weight.

The first calf heifer group can manage on good quality hay fed free choice. If they are smaller or thin you might consider supplementing the hay with a protein source (soybean meal or a protein block or lick) or with corn silage or haylage. They should be eating 2-2.5 % of their body weight in dry matter (a 1000 lbs. heifer should get 20-25 lbs. hay per day).

Your mature cows can get by on your lowest quality feed. Your latest cut hay will do fine, protein requirements for a mature dry cow are around 6%. However, you need to keep in mind that you are just maintaining her on this diet. If the cows start the winter in poor condition then you will need to consider feeding them a higher quality feed. In addition, as they get closer to calving, in their third trimester, you will want to improve the quality of feed. Feeding hay at a rate of 2% of the cow's body weight is proper for these animals.

The main reason to divide your cattle into groups in the winter is to allow the younger cattle, who generally have higher nutritional needs than the older ones, to eat what they need. If in our example herd we left all the animals together, the 6 mature cows would eat all the best feed, the heifers getting the next shot at it and then finally the weanlings. Even if you are feeding them all the same thing – hay, baleage etc. – you should still separate the different groups.

One final note, many people getting into Highland cattle have the misconception that because they are "hardy" cattle this means they should not be fed and particularly not given grain. While historically their ability to survive harsh winters in Scotland was an important attribute, times have changed and mere survival is not the goal of a cattle breeder. Their value as "hardy" beasts is now measured in their ability to calve unassisted, their maternal ability, longevity and fleshing ability. It is important that all Highland breeders provide the appropriate nutrition to all their animals and to be able to do so in an economical way. This may mean feeding grain, hay, pasture, round bales, square bales or whatever makes the most sense in your operation.

Glossary

Dry Matter: The actual dry matter in a feed. Dry matter is used when calculating daily needs and intake, as feeds can vary greatly in dry matter, hay usually running 90%, grain 80-90%, corn silage 30%.

Free Choice vs. Limited Feeding: Feeding free choice means having feed in front of an animal at all times and limited feeding means limiting an animal's intake. Many feed hay free choice, particularly if the quality is low or if you are worried about each animal getting their fair share. Grain is mainly fed in limited amounts.

Grain: A generic term that is used for corn, oats, barley, soybean and processed feeds. Many breeders buy premixed grains that have mineral and protein supplements. Non processed grains often need to be mixed to meet the requirements of an animal. For example, corn is high in energy but low in protein (8%) so if it is to be fed to weanlings, an additional protein supplement like soybean (44% protein) may be needed.

Hay: Dried grass or legumes (alfalfa, trefoil or clover) that is baled in either square or round bales. Hay is the most common cattle feed (after pasture). The quality of hay can vary greatly depending on when it is cut, whether its first or second cutting and what it is (legume vs. grass). It is a good idea to have your hay tested for its feed values.

Corn Silage: The entire corn plant, chopped and then ensiled (fermented). A good roughage for energy but low in protein. Corn silage can be stored in silos, bunks, piled on the ground or in plastic "bags".

Haylage or Baleage: Grass or legumes that have either been chopped or round baled at higher moisture and ensiled. Round bale baleage is becoming popular in many parts of the country. It is a high quality, high protein feed.

Sample Rations

Weaned heifers or steers (500 lbs.)
- 4 lbs. shelled corn, 1 lb. soybean meal and 12 lbs. hay

Lactating (nursing) cows
- 25-30 lbs. (free choice) high quality hay
- 16 lbs. high quality hay + 20 lbs. corn silage
- 45-65 lbs. haylage or baleage

Yearlings and bred heifers
- full feed (20-25 lbs.) good quality hay
- 15 lbs. hay + 15 lbs. corn silage
- 40-55 lbs. of haylage or baleage depending on the moisture content

Dry cows
- 17-25 lbs. hay
- 7 lbs. hay + 15 lbs. straw
- 1-2 acres of corn stalks per cow plus hay or supplement
- 35-50 lbs. of haylage or baleage

FINISHING RATIONS

Jim Welch, Ph.D.

The primary feed for beef cattle is roughage. This includes pasture or range and stored plant material as hay or silage. Using roughage for growth and reproduction is what justifies the existence of cattle in our agricultural systems. There are, however, times in the beef business where rapid gains are desired either for the last part of the growth period for slaughter animals or for show animals. The gut capacity of cattle does not allow sufficient intake of most forages to allow for maximum growth. Grain is usually used as it is more concentrated in terms of nutrients available per unit of both weight and volume. The rumen system must have some roughage to keep working properly (they can't change into a pig) but significant amounts of grain can be fed to get faster growth and more finish (fattening).

To start with, changes in a ruminant's ration must be made slowly. Often over 70% of the energy from feed material is derived from microbial growth in the rumen. If there is a sudden surge of highly fermentable feed, huge amounts of excess acids can be produced and the animal will become very sick and may die. Gradual change allows for the system to adapt. Roughage adapted cattle should be started on grain at no more than 2 lbs. of grain plus all the roughage they will eat. The grain should be increased about 1/2 lb. per day until 60 to 80% of the dry matter being eaten is grain. The cattle should be carefully observed daily with particular attention to the consistency of the manure. If scours occurs the grain offering should be reduced until the manure is normal. Much time and growth potential can be lost with a prolonged upset stomach. Over fattening is to be avoided also. Fat cows and heifers will often have problems conceiving. Fatty udders will permanently reduce milk production. Feeding grain for long periods of time will permanently reduce rumination and roughage intake ability.

The concentrates (grain or grain byproducts) fed can be a wide variety of materials but they all have the property of supplying high amounts of digestible nutrients compared to roughages. Ration balancing is a process beyond the scope of this article but a general guide will suffice for the discussion. For maximum growth rates a protein level of 12% to 15% will be adequate and a final digestibility of 80%. Oats and barley are safer grains than corn or wheat. Rolling or crimping increases the digestibility. Some feed mills produce pellets from byproduct feeds such as wheat bran, midds and soy hulls. A 16% protein high fiber dairy pellet may be the best concentrate available. Many feeders like to feed grass hay when high grain intake is in place because legume hay may be laxative. The major requirement is constant attention, assessing the progress of the cattle and their projected time to the desired fitted condition.

A typical feeding schedule for a 500 lb. bull might go as follows:

Day 1	10 lbs. hay
Day 2	9 lbs. hay plus 2 lbs. grain
Day 3	8 lbs. hay plus 2.5 lbs. grain
Day 4	7 lbs. hay plus 3 lbs. grain
.....	
Day 10	3 lbs. hay plus 6 lbs. grain
.....	
Day 15	3 lbs. hay plus 7 lbs. grain

Keep this 3/7 ratio, increase both hay and grain as growth occurs and appetite increases.

CALVING TIME

Making sure your calf gets a good start and dealing with calving difficulties

Pat White, D.V.M.

A new calf gets a good start.

Normal calving in the Highland cow is simple and easy but despite the reputation of the breed for ease in calving, small calves, and excellent mothering, problems can and do arise. Gestation in the Highland usually runs about 280-285 days from the breeding date. If you are lucky enough to catch the cow in heat and see her bred, that date should be recorded, as it can aid in predicting when the cow will actually calve. Bear in mind that some individuals will carry their calves for considerably shorter or considerably longer periods of time and still be healthy and normal. Known gestation lengths of 270 to 292 days have been reported on the same farm. The bigger risk will be in those cows that carry their calves for the longer time period. Calves add 1 to 2 pounds of weight per day during the last 2 weeks of pregnancy, so that longer gestation periods result in larger calves. Carried to the extreme, this can lead to oversized calves for the cow. The cow is not the only contributing factor to gestation length. The bull also can contribute genetics for either shorter or longer gestation lengths. Thus, some bulls will routinely produce larger calves than the norm in many of the cows to which they are bred, while others will produce smaller calves because of a shorter gestation length. Heavy birth weights do account for most of the problems related to calving difficulty caused by calf effects. Birth weights are affected by the breed of the sire, individual bull within a breed, sex of the calf (bull calves tend to gestate for a longer period), the age of the cow (calf size increases with the age of the cow) and nutrition of the cow. Protein deprivation has been associated with smaller calf size and less dystocia, however the advantages of adequate and even excessive protein levels is too great on the later performance of the calf to be ignored. It is never recommended that animals be deprived of adequate nutrition as a method of controlling calf size. Sometimes the shape of the calf may have an effect on calving problems. Large shoulders or hips may be two critical areas and may help explain why even normal lighter weights in bull calves may still be associated with dystocia.

The cow herself can contribute to calving problems not only through her contribution to calf size but to her maturity. First calf heifers are generally smaller in size than mature cows and their pelvic area increases in size as the cow approaches maturity. Calving difficulty is more likely to be seen in 2 and 3 year old cows with a smaller pelvic area. This pelvic area will increase as the cow ages and difficulty calving as a heifer does not necessarily indicate a lifetime of calving problems.

Pelvic area also varies by individual, so there will be members of a breed that in fact do have smaller pelvic areas than the average. Measurements of pelvic area can be used to make culling decisions but only when compared between similar aged animals.

Calf position at birth needs to be normal; about 5% of calves will be in an abnormal position. If you are unlucky enough to have one of these calves, it will be a problem and assistance must be given to the cow in order to save her and hopefully the calf as well.

CALVING PREPARATIONS

1. Move cows due to calve to a special calving pasture. The pasture should be easily seen from a road, lane or house and should provide good footing for a newborn calf. Slippery, muddy conditions may prevent the calf from getting to its feet and delay colostrum consumption. If the calf thrashes around in slick mud, it makes that much more work for the cow in cleaning off the calf. ***All that Highland hair is a liability to the newborn calf until it is dry.***

2. Fence cows out of woods and timber but leave windbreaks.

3. Have some area available that is a special calving assistance pen or barn.

4. Keep all calving equipment in a clean plastic container with a cover that can be easily moved to a truck or calving area.

5. Train your spouse, children and neighbors, if necessary, to look for signs of labor. Check cows in early afternoon.

6. Count cows at feeding time and check for missing cows.

7. Get a calving video and watch it. Know when and how to assist in labor.

8. Never leave a cow that has started labor to go to bed or work. Cows in active labor should be observed every hour.

Normal Parturition

Impending parturition has several indicators. Udder development is one of the earliest signs of impending parturition but it is not reliable to predict the actual time of calving. Heifers can show enlargement of the udder as early as 4 months of pregnancy. Cows generally don't show enlargement until considerably closer to calving, many times in the neighborhood of 2-3 weeks prior. Still other cows may bag up literally days prior to calving.

The most accurate signs indicating close onset of labor is the changes occurring in the pelvic ligaments. The croup ligaments and muscles sink, the caudal border of the sacro-sciatic ligament between the tailbones and the pin bones becomes less cordlike and tight, and more flaccid and relaxed. As a result, the tailhead will become slightly raised and the entire area around the tailhead and vulva will be soft and flabby. Calving will usually commence within 24-48 hours.

Normal calving can be divided into 3 general stages.

Stage 1 Preparation for calving takes approximately 2-6 hours, although this can vary considerably between breeds and individuals within the breed. During pregnancy, the calf has been on its back. Just prior to labor, *the calf rotates to an upright position* with its head and front legs pointed toward the birth canal. This position provides the least resistance during birth. Cows and heifers will often appear nervous and wander away from the main cow herd during this stage. Often they can be seen lying down and getting back up often. They are obviously uncomfortable. The *sac comprising the chorioallantois breaks* as it presses against the cervix and forces its complete dilation. *The uterus begins contractions.*

At this point **Stage 2 Delivery starts**. This usually will take 1-2 hours, sometimes longer in a heifer. The amnionic water sac pushes through the cervix and the fetus enters the birth canal, usually with the cow lying down, although occasionally a cow may stand during delivery. Often the animal will lie on its side and will be visibly straining. This water sac may appear at the vulva as a distended translucent membrane. The two forelegs (actually the hooves) should be the first thing you will see of the calf itself. Many times the feet will appear and disappear several times during the early part of delivery. Once the feet have made their appearance at the vulva of the cow, definite progress should be noted within 30 minutes or the cow should be checked. The head should be resting between the legs just inside the vulva at this point. When the nose is exposed at the opening of the vulva, the cow will commence maximal straining to pass

the shoulders and chest through the pelvis. Once the head is clear of the vulva, the cow may rest for several minutes before she begins maximal contractions again. At this point complete expulsion of the calf is rapid. Once the hips pass through the pelvis of the cow, the umbilical cord will break and respiration generally begins. Once the calf's nose is outside the vulva, it can start respiration, although its ability to inflate the lungs are limited by the confines of the vaginal walls. Occasionally the hips and legs will remain inside the birth canal until the calf or the cow moves. Delivery generally occurs within 1 hour or less in mature cows. First calf heifers can take 1-2 hours for normal delivery. Assistance is warranted if any labor goes beyond 2-3 hours.

Stage 3 of parturition is the passing of the placenta (afterbirth). This usually occurs within 2 to 8 hours. The *button attachments (cotyledons) that attach the placenta to the uterus relax* and then *uterine contractions expel the placenta.* If the placenta is retained past 24 hours, consultation with a veterinarian is indicated. Often no treatment is necessary and retained placenta may just indicate the fatigue. Artificial induction of labor may also be associated with a retained placenta. If your herd suffers from high rates of retained placenta, the diet ration should be checked for protein and energy values. Likewise, some mineral deficiencies, such as selenium, can contribute to the abnormally long retention of the afterbirth.

Determining When and How to Intervene

1. Rule of thumb: assist after 2-3 hours of labor or 30 minutes of no progress. Statistically, early intervention (after 60-90 minutes of labor) is more successful than waiting until the cow is exhausted and the calf is stressed. Calves that experience calving difficulty are less healthy. Furthermore, they will take longer to stand and nurse if they have a difficult birth. Calves require colostrum within 4-12 hours of birth. The sooner they nurse, the more antibodies they absorb from their mother's colostrum. Delayed nursing due to prolonged delivery may increase illness do to respiratory disease and scours. Calves that are sick early in life often have lower weaning weights and poorer performance once on feed. Cows and heifers that experience calving difficulty will probably not rebreed as rapidly. Giving the cow more time to see if she can do it on her own, while perhaps successful in delivery of the calf, may result in a weakened calf and a cow that is delayed in rebreeding. This may even result in culling of the animal if you limit yourself to a 45-60 day breeding season and she can't get bred in this time period.

2. Cleanliness is mandatory. Wash and disinfect your arms, equipment and the perineal area of the cow.

3. Do not use liquid soap as a lubricant. It breaks down the natural lubricant of the cow and can irritate the lining of the birth canal. Standard obstetrical lubricants, unused cooking oil, mineral oil or Vaseline are all excellent lubricants but veterinary lubricants are far easier to clean up than oil based lubes.

4. The cow needs a comfortable calving area, about 12 square feet, under cover, well lit and well bedded. It is not recommended to put the cow in a squeeze chute, as her inclination will be to lie down during assisted delivery and she could get stuck in the chute. It may be necessary to put her in the chute to get a halter on her so that her head is tied when you attempt to assist her.

5. Assess the situation. Has the cervix dilated? If you can pass your hand along the vaginal wall into the uterus. You should feel no ridges of tissue; it should all be smooth and continuous. If you feel a ridge of tissue (not the bony pelvis) the cervix is not completely dilated and pulling a calf at this stage can damage the cow and the calf.

Is the water sac broken? If the water sac has broken, it is important to make good progress to delivery. If it is broken, you should feel a wet slimy calf directly with your hands, instead of the calf through a tough membrane that slips all over the calf. It is not recommended that you break the water sac, as it could stimulate early respiration that may drown the calf if its head is not out of the vulva.

Is the calf in a normal position for delivery? The two front feet should be right side up coming out of the vulva, with the calf's head between and on top of the legs (with the cow standing). If this is not the case, determine if you have the expertise to correct the situation. If not, call a veterinarian.

Will the calf pass through the pelvis? Forcing a large calf through a small pelvic opening can result in injury or death to either or both the cow and calf. If one person can pull the first leg outside the vulva as far as the width of one hand above the pastern and while holding the first leg in this position, if one person can pull the second foot equally far outside the vulva, then there should be sufficient room to deliver the calf. This is because at these distances, both shoulders of the calf will have passed the bony entrance of the pelvis. The circumference of the calf is greatest at the points of the shoulders. If the head and feet are still inside the birth canal, a veterinarian can still deliver a live calf via caesarean section.

OB chains should be attached below the dewclaws and above the hooves, with a single loop, and the large link on the dorsal (top) surface of the pastern.

Pull alternately on each leg to "walk" the shoulders out. At this point, traction is applied straight back and always applied with gradually increasing pressure.

Once the head and shoulders are free, rotate the calf 90 degrees to aid in passage of the hips through the pelvis. Apply traction downward, with gradually increasing pressure. If the calf becomes hip locked, the umbilical cord can become pinched off. Make sure the calf is breathing and call for a veterinarian.

6. All posterior presentations (rear feet first) are an emergency. The feet will appear to be upside down. While the cow may deliver the calf without assistance, once the hips of the calf pass the pelvic rim, the umbilical cord is pinched off. The calf is deprived of the oxygen in its mother's blood and its head is still within the uterus, where it will not breath. Death will ensue rapidly unless the calf is delivered immediately. Again chains are looped around each foot below the dewclaws with the large link at the front of the foot, which will now be the underside of what is showing so that the pull comes off the actual front of the foot. Rotating the calf a quarter turn and alternating traction between the feet will assist in delivery. If it is possible for two people to pull both hocks on a rotated fetus far enough for the hocks to appear at the lips of the vulva, then it should be possible to deliver the calf through the vagina.

Two reasonably strong people should have all the strength necessary to vaginally deliver the calf. If they cannot pull the calf, it will probably be necessary to perform a c-section or a fetotomy (removal of the fetus in pieces.) A calf jack or calf puller should only be used by someone familiar with its operation. The calf puller can exert tremendous pressure, and used incorrectly, can result in serious damage to the calf and cow.

7. The calf puller is designed to save the strength of the operator. It was never intended to stretch an oversize calf through a keyhole.

8. If you are assisting a cow and you have made no progress in 30 minutes, call a veterinarian.

Getting That Highland Calf Off to a Good Start

The vast majority of Highland calves will be delivered by their dams with no problems whatsoever. Likewise, it is probable that the majority will also get to their feet, nurse and receive adequate amounts of colostrum without assistance. There are Highland calves, unfortunately, that will do no such thing. A calf that has been traumatized by dystocia, been stressed by the cold or whose dam has a poorly shaped udder may need assistance to ensure adequate colostrum intake.

Calves that have undergone the rigors of a hard, long delivery are weak and stressed, often far more than they appear. Cold and wet conditions are further stressors, despite this breed's reputation for hardiness. Wet, cold Highland calves are sitting ducks for difficulty in nursing and failure to consume adequate levels of colostrum. Calves basically have limited time to consume that vital first milk so loaded with antibodies they need to fight off all the diseases running rampant on the farm of birth. Mature animals are immune to all these diseases through natural exposure and vaccinations and as a result most people don't even know these diseases exist on their property. Newborn calves are born with no acquired immunity to these diseases and require colostrum to provide their only protection against disease organisms until the calves are capable of producing their own antibodies.

Calves need dry footing when they are first born. Muddy, slippery conditions with a calf unable to get to its feet, continuing to coat itself with mud, will exhaust even the most experienced mothers that managed to deliver quickly and easily. Combine a chilled, exhausted, muddy calf with an immature, exhausted heifer who has never witnessed calving and doesn't have the slightest idea what to do, and you have disaster in the making.

If dystocia was the initiating problem and the cow required assistance, the first priority is to get the calf breathing if it is not. ***Wipe the mucous from around the nose*** and ***suspend the calf from its hind legs*** to allow drainage of fluid from its airways. There usually is no need to panic if excessive fluid seems to come out; most of it is probably coming from the calf's stomach. ***Throw cold water on the calf's head to stimulate respiration if it is not breathing***. Another method to stimulate respiration is to ***vigorously tickle the inside of the nose with straw*** or ***apply pressure to the chest wall just above where the heartbeat is felt the strongest***, which may stimulate the phrenic nerve.

Next, dip and hold the umbilical cord in a cup of 7% (strong) iodine.

The calf should be dried, either by the cow or with human help.

The cow should be checked for the presence of colostrum, blind quarters and mastitis. Some first milk will appear to be bloody from bruising of the udder as the cow walks with a distended bag the last few days before calving. Bloody milk is not a problem to feed to the calf, however, watery milk with clumps of debris in it or curdled, clotted yellow milk that resembles thick pus should not be fed.

Help the calf to nurse either on the cow or feed it by bottle or esophageal feeder. Every cattle breeder should have and know how to use an esophageal feeder. Ask a knowledgeable stockman or veterinarian to demonstrate if you don't know how to use one.

Allow the calf and cow to bond by penning with the dam in a warm and sheltered environment.

Feeding Colostrum

Colostrum in the beef cow tends to be more concentrated than in the dairy cow. A general rule of thumb is that the calf should consume 10% of its body weight in colostrum in the first twelve hours after birth. Due to the increased concentration of the beef cow's colostrum a 75 pound calf should ingest 2-3 quarts of colostrum within 4-12 hours of birth. The sooner colostrum is given, the more antibodies that will be absorbed through the gut of the calf into the bloodstream. After a number of hours, the ability of the gut to permit the passage of relatively large immunoglobulins intact shuts down and colostrum antibodies are no longer absorbed. Thus, the importance of providing the newborn calf with early and high quality colostrum.

The best colostrum usually will be from the mother herself but there will be times when she does not have adequate amounts or is not available to give colostrum. Heifers do not have as high a quality of colostrum as mature cows, nor do they tend to give as much. Sick animals or those in poor health due to nutritional deficiencies may have little or poor quality colostrum.

The best substitute for the mother's first milk is colostrum from another cow, preferably from the same herd. This is important for two reasons: first, the disease exposure for dam and donor will presumably be the same (the calf will be protected from disease organisms present on the farm of origin) and you avoid the introduction of potentially devastating disease by bringing in off-farm colostrum. Johnes Disease is an excellent example of a disease that could be introduced to the farm through colostrum.

It is wise to bank colostrum from some of your herd members, ideally those that give large volumes of milk and are docile enough to allow milking. Colostrum should be taken from the very first milking of that cow immediately after she calves, ensuring that there is adequate colostrum for her own calf as well. This colostrum can be frozen indefinitely, as long as it is not stored in a freezer with an automatic defrost cycle. Colostrum stored in such a freezer will lose substantial percentages of the protective antibodies over a 12 month period of time. Colostrum can be placed in clean plastic soda or water bottles that range in size from 12-32 ounces. Such containers are easy to thaw in a hot water bath, as their caps can be tightened adequately to allow complete submersion.

Thawing frozen colostrum requires some care. The best method, if time allows, is to thaw in a hot water bath (not boiling) until it has reached 104 degrees. The water can be changed frequently and multiple smaller containers of 12 and 16 ounces will thaw more quickly than quart or two quart sizes. It is not recommended to microwave frozen colostrum. Cooked colostrum destroys the immunoglobulins so that the colostrum has no value. Even on 10% power, microwave thawing can result in spots of cooked colostrum. Although more time consuming, hot water baths are a safer way to maintain colostrum integrity.

Although there is no method short of laboratory analysis that will guarantee high quality colostrum, make sure your colostrum donor is a mature cow in good health and condition who gives large volumes of milk. Look at her history of weaning weights on her calves: the high weaning weights are usually the result of heavy milk production, unless you are creep feeding, then you can't really tell.

Colostrum Substitutes

There are a number of colostrum substitutes on the market today. These are supplements, designed to be given to calves that have received some natural colostrum but not adequate amounts. You should probably figure that most calves should receive roughly 150 grams of immunoglobulins. Many of these powdered products may contain 24-36 grams of immunoglobulins per 2 quart package. They must be mixed with adequate water and it becomes exceedingly difficult to get the required amount of immunoglobulins because of the huge volume of liquid that must be consumed. Feeding such a large volume of colostrum substitute, even spread over 12 hours, is not recommended. The calf's stomach is not large enough to digest this amount of food. Certainly, several 2 quart feedings can be made in this time but not enough to supply the calf's total requirement for ideal immunoglobulin levels.

There are colostrum boluses on the market, however, these may only contain .3 grams of immunoglobulins. These are essentially worthless as a colostrum substitute.

There are also pastes designed as "first milk". These 30 ml tubes contain only 5 grams of immunoglobulins.

It is necessary to consider the requirements of the calf before relying on any colostrum substitute. At a bare minimum, 80 grams of immunoglobulin should be given in the first 12 hours. Double that amount for ideal levels of immunoglobulin in newborn calves. If you consider the fact that 2-3 quarts of real colostrum from a beef cow is adequate for most calves, it is obvious just how superior real colostrum is. However, in the event that it is needed, powdered colostrum supplements that supply at least 24 grams of immunoglobulins per feeding, are certainly better than nothing and give the calf a chance at a successful start in life.

Identifying the Calf that May Require Assistance to Nurse

1. Any calf when the cow required assistance to deliver. (abnormal position, coming backwards, calf large for size of cow, sick cow)

2. Any calf when the cow suffered a prolonged labor and delivery.

3. Any calf that appears to be struggling and unable to stand. (contracted tendons, muddy conditions)

4. Any calf whose dam has large banana-like teats. These teats are very difficult for the newborn calf to successfully grab and learn to nurse. Teat conformation may be hereditary or can be a result of injury. Serious consideration should be given to culling such cows with teats in this category, particularly young cows. Young cows, with large, ballooning teats require a lifetime commitment to ensure the calves' survival.

5. Any calf born to a cow with a large, pendulous udder. If the udder hangs too low for the calf to find the teats, this is a problem. Many cows' udders do break down with age, and again, this condition may be hereditary. You need to consider the history of the cow; a 12 or 13 year old cow who has weaned a lifetime of good calves on your farm warrants a different approach than a 4 year old cow with her lifetime and a good part of yours in front of her. Lopsided udders, where the front teats are carried considerably higher than the rear, may be unattractive but if the calf can function and nurse without assistance this would not be considered a problem udder.

6. Any calf born to a cow with ballooning teats and a low pendulous udder. This is a horrible combination. Serious consideration should be given to culling the cow once she has raised her calf. These calves will not be able to nurse and with the likelihood of a hereditary basis, it is wise to consider culling both cow and calf from your breeding herd.

7. Any calf you discover sucking off a clump of matted hair or a mud ball (or sucking on any other abnormal location) for anything more than a few brief seconds. The instinct to suck is very strong in most calves but occasionally they will latch onto the handiest protrusion from the cow and it might not be a teat. They may well never make the connection that they are not getting any food because they never have had food in their stomach to recognize the feeling and nursing brings them the only satisfaction they have ever felt. These calves may fool you into thinking that they are truly nursing with their head in the right area but they do not have the teat in their mouth. A nursing calf will have milk on his nose, around his mouth and many times on his head. He will develop a full appearance after nursing and feel full and firm right behind the ribcage. He will snake along his mother's underside if he loses the teat and will search frantically to pick it up again if he is still hungry. The calf that has nursed may appear more hungry when he feels it is time to eat, compared to a calf that has never tasted milk. This may explain many cases of calves that appear to be perfectly normal and even energetic for several days after birth and then are found dead.

8. Calves that seem to nurse constantly, returning over and over again in a very short timespan to the udder may not be receiving enough milk. These calves may well recognize the fact that milk is food but can't get enough to satisfy their appetite. These calves may need additional colostrum as well as supplemental nutrition throughout their entire calfhood.

9. Any calf that you are just not sure about.

Highland cows do tend to be good mothers, cleaning their calves and assisting them in finding the udder and teats. However, cattle learn by imitation; calves imitate their mothers when they first learn to eat grass and hay and in many other areas of bovine development. Heifers should be allowed to watch calving experienced cows and see how they respond to that new life slithering around their bodies. This may not guarantee good mothering but it is one more way to get the new mother off to a good start and by extension, help get the calf off to a good start.

Artificial Insemination vs. Natural Service

William Lipsey

As the breeding season rolls around, one decision facing a new cattle owner is whether to buy a bull or breed your cows through artificial insemination. Those with smaller herds worry about whether it's worth owning a bull – they get big, hard to handle and is the investment justified for 3 (4, 5, 6 or however many) cows? Below is a look at the advantages and disadvantages of AI versus bull ownership and some thoughts as to who should consider which system.

A.I.

Advantages

- Variety of high quality genetics – by using AI a breeder can utilize the top bulls in the breed plus, if they want, use a variety of bulls each season.
- Lower up front costs – as opposed to buying a good quality bull, you can purchase straws of semen.
- Ease of management – without a bull you don't have to worry about separating young open heifers. All your cattle can graze as one unit throughout the season.
- Control of your breeding season and due dates – with AI you breed your cows when you want them bred and with good records you will have fairly accurate due dates for when they will calve.

Disadvantages

- Heat detection – in order for an AI program to work you must have the time and knowledge to be able to detect heat in your cattle. See *The Bagpipe* Summer 2003 for a detailed article on heat detection.
- Facilities – in order to AI you must be able to easily catch your cattle when they come into heat. A head gate and some sort of chute system is a necessity.
- Low conception rates – as a national average 50% is the average conception rates for first service AI. Over the years it is very difficult to keep a short calving season using AI alone.

Owning a Bull

Advantages

- He does the work – no heat detection, no worries, just put the bull out with the cows and he will breed them.
- High quality bulls in the Highland breed are relatively inexpensive as compared to some other breeds of cattle.
- Highland bulls have excellent dispositions and are a beautiful sight in the pasture.

Disadvantages

- Management – all bulls, no matter how gentle, need good management and care when handling. You need to keep open animals that you do not want to breed away from your herd sire and in order to control your calving season you need to be able to separate your bull from the herd.
- Daughters – this is the age-old question for many Highland breeders – what to do when the daughters of your herd sire are old enough to breed? Sell the bull or the heifers?

So who should consider AI and who should buy a bull? If you have limited time to spend with your cows and don't have the greatest handling facilities then go out and buy a bull. If you have plenty of time to heat detect and can catch your animals easily then AI may be right for you. Don't make the mistake to assume that AI is the cheaper way to go. Even if you have a herd of 10 cows or less it is not necessarily less expensive to AI – by the time you by all the semen that you need, pay for synchronizing drugs, the AI technician, etc., the costs are not that different.

If you are going to use artificial insemination, plan ahead. Find an AI technician and talk to him, make sure he can store your semen and find out what time of day he would breed your cows. If he is usually busy and will breed your cows "when he gets to them" make sure you have a location to keep the cow in a shaded comfortable place.

Order your semen well ahead of time and make sure you order enough. If you have a small herd (10 cows or under) buy 2 straws per cow, for larger herds 1.5 straws per cow. Consider heat synchronizing your animals, this will reduce the time and make it easier to heat detect.

Make sure your facilities are good. Cows in heat can sometimes be a little nervous and if you are separating them from the herd they can be hard to handle. Cows don't always come into heat when you expect so you need to be able to easily catch them at any time during the breeding season

If you are going to buy a bull – buy wisely.

A bull will have a dramatic impact on your breeding program so select one with care. One of the best places to buy a bull is at one of the bull test sales. There you can buy a bull with confidence that it has been raised properly, is semen tested, ready to breed and has been compared to a top selection of his peers. If you are buying an older bull or already have one, consider having a vet do a breeding soundness exam before the breeding season. Make sure your herd sire is in good condition for breeding season, he will lose weight breeding cows so a bull should start the season in good condition. **Any bull with a poor disposition should be culled.**

Getting your cows bred each year is the fundamental function of a cattle owner. Whether you use AI, natural service or a combination of the two should depend on which system works best for your farm. Choosing wisely will make your cattle experience more enjoyable and profitable.

CATTLE GESTATION TABLE

Based on 283 days
Due dates are plus or minus 10 days with smaller and younger cows averaging earlier and older and larger cows later.

Bred	Due	Bred	Due	Bred	Due
Jan 1	Oct 10	May 7	Feb 13	Sep 10	Jun 19
Jan 8	Oct 17	May 14	Feb 20	Sep 17	Jun 26
Jan 15	Oct 24	May 21	Feb 27	Sep 24	Jul 3
Jan 22	Oct 31	May 28	Mar 6	Oct 1	Jul 10
Jan 29	Nov 7	Jun 4	Mar 13	Oct 8	Jul 17
Feb 5	Nov 14	Jun 11	Mar 20	Oct 15	Jul 24
Feb 12	Nov 21	Jun 18	Mar 27	Oct 22	Jul 31
Feb 19	Nov 28	Jun 25	Apr 3	Oct 29	Aug 7
Feb 26	Dec 5	Jul 2	Apr 10	Nov 5	Aug 14
Mar 5	Dec 12	Jul 9	Apr 17	Nov 12	Aug 21
Mar 12	Dec 19	Jul 16	Apr 24	Nov 19	Aug 28
Mar 19	Dec 26	Jul 23	May 1	Nov 26	Sep 4
Mar 26	Jan 2	Jul 30	May 8	Dec 3	Sep 11
Apr 2	Jan 9	Aug 6	May 15	Dec 10	Sep 18
Apr 9	Jan 16	Aug 13	May 22	Dec 17	Sep 25
Apr 16	Jan 23	Aug 20	May 29	Dec 24	Oct 2
Apr 23	Jan 30	Aug 27	Jun 5	Dec 31	Oct 9
Apr 30	Feb 6	Sep 3	Jun 12		

BASICS FOR HIGHLAND OWNERS

Tom Field, Ph.D., John Scanga, Ph.D.,
Celina Johnson, Ph.D., Brett Kaysen & Michael Hays

William Danforth, the founder of Purina Mills, advocated that there were four fundamental factors required for successful livestock production:

1. Good feeding
2. Good breeding
3. Proper sanitation
4. Sound management and husbandry

This philosophy is still appropriate in today's environment.

Good feeding requires that producers recognize the unique attributes of ruminant animals. The compartments of the bovine stomach include the omasum, abomasum, reticulum, and rumen. The rumen is the largest compartment that contains a dynamic microbial population of approximately 10 billion bacteria, 1 million protozoa and 10 thousand fungi per ml. of fluid. These microbes are responsible for digesting the cellulose and hemi-cellulose that comprise the structure of high roughage feedstuffs. The microbes of the rumen are the unique feature that allows cattle and other ruminant animals the competitive advantage of having a diet centered on the use of high fiber feeds. The microbes in the rumen produce volatile fatty acids (VFAs) as a result of their own digestive activity. Cattle then use these VFAs as a primary energy source. This symbiotic relationship between cattle and the microbes in the rumen provide the basis for the ruminant's role in grazing ecosystems.

Accurate ration formulation requires the following information:

1. Precise description of the class of cattle (gender, age, weight, frame size, body condition, stage of production and desired rate of gain)
2. Accurate description of the nutrient content of the available feeds as verified by laboratory analysis
3. Knowledge of the effects of climatic and environmental stressors on the nutritional requirements of animals
4. Knowledge of the impacts of other management protocols such as animal health, usage of feed additives and/or implants, etc. on nutrition

One of the keys to nutritional management is monitoring body condition of animals. Body condition scores can be assigned to individuals based on a visual assessment of the animal's composition. The scoring system ranges from 1 to 9 with 1 equal to severely emaciated and 9 equal to extremely obese. The target body condition score at weaning is a 4+ to 5, at calving is a 5+ to 6 and a rising 5 at the time of breeding (one-half a BCS higher for heifers).

Once body condition scores are assessed they can be coupled with other sorting criteria to establish management groups that can be fed to the specific needs of the group. For example, at weaning time the cow herd could be sorted into the following categories and then managed accordingly:

1. Mature cows with a BCS of 4 or lower
2. Mature cows with a BCS of 5 – 6
3. Yearling heifers

A number of digestive disorders may be encountered in cattle but the three most likely are bloat, acidosis and hardware disease.

Bloat: The functional ruminant animal is able to expel gases created via microbial digestion. However, if the rumen is blocked or is rendered dysfunctional as a result of the gas accumulation, cattle will experience bloat. Bloat is characterized by distension of the upper left abdomen as a result of gas build-up. The use of an esophageal tube to release the gas is often required.

Acidosis occurs when the rumen environment becomes too acidic as a result of excessive grain intake or reduced buffer production. There are two types of microbial digesters in the rumen – fiber digesters that prefer a pH of greater than 6.2 and starch digesters that thrive in environments with a pH of 5.4 to 7.0. Because of these differences, it is imperative that as rations move from forage to forage plus grain that the dietary changes are conducted in a transitional manner to ensure normal rumen function.

Hardware disease occurs when metal objects such as bits of wire, small nails, etc. are ingested, trapped in the honeycomb structure of the reticulum and migrate into other vital organs. Proper maintenance of facilities is the basis of prevention of this condition. However, in some circumstances, the use of a reticular magnet to hold metal in the reticulum may be warranted.

Good breeding depends on the assessment and utilization of superior genetics. Ninety percent of the genetics of each calf crop is due to the influence of the last three herd sires used - sire (50%), sire of dam (25%) and sire of maternal grand dam (12.5%). Therefore, sire selection is of the utmost importance. Sire selection should be viewed as a strategic activity that is founded on the careful determination of breeding objectives and the systematic evaluation of potential parents and their ability to meet the genetic goals of the enterprise. Seedstock producers will increasingly incorporate a focus on solving customer problems and adding value into their sire selection process.

While the specific traits and desired level of performance in these traits will vary from herd to herd, it is generally accepted that the most effective selection systems will be 80 percent focused on objective measures and 20 percent focused on subjective assessment. The long-term key to genetic progress is to continually benchmark herd performance in key traits, keeping excellent records and avoiding inbreeding.

Management of genetic data is dependent on the creation of an accurate and permanent system of animal identification. The American Highland Cattle Association stipulates the use of a tattoo that includes the original owner's herd letters, unique animal number, and year code designating the year in which the animal was born (2005 -S, 2006 - T, 2007 - U, 2008 - V, 2009 - W, 2010 - X, etc.)

The tattoo should be applied prior to 3 months of age to assure good readability. The application of the tattoo should involve the following steps:

1. Observe and verify the animal to be tattooed
2. Place the appropriate ID symbols in the applicator
3. Double check accuracy by tattooing a scrap of paper
4. Clean the ear with a rag and rubbing alcohol
5. Liberally apply ink to the ear
6. Rub ink into the ear with thumb or a small brush
7. Apply tattoo to the upper lobe of the ear with the number located horizontally in the middle one-third of the lobe
8. Apply tattoo with moderate pressure
9. Reapply ink and rub in thoroughly
10. Clean tattoo instruments

There is no more important task of the modern breed society and the individual cattle breeder than the complete and detailed collection, sharing and utilization of accurate data. Genetic information collection begins at birth with recording of birth weight, calving ease, calf vigor, dam's body condition score and dam's udder score.

Ideally the calving season should be constrained to a 60 to 90 day period with each cow calving every 365 days to allow for optimal management. In most cases, year round calving should be avoided. The choice of calving season should be based on weather and seasonal conditions as well as market targets. Once a calf is born, it is important to have the calf nursing within one hour to assure that colostrum is ingested by the newborn. Even though colostrum intake is important, purchasing colostrum from dairies or other herds should be avoided as a biosecurity precaution.

Weaning is a critical production step both in terms of good husbandry and data collection. Timing of weaning should be aligned with opportunities to increase body condition of cows on grazed forage, avoidance of extreme variation in daily temperature, dusty conditions and other stressors, as well as forage, health and marketing plans.

If possible, administration of the first vaccine should occur 2-3 weeks prior to actual removal of the calf from its dam with the booster given at or following weaning. If calves will be fed or watered in unfamiliar conditions following weaning, it is a good idea to introduce calves to the new condition while still on the cow or with use of a "babysitter" cow.

To minimize stress at weaning, many producers have adapted side-by-side weaning protocols that allow the calf to remain on grass and in near proximity to the cow while being restrained from nursing by a fence or an anti-suckling device. If the use of a corral at weaning is required, then it is best if the cow can be penned while calves are allowed to remain on pasture. Low stress handling and transportation techniques should be utilized. Calves should never be weaned, vaccinated and transported on the same or concurrent days, unless the situation calls for accepting high risk. Good sanitation is one of the key elements of an effective herd health program. Other components include:

1. Establishment of a working relationship with a good veterinarian
2. Implementing a Beef Quality Assurance plan and sound biosecurity measures
3. Provide training for employees

4. Buy livestock from known sources
5. Maintain excellent facilities
6. Implementing a sound preventative vaccination schedule
7. Maintain a good record keeping system
8. Provide appropriate nutrition and effective mineral supplementation

Sound management and husbandry are developed from experience and continuous learning. The following list of web sites provides a minimal but useful set of resources to assist you in accessing information of value.

Best sources of information:

University Sites
- www.csubeef.com
- www.iowabeefcenter.org
- www.ansi.okstate.edu

National Cattlemen's Beef Association
- www.beef.org

Beef Improvement Federation
- www.beefimprovement.org

Marketing Information: Livestock Market Info Center and Cattle-Fax
- www.lmic.info
- www.cattle-fax.com

Information Sites
- www.beefstockerusa.com - stocker cattle
- www.beefcowcalf.com - cow-calf

USDA
- www.usda.gov

Beef Publications
- www.beefmagazine.com
- www.drovers.com

Fencing
- www.ces.uga.edu/pubcd/C774.htm
- http://muextension.missouri.edu

THE VALUE OF INFORMATION

Tom Field, Ph.D.

Can you imagine purchasing fertilizer without a thorough evaluation of the soil fertility, expected application rates and desired crop response? The introduction of new cultivars is based on a detailed assessment of expected performance based on experimental plot results. Yet, many continue to purchase herd bulls with only a cursory evaluation of the available genetic information. We can no longer afford the luxury of depending on phenotypic evaluation as the primary method of determining which seedstock will be incorporated into our herds.

Agriculture is entering into an age where the development of food systems specifically created to meet the needs of unique consumer niches will force increasing levels of accountability, consistency and information transfer. As commercial cattle producers becoming increasingly sophisticated in the data they require to make both management and genetic decisions, the seedstock sector must accommodate this changing demand for information by offering customers more than an attractive sire. The provision of meaningful data will no longer be seen as a competitive advantage but a prerequisite to market entry. In other words, those with information will gain access to food system markets while those without will find themselves in an increasingly uncompetitive position.

"Leaders do not need to know all the answers. They do need to know the right questions," wrote Ronald Heifetz of the Harvard School of Business. Information management is one of the most discussed subjects by leaders of almost all forms of business and industry and as Dr. Heifetz points out, the critical first step is asking the right questions. In the past decade, the battle cry in the economy has been to build information-based companies where knowledge could effectively function as the centerpiece of value. It would be safe to say that the least enviable job in any company would be that of vice-president of information technology. Despite these challenges, the need for collection of meaningful data and the creation of useful information as an aid to decision-making has not been diminished.

It is not an easy task to create meaningful information from the vast expanse of data that can be collected within the industry or even a single cattle enterprise. Thomas Davenport and John Glaser (2002) outline four fundamentals to assuring that information is successfully integrated into the management decisions:

- ✓ Assure that the knowledge base is up-to-date and founded on expert information.
- ✓ Prioritize processes by directing focus in the most critical areas in which information will be **utilized** and **valued.**
- ✓ Establish an organizational culture of measurement. Information systems will only work in a culture of commitment.
- ✓ Train people to collect and utilize the information.

We have all heard the TQM message that "you can only manage what you measure". In essence Deming was correct in this philosophy. Only when we develop a disciplined and objective approach to assessing performance against a stated objective or goal is there any real opportunity to sustain improvement. What Deming failed to say was that there is a second rule – what gets paid for gets done more. Keeping both rules in mind suggests that we should only measure the important stuff – those components of the business that contribute to profitability in both the short and the long term.

Nonetheless, there have been tremendous shortcomings in the beef industry's ability to capture data, transform that data into information, transfer the information through the system and to apply it to decision making. We cannot hope to turn beef demand and industry profitability in a favorable direction without access to and use of meaningful information. Simply put, the game cannot be won without knowing the score and how much time is left on the clock.

What Records Do I Keep?

The first step is to determine what information customers want. This question should be asked directly to those who buy products/services from you. The largest gap in the beef production chain is the lack of conversation between cow-calf producers and their seedstock suppliers. By asking the right questions of both existing and potential customers, genetic providers can better grasp the challenges facing commercial cow-calf producers and the information needed to overcome the obstacles.

The next step is to undertake the process of answering the following questions about your own enterprise:

1. What are your goals? Without a clear, detailed and complete answer to this question – it is impossible to determine which records to keep. If you take the goal setting process lightly you are doomed to certain frustration and very likely you will fail.

2. What are your resources? Do not attempt to answer this in loose terms – again you will have to go to considerable effort to understand what you have at your disposal and to estimate the reliability of availability.

3. Define the system in terms of the processes used. Once the processes have been determined you can then establish the points of critical control. In other words, where do you have influence and at which steps of the process will your control yield the greatest benefits in terms of your goals?

4. Determine the level of complexity with which you and your staff are willing to deal. If you want complexity but the crew isn't receptive…welcome aboard Captain Bligh.

5. Outline the factors of a biological nature and an economic nature that will impact your goals. Focus on the biological traits that are most likely to have the greatest economic impact. Remember to think both short and long term.

As producers evaluate their management and marketing plans for the future, they are advised to consider the need to collect and disseminate additional information about the genetics, management and previous performance of cattle from their herds. Every attempt should be made to communicate with direct customers about the desired levels of performance and the information to be collected. Those with information are likely to have more power in the marketing process.

Specifically, the seedstock producer should collect, record and utilize the following data:

Birth
- Sex
- Tag/ID
- Birth weight
- Calving ease/vigor
- Birth date
- Color
- Dam
- Dam's udder score
- Dam's BCS

Weaning
- ID
- Weight
- Height
- Date of weaning
- Management group
- Docility score
- Note any blemishes
- Dam's weight/BCS
- Dam's pregnancy status

Yearling
- Tag/ID
- Date
- Weight
- Hip height
- Ultrasound data
- Scrotal circumference

Breeding
- ID
- Weight and BCS
- Date of breeding or turnout of bulls
- Sire

The most important function of the seedstock producer and the breed association is to create an accurate, detailed and breed wide database that allows for the creation of meaningful genetic predictions. The Highland breed will only be able to advance and grow if breeders are committed to the collection and dissemination of high quality information.

The Human Factor

"Some men have thousands of reasons why they cannot do what they want to, when all they need is one reason why they can." Mary Frances Berry.

No system will ever work without the commitment and dedication of people. People are the key to the development, implementation and effective utilization of an information system. Creating a culture of measurement, accountability and communication is not an easy task. Therefore, as you design information management plans keep in mind the needs of those who will have to use the system. Always ask the questions – "Is this necessary? Is it user-friendly? How much training will be required? Have the people in my enterprise had an opportunity for input? Does it ask the right questions?"

The development of an educational outreach effort to your customers is needed if they are to tap into the full value of the data you provide. Furthermore, the increase in information available on cattle opens the door for the provision of customer specific advice as to which bulls are best suited to their individual farming enterprises. Several U.S. breeders are providing their existing clients with a customized catalog that ranks which bulls are ideal for their particular situation.

Don't forget to include your own staff, sale managers and other herd consultants in your training and outreach efforts. A quick study of other industries suggests that even the best information technologies are rendered useless when the people in the organization lack the training, the desire or the time to make them work. Remember, people are the key. Even good ideas cannot change themselves.

Nobody Knows Nothin' For Sure

"Do what you love, love what you do and deliver more than you promise." Harvey Mackay.

In the final analysis, the honest truth is that we don't fully understand information management and the role of information technology in our industry. At Colorado State University we are currently building an information system to link three ranches representing some 1000 head of cows together with our research feedyard in an attempt to better answer questions about the cost and benefit of hitting specific market targets, to determine which questions ought to be asked and the data requirements to answer those questions and to provide an open-to-the-world demonstration of a coordinated production system. What we have learned so far is that nobody knows anything for sure.

There are no easy solutions or quick fixes. Even though information management is not a perfect science, we simply cannot afford to ignore its importance. As we seek the answers there are several key philosophies to keep in mind according to management consultant John Graham:

- ✓ If information is to be used as a value-added strategy then make sure that the definition of value is accomplished according to the wants and needs of customers.
- ✓ There are no silver bullets. Take your time and continuously evaluate the cost and benefit.
- ✓ Be careful of the NIKE slogan – "Just do it". While the action orientation makes sense to get the initiative moving, it isn't enough by itself. Without a plan, a functional process and system-wide accountability, the effort is doomed to fail.
- ✓ Don't get trapped into a commodity mindset unless you are willing to take the lowest price possible for your product.

The internationalization of commerce, the creation of food production and supply chains and the growing sophistication of consumers have created a more complex environment in which our clients work. It is the ultimate responsibility of the seedstock producer to provide them the tools, advice and service to assure their opportunity to be competitive.

A Minimum Herd Health Program For a Spring Calving Beef Cow Herd

Pat White, D.V.M.

Introduction: This fact sheet outlines a minimum herd health program for beef cow-calf producers. It is based upon a March-April calving situation but it can be adjusted to fit other calving times.

December-January-February (late gestation):

1. Check the free-choice mineral mix to be certain it provides 8% phosphorus. If in a selenium deficient area, check with your veterinarian or extension agent for the proper level of selenium to include in the mix. Feed year round to the breeding herd.
2. If lice are a problem, apply an approved pour-on. If the pour-on also kills grubs, consult your veterinarian or extension agent on the timing.
3. Vaccinate replacement heifers when 9-12 months old with IBR-BVD-PI3 and Lepto-5 bacterin. Consult your veterinarian on whether to use a modified live or killed product for the IBR-BVD-PI3.

March-April (calving season):

1. Calves at birth:
   a. Make sure that calves get colostrum within 1-4 hours of birth.
   b. Dip navel in 7% iodine.
   c. Give selenium-vitamin E injection if recommended for your area. Repeat in 2-4 weeks if white muscle disease is a problem. Consult your veterinarian.
2. Vaccinate the cow herd and replacement heifers twice the first year and annually thereafter with the following:
   a. IBR-BVD-PI3 killed virus vaccine. Consult your veterinarian on how and why to vaccinate with a modified live vaccine. Never use a live BVD vaccine in a pregnant cow.
   b. Lepto-5 bacterin. You may have to vaccinate twice a year if lepto is a severe problem.

May-June-July (pasture and breeding season):

1. Use some form of fly control such as tags, pour-ons, sprays, dust bags, back-rubbers, etc.
2. Calfhood vaccinate replacement heifers for Bangs (brucellosis) between 4-8 months of age. Age varies by state; check with your veterinarian on advisability of vaccination and proper age.
3. Vaccinate calves for blackleg-malignant edema if it is a problem in your area.

August-September (preweaning practices):

1. Vaccinate all calves over 5 months old but no later than 3 weeks before weaning with:
   a. IBR-PI3 modified live vaccine if cow herd was vaccinated; if not, use either killed or intranasal vaccine.
   b. BVD killed vaccine. Consult your veterinarian if using a modified live vaccine as live BVD vaccine should not be given to calves nursing pregnant cows.
   c. Blackleg-malignant edema bacterin.
   d. Haemophilus somnus bacterin.
2. Castrate and dehorn calves if not done earlier and if it is desired.
3. If possible, put out creep feed so calves learn to eat grain prior to weaning.

October-November (weaning):

1. Cow herd at weaning:
   a. Grub and lice control: observe cut-off dates; be advised that lice can be a serious problem in Highlands because of the longer hair.
   b. Vaccinations, if not done before breeding season:
      (1) IBR-BVD-PI3 killed virus vaccine.
      (2) Annual Lepto-5 bacterin. You may have to vaccinate twice a year if lepto is a severe problem.
2. Calves at weaning time:
   a. Wean calves. Try to minimize stress.
   b. Grub and lice control on calves retained as replacements. Observe cut-off dates.
   c. Booster vaccinations for IBR-PI3, BVD and Haemophilus somnus on calves retained as replacements.

Adapted from Extension Bulletin E-1686, Cooperative Extension Service, Michigan State University.

A MAXIMUM HERD HEALTH PROGRAM FOR A SPRING CALVING BEEF COW HERD

Pat White, D.V.M.

Introduction: This fact sheet outlines a maximum herd health program for beef cow-calf producers. It is based upon a March-April calving period but it can be adjusted to fit other calving times. Some of these practices may not be needed in every herd. Nevertheless, they are presented for those producers who want a program that provides maximum protection against common cattle diseases for their Highland herd.

December-January-February (late gestation):

1. Check the free-choice mineral mix and make sure it contains 8% phosphorus. If in a selenium deficient area, check with your veterinarian or extension agent for the proper level of selenium to include in the mix. Feed year round to the breeding herd.
2. If selenium deficiency has been a severe problem in the herd, consider administering slow release selenium boluses to pregnant cows.
3. If lice are a problem, apply an approved pour-on. If the pour-on also kills grubs, consult your veterinarian or extension agent on the timing.
4. Vaccinate replacement heifers when 9 to 12 months old with IBR-BVD-PI3, Lepto-5 bacterin and Vibriosis bacterin. Consult your veterinarian on whether to use a modified live or killed product for the IBR-BVD-PI3.
5. If scours has been a problem in the past, vaccinate the cow herd twice, three weeks apart, with rota-corona-E. coli vaccine; the second shot should be within 2-3 weeks of calving. Re-vaccinate annually.
6. Inject the cow herd with 2 million IU of vitamin A if forage is apt to be deficient in vitamin A.

March-April (calving season):

1. Calves at birth:
   a. Orally vaccinate calf with rota-corona vaccine if the cow herd was not previously vaccinated. Do this within 12 hours of birth.
   b. Make sure calves get colostrum within 1 to 4 hours of birth. Have frozen colostrum available for calves that are slow to nurse. Frozen colostrum should come from older cows.
   c. Dip navel in 7% iodine.
   d. Give selenium-vitamin E injection if recommended for your area. Repeat in 2-4 weeks if white muscle disease is a problem. Consult your veterinarian.
   e. Give Vitamin A injection, 1 million IU.
   f. Vaccinate calves with intranasal IBR-PI3 if the cow herd is not vaccinated and you expect IBR to be a serious problem.
   g. Identify calves with ear tags. This is a good time to tattoo if required.
   h. Castrate (optional).
   i. Dehorn (optional but something to consider for feedlot steers).
2. Scours and death losses from cryptosporidiosis are becoming more prevalent in beef herds. There is no known cure for crypto. Bolstering the calf's immune system with colostral antibodies provides the best protection.
3. Vaccinate the cow herd and replacement heifers twice the first year and annually thereafter with the following:
   a. IBR-BVD-PI3 killed virus vaccine. Consult your veterinarian on how and why to vaccinate with a modified live vaccine. Never use a live BVD vaccine in a pregnant cow.
   b. Haemophilus somnus bacterin.
   c. Lepto-5 bacterin. You may have to vaccinate twice a year if lepto is a severe problem.
   d. Vibriosis bacterin.
4. Deworm the cow herd before going to pasture, if not done in the fall.

May-June-July (pasture and breeding season):

1. Calves 2-4 months of age should receive:
   a. Bangs (brucellosis) vaccination for replacement heifer calves between 4 and 8 months of age. Age varies by state; check with your veterinarian on advisability of vaccination and proper age.
   b. Blackleg-malignant edema bacterin. If these are a serious problem in your area, vaccinate at 1 month and repeat after 5 months old.
   c. Castrate and dehorn if you need to and if it was not done earlier; beware of fly strike in wounds.

2. Have your veterinarian palpate cows with potential reproductive problems such as retained afterbirth, abnormal discharge, erratic cycles or repeat breedings. Treat or cull as necessary.
3. If pastures contain a high percent of alfalfa, put out poloxalene bloat blocks.
4. If grass tetany is a problem, feed high magnesium salt or supplement.
5. Provide fly control.
6. Consider mid-summer deworming of cows and calves on parasite contaminated pastures.

August (preweaning practices):

1. Vaccinate those calves that are 5 months old or older with:
   a. IBR-PI3 modified live vaccine if the cow herd was vaccinated; if not, use either killed or intranasal vaccine.
   b. BVD killed vaccine. Consult your veterinarian if using a modified live vaccine as live BVD vaccine should not be given to calves nursing pregnant cows.
   c. Haemophilus somnus bacterin.
   d. Clostridial 7-way bacterin.
   e. BRSV modified live vaccine.
   f. Consider vaccinating with Pasteurella haemolytica toxoid.
2. Bangs (brucellosis) vaccinate replacement heifers if not done earlier and if it is desired. Consult your veterinarian.
3. Castrate and dehorn if not done earlier and if it is desired.
4. If possible, put out creep feed so calves learn to eat grain prior to weaning.
5. Beware of late-summer pinkeye. Use eye patches as necessary but be advised that the longer hair on the face of Highlands requires more glue to get the patches to stick.

September (preweaning practices):

1. Wean those calves that are 6 months old or older. Do this no later than 1 month before sale time.
2. Get calves accustomed to eating grain or silage out of a feed bunk unless you are on a strictly forage-fed system.
3. Provide hay free-choice.
4. Give booster vaccinations for IBR, BVD, Haemophilus somnus, Clostridia, BRSV and Pasteurella haemolytica.

October-November (weaning):

1. Cow herd:
   a. Provide grub and lice control. Observe cut-off dates; consult with your veterinarian or extension agent. Lice can be a serious problem in Highlands because of their longer hair.
   b. Deworm.
   c. Pregnancy check and cull open cows; it is not economical to keep them around another year unless their calves are worth far more than the average beef animal.
   d. Give annual vaccinations if not done before breeding season:
      (1) Annual IBR-BVD-PI3 killed virus vaccine.
      (2) Annual Haemophilus somnus bacterin.
      (3) Annual Lepto-5 bacterin. You may have to vaccinate twice a year if lepto is a severe problem.
      (4) Annual Vibriosis bacterin.
   e. Vaccinate the cow herd annually at this time with 7-way Clostridial bacterin to protect the newborn calves in the spring.
   f. If the quality of harvested forages is low and apt to be deficient in vitamin A, inject cows with 2 million international units (IU) or add to the diet in supplemental form. Repeat injections in 90-100 days.
2. Calves:
   a. Minimize stress to calves at sale time.
   b. Calves kept for replacements and/or later sale:
      (1) Wean younger calves not weaned earlier and start on feed.
      (2) Give booster vaccinations for IBR, BVD, PI3, Haemophilus somnus, Clostridia, BRSV and Pasteurella haemolytica if not done earlier.
      (3) Deworm if not done earlier.
      (4) Provide grub and lice control. Observe cut-off dates.

Adapted from Extension Bulletin E-1687, Cooperative Extension Service, Michigan State University.

WEANING STRATEGIES

William Lipsey

Putting on nylon halters and allowing the calves to drag them around for several days is an easy, low stress beginning to halter breaking.

For every cattleman there are certain terms, activities and occurrences that take place every year, sometimes everyday, that could be described as the basics of cattle raising. Calving, breeding, feeding, weaning, giving shots, etc. all become second nature to the experienced cattleman. However to the "new comer" in the business, some of these things are mysterious and confounding.

Weaning is one of the most stressful times in a cow and calf's life and can be one of the loudest for their owners. Generally calves are born in the spring and they nurse their mothers until they are taken away in the fall. Why? First of all, these are not dairy cows, they only produce a calf and the milk to raise them. Typically the calf nurses for 4-8 months until it is old enough and big enough to digest "regular food" (hay and grain). At this point a calf is actually getting a larger percentage of its nutrition from grazing, rather than its mother.

Why not just let the calf continue to nurse until it weans itself? First off, they often won't wean themselves, sometimes you see a calf nursing on one side of a cow and her yearling on the other. Secondly, as mentioned above, after about 8 months of age, the calf is getting a fairly small percentage of its nutritional needs from nursing, yet milking takes a great toll on a cow, greatly increasing her nutritional needs. Unfortunately, neither the cow nor the calf understands the benefits and both will bellow and blat like it's the end of the world. Just remember, in order to have properly developed calves and good healthy cows, weaning is a necessary evil.

Following are descriptions from several established breeders of when and how they wean their calves and what other procedures are done at that time.

ZEALAND FARM: The calves are weaned at 180-200 days of age. They are put in a separate 4-5 acre area and kept from the rest of the herd by 4 strand barb wire with an additional hot wire on the herd side of the barb wire about 10' back. They are kept separated from the rest of the herd all their first winter, allowing me to supplement their hay ration with creep.

At weaning time they are all given an Ivomec injection, plus a 7 way (clostridial) and a 5 way (shipping fever complex) shot as recommended by my vet for this area. At this time I also castrate the bull calves that I know will not make bulls. The steers and heifers stay together, while the bull calves that have bull potential are taken to another farm to be fed and watched separately. At 11 months we then band the nearly yearling bulls that do not make it and take them back to the main herd. Last year only 1 out of 12 bull calves made the cut.

Tie the calf low to the ground and short enough so it can lay down but not get tangled.

Halters are put on all heifer and bull calves at weaning and we start working them at that time. The two or three cows that have calves that have cow/calf potential for showing are held in a separate area and llama halters are put on the calves two to three days after birth.

SPRING FLIGHT FARM: Here at Spring Flight Farm, we wean our calves between 5 and 7 months of age. Several factors go into the decision. We evaluate the dam's body condition as well as the calf's growth rate. For spring calving dams, we like them to go into winter in good condition. If they need some extra conditioning it is easier and less expensive to do this before the temperatures get too low and without a calf at side. I must add that sometimes, we wean at five months to get them ready for a scheduled show or if we have a buyer waiting.

In ideal years, when we vaccinate our cows in the fall, we schedule this about two weeks prior to weaning and the calves get an initial dose of Triangle 9+PH-K. This is a killed virus safe for settled cows, however, the calves must be boostered within a month to be fully protected. Several weeks following the vaccination we separate the calves from their mothers. We put the calves in a shed and within 24 hours halter and tie them. We bring water and food to them for a day or two and then proceed in walking them to the water source while continuing to have free choice hay. We usually wean our calves in groups with the minimum being two and maximum six. This gives them company and also limits the number to something manageable, time wise. By having the calves in the shed, the calves and mothers cannot see each other. This tends to keep the bawling down to a minimum. Tying the calves keeps them from pacing or milling and it is an ideal time to halter break the critters. At this time, we give the additional dose of Triangle 9+PH-K and have our heifers vaccinated for brucellosis. New York is a brucellosis free state and has been for quite some time. We have considered discontinuing this but because we show some animals, have decided to continue the protocol. Our weaned calves stay in the shed for a week and then go to a separate pasture, usually with some of the yearlings. We try not to have a common fence line when we put them back outside.

Castrating is accomplished by banding. We usually wait until the animal is 12 to 15 months old. This allows us to track his growth and determine if he is a good breeding bull prospect and gives the animal testosterone. When banding, the animal is given a tetanus shot.

HONEY HILL FARM: We try to wean during the 6th month. However, there are some things that could affect that timing. If we have several calves about the same age we find it easier to wean them at the same time. So we might have a 5 month, a 6 month and a 7 month old calf weaned together. We also look at the condition of the cow. If she is older or the pastures are beginning to fail we might wean a little early to give her a chance to recover. By the same token, if the pastures are really going great we might leave the calf as long as 8 months.

We halter break, wean and castrate our calves at the same time. We bring them into the barn and halter and tie them to a ring close to the ground. We bring them their hay and water every day and touch and brush them. This gets them used to human contact. Once they are fairly calm we untie them and let them free in the barn but we try to tie and brush them every couple of days. We leave the cows in the pasture right outside the barn so they can stand right on the other side of the wall and bellow to their calves. This reduces the loud bellowing from across the farm when the cows and calves are trying to find each other. Since we have neighbors 200 feet from the barn we try to reduce the noise at weaning.

We don't give any special shots at weaning. Once separated from the herd the steers are returned after 4 - 8 weeks. The heifers are not returned to the herd since we keep the bull with the herd and do not want them bred. We keep a separate heifer herd for those animals we are not ready to breed.

Tips

- Consider creep feeding your calves 60-90 days prior to weaning. This gets them used to eating grain plus reduces stress and weight loss at weaning.
- Putting a rope halter on a calf and letting it drag the halter around for several days is an easy stress free way to halter train. Make sure that you use a nylon halter (natural rope swells and is hard to remove) and have them in an area where they won't get tangled.
- Consider weaning your calves early (120-150 days of age) if you are in a drought stressed area or have low body conditions scores (thin) on your cows. It will reduce the load on your pastures and the cows will be able to gain weight back easier than in the winter.

HALTER BREAKING

Jim Welch, Ph.D.

To facilitate handling and moving cattle outside the confines of a corral and working chute system, halter breaking is a useful procedure. There are several methods of getting the job done but they all have some things in common. First, the halter must be of suitable size to fit the animal and be of sufficient strength to hold it when tied. There needs to be a good system for restraining the animal while the halter is being put in place. A major part of working cattle properly is controlling and reducing fear. A rodeo atmosphere will likely produce a wild response, particularly in Highlands. I like to start with simply putting the whole herd through the working chute system on a regular basis. Bring them in with grain and get them to think that a trip to the corral is something akin to a trip to the candy store. With large herds the grain feeding is impractical but the principle of having the herd accustomed to the process still holds. Calves less than 400 lbs. are easiest to halter break. The first session for my calves involves putting them in a chute, putting on the halter and letting them stand there tied up for a few minutes. Then take the halter off and let them go. The knot used to tie the halter should be the quick release knot as entanglement can be problem and it is difficult to untie a hard knot on a flailing animal. My next step is to put the halter on again and move them to a strong post where they can be securely tied for an hour or more. They will learn that there is no use pulling and thrashing as the post does not give in. Following several sessions with the post they are ready for the leading exercise. It is very important that the calf never wins a tugging bout as they will remember this and try again. An attitude of kindness and gentleness pays off best. Another method starts with placing the halter on the calf in a chute. Then the calf is turned loose and allowed to walk around for several days with the halter on and the lead rope dragging on the ground. This gets the calf accustomed to living with the halter and the occasional tug when it steps on the lead rope. A third method is to put a neck strap on a tame animal and halter the learning animal to the neck strap. The animal being halter broken should be smaller than the lead animal.

Preparation for the show ring needs some more steps. The animal needs to get used to the show stick and positioning for exhibition. It also needs to be ready for strange people, strange noises, strange dogs and the fitting process getting ready for the show. This takes time and patience. I also like to give show animals a ride in the trailer several times before they actually go to the show. They arrive at the show in much better shape if they know that the trailer is not taking them to the end of the earth.

The overriding principle is the practice of firmness, the handler is the boss, with an attitude of kindness.

Treatment of Calf Scours

Pat White, D.V.M.

Calf scours is a complex syndrome caused by a number of conditions or agents that result in neonatal calf diarrhea. It remains one of the major problems for beef calves and is the primary cause of death in the newborn calf. The result of scours is a net loss of water and electrolytes from the calf's body via the intestines. This can lead to life-threatening dehydration and electrolyte imbalances. While the cause may be a single agent, such as salmonella, there may be many factors contributing to disease, such as simple overeating with an irritated gut leading to invasion by a pathogenic strain of E. coli bacteria. Several viruses can cause disease and secondary bacterial infection or coccidiosis may complicate the picture. The more agents involved in a particular case of calf scours the more important control and prevention becomes.

Calves born on clean dry pastures are less likely to suffer from scours.

The severity of the illness is dependent upon three things: level of calf immunity (colostrum quality, quantity and absorption), the dose of the organism that the calf is exposed to and stress on the calf.

Treatment for scours is very similar regardless of the cause. It is necessary to correct dehydration, acidosis and electrolyte loss. The initial treatment for all scouring calves, regardless of cause is the same, they must receive fluids, electrolytes and energy. Simple water will not be effective because it will not be absorbed from the gut unless it contains electrolytes in the proper proportions. Consult your veterinarian for powdered electrolyte and glucose supplements that can be easily mixed with water and administered to sick calves. Unless the calf will drink out of a bottle, it is likely that you will need to have an esophageal feeder and know how to use it. An esophageal feeder is a long stiff tube that passes down the throat of the calf, attached to a plastic bag or reservoir that holds 2 quarts of fluid. Consult with your veterinarian or a knowledgeable stockperson for correct use of an esophageal feeder.

Extent of treatment should be based upon severity of illness. Calves racing around the pasture, kicking up their heels, with yellow or white diarrhea probably do not need treatment. Nutritional scours usually will self correct with time. The four gauges to establish severity of illness are general disposition, appetite, dehydration and body temperature.

If the calf is weak, depressed or reluctant to move, something generally is wrong. If the calf is not eating, the cow's udder will be distended and this is an indication to further observe the calf. Dehydration can be evaluated by pulling up the skin over the shoulders or the side of the neck. The skin should rebound to its normal position almost instantly. If the calf is dehydrated, the skin forms a tent and will stay in that tented position for a period of time: the longer the time, the more severe the dehydration. The inside of the mouth may feel tacky instead of slick or slimy. As dehydration worsens, the eyeballs sink back into the head and you may notice a gap between the eyeball and the inner lid and urine output may cease. Normal body temperature should be about 100.5 to 102.5 degrees F. Subnormal temperatures indicate the calf should be warmed, while an elevated body temperature could indicate that systemic antibiotics are indicated.

Treatment

Early fluid loss

The calf is still standing, the skin tents for less than 4 seconds, the eyes are bright and the oral membranes are moist or slick. This combination of signs indicated that the calf is less than 5% dehydrated and treatment with oral electrolytes is indicated. The calf may suck electrolytes from a bottle, although more than likely, you will need to tube the calf with either a stomach tube or an esophageal feeder. Add several 2 quart feedings of oral electrolytes per day until scouring slows. Leave the calf on milk, preferably its mother. **Old information that suggested taking the calf off of milk for several days and feeding only electrolyte solution, is wrong.** Calves that are fed only electrolyte solutions with glucose will rapidly lose weight and can die of starvation if the diarrhea lasts for any substantial amount of time. Separate milk feedings from electrolyte feedings by a minimum of 30 minutes; 2 hours is probably better.

Moderate fluid loss (7% dehydration)

The calf is dull and lying down but upright, the skin tents for 5 seconds, the eyes are slightly sunken, legs are cold but the inside of the mouth is warm but sticky. This calf needs 2 quarts of warm, high energy electrolyte solution by stomach tube or esophageal feeder (it will not have the energy to nurse from a bottle even if it would) immediately and again in several hours. Keep the calf in a warm area where it can be monitored and continue electrolyte solution at replacement levels until recovery.

Severe fluid loss (greater than 9% dehydration)

The calf is lying flat, comatose or close to it, the skin stays tented, the eyes are deeply sunken with a big gap between eyeball and lid, the legs are cold and the inside of the mouth is cold, pale and dry to the touch. This calf is very close to death and requires intravenous fluids immediately. Oral fluids will not be absorbed quickly enough to save the calf.

Calculating Fluid Requirements

Enough balanced electrolytes must be given to:

Replace the amount of fluid already lost (correct the dehydration).

Meet the daily requirement for fluid if the calf were not sick (roughly 50 ml per kg of body weight or 25 ml per pound of body weight).

Keep up with the ongoing fluid loss from the diarrhea, which may be 1-4 liters of fluid a day.

For a calf weighing 100 pounds which is about 7% dehydrated:

100# divided by 2.2 #/kg = body weight (BW) in kg

45.45 kg x .07 (% dehydration) = 3.18 kg = 3.18 liters = 3180 ml

45.54 kg x 50 ml (daily requirement per kg of body weight) = 2277 ml = 2.277 liters

1-4 liters/day in ongoing fluid loss to diarrhea (big calf, go with largest amount)

3.18 liters + 2.277 liters + 4 liters = 9.457 liters per day for this calf = about 9 quarts per day

This amount should be force fed in addition to the milk the calf is drinking.

It is a common mistake to give the calf too small an amount of fluid. If too much is given (within reason) the calf will urinate any excess out of the body. The problem with giving too much fluid results from feeding too large an amount at one time. Give no more than 2 quarts or liters per tube feeding but feed the required amount over the course of 24 hours.

Several homemade electrolyte solutions for oral use:
Each recipe makes one dose. Some of these recipes will be very low in energy, although they are excellent in the event of an emergency. Commercial electrolyte solutions are easier to mix and superior for longer term use. Again, consult with your veterinarian.

1/2 cup light Karo corn syrup
1/2 tablespoon baking soda
1/2 tablespoon regular salt
Warm water to make 2 quarts

or

1 teaspoon baking soda
1 teaspoon regular salt
1 teaspoon potassium chloride
1/2 cup light Karo corn syrup
Warm water to make 2 quarts

or

1 package pectin (Sure-Jell) or 100 cc 50% dextrose solution
1 tablespoon low sodium salt
1 tablespoon baking soda
Warm water to make 2 quarts

Some older electrolyte recipes include canned beef consommé from Campbell's as an ingredient. In the wake of BSE (mad cow disease) this should never be used as an ingredient for ruminants including calves.

Prevention of Calf Scours

The general principles of preventing calf scours are truly nothing more than common sense. The primary efforts during a scours outbreak should be to prevent it from affecting more calves. The three main areas of concern are the level of immunity against disease in each calf; the number of infectious organisms in a given area; and the level of stress encountered by susceptible calves. **Maximize the calf's natural and acquired resistance to disease organisms prior to exposure.** This involves taking good care of the dam in the first place; minimize dystocia and its affects (prevent obesity as well as very thin cows, observe cattle closely and give assistance in a timely manner so as to avoid undue stress to the cow and calf) and maintain proper nutrition and body condition of the cow in that critical third trimester of pregnancy. A healthy, well fed cow (not obese) has a better chance of delivering and raising a healthy calf. Underfed cows often have lower milk production and may have poor quality colostrum. A healthy cow should produce good quality colostrum, which is the first major step in preventing diarrheal disease in calves. It is imperative that the calf receive this colostrum within a short time of birth (within 4 hours is best). Calves are not born with any antibodies in their bloodstreams. These protective antibodies must be supplied in the colostrum or first milk and are only absorbed from the calf's gut for a short period of time. As more time passes, less and less of the antibodies present in colostrum will be absorbed by the calf, until at about 24 hours the calf is unable to absorb further antibodies. The higher the level of antibodies absorbed by the calf, the higher the immunity level in the calf, the less the disease severity and the shorter the duration of illness. Bear in mind that anything mixed with the colostrum (such as manure and the organisms associated with manure; in other words virtually all the bacterial organisms that cause neonatal diarrhea) is also absorbed through the gut, so E. coli and salmonella can become a systemic illness virtually at birth.

Colostrum is generally supplied through natural suckling in beef calves. As a result, there is highly variable intake, as well as highly variable quality of colostrum. There is a good chance of delayed colostral intake, which lowers the amount absorbed. A significant number of beef calves (30% to 80%) will have insufficient levels of antibodies to fight infection well.

Artificially supplied colostrum will allow management to control the amount of colostral intake, how quickly after

calving the colostrum is consumed by the calf and the quality of colostrum given. This can significantly decrease the number of calves with inadequate antibodies to fight infection well (down to only 10% to 20% with insufficient levels). Tubing with an esophageal feeder is generally more efficient than bottle feeding when done properly. Aiding all beef calves to receive adequate colostrum is an intensive and exhausting endeavor. As such, selecting sires with calves that are quick to get up and nurse, as well as keeping cows that have good udder conformation and good mothering instincts become extremely important in the management of any beef herd.

Delay and minimize the infectious dose to which the calf is exposed. Most of the agents causing scours are ubiquitous: the calf will ultimately be exposed and will hopefully develop immunity. Any factor which allows for an increase in the number of organisms in the environment will increase the likelihood of the calves to contract scours. The agents of scours are spread by ingestion, aerosol-inhalation or contamination of the navel. Sanitation and ventilation are critical factors for maintaining healthy calves. If using calving pens, keep them immaculate. Clean and dry them between animals. Treat the navel with iodine soon after birth. If you use an esophageal feeder to give colostrum to newborn calves, use a separate one for the sick calves. Always tend to healthy animals first, leaving the sick calves until last. Wash hands and clean up after handling sick animals.

You can also minimize exposure by minimizing the density of susceptible calves. Exposure of the various organisms to drying or sunlight can drastically limit their survival in the environment. Cows can be chronic carriers of the viral agents causing scours and intermittently shed low numbers of virus into the environment. The viruses survive very well in the pasture or calving area. The incubation period in the calf is short, about 3 days and then the scouring calves infect others by shedding the virus in their diarrhea in very high numbers. Calves out of first calf heifers are more susceptible to these viruses, usually due to the fact that their colostrum is not of the same high quality as the older cows. To reduce exposure, move newly calved pairs out to pasture to physically spread out the calves. If scours develops in that group, leave it together but don't make new additions; newer cow/calf pairs should go to another new pasture. Do not bring in sale barn calves to graft onto mothers with a dead calf. Often neonatal sale barn calves are colostrum deprived and have already been exposed to a whole host of infectious agents.

Reduce stress factors. The primary stress factors for newborn calves are difficult delivery, lack of energy intake, wetness and wind. Calves can handle severe cold if they are dry and protected from the wind. Highland calves have a heavy hair coat to protect them from the elements but if that hair gets soaked, it becomes a liability. Protection can be given to calves by means of portable calf sheds in the grazing area. It is essential that they be cleaned out or moved periodically.

Calf scours can be prevented and controlled but this can only be through proper management practices.

Causes of Calf Scours

E. coli: bacteria normally present in the intestines of all mammals. Certain strains can cause diarrhea, others do not. This agent is always present in the intestinal tract and usually only causes disease as a secondary infection following viral agents or intestinal irritant.

There are 3 main disease forms:

Colisepticemia describes a disease where E. coli spreads from the intestines though the calf's body and causes abscesses in the brain, eyes, kidneys and joints. This occurs when the newborn calf ingests it in manure, mud or other material before or along with getting colostrum. Extremely difficult to treat successfully; it can be prevented by calving in clean dry areas, making sure that the cows' udders are clean, and keeping colostrum clean and refrigerated or frozen. This can be caused by any strain of E. coli.

Enterotoxigenic E. coli (ETEC) is caused by a specific strain (K99 and a few others) that attaches to the intestinal cells and causes them to pump excess fluid into the gut lumen, where it is subsequently passed (hypersecretory diarrhea). This process can pump so much fluid into the gut of the calf that it can die before outward signs of diarrhea appear. This diarrhea is almost the only diarrhea to occur within the first 3 days of life. It can be prevented by feeding colostrum containing K99 antibodies. This entails vaccinating the cows prior to calving.

Enteropathogenic E. coli (EPEC) is a specific strain that attaches very tightly to the intestinal wall and produces various poisons that cause both excess secretion and malabsorption of fluid. There is no vaccine available.

Rotavirus diarrhea: This virus is ubiquitous throughout neonatal cattle populations. The disease is characterized by a brilliant yellow, voluminous, pudding-like stool later becoming more watery. Calves can be affected as young as 12 hours after birth but most cases will be between 3 and 30 days old. Calves will be severely depressed and lose their appetite. Diagnosis depends upon laboratory methods.

There are several vaccines available for rotavirus; one involves vaccinating the cow at very specific periods prior to calving so that the colostrum is fortified with antibodies against rotavirus. This method still requires rapid and adequate colostrum consumption by the calf, as these antibodies are not passed through the placenta as in other

species. Another vaccine is given orally to the calf at least one hour before it has consumed any colostrum, as colostrum will neutralize the attenuated virus used in the vaccine. This method of prevention requires meticulous diligence to management of newborn calves.

Coronavirus diarrhea: This virus causes a severe and long-lasting disease with a high morbidity (the number of calves affected) and moderate mortality (the number of calves that will die). Fortunately this virus appears to be less widespread than rotavirus. The calves are commonly affected between 5 and 21 days of age but when the virus is first introduced into the herd, calves up to 6 weeks may be affected. Depression is not as severe as that seen in rotavirus infection. Diarrhea and dehydration progress though a course of 4-5 days with the calf becoming moribund. Severe, watery diarrhea is not a feature of this disease, although mild respiratory signs may be seen if the virus is present in the air and inhaled. Diagnosis depends upon laboratory methods.

There are several vaccines available against coronavirus including one given to pregnant cows in combination with rotavirus and ETEC. Likewise, an oral vaccine given prior to colostral intake by the calf is also available. Efficacy of both is questionable.

Importantly, there may be a synergism between coronavirus and prepatent (before maturation) coccidia infection. This may explain the severity of the illness attributed to coronavirus alone. If this is truly the case, then anticoccidial treatment may become a significant method of controlling morbidity and mortality of coronavirus infection.

Coccidiosis: This disease is caused by protozoa, single-celled organisms that invade the intestinal tract of animals. Only certain strains cause disease in cattle. This organism causes disease in calves usually older than 3 weeks of age and often occurs 7-14 days after being moved from calving lots onto pasture. Coccidiosis is often considered a disease of intensive animal husbandry and overcrowded conditions but free ranging animals are also at risk. Older cattle are carriers of coccidia and typically contaminate pastures. The organism is resistant to disinfectants and can remain viable in moist shady areas for years. However, sunlight, freezing temperatures and desiccation will destroy the oocysts. Severity of disease varies with the number of oocysts ingested. If the calf is exposed to just a few, it may develop immunity and never show any signs of disease. Moderate numbers may induce mild disease before complete immunity is reached. Ingestion of large numbers of oocysts usually results in severe disease and occasionally death. Signs include bloody diarrhea, rectal straining and discomfort, loss of appetite, slight fever and debility. A typical sign of coccidia is finding calves with diarrhea smeared across their rumps as far as their tail will reach. Diagnosis is based on clinical signs and finding oocysts during microscopic examination of manure. Treatment of disease consists of using amprolium (Corid) or a sulfonamide. Other medications are used prophylactically as a preventative for coccidiosis and are not suitable for treatment of acute disease.

Cryptosporidiosis: Cryptosporidium parvum is a protozoal coccidian parasite and is a very important zoonosis (disease that affects both animals and humans). Four hundred thousand people contracted this disease when oocysts (eggs) contaminated the Milwaukee water supply. Infections can easily spread from calves to humans. Persistent and fatal diarrhea can affect both calves and humans.

Signs of the disease are nonspecific and vary from depressed appetite with mild diarrhea to protracted, watery diarrhea and debilitation. The diarrhea is nonresponsive to medication as this organism is resistant to conventional antimicrobials, including those routinely used for treating coccidia. This usually affects 1-3 week old calves. Dehydration may not be a factor but weight loss leading to emaciation is virtually certain. The diarrhea may last 6-10 days, with maximum oocyte detection occurring at 12 days of age. This is the ideal age to sample calves to detect the presence of C. parvum as this can be a difficult pathogen to find. The organism is destroyed by freezing but is extremely resistant to disinfectants.

Unfortunately at this date, there are no practical treatments for C. parvum. Paromomycin and azithromycin (Zithromax) are used in human cases but are prohibitively expensive. Lasolocid (Bovatec) does help prevent infection but at doses so high they could cause death in 50% of the calves treated.

Clostridium perfringens type C enterotoxemia: This disease is caused by the toxin produced by a ubiquitous organism commonly found in the gut of many mammals including cattle. Disease occurs when the organism proliferates and produces one or more toxins. This is usually seen in calves less than 2 weeks old. Death may occur so rapidly that signs of abdominal pain and depression are never even noticed. Diarrhea, if it is seen, would be profusely hemorrhagic, many times looking like pure blood. Diagnosis is usually made at autopsy, the presence of extensive hemorrhage in the small intestine (purple gut) is highly suggestive. Treatment is extremely difficult due to the rapid onset and course, with a poor prognosis regardless of signs. Hyperimmune serum, massive extra label doses of penicillin intravenously, rapid IV fluid therapy and anti-inflammatories to combat endotoxic shock may be successful if started early enough.

Prevention is vaccination of the cow with the appropriate clostridial toxoid two times and then on a yearly basis. The calf, of course, must consume adequate colostrum.

Salmonellosis: This disease probably gets more attention because it is associated with illness in humans. There are over 1000 types of salmonella; virtually all can cause disease. In cattle, it is capable of causing high rates of disease in both calves and adults. This organism produces a potent endotoxin within its own cells. When the organism is

killed by antibiotics, it releases this toxin into the intestines and can actually make the illness more severe, inducing shock. Therefore treatment is aimed at combating endotoxic shock. The effects are particularly severe in the neonatal calf. In addition to diarrhea, salmonella can cause pneumonia, septicemia (blood poisoning), meningitis, osteomyelitis and arthritis.

Usually affected calves are at least 10 days old, with sale barn calves being at particular risk. The diarrhea is intractable; may be characterized by a septic tank odor and by severe dysentery with chunks or flakes of fibrin or even full fibrin casts (molds of the intestine formed by secretion of fibrin into the intestines: this fibrin takes up the shape of the intestine and is sloughed in one piece, like a piece of soft, flexible pipe). Some calves will only show signs of diarrhea, others will show multiple organ involvement. Diagnosis is based upon laboratory methods. Treatment of diarrhea with antibiotics is controversial but antibiotics are always indicated in septicemia and the other forms of the disease. In humans, the use of antibiotics in the enteric (intestinal) form of salmonella does not decrease the severity or duration of the diarrhea and in fact increases the duration of shedding of the organism in the stool. Probably the most important feature of treating with antibiotics in calves is that it reduces the spread and helps prevent signs in unaffected animals exposed to scouring calves.

Prevention involves improving management. Risks include overcrowding, common calving areas, contaminated feed or water, septic tank overflow and improperly handled farm waste. A vaccine is available for the calf, which is helpful in well-managed facilities but actually a detriment in poorly run facilities resulting in an increased risk of death.

Salmonellosis is a very important animal borne disease of humans. Ingestion of contaminated food of animal origin is the most important method of transmission but outbreaks can occur because of direct contact with infected animals.

Nutritional scours: This may be commonly seen in beef calves due to changes in the calf's nursing habits. Under range conditions, the calf develops a pattern of nursing that suits his appetite. Anything that disrupts this pattern can lead to scours. This could include a bad storm, strong wind, the cow searching for new pasture or the cow/calf pair being changed to new, lush pasture. A calf separated from the cow for a longer period than normal may cause the cow's udder to contain more milk than is normally present at feeding and the calf may overeat. Erratic nursing patterns may also be conducive to developing Clostridial endotoxemia.

This type of diarrhea presents little problem. As long as the calf is active and alert, no treatment should be necessary. If the calf does become depressed and fails to nurse, it will need to be treated.

FLY STRIKE AND PINKEYE

Jim Welch, Ph.D.

Two common problems that the Highland breeder must be prepared for are fly strike and pinkeye. Fly strike is the process of flies laying eggs on an animal where the eggs hatch into larva (maggots) and proceed to invade the skin surface producing extreme irritation. It is truly an ugly condition and can kill an animal. It is a particular problem in newborn calves during fly season. Even though the dam may do a good job of cleaning the calf up, enough amniotic fluid remains on the calf to make it attractive to flies. They will lay their eggs often around the tail head or navel. The eggs hatch into maggots and a really bad situation develops. Various insecticide treatments will solve the problem but the simplest for me has been to use pour on Ivermectin. The easy way to do this is treat the calf the first day while it is sleeping. Get a 6 foot stick with a little plastic container attached to the end. Put the appropriate amount of pour-on in the container and quietly apply the Ivermectin without waking the calf up. This will make the calf resistant to the maggots for at least 3 weeks by which time the major problem period is over.

Despite folklore to the contrary, Highland cattle get pinkeye and while it will not kill them directly, it is a miserable condition and measures to both prevent and treat it will be part of normal herd management. At its worst, pinkeye can cause permanent blindness and the condition will reduce feed intake, growth and social status in the herd as even temporary blindness reduces an animal's ability to compete. Prevention measures have improved over the years and there are some relatively effective vaccines available. There are some breeders that feel vitamin A and mineral supplements help in producing improved resistance. Treatment should be started early as advanced cases include scar tissue on the cornea of the eye and this scar tissue lasts a long time (sometimes years). A course of repeated long acting antibiotic injections is the most common treatment.

Control and Restraint

Ted Millen, D.V.M., Ph.D.

Perhaps you can scratch your cattle behind the ears or maybe even pet them but there are times when you need to be able to immobilize them safely. You should have a good squeeze chute or at least a head gate for use when tattooing, hoof trimming, treating or examining your animals. Minimum equipment for handling them would be a small area where single animals can be confined, a good lariat preferably with a release honda, a stout post and a nose lead on a rope.

Your gentle cattle may come to you when called, take food from your hand and be very tame but when you grab hold of them they react. Always be mindful of the arc or swinging horns, both up-and-down and from side-to-side. Stay behind this arc till an animal is secure.

Before I bought my chute I used welded cattle panels set about 32 inches apart and fastened to wooden posts. I drove or coaxed the animals into this narrow passageway and stuck 2" x 4"s at either end to hold it in place.

I can't throw a loop around the horns of a good-sized Highlander but by using a forked stick I can usually ease the loop over the horns. When the loop is drawn tight around the horns and the rope is snubbed around a stout post, the animal usually quiets down. The nose lead can then be applied and its rope passed around a firm support above the animal's head. Your critter can then be handled safely. Always have a knot in the lariat rope so that if the loop goes over the head and is drawn tight, the animal will not choke. A second lariat could be put around the horns before removal of the first from around the neck.

Never give the animals slack rope when a nose lead is on, for it may injure itself. Also, always remove the nose lead before taking the lariat from the horns when releasing the animal.

Topping the "Pecking Order"

Your cattle establish a peck order. I always stay at the top of the peck order in my herd. If they tend to crowd around when I am carrying feed to them, I often carry a short broomstick or other rod.

Frequently an animal is turned suddenly by a "superior" and in swinging away from it may come too close. I tap it on the head to let it know I have a longer horn than it has and to keep it at a safe distance.

Also, your animals have a reflex kick ready for attacks from the rear. This may be triggered by a shadow or sudden close movement. I always carry the bucket between me and the feeding cattle. Recently a gentle cow with a day-old calf (hidden somewhere in the weeds) kicked my bucket as I passed her beside the feed bunk. I always chase such an aggressor a few steps when it does this, to re-establish my top position on the peck order.

When I put feed in the line of wooden boxes on the ground, I drive the animals away from the side I am on by sound, stick or dog, so that there will be no sparring behind my back in case a retreating animal should swing around and catch me with a horn tip. I am not mean to my animals but I am always the boss. When I whistle, the lead cow answers and the herd comes for a reward.

Once I tried to get a yearling heifer to go into a truck by touching her with an electric prod. She didn't move forward but took the glasses right off my face with a reflex kick. I don't use the electric prod anymore.

Don't get behind low peck order animals in a cramped space with a high peck order animal ahead of them. First thing you know you will be run over by retreating cowards. Don't let your veterinarian crowd a bunch of animals together to tail bleed them. Take them one at a time, especially if more than one age group is represented and have the animals tied up or in a headgate.

An animal may catch its head in a narrow slot and not be able to get it out. Put on a pair of thick gloves, grasp the horns near the tips and turn the head sideways till you get it released. Be careful to keep your head back so a sudden upper thrust will miss your chin or eye.

FENCING AND HANDLING FACILITIES

Pat White, D.V.M.

Fencing is one of those facts of life that you cannot avoid when purchasing your first Highland cattle. It is mandatory that you have already constructed fence that is capable of holding cattle. Highland cattle are no harder to fence than other breeds but if there is a way to escape, they will find it.

If your first purchase is Highland calves, they may not have had very much handling prior to their arrival. They will probably arrive tired, frightened and confused. You must have an adequate fence to contain them because they will not recognize their new location as home and given the proper opportunity, they may decide that you will never see them again. It is ideal to have a very sound, small enclosure of 1/4 to 1 acre that can be used as an area to become acquainted with your new purchases and for them to become acquainted with you. Give them a week or so to figure out that this is their new home where they are fed and watered. Once they no longer bolt at your very presence and seem to be acclimated to their feed and water supply, then it should be safe to release them to a larger pasture or range. However, any Highland that does not have adequate food and water will try to escape so that it can eat or drink.

There are many types of fencing materials available. Several different types are listed here, with some advantages and disadvantages of the more common ones. It is always wise to visit other cattle owners in your area to see what they are using.

Barbed wire is considered good cattle fencing, that is relatively inexpensive and is rapid to install. It may be improved by adding one or more electric strands. It is not adequate for calves or frightened adult cattle, as both can usually go right through it. The calves can do so without any damage to themselves or the fence but an adult animal can severely cut itself as well as take down part of the fence if it should run through it. Three-strand electrified barb is certainly adequate in most situations where the cattle are reasonably calm and not fearful. The small calves may be able to go under the fence at will but will usually return to their mothers. This could be a definite liability should the pasture be in close proximity to a busy road or even just a poorly sighted road.

Page wire fencing is another type that is going to be more expensive and more time-consuming to install. It makes a good barrier for calves and adult cows, although it is possible for a frightened animal to go through it on occasion. Cattle will also use the fence as a butt scratching post and can certainly loosen the fence considerably. If you have horses also, some of them will learn to walk down the page wire so that they can reach grass on the other side. It would be highly improbable for a cow to do this but the cows will certainly take advantage of any weakness and low spot in the fence that a horse has made. Page wire can be improved by running a strand of electrified smooth or barbed wire along its length at the top of the fence.

High-tensile fencing is also excellent cattle fence, particularly if some of the strands are electrified. They are not inexpensive but by their very nature, repairs are kept to a minimum. The tension on the wire is such that if a tree should fall across the fence, it only has to be removed and the fence will bounce back into its former shape. Calves and adult cattle can learn to crawl between the strands, particularly if they are not electrified. Also, in the event of a shoving match between cows or bulls, the loser can quite easily be pushed through the fence, electrified or not. A distinct advantage though, is the lack of damage to the fence and the animal (assuming the winner of a fight didn't inflict serious injury).

High-intensity electric fencing is also excellent cattle fence. This fence, when working properly, packs a jolt that even the largest bull cannot ignore. If your animals are accustomed to you and your land, this would be ideal fence. It requires great attention to detail, however, including proper grounding and lightening protection. The fence chargers are quite a bit more expensive than the standard, run-of-the-mill fence charger but correctly installed, are well worth the investment. This system has the distinct advantage of being highly portable if you want it to be so that you can easily fence in different areas for just a few days.

Pipe fencing and wooden fencing are both excellent choices in terms of confinement of cattle but they are very expensive and labor intensive to erect. They would both be excellent for a small corral to confine new additions to the herd. Both must be constructed with small enough spaces between the pipes or the boards that the animals will not try to go through them. These can also be ideal areas for confining calves during weaning.

There are many choices available for good fencing. It would be wise to visit other cattlemen in the area to see what they are using and get ideas. Your county extension office will have publications concerning types of fence, cost and how to construct them. Contractors in your area may specialize in certain types of fence construction and may be able to put them up much faster than you could.

Handling facilities are necessary because at some point in your cows' lives they are going to require some form of treatment for an ailment. The literature concerning Highland cattle always seems to emphasize that these animals are hardy and require minimal interference from humans. This is basically true but minimal interference does not

mean **no** interference. All cattle owners should have some method that is a usable restraint technique should their animals require vaccinations, deworming, assistance getting a calf to nurse, milking out a cow or assisting a cow in labor.

Your handling facilities need not be elaborate but they must be sufficiently well made that they will secure an uncooperative beast that does not necessarily enjoy what you have in mind. If you are proficient with a lasso and tie-downs, then you may be able to do without any formal, constructed handling facilities. The more difficult the task and the wilder the cows, the more sturdy your facilities must be.

Again, county extension offices will carry literature with plans to build working corrals and handling chutes. You can purchase handling chutes and premade corrals. The best idea is to visit with other beef producers and get ideas for exactly what you want.

SHELTER

Pat White, D.V.M.

Highland cattle do not, as a general rule, require shelter in the form of a barn. Mother Nature designed these cattle to withstand the weather, regardless of what that weather might be. However, sick, malnourished, very old or very young cattle are not going to be as weather resistant as the healthy, mature Highland.

It would be prudent to consider at a bare minimum, some form of a windbreak for your cattle. During severe winter conditions, the wind-chill is going to have more of an effect than the actual temperature. It is also imperative to have adequate shade for summer. High temperatures, particularly combined with high humidity, are conditions to which any animal, Highland or not, will have a hard time adjusting. Heat stroke is always a possibility in hot weather and is very serious and possibly fatal. Cattle should not be worked in very hot or hot and humid conditions. Cattle need a place to get out of the hot sun and the cold wind, just as any animal does.

In the event of sick cattle, it is convenient to have some form of enclosed area in which to confine the animal. A three-sided, covered shed that can be fenced closed makes an excellent temporary shelter for the very ill animal, however, this is by no means a requirement. Such a shelter is also ideal for the possible orphan calf or very old animal that just requires a little extra care.

A completely enclosed barn is a handy thing to have on the property but it is not necessary. It is also unwise to keep cattle enclosed at all times. This is as true of Highlands as it is of other cattle, if not more so. Ventilation is a very serious consideration for any enclosure and air exchange is necessary to avoid respiratory disease. Close, tight quarters encourage the spread of contagious diseases and the build-up of ammonia from urine can be a cause of respiratory disease in and of itself.

Protection from rain is optional, as a healthy Highland with a representative haircoat will shed a very large volume of water without soaking through. If cattle are in poor body condition, needless to say the effect of a cold, driving rain will be far more severe.

TRUCKING HIGHLAND CATTLE

Dick LeClar

Equipment

I started out with a 16' steel bumper pull with a 1/2 ton truck, then to a 3/4 ton truck, went to a 20' steel goose neck with a 3/4 ton truck and now have a 24' aluminum goose neck with a 1 ton dually. Steel trailers are cheaper but will not last as long. They do not hold up to salt and winter conditions in my area. Aluminum is lighter, therefore, you can actually pull a little bigger trailer for the same weight. I had my 20' steel trailer completely stripped after 2 years because of rust, repaired, primed with a rust retardant primer, then painted with a high grade of paint and it still rusted through after about a year. Aluminum costs considerably more than steel but I know people who have used the same trailer extensively for over 10 years and they are still going strong. My current trailer has over 100,000 miles but other than brakes and tires, I have not had to do anything in the line of repairs and there is not a spot of rust anywhere. As with any equipment you should occasionally do a thorough check for any cracked or broken welds. I feel if you break down the cost per year, you definitely save money by buying aluminum if you plan on keeping the trailer for a period of time. There is also better resale value on aluminum trailers. The type of trailer each person buys depends on how many miles you put on, what type of weather you drive in, if you hose off the salt after every use, etc. Trailers come in widths from 72" to 102". Because I haul commercially I prefer the 102", it gives the animals more room to stand across the trailer without rubbing the hair off their rear end and allows me to carry more animals. Depending on the width and the design of the trailer, you may or may not have wheel wells in the rear compartment and possibly in part of the front compartment. Try to get a trailer with the least amount of wheel well area and it is best if they are sloped instead of square.

After having used both a bumper pull and gooseneck, I would never go back to a bumper pull. With a gooseneck, the loaded weight is more evenly divided between the truck and trailer because the neck of the goose sits over the rear tires of the truck rather than on the bumper. By saying bumper, I also am referring to vehicles that have a trailer hitch package, the weight is still at the very end of the vehicle. You have much more stability with the tow vehicle using a gooseneck. Even with the use of equalizer bars (they go from the trailer to the tow vehicle) on a bumper pull, I found there is still considerable sway if the animals are loaded loose and moving around. With a gooseneck you do lose some storage in the bed of the tow vehicle but you also gain storage in the gooseneck area. Most 16'-20' trailers come with one divider gate splitting the compartments about 50/50. Over 20', you normally get two divider gates and if you order the trailer, you can usually get the compartments divided any way you like. You can also order a movable divider gate(s) and that lets you change the size of your compartments to suit your needs. My 24' trailer is divided into 4', 12' and 8' compartments. The normal configuration for this size trailer is 3 compartments divided equally. This works best for me but each person has to decide what his/her needs are and order accordingly. Most rear doors open full and have a 1/2 door slider. At times it is convenient to only open half of your entrance/exit door. Of course sometimes the slider door freezes and it is always just when you need it.

Trailers come with two different types of axles, spring and torsion. Most of us prefer the torsion axles. If you have a flat tire with a spring axle, you have to jack up the trailer and get both tires off the road to change the flat. With torsion axles you can drive the good tire up on a block ramp and it picks up the weight of the trailer and raises the flat tire off the ground. I also feel that the animals get a better ride with the torsion axle. I always carry a 10 ton hydraulic jack with me and that will pick up my trailer with a full load of cows. My experience with tires indicates that radial far out perform bias ply. Remember, I carry some heavy loads but the bias ply tires heated up after just a short trip. With the radial, I do not have that problem and I usually get 25-40,000 miles. I know that seems like a large range but some tires just seem to wear better than others. I have basically stayed with one brand of tires for the past 5 years both when I used the bias ply and the radial. To help keep the electrical system to the trailer working, I have found that keeping the "plug in" for the trailers in the side of the bed of the pickup helps to keep it from having a problem with moisture. If you use the one that comes under the rear bumper, it collects all the road salt and moisture and eventually will give you a problem. If a person could take the best from each trailer and combine them, they would be able to come up with the best of the best. Seeing how this is not possible, you have to look at the many different makes, styles, models, features and decide what is best for your situation and finances. I looked for two years before I decided on the current trailer which has served me very well.

Now that you have decided on a trailer, what about the interior? I highly recommend rubber matting for the floor. I use regular cow matting, bought at a local farm store and cut it to fit. Most trailer sales will also sell and install the matting if you do not want to do the work yourself. The reason for the matting is three fold. It is not as slippery for the animals, gives them some cushion from road bumps and makes it easier to clean out the manure, especially if you have aluminum flooring with ribs. If you have wooden flooring, it can be very slippery especially if it is painted. If you are

going to go with a wood floor, I suggest you paint it with a sand type paint if you are not going to use matting. I always thought that aluminum flooring was more slippery than wood but that is not the case. In my area, the rubber matting will sometimes become slippery due to rain blowing in and freezing. When that happens, I use calcite under the bedding and it also helps when trying to clear out frozen bedding. I take my mats out about three times a year and wash under them. With a wooden floor, they may need to come out more often because the urine will eventually rot the wood and it eats the sides of a steel trailer. You can also line the sides of your trailer with matting. I don't feel this is necessary and you are adding a lot more weight to the trailer. If you have ever used rubber cow matting, it is very heavy. You will also want at least one interior light. I have three in my 24' trailer and if I can keep two of them working at the same time, I am doing well. If you have one and it goes out, you are in the dark and there is nothing like trying to untie animals and unload your show equipment in the dark after a long haul to or from a show. You may want handles on the outside of the trailer. That allows you to open interior compartments if you have loose or unruly animals to unload. Many trailers don't come with any way to tie animals except to the post openings. Usually they are about 5' off the floor of the trailer. You should consider putting a tie bar or rings about 3' from the floor. The animals can lie down and not have as much rope slack which sometimes leads to animals getting tangled in the rope or amongst themselves. It is a good idea to consider ties on the outside of your trailer, especially if you exhibit at a place that doesn't have a place to tie your animals. This way you can use your trailer as a tie out area. A rubber rear bumper is a good idea but not necessary. It does help if you back into a solid post, tree or loading dock.

For a 16' to 20' trailer, I recommend a 3/4 ton tow vehicle and over 20', a 1 ton dually. Of course you can use a 1 ton single tire for any of the trailers but I am more comfortable with the dually for the bigger trailers. Any vehicle that is suitable for towing a trailer is not going to give you the best mileage, whether it's gas or diesel. Since you will have to live with the fuel economy for all your driving, it may be less expensive to hire your cattle moved if you have only occasional needs for moving cattle.

Be sure and check the vehicle manufacturer for tow capacities of any vehicle you choose. Remember, now most trucks are being sold to people that don't use them to tow a trailer so it is wise to check and make sure your mirrors are wide enough to be able to see farther on the vehicle. I believe one brand recommends a 1/2 ton vehicle beefed up to what I call a 3/4 ton. Be honest in what you think you will be drawing. Most of us say we will only take two animals to a show, sale, etc., then we decide well I've got four, plus feed, plus show box and then a friend wants to know if you could possibly take one more small yearling, etc. Before you know it, you realize you should have gotten a bigger truck and possibly a large trailer.

Handling the Cattle

I always load larger animals towards the front. This puts more weight on the drive wheel plus the larger animals have more room because there are no wheel wells to contend with. If you are using a bumper pull, it is best to divide your load more evenly so that all the weight is not on the rear of the tow vehicle. If the animals are from the same herd and used to each other, I tie them with all heads in the same direction. If strange animals or a really feisty animal, I tie head to tail. If I know I have a female in heat and a bull on the same load, I try to put them in separate compartments or at least separate as much as possible. Do not tie them next to each other head to tail and try not to put the female between two bulls. If I know I may have a female coming in heat about the time of travel and I am going to have bulls on the same trip, I sometimes give the female a shot to bring her into heat prior to the trip. I normally use the poly/nylon halters. I also carry and use a homemade nylon halter that is sometimes easier to remove. I have had halters slip off the nose but it usually stays on, held by the horns. So far I have never had one come off and tighten around the neck. I always wear gloves when handling animals. If an animal spooks coming on or off the trailer, rope going through the hands will burn.

Drawing Highlands loose can present a challenge. Try not to put bulls with females, boss cows with smaller animals or two animals you know fight each other. Normally I have found animals won't fight when you are moving but they will fight during lunch breaks, fuel stops, construction delays, etc. Therefore, I try to limit my stops as much as possible. When drawing loose animals, more than a couple, I try not to give them any extra room in a compartment, tighter the better. On long trips, i.e., Denver, CO, I halter and tie all animals leaving enough space for them to lie down as they get tired. For long trips, I usually put down shavings about 2" deep, and then about 12"-15" of straw. The shavings help to soak up the urine and the straw helps to give them a more cushioned ride. I feed twice a day and water 3 times. Most all trucks stops have external waterspouts but I have also carried many pails from a motel bathtub. Always try to get a room on the first floor with an outside entrance, it's easier and you don't get as many funny looks. I stole an idea from EZ Braun and had small doors cut in the side of the trailer so I am normally able to feed and water without getting in the trailer. Of course when the big bull pulls the bucket out of your grip, then you have to carefully get in the trailer and retrieve the bucket. I have never had anyone tamper with the trailer or animals on long trips but I padlock the trailer at night. I don't leave the locks on during the day if the weather is bad because they sometimes freeze.

Sometimes it helps to put a small amount of molasses in the water about a week or two before going on a long trip, then using it during the trip each time you water. The animals have gotten used to the sweet taste and don't notice the different tastes at each stop. I have found animals do not normally eat or drink as much when traveling. Don't panic

when the big bull that normally eats 25 pounds of grain a day and drinks 3 pails of water at each feeding just plays with his water and nibbles at the grain the first day. Basically when they get thirsty they will drink and when they get hungry they will eat. On a long trip your animal can and normally will lose some weight.

Animals will load best through a wide opening, especially Highlands. It is best to load through the entire width of the rear door rather than just the slide door. They are going into a strange environment and using the slide door opening they hit their horns and really don't load as well. This is not to say you can't get them in a small door opening and sometimes circumstances dictate that you use it. When loading loose or haltered animals, I like to take a very slow calm approach. Hollering and shouting only makes the animal more nervous. If loading a group, try to keep them together because once one animal starts in the trailer, usually the rest follow and you want to do that as quickly as possible or the first animals in will start to come back out. If possible, always try to keep all animals headed in the same direction, sometimes easier said than done. I do not like to put feed in the trailer and coax the animals especially if there is more than one animal to load. Most of us know how Highlands are when there is feed around and the first one likes to keep the others out of the way. If loading one animal, you may try to coax it in the trailer with a pail of grain but if loading more than one loose in the same compartment, remember the one in the trailer will want to follow you out with the grain bucket.

Sometimes I put hay or straw on the ground so they don't see the step up into the trailer. If I can, I get close enough to the loading area to use the swinging door on one side and a gate or panel on the other and as the animal(s) enter the trailer, I use the door as a pusher. There is always the possibility the animals will try to come out of the trailer in mass before you can get the door latched so make sure you have a quick and easy escape route. A 1000 pound cow hitting a six foot swinging trailer door can really knock a person end for end. It sometimes helps if the side gate or panel you use is covered with plywood so the animal cannot see daylight, they think they can go through the gate or at least try. Make sure the gate or panel is chained to the trailer or better yet, has a tractor tire against it.

If an animal is at the trailer facing in and does not want to enter, I sometimes give them 1 shot with a prod (feels the same as if they touched an electric fence) and they jump forward into the trailer. All these things also apply to loading haltered animals but remember you are at the front of the animal if it decides to "leap" into the trailer. A trailer gets very small in a hurry with an upset or nervous 1200 pound cow with horns and you vying for the same space. I have loaded non-haltered animals with a lariat around their horns but I either run the rope outside through the side opening or I stand in front of a divider gate. Most animals do not like a rope just around their horns and remember, you have to get the rope off sooner or later.

After loading, make sure all trailer latches are secured. I have been told it is embarrassing to arrive at your location and find the sliding door open and 1 or 2 less animals on the trailer than you started with. The sliding door in the rear will bounce to the open position if not properly latched.

Each vehicle should carry a jack capable of picking up their truck or trailer with a load. Most states require that you carry DOT approved flares and a fire extinguisher. You should have a spare tire for both the trailer and the tow vehicle and the necessary tools to remove the tire. Wheels that are put on with an air wrench are sometimes very hard to get off with muscle power. A light weight 4 way spinner wrench will not always do the job. If your lugs are frozen on and you don't have WD 40 with you, you can use a can of coke or plain old coffee to help free the rust. I carry a socket with a breaker bar plus a 2' piece of pipe to slip over the breaker bar to break the lugs loose and this isn't always sufficient. If nothing works, then you have to call a garage. Voice of experience speaking, don't carry the spare for your trailer in the goose if you have a full load of Highlands.

I carry a 50' and 75' rope that I have used in the rare cases of "wild" animals or sometimes tame animals which are spooked by unfamiliar surroundings at a show or sale. Remember, you still have to have a way to confine the animal before attempting to put the halter on. The long ropes are also sometimes handy for unloading if you can't get the trailer to a barn, corral or wherever the customer wants the animal delivered.

People think that when they are told an animal is halter broken it is easy to lead or load. Not necessarily so since many "halter broke" animals have never been lead or loaded on a trailer. They have been brought in for weaning and a halter has been placed on them for a couple days and then they have been let loose again. If you are handling just your own animals, some of these items may appear to be irrelevant but when you go and buy from someone else, you really never know how an animal will react to strangers. Be very careful when trying to lead an unfamiliar animal. It is sometimes necessary to put a second halter or a collar on so the animal can be "stretched out" between two leaders. Do everything you can to make hauling animals as stress free on yourself and the animals as possible. I am not afraid of handling horned animals but I have a healthy respect for the size of the animals and their horns; everyone should.

If after reading this you think it would be easier to hire someone to move your animals, here are a couple of thoughts I want to share with you. Most cattle haulers do not normally haul Highland cattle so make sure they know what they are going to be loading and have no problem with that. Also, normally truckers haul at the owner's risk. Some of us do carry insurance in case of an accident on the road but if the animal slips on the trailer and injures itself, the trucker may not be willing to pay for the loss of the animal. If you have just spent megabucks for a new herd sire, you may want to look into having him insured under your policy before he is loaded on a truck. All insurance companies are different and don't think that your farm owner's policy will always protect you.

FARM DIRECT MARKETING MEAT

Adapted from 'Direct Marketing Meats'
Alberta Agriculture Food and Rural Development

This article is intended for producers who may be thinking about selling meat products directly to consumers. It is a decision that takes a lot more into consideration than just deciding to sell meat.

- Where and how to sell?
- What regulations will you need to follow?
- How will food and public safety impact your choice of production and processing?
- How do you set a price for your product?
- Do you know what questions to ask a processor to ensure that you and your customers get what you want?

Well presented marketing materials can have a positive effect on sales efforts.

1. Maintaining Product Quality & Consistency

- Maintaining product quality starts with production choices. It does not end until the customer has consumed the meat. To secure a successful business venture, customers' expectations from pasture to plate must be met.

Quality is a pasture to plate issue. The product needs to be nurtured and tended from breed selection to packaging.

Meeting Customers' Expectations

When you plant a crop that promises so many bushels per acre, you expect to harvest at least that much. When you breed a Highland cow with a Highland bull, you expect a Highland calf, not a Holstein. As a producer, you have expectations.

When you direct market meat, you will find that your customers also have expectations. For a fair price, they expect a safe product that represents quality and consistency. As the producer, you are responsible for meeting the customer's expectations.

Safe Products

Supplying a safe product is easy:

- Follow the Beef Quality Assurance guidelines to ensure that stock entering the food chain arrives in the safest condition.
- Deal only with a facility in which you have confidence, someplace you would take your customers.
- Have your customer pick the meat up at the processor. If this is not possible, you must be able to transport it back to your home, while keeping the temperature below 39ºF, if fresh or -4ºF, if frozen. Once at your farm, ensure that these temperatures are maintained. Keep the meat you plan to sell separate from your home-use storage facilities.

- If there is an issue with one of your products, ensure there is a traceback so that you're able to easily identify which animal and which processor was involved in that product.

Quality Products

Customers will want tasty, tender meat. The actions you take contribute to these two leading palatability factors.

- Finish your animals around the same weight range on the same feed, which ensures the steak size and flavor will be consistent.
- If you say 14-days aged, then ensure you're aging for 14 days. This may cost more but satisfied and loyal customers make the extra cost worth it in the long term.
- Discuss your expectations with the processor. Make certain that your animals can be processed in the way you'd like them presented to the customer.
- You may also provide instructions on handling and cooking the product to maintain the quality you have worked to attain.

Keeping Customers

It's easy to make the first sale but much more difficult for subsequent orders if expectations are not met. An unsatisfied customer will not likely buy from you again and may tell at least 20 other people. Customers will also purchase for other production reasons. They may wish a natural or organic solution. If your product falls into such a category, you should be prepared to back up the claim.

Bottom-line, your customers, regardless of their buying criteria, want good value for the money spent. They really are no different than you. Treat them the way you'd like to be treated.

2. Considering Food Safety

- Every year there are deaths due to foodborne illnesses, therefore be sure that all your actions during production, transportation, storage and selling are kept in line with accepted food safety procedures. Regardless of chosen direct marketing channels – farmers' markets, direct from farm gate or farm retailing, keeping food safe is a sure way to keep customers happy, healthy and coming back for more.

Your customers trust that the way you choose to raise, harvest, process and deliver a food product make it 100% safe to consume. They trust that your food safety system is in place so consider all aspects where food safety problems can originate.

Actions Speak Louder than Words

Trust is built on more than verbal assurances of "I eat it"! Your actions will go much further to deliver a safe product; you can also help teach your customer how to deal with the product in a safe manner.

A record-keeping system that outlines the checks in handling the product safely can help you to follow safe product procedures.

Here are some points to consider:

- On-Farm Production:
  1. Use only registered pharmaceuticals and pesticides.
  2. Follow labeled instructions to ensure adequate, observed withdrawal times. This can prevent antibiotic and chemical residues in the animal for those drugs and pesticides. Be sure to document records with dates of drug administration and withdrawal times.
  3. Use common sense!
- Transportation and Storage:
  1. Provide adequate storage space for chilling meat cuts.
  2. Monitor the temperatures of coolers and freezers.
  3. Ensure your retail freezer storage is separate from your domestic use freezer.
  4. Use coolers or freezers for sales and delivery. Document temperatures throughout travel.
  5. Ensure customers are aware of how to transport in a safe manner. Improperly stored products will spoil faster and can cause unpleasant flavors and odors.
  6. Document the type of temperature control the customer is actually using and make a note even if nothing is being used.
- Selling Direct:
  1. Raise awareness of bacteria growth when recommended temperatures aren't followed. Offer coolers or ice at extra cost or notify the customer to buy ice as quickly as possible.
  2. Wear clean clothes, wash hands and clean equipment.
  3. Have hand washing equipment in place when handling meat and meat products.

4. Contact the local health authority to obtain a retail permit and determine what requirements are needed for licensing and operation of a farm direct marketing facility.

By following these simple steps, you will go a long way in ensuring that you're maintaining your customers' – and your business' – health!

3. Regulating Public Health & Safety

- Federal, state and health considerations are built into regulations, which affect the production and processing of meat products. Depending on the facility chosen to process meat, there will be different markets open in which to sell and distribute meat.

Public Health is #1

In order to ensure public health, several regulations are in place for both production and processing of meat intended for public sale. The USDA inspects certain facilities and allows you to sell beef that is processed in these facilities. In certain states there are state inspected facilities from which you can sell meat. There are also processing plants that are not inspected and from which you may not sell meat.

It is important that before you embark on a direct marketing project that you contact your state Department of Agriculture or your county extension agents and learn the requirements for selling beef in your state. Then check with your local packing plants to find out whether you can sell beef processed in their plant.

4. Pricing Your Meat Products

- Choosing a price for new meat product is no easy task. Take market conditions, competition, your costs and processed product into account when setting prices that will help with cost recovery and also provide a profit!

Research

Setting price is one of the most challenging undertakings when developing a new product. A good place to start is to compare prices. This means looking at comparable products to see their prices. To get an idea of the price you can set for your product, you will need to do the following:

- Know what your customers want and will pay.
- Be aware of what other direct marketers are charging.
- Be aware of the regular retail price of those cuts in your market area.
- Ensure you understand the market environment.

Setting prices is a lot of work. You are competing against other seasoned marketers and retailers. Be prepared to work as hard at making a profit as they do.

Determining Your Costs

On-farm production – These costs are the most complex to calculate but they will be the most useful. Costs include: feed, veterinarian, breeding, pasture, utilities, fuel, equipment, buildings, custom work, interest, taxes, insurance and paid labor; same as for any farm enterprise. All these will allow you to better evaluate your alternatives, in addition to looking for ways to improve your overall cost structure. Software tools can be very helpful here but paper and a pencil will work as well.

Harvest and processing – Because these costs are billed directly, they are easier to track. However, do not forget live transportation costs and add the harvest, rendering, cutting, storage and wrapping charges. Because of recent events, rendering charges have increased significantly. Expect these additional charges to be passed back to you and be prepared to pass them on to your customers.

Marketing and storage – These costs will include items such as phone calls, freezer space, electricity and any advertising you may do. Don't forget the cost of picking up the meat from the processor. Also, remember to factor in your time spent driving to the market, manning the sales booth or delivering the product to customers.

Pricing Your Product

Now comes the challenge. After processing, what you have left to sell weighs a lot less than your live animal because the hide is stripped, the animal is eviscerated and the bones are removed. Weight also depends on the breed, the animal's conformation, finishing feed rations and overall health of the animal.

Your processor can provide guidance when addressing all issues from weight to type of cuts. If you do not have specific cutting instructions from a customer, the processor may have some recommendations for standard cuts. Remember: when selecting cuts, you are not the end-customer.

When it comes to setting a final price, you have three different options:

1. Sell per pound based on the whole or portion of the carcass.
2. Sell meat packaged at specified weight and at a specified price.
3. Sell at a price per weight per cut.

Choosing how to sell depends on how you want to run your new business, on your market and competitors. Depending on your decision, you'll be better positioned to determine your price to ensure your costs and interests are covered. Keep records of your meat sales and soon you will be able to project the volume and overall value.

5. Finding and Working with a Meat Processor

- The choice of processor can make a huge difference in the quality, safety and long-term viability of a new meat-based business venture. Choose wisely!

If you're looking to market your beef direct to customers, then the processor is about to become an important part of your business.

Meat processors are entrepreneurs, like you. To work most effectively with you, they need to become your partners. Consider them to be very much like your fuel agent, machinery dealer, crop input supplier or veterinarian, all integrated into your farm production operation.

Finding a Facility

Because it is important to develop a working relationship with the processor, plan to visit more than one facility. Meet the people working and managing the business. Ask yourself if you would be happy to show the facility to your customers. When you're there, remember that a lot of them have an existing clientele, some may even process their own products. They will consider your business only if they can fit it in or if they see an opportunity for a good, long-term client.

A long-term relationship will benefit both you and the processor. It assures the processor of a new client and assures your customers that they are receiving a high quality, consistent product, which contributes to success of your new business venture.

What to Ask?

Before visiting the processor, develop a list of questions you want to ask. Some of your questions may center on various costs but don't forget to ask about:

- Aging
- Packaging
- Cutting
- Labeling
- Timing to book animals
- Other options: boxing and/or delivery

Be prepared for some questions in return. The processor may ask you:

- About the type and number of animals to be processed
- Product aging
- Types of cuts
- Financial credibility

If your freezer is starting to get low, have the potential processor fabricate one of your animals for your home use. Ask yourself some questions. Are you getting the cuts you asked for? Is the fat trim satisfactory? Do you like the packaging and labeling? Is the quality of the cutting consistent? Would you buy this product?

Making it Work

Once you have selected a processor, be sure to clearly outline your needs and ask them for theirs. Ask how you can make it easier for them to do business with you. Both of you are looking for a win-win situation. Your win is getting the animals processed in the manner you need. There is a considerable difference in price between a custom order and getting an order custom processed for retail sale. This may cost you more but remember, you are not the customer, your client is. The processor's win may be more volume in their business but it might also be timing of the business. The bottom line is that you each want to be more profitable because of your business relationship.

6. Final Checklist

Farm Direct Marketing Meats – Readiness Checklist

After reading through the information series, you should have an understanding of the aspects involved in starting to sell meat directly to customers.

Ask Yourself:

- Are you ready to make a long-term commitment to farm direct marketing?
- Do you know what your customers expect? Can you meet these expectations?
- Have you considered all that it takes to make a product safe? From pasture to plate?
- Have you arranged for safe transport or pick up of your meat product?
- Do you feel comfortable with the processing facility you've chosen? Would you like your customers to see the facility?
- Have you ensured that all your products are equally tasty and tender?
- If you've made certain claims about your products, can you back them up?
- Are you prepared to incur higher costs to ensure a quality product?
- Have you taken all precautions required to maintain food safety? Are these steps documented?
- Have you considered all regulations that affect the level of facility you've chosen?
- Have you obtained the correct licenses to sell meat in the manner of your choice?
- Do you know what all your competitors are charging?
- Do you know what your customers are willing to pay for your product?
- Do you know your costs? On-farm production? Harvest & processing? Marketing & storage?
- Have you identified the kind of strategy you'd like to use in your business? What does this strategy mean for pricing?
- Are you ready to take on a long-term working relationship with your processing facility?
- Do you know what to ask a processor? Are you ready to answer his or her questions?

You should be able to answer "yes" and add details around each of these questions. Be sure that you've taken the time to understand the impact of entering this new venture. It is a big commitment and there is a lot to think about. Do not consider farm direct marketing meat lightly.

A Highland steer ready for market.

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Bill & Terri Springer
Springtime Hill Farm
Mill Run, PA

Wayne Stark
Lost River Highlands
Grygla, MN

Larry Stenner
Dodgeville, WI

Randy & Michelle Sweem
Sweem's Highlands
Tacoma, WA

Stephen & Joyce Tillotson
Thistle & Rose Farm
Woodbury, TN

Joe & Maureen Vaillancourt
Thorbardin Ranch LLC
Buffalo, WY

Cameron & Paula Van Buskirk
Post Oak Ranch
Ada, OK

Johannes Von Trapp
Trapp Family Lodge
Stowe, VT

Jim & Mary Lou Wagner
Wagner Highland Farm
Clarendon, PA

Carroll & Nina Wainwright
Corral Creek Ranch
Lima, MT

Gerard & Constance Wanechek
The Highland Cattle Company
Ellensburg, WA

Daniel Weber
Pine Lake Farms
Cincinnati, OH

Jim & Lorri Welch
Owl Rock Farm
Colchester, VT

Steve & Pam Williams
Glas Deffryn Ranch
Oak Creek, CO

Pat White & Larry Alber
LEA-White Farms
Charlotte, MI

William Wright
Wright Way Ranch
Bealeton, VA

Larry Wyles
Winding Creeks Farm
Lebanon, PA

Larry & Pat Zea
Zealand Farms
Blackduck, MN

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