

HEIFER DEVELOPMENT

Lesson 2

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Prior to Weaning

SIRE SELECTION: Most of the improvement in a cow herd will come not from direct selection for replacement heifers, but from selection for their sires. The typical traits such as birth weight, growth, and structural correctness continue to be important. However, another trait that has been found to be important is scrotal circumference of the bull. Research studies have found a favorable correlation (.71) between sire scrotal circumference and sibling heifer age at puberty. In another words, as sire scrotal circumference increases, sibling age at puberty decreases. A rough estimate is that one centimeter increase in testicular circumference will give you approximately four to five days earlier age of puberty. The variation of one centimeter increase in testicular circumference on reduction in age at puberty has been from 0.75 to 10 days. The variation is probably due to environmental effects such as nutrition and weather.

Heritability estimates for female reproductive traits are generally low, while heritability estimates of testicular traits are moderate to high. Table 4 shows a further association of scrotal circumference with other reproductive traits in heifers and cows:

Table 4. Correlation of Female Reproductive Traits with Sire Scrotal Circumference

Trait	Correlation with Scrotal Circumference
Age at first conception as yearling heifers	.69
Heifer pregnancy rate	.64
Calving interval	.12

In summary, selection for bull scrotal circumference may improve a number of female reproductive traits.

Colostrum Quality: Colostrum is the most important meal a calf will ever have. Colostrum is referred to as “first milk”, but this is actually much more similar to blood than milk. Colostrum contains 22 percent solids, compared to 12 percent solids in normal whole cow's milk. Besides being very high in immunoglobulins (Ig) for disease and infection prevention, it is a source of energy, vitamins, white blood cells and growth factors.

A calf's immune system is not fully developed at birth. The immunity a calf attains by consuming colostrum is called passive immunity. Passive immunity is that which is received *passively* from an outside source; conversely. The calf must rely on colostrum from the cow until its own *active* immune system is totally functional (about 1 to 2 months of age).

Timing of Colostrum

For colostrum to be most effective, the calf should receive 1 quart within six hours after birth and a total of 2 to 3 quarts within 12 hours of birth. After this time the gut, specifically the intestines, begins to "close" and it becomes more difficult for the calf to absorb the antibodies found in the colostrum. Calves that fail to achieve the benefits of this first meal are considered to have Failure of Passive Transfer (FPT). A correlation exists between the incidence of FPT and calf illness and death. Attainment of adequate passive immunity is often associated with blood IgG concentrations ≥ 10 g/L at 24 h of age. The incidence of calf death is increased when blood Ig levels fall below this threshold. A healthy calf which has access to liquid feed or has consumed colostrum will undergo complete gut closure by about 24 hours of age.

Quality and Quantity

Cows on a higher plane of nutrition produce more colostrum than cows on a low plane of nutrition. If cows are in adequate body condition score (BCS) prior to calving, quality of colostrum is generally not a problem. Heifers should be in BCS 6.5 – 7.0 and cows in BCS 5.5 – 6.0 precalving. Mature cows produce more colostrums than heifers. Quality can be assessed with commercial test kits available through your veterinarian or with use of a colostrometer

Deciding to use Supplemental Colostrum

Calves should be seen to be up and nursing within two hours of birth. To decide whether or not to hand-feed colostrum to a newborn beef calf, ask yourself the following questions:

- 1) Is the calf too weak to suckle soon after birth?
- 2) Has the cow abandoned the calf or refused the calf access to suckle?
- 3) Has the calf experienced a difficult birth or been exposed to bad weather that might interfere with its ability to suckle?

If you answer yes to any of these questions, you may wish to supplemental. Under extensive grazing situations, administer at least a single fluid feeding so that the calf is handled at least once. In this case, it is important to use an esophageal feeder.

The esophageal feeder is a long, narrow, rigid tube, which is inserted down the esophagus. A bottle or bag attached to the other end of the tube. The use of an esophageal feeder has been associated with a slight decrease in the efficiency of Ig absorption but it provides a quick and simple method for ensuring delivery of Ig to newborn calves.

How much colostrum does a calf need?

As a general rule of thumb, a calf should receive 5 to 6 percent of its body weight as colostrum within the first six hours of life. That same amount should be fed again when the calf is about 12 hours old. Colostrum weighs approximately 8 pounds per gallon. For an 80-pound calf, this equates to approximately 2 quarts (4 pounds) of colostrum per feeding. A way to remember the volume/time equation is 2 x 6 and 4 x 12. In a calf under

75#, give 2 – 3 quarts and for calves over 75#, give 3 – 4 quarts soon after birth.

Handling and storing colostrum

For optimum results, colostrum should be collected from cows within 24 hours of calving and fed fresh. Colostrum can be collected at calving, stored frozen for up to a year. Ways to collect colostrums is to: (1) milk out a cow that loses her calf for non-disease reasons or (2) take a small amount of colostrum (about a pint) from numerous cows that have a more than adequate supply of colostrums.

Colostrum should be frozen in pints or quarts for easy thawing. Colostrum can be stored in sealable bags. Colostrum should not be thawed and refrozen.

Ideally, colostrum is thawed in warm water not in the microwave. Correct thawing is important to prevent colostrum from being damaged. Colostrum should be thawed slowly.

- 1) Place frozen colostrum and its container in a bath of warm water (110°F) and stir every 5 minutes. Add more hot water to the bath as the frozen colostrum cools the water. The colostrum should be warmed to 102 to 110°F. Do not thaw by running hot tap water over the container. Thawing time will vary depending on container size.
- 2) Thaw colostrum in a microwave oven. Set the oven at no more than 60 percent power for gentle thawing. Agitate or stir the colostrum frequently to assure even thawing and warming. This is important since many microwaves do not heat material evenly. Warm the colostrum to 104°F.

Commercial Colostrum

A number of commercial products that act as colostrum substitutes are available. Research studies with these products conducted at universities indicate that calves that received these products were healthier than those that received no colostrum at all; however, they did not receive the level of protection they would if fed frozen, stored colostrum. Look for products that have a minimum of 60 grams of IgG per liter.

Biosecurity

If you obtain colostrum from another farm, you could be at a risk of obtaining a new disease for your farm. Johne's disease (pronounced "yo-knees", Myobacterium paratuberculosis) can be spread to your herd through infected colostrum. If you are using colostrum from another cow as a supplement, be sure the cow from which you get it is free of Johne's disease. A national study of US dairies, Dairy NAHMS 96, found that approximately 22 percent of US dairy farms have at least 10% of the herd infected with Johne's disease.

Summary

Calves that do not ingest enough high quality colostrum soon after birth are 3 times more likely to get sick and 5 times more likely to die later in life as compared to calves that

receive adequate colostrum. If colostrum availability is limited, use a bovine-serum based commercial supplement either to fortify an existing colostrum source or to replace colostrum when none is available.

Properly developed beef heifers that are in good (BCS = 6) body condition at calving produce more colostrum. If they are bred to "calving-ease" bulls, they should have reduced calving difficulty and their calves should have less acidosis than heifers that go through a long, difficult delivery. Assisting heifers with calving problems within one hour of the beginning of stage 2 of labor will also give the calf a better chance of being able to stand, nurse, and absorb an "adequate" amount of the antibodies.

IMPLANTS: Because of the potential negative effect implants have on fertility, producers should check on prior implanting status when buying replacement heifers. Most replacement heifers come from calves born early in the calving period. Heifers should not be implanted at birth or within the first month of birth. Implanting at two to three months of age appears to have very little adverse effect on subsequent reproductive performance. Use of multiple implants (once at two to three months of age and again at weaning) appears to have some negative impact on subsequent reproductive performance. Consideration should be given to implanting only the late-born heifer calves as a compromise to take advantage of increased weaning weights at market. Implanting once will have little effect on subsequent reproductive performance.

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