Beef Logic

by R.A. "Bob" Long

Calving difficulty

Dystocia, or calving difficulty, is a serious problem. Dead calves are a financial disaster. Cesarean sections are expensive. Herdsman's assistance at calving involves time, labor and inconvenience.

Calves that survive a difficult birth are much more likely to die during the critical first two or three weeks after birth. Cows and heifers that experience problems at calving are slow to rebreed.

It is no wonder why cattlemen are concerned about the problem.

Among the many factors that contribute to calving problems are birth weight, shape of the calf, age of the heifer at first calving, plane of nutrition, and the cow's pelvic size and shape. These factors make for a complex problem, and attention to any single item is not a solution.

Birth weight

Size of calf as measured by weight is always listed as the most important item contributing to a difficult birth. However, birth weights are the result of the total effect of genetics and environment. Therefore, selection on the basis of individual birth weights is not indicated.

Cattlemen frequently remark, "I would never use a bull whose own birth weight was more than 80 pounds." This is an overly simplistic statement, and it certainly is not a solution to the problem.

A far better predictor of the birth weight of a bull's calves would be his expected progeny difference (EPD) for birth weight. The EPD is calculated from birth weight data of a large number of close relatives. Birth weight EPD is well-established as a better measure of genetic potential than a bull's own birth weight.

For example, a chance effect of weather or management can shorten or lengthen the gestation period of a cow by four or five days or more and can result in sizable differences in birth weight that are not due to genetics. There should be no hesitation in using a bull with an excessive birth weight if the EPD for birth weight is reasonable.

Even with great accuracy, a low EPD for birth weight is not a guarantee for herd or breed improvement. A fetus's rate of growth during development is a reflection of the calf's genetic potential for growth after birth.

This fact explains the positive correlation between birth weight and rate of growth or yearling weight. It also explains why selection for low birth weights usually results in reduced growth rate. It is a rare occurrence to find a bull with a low EPD for birth weight and a high EPD for yearling weight.

Unfortunately, when it does occur, the bull and his offspring usually exhibit undesirable composition by being light-muscled and excessively fat. Further, the fact that a bull with a low birth weight EPD sires calves that are born easily does not guarantee that his daughters will calve easily.

Shape of calf

Baby calves, like all cattle, are composed of three major tissues — bone, muscle and fat. Calves are born with little fat. Therefore, the only variables are bone and muscle.

Bone makes up the frame or skeleton. There are sizable differences among newborn calves in both length and thickness of bones. However, because of the softness of the cartilage that holds the skeleton together and the angle of the bones in a normal birth position, the size of the skeleton usually is not a problem.

Muscle development, however, can be a major cause of trouble. For example, two calves of identical frame size but with a different degree of muscling can easily vary 20 or 30 pounds (lb.) in weight. Heavily muscled calves are not only heavier but are thicker bodied and can cause trouble in the pelvic canal.

The heavily muscled calf is desirable from the standpoint of carcass potential, but the danger at birth is a conflict of interest.

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PHOTOS BY SHAUNA ROSE HERMEL

Because of the softness of the cartilage that holds the skeleton together and the angle of the bones in a normal birth position, the size of the skeleton usually is not a problem during parturition. Muscle development, however, can vary and may cause calving trouble.

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Maternal instinct is often taken for granted, yet a close examination finds this behavior quite amazing.

Therefore, selection must be for an optimum degree of muscling.

Degree of muscling is a highly heritable trait, and this trait must be considered in herd-bull selection, particularly if the bull is to be used on first-calf heifers.

Age at first calving

Age at first calving is a decision that must be made in every herd-management program. It is widely believed that heifers bred to calve on or near their second birthday produce more weaned-calf weight during their productive life than those first calving as 3-year-olds. This is true only if the feeding program supporting the 2-year-olds allows them to grow and to develop adequately before breeding, during gestation and particularly after calving.

Even though heifers receive adequate nutrition, they will experience more trouble birthing a first calf than thereafter. Analysis of records reveals that 2-year-old heifers have reached only 75% of their mature size. However, a 2-year-old's calf will weigh 90% of the weight of a calf produced after she matures if bred to the same bull. Simply stated: A heifer produces a calf that is a greater percentage of her body weight than she will produce as a mature cow, and this spells trouble (see table).

Comparison of calf weight as a percentage of the dam's weight for heifers vs. mature cows

	2-year-old heifer	Mature cow
Weight (wt.)	900 lb.	1,200 lb.
% of mature wt.	75%	100%
Wt. of calf	72 lb.	80 lb.
% of dam's wt.	8.0%	6.6%

Pelvic size

Most calving difficulty occurs when the calf is larger than the birth canal or pelvic opening. This has led to attention to pelvic size as a selection and culling criterion in both seedstock and commercial herds.

Research in this area universally has found the pelvic size of a heifer is more highly correlated with the size of the heifer than with any other factor. That a big heifer has a big pelvic opening should be no surprise in view of the fact that skeletons grow proportionately, and the pelvis is a part of the skeleton. However, the fact that a big heifer has a big pelvic area is no guarantee that she will have a calf without difficulty.

As both heifers and cows approach calving, the body undergoes profound changes. A major change is in the pelvic region. The pelvis or pelvic girdle, which forms the birth canal, partially surrounds the sacral region of the spinal column. However, there is no bone-to-bone connection. The pelvis is attached to the sacrum by ligaments (sacroiliac and sacrosciatic).

During the three or four weeks before calving, extensive changes in hormone secretion occur, and a hormone called *relaxin* is produced. This hormone causes the sacroiliac and sacrosciatic ligaments to relax, resulting in an increase in the vertical dimension of the pelvis.

The amount of relaxin produced (as in the case of other hormones, such as growth hormone) is genetically controlled. Some females produce more relaxin than others. This results in a greater increase in size of the birth canal in some cattle. In view of these facts, it is easy to understand why the size of the pelvis in a 12-month-old heifer is not a good measure of her pelvic size when she calves a year later.

Bulls have a somewhat smaller and differently shaped pelvis than do females. However, recent research has shown a positive correlation between pelvic size in bulls and that of their daughters. This has led to a recommendation to use the pelvic size of yearling bulls to indicate easy calving in their daughters.

Keep in mind that skeletons grow proportionately, so large yearling bulls have larger pelvic areas than smaller bulls. Further, large yearlings grow faster than small yearlings, and growth rate is highly heritable. So the daughters of big bulls are bigger than the daughters of smaller bulls and also have a larger pelvis. No surprise — but not a guarantee of easy calving.

The angle of the pelvis also has been suggested as a method of predicting calving ease. A few years ago, a gentleman from Africa, whose experience was largely with *Bos indicus* cattle (Zebu influence), gave a series of lectures in the United States. He stated that cows must slope from hooks to pins in order to be easy calvers.

It is true that *Bos indicus* cattle (Brahman) have sloping rumps and are easy calvers. But it is also true that Jersey cattle are level-rumped and are easy calvers.

Actually, when any cow lies down to calve, she pulls up her hind legs. This tilts her pelvis so that she slopes in her rump. The sloping rump is simply a matter of posture.

Calving season

Calving season has a major effect upon calving difficulty, primarily as it affects birth weight. Records reveal that calves born in the fall are considerably smaller than calves of similar matings born in the spring.

A logical explanation for the smaller size of fall-born calves is the fact that the latter portion of the gestation period is in the heat of summer. The high environmental temperature causes vasodilation (increased blood supply) at the body surface to increase heat loss. This reduces the blood supply to the fetus, which may reduce its growth rate.

Conversely, the spring-born calf is carried in cold weather, and the resulting vasoconstriction increases blood supply to the developing calf.

Geographic location

When genetically similar cows and heifers are mated to the same bull in different parts of the nation, wide differences in birth weight occur. Birth weights increase as cattle are moved north, west or to higher altitudes.

For example, a group of half sisters bred to the same bull in Florida were randomly divided, and one group at four months of gestation was moved to the Texas Panhandle. Birth weights in Texas were approximately 10% heavier than those of the heifers remaining in Florida. Similar differences were reported by U.S. Department of Agriculture (USDA) researchers who moved cattle from Florida to Montana and vice versa.

The combined effects of calving season and geographic location can bring about erroneous progeny-test results. A bull tested in the Southeast in a fall-calving program will sire calves with much lower birth weights than the spring calves he would have sired in another part of the country. This is another example of why the actual birth weight of a bull or those of his calves are not dependable as a genetic measure.

Fortunately, EPDs calculated from records collected nationwide and tied

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together by reference sires eliminate these environmental effects. As stated previously, EPDs for birth weight are much more accurate than individual birth weights in evaluating genetic potential for this trait.

Sex of calf

It is well established that bull calves are heavier at birth than heifers. This increase in size or weight is simply a reflection of the bull calf's growth potential after birth. Among cattle of similar genetic background, bulls grow faster and are larger at maturity than females.

Since there is no practical way to control sex of the calf at this time, it is a problem that must be tolerated. Remember that selection for low birth weight is selection against rapid growth.

Plane of nutrition

Unfortunately, some ranchers believe that reducing feed intake for pregnant females during the latter part of gestation will reduce the size of the calf and thereby decrease calving trouble.

Heifers that are undernourished will produce calves with slightly lower birth weights than heifers that have been fed well. However, the smaller size of the heifers resulting from inadequate nutrition can cause more problems, not fewer. In the case of mature cows, plane of nutrition has practically no effect on the birth weight of their calves.

Nutrition can be overdone, of course, and females on extremely high levels of energy can become too fat. The resulting fat deposits in the birth canal can be a problem. More often than not, too little feed is the real enemy. Use the feeding standards that have been established based on age, size and milking ability, and cull the females that can't get the job done.

The will to calve

The "will to calve" is a variable in the behavior of pregnant females at calving time. Lack of effort at time of parturition is observed most often in first-calf heifers.

Some heifers will work hard and persistently to give birth (usually with success), while others will strain a few times and quit trying. Failure to work hard at birthing a calf is a heritable trait as evidenced by the fact that a majority of the daughters of one bull will display this fault while the daughters of another bull used in the same herd will keep trying until a calf is delivered. The bull whose daughters exhibit this faulty behavior must be culled.

Maternal instinct

Maternal instinct is a characteristic of females that is often taken for granted, yet a close examination finds this behavior quite amazing. A newborn heifer calf can be removed from the mother at birth and kept in complete isolation from other cattle. When this calf matures sexually, she can be artificially inseminated, conceive and — after a normal gestation period — lie down and give birth. She will then get up, claim the offspring, clean it off, get it up, allow it to nurse, stay with it and protect it.

The complexity and subtlety of the hormone interactions that control this behavior are mind-boggling. A well-developed maternal instinct is an important asset in a breeding herd. Nothing is more discouraging to a herdsman than to have a cow give birth to a live calf and refuse to claim it. The extra time and labor required to pen such a cow with her calf (which she may kill or injure) and force her to allow the calf to nurse for three or four days is intolerable. Even then, she may not claim it. Also, in severe weather (either hot or cold), if an unattended cow fails to claim and care for her newborn, a dead calf is the result.

Abnormal presentation

Instead of the typical upright head extended over the forelegs, a calf may have its head turned back, or one or both forelegs back. A backward presentation — hind legs first — may occur, possibly with one or both (breech) hind legs back.

These conditions make birth impossible, so the calf must be pushed back through the pelvis and the position corrected. There have been a few reports that such abnormal presentations are hereditary, but a genetic effect has not been substantiated. Since this condition occurs infrequently, it is probably a chance happening and of little concern in selection programs.

Sire of calf

The industry has tended to oversimplify the solution to calving trouble by a never-ending search for "heifer bulls." Such bulls are defined as small in size, light muscled and with low birth weights. Each of these three traits is in conflict with efficient beef production.

Why search for bulls that sire calves that any cow can deliver without difficulty, knowing the calves will be of little value? It is more appropriate to use bulls whose daughters can deliver a big, strong calf that will grow rapidly and produce a desirable carcass.

There are many factors involved in determining whether or not a cow calves successfully without assistance. Therefore, selection for any single trait involved in calving ease will not solve the problem. The important measure is simply whether or not a female produces the right kind of calf without assistance.

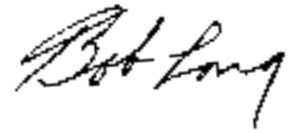
The American Angus Association has a meaningful database on calving ease. The Angus performance pedigree lists individual birth weight, birth weight EPD and calving-ease score. The pedigree also includes a bull's progeny and the progeny of both paternal and maternal grandsires.

A. Number of herds represented
B. Total number of progeny
C. Average calving-ease score (1 to 5)
   1 = No assistance
   2 = Some assistance
   3 = Mechanical assistance
   4 = Cesarean section
   5 = Abnormal presentation

The big picture

Summarizing the dystocia problem, purebred breeders should treat cattle uniformly and under a nutritional and management program typical of the commercial herds in their respective areas.

Seedstock producers should require replacement heifers, when bred to herdmates, to calve as 2-year-olds without assistance. The steer calves resulting should have the genetic potential to weigh 1,200 lb. at 13 or 14 months of age and to produce a USDA Choice, Yield Grade (YG) 2.0 carcass.



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