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Robert G. Mortimer

Colorado State University, Fort Collins, Colorado

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Calving Difficulty

Robert G. Mortimer, MS, DVM
Department of Clinical Sciences
Colorado State University, Fort Collins, Colorado

INTRODUCTION

The recognition of abnormal calving (dystocia) comes **FIRST** from a basic understanding of normal calving. From this understanding, the establishment of guidelines for observation of cattle and for intervention will reduce calf losses. In Colorado, as part of a pilot program of the National Animal Health Monitoring System (NAHMS), two-thirds of the costs of disease losses were associated with death loss. From a subset of 73 of the 86 NAHMS herds in studied in 1986-87 in 24,396 births, 4.5% of the calves were lost. Of the 4.5% losses, 34% were attributed to dystocia related losses. In addition, losses attributed to diarrhea, pneumonia, or cold may have been a consequence of the increased risks associated with dystocia. On most operations this is a very effective area where personnel training in obstetrical management will have a large beneficial impact. Most large operations have a labor turnover and small operations sometimes don't see enough problems to feel comfortable handling them. Thus, this training should be an ongoing part of the management program.

UNDERSTANDING THE BASICS OF NORMAL CALVING

Biological Process

Calving is a complex process. Many mechanisms affect the process but none completely control it. As the fetus matures and the uterus enlarges, the capacity of the placenta to respond to additional demands of the fetus may be surpassed. The placenta may begin to function less efficiently due to limiting morphologic changes which occur during the latter part of pregnancy. These or other undefined stimuli cause a fetal stress reaction. In cattle, this results in an increased production of glucocorticoids such as cortisol and steroid precursors to estrogens from the fetal hypothalamo-pituitary-adrenal systems. These steroids in turn enable the fetoplacental unit to produce estrogens and prostaglandins. Endometrial glands in the uterus may also produce prostaglandins. Concurrently, production of progesterone is decreased, probably at least in part due to the luteolytic effect of the prostaglandins on the corpus luteum of the ovary. The estrogens and prostaglandins in turn stimulate maternal release of oxytocin, sensitize the uterus to the effects of oxytocin, and cause the cervix to dilate. The uterus is thus released from inhibition by progesterone and made sensitive to the stimulatory effects of prostaglandins and oxytocin, and to stimulation mediated through the autonomic nervous system. Uterine muscles, which have increased contractility in late pregnancy due to stretching, begin to contract regularly as the cervix dilates. When the cervix is dilated, fetal parts are forced into the birth canal. These produce point pressure in the vagina, further stimulating release of oxytocin and initiating the abdominal press. The process appears to have a cascade effect and is irreversible. The fetus must be delivered or death of either the fetus and/or the dam or both are likely to occur.

PREMONITORY SIGNS OF LABOR

From the practical viewpoint, **the time sequences involved in calving are more important than the biological mechanisms.** Prediction of time of calving would be of value under certain conditions, but it is difficult to predict time precisely on the basis of clinical signs. Criteria that have been used in attempts to identify the onset of labor in cattle include changes in body temperature, respiration and heart rates, "springing" or relaxation and enlargement of the vulva, udder changes including enlargement, tenseness and filling of the teats, changes in quantity and viscosity of vaginal secretions, relaxation of the sacro-sciatic ligaments, and dilation of the cervix. Two criteria, relaxation of the sacro-sciatic ligaments and cervical dilation, are more reliable but difficult to apply on a practical basis for beef operators. Relaxation of the sacro-sciatic ligaments can be palpated best by inserting one hand into the rectum and placing the other on the caudal border of the ligament from the outside. Displacement of the ligament can be estimated when pressure is placed against it from the inside. Several days before term, the ligament can be displaced up to 2.5 cm (1 inch). This relaxation should not be confused with the progressive relaxation that occurs just before calving, allowing displacement of the ligaments 5 cm (2 inches) or more. Successive palpations will help define this stage, which indicates that calving will usually occur within 24 hours.

Dilation of the cervix begins shortly before calving. It is usually closed prior to calving, although up to four fingers can be inserted part way in some cows. Normal dilation preceding calving can be identified by a progressive, conical dilation of the cervical canal with the apex of the cone toward the internal os. When uterine contractions begin, mechanical forces are applied to the internal os and enlargement of the cervical canal proceeds throughout its length. Once cervical dilation is initiated, calving usually occurs within 24 hours, sometimes in as little as 6 hours in multigravida. Cervical dilation is very rapid in most cows after it has opened enough to allow passage of the hand.

Mechanical Aspects of Normal Calving

Normal calving is a continuous process but is often divided into three stages for the purposes of description. These stages are arbitrary but fairly well defined. They are: **Stage 1**, cervical dilation; **Stage 2**, fetal expulsion; and **Stage 3**, expulsion of fetal membranes. They usually follow one another in the sequence given, but sometimes, when dystocia is present, fetal membranes are expelled or at least freed from their maternal attachments before a dead fetus is delivered. Dystocia occurs when any stages is slow developing or fails to progress normally.

Stage 1. Stage 1 begins when the longitudinal and circular fibers of the uterus start to contract and ends when the cervix is dilated and fetal parts enter the birth canal. Visible signs of labor are scanty or absent in stage 1. The pastured cow will usually seek an isolated place and vaginal discharges increase in liquefaction and expulsion of the cervical plug. Occasionally, signs of colic are evident, especially in heifers. Restlessness and a tendency to lie down and get up frequently are also often observed. In ruminants, **duration of stage 1 is 2-6 hours**; sometimes longer in heifers. If you really suspect a heifer is in stage 1 but does not progress into Stage 2, **intervention at no latter than 8 hours in stage 1 is recommended.** Certain abnormal deliveries

are characterized by a failure to go into stage 2 and the calf may be dead before detected so some caution is advocated.

Stage 2. Second stage labor begins when fetal parts enter the birth canal and stimulate the abdominal press. The chorioallantoic sac is usually ruptured early and the unbroken amniotic sac (water sac) is often forced through the vulva after the cow has been in labor a short time. **In cattle, delivery should be completed within two hours after the water sac appears at the vulva.** The feet of the fetus are forced through the amniotic sac either just before or after it comes to the vulva.

At this point it is appropriate to introduce the terms of **presentation, position, and posture** of the fetus during a normal delivery. Presentation refers to whether the calf is coming front-wards, backwards, or transverse. The most frequent presentation of the fetus is front-wards although a backwards presentation may occur and can be considered normal in some instances. Nevertheless the presentation of a backwards calf should signal intervention in most instances. All other presentations are considered abnormal. Position refers to whether the calf is right-side up or upside-down with only right-side up being considered normal. Posture refers to the relationship of the legs and head to own body. In a front-wards presentation both front legs and the head should be presented to be considered normal. In backwards both hind limbs should be presented.

During stage 1, uterine contractions first occur about every 15 minutes but by the beginning of stage 2 they occur about every 3-5 minutes. When point pressure is applied to the birth canal by fetal parts, its uterine contractions are accompanied by the abdominal press. The press is exerted more frequently as labor progresses until it occurs every 1-3 minutes. A series of frequent presses followed by a short period of rest is characteristic of this stage of labor. The greatest frequency and force occur when the fetal head is being forced through the vulva. Following delivery of the head a short period of rest may occur. Strong expulsive efforts are required again to force the chest of the calf through the birth canal. Sometimes the cow will stop straining for a short time following delivery of the chest, allowing the rear legs to rest in the birth canal. At this point, usually the umbilical cord may be compressed shutting off the oxygen supply to the calf from the dam. It is not unusual to observe the calf establishing its own breathing at this point. Delivery of the hips and legs is usually uneventful, occurring soon after the chest passes through the vulva. Second stage labor lasts from .5 to 4 hours in the cow but intervention guidelines suggest assistance a not over 2 hours and in some instances early if it is progressing abnormally.

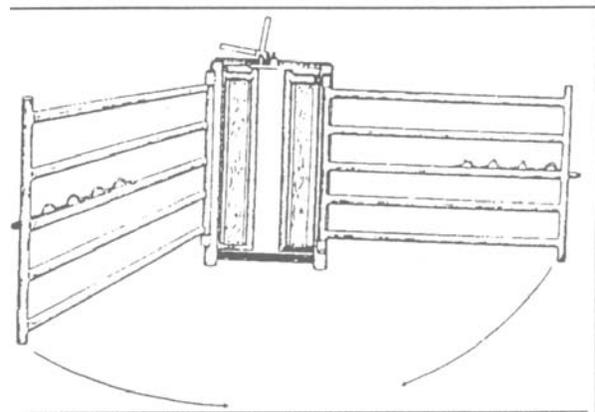
Stage 3. The placenta is usually expelled within 8-12 hours after delivery of the fetus. If they are retained, treatment may be indicated. In no instances, however, is manual removal of the fetal membranes advocated as this has been demonstrated to be detrimental to subsequent reproductive performance.

RECOGNIZING AND HANDLING DYSTOCIA (ABNORMAL CALVING)

Physical Facilities and Equipment for Handling Dystocia

The design of the physical facilities should allow easy entry of animals and minimize the stress of handling and restraint during assistance. Preference on most operations, unless on very small herd size, is to have a separate delivery and post-delivery areas. This is advocated from both the physical handling of the delivery and the potential for build-up of disease producing organisms. For the calf, dam, and attendant providing assistance, protection from the elements is the most desirable. Being dry and warm will go a long way in encouraging the use of proper techniques in dystocia management. The delivery area (18 sq. ft) should have a straight-sided head catch with side gates that are hinged on each side of the head catch to swing freely to either side with sufficient room to the sides and rear to allow assistance with the needed personnel or fetal extractor (Figure 1). This allows the cow to go down and not be choked in the process.

Figure 1. Illustration of Head Catch and Swinging Gates for Handling Cows When Providing Assistance During Calving



Handling dystocia in squeeze chutes is to be avoided. A cement floor is recommended for cleaning purposes with access to both hot and cold water preferred. This may seem like a luxury, but may make the difference in optimizing calf survival.

Obstetrical chains are preferred to rope when traction is required because they are more easily sanitized. Also handles are available which attach anywhere along the chains and make traction easier to apply. Nylon web obstetrical straps are available. These may be less traumatic to the fetus but must be sanitized very carefully between deliveries. Fetal extractors are an essential component of the calving shed but are a dangerous item of equipment if misused. More important than the equipment used is the amount of traction placed on the calf during the delivery process. Two strong men can exert a force of from 400-600 pounds per square inch while a fetal extractor can get over 2000 pounds per square inch. Thus, clinical judgement is important and necessary.

Guidelines for Observation and Intervention

This training starts with the establishment of guidelines of both the observation of calving animals and for intervention in the calving process. This should include a thorough discussion of the stages of labor and their relationship to calf losses. These guidelines need to be established to fit within the economic restraints of the individual ranch and biological efficiency of the cow herd. An understanding of the rationale behind these guidelines for all personnel who may be involved in the calving crew is essential. Full-time cow/calf operations usually can provide almost full-time observation of their heifers but may fall short of adequate in mature cows. Some of the guidelines

recommended are:

- Minimum observation of every **three** hours.
- Once a cow/heifer is in **stage 2** of calving to **observe more closely** until calf is delivered.
- Intervention** may be necessary if:
 - in **stage 1 over 6-8 hours**.
 - in **stage 2 over 2 hours** if not trying
 - or **if trying for over 30 min** and making no progress
 - Heifer/cow has **quit trying for over a 15-20 min.** period.
 - Heifer or cow **has not passed membranes within 12 hours** of calving.

These specific guidelines for intervention in protracted labor will be adequate in most instances. However, the stockman should realize that **interruption of normal progress of labor at any stage or time is sufficient for intervention.**

Handling of Common Dystocia Problems

Once observation had determined intervention is necessary, the cow and assistant should be cleaned to minimize contamination of the uterus from the procedures. Then, the presentation, position, and posture of the fetus should be assessed and a determination made as to whether it can be handled within the capabilities of the assistant. Luckily, the handling of most dystocia problems is within the capabilities of the stockman. If assistance is to be provided it is essential that the assistant have a thorough understanding of the amount of traction, direction of pull, and limitations of assistance in the delivery process. **If not, more qualified help should be sought immediately.** The methods presented in the following paragraphs are for the Utrecht method of handling dystocia.

Oversized fetus. The most common cause of dystocia is oversized fetus. The major question here is if the calf is deliverable or not. Chains should be placed either around the pastern area of the legs or above the fetlock and a half-hitch take below the fetlock. Traction should only be applied when the cow is assisting with an abdominal press.

Tests for delivery have been established for calves in frontwards and backwards presentations. In the frontwards presentation with normal position and posture of the fetus, this guideline is determined by passage of the shoulders of the calf through the pelvis of the cow. To actually determine this, the cow should be down, on her right side and traction should be applied to one leg at a time (unilateral traction) to walk the shoulders through the pelvis of the cow. Traction should only be applied when the cow is providing assistance by straining.

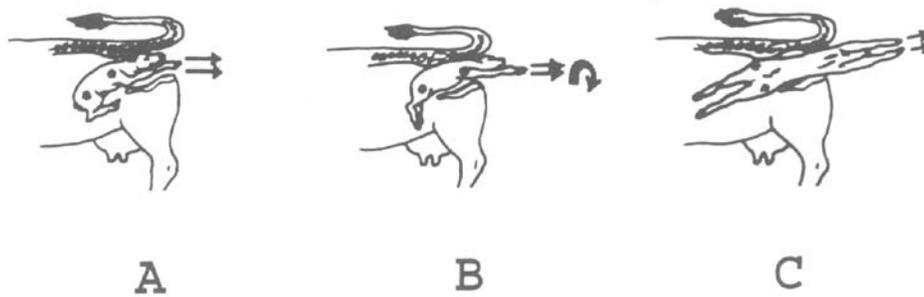


Figure 2. Forced Extraction of Calf in Frontwards Presentation: Cow Is in Right Lateral Recumbency. A: Unilateral Traction (One Leg at a Time) Is Applied Straight Back Initially Using the Force of One Man per Leg; B: after Shoulders of Calf Are Through the Maternal Pelvis, the Calf Is Rotated 45-90 Degrees And; C: Traction by the Force of Two Men or Equivalent Can Be Applied Bilaterally. Traction Is Then Straight out to Slightly Dorsal Direction Relative to the Longitudinal Axis of the Cow.

It is preferable to start with the down leg (left) of the calf. This usually comes through easily so the test actually is if you can get the second shoulder past the pelvis. You should be able to feel the shoulder move past the pelvis as you are applying traction. However, a suggested rule is for the fetlock joint to be **one hand's breadth or about 10 cm** outside the vulva of the cow. Once the first shoulder is through the pelvis of the cow it should be held in place and unilateral traction applied to the other leg. The amount of traction should be limited **to the force of one man per leg**. The direction of pull should be straight back from the cow which is difficult unless the cow is down (Figure 2)

Once the shoulders are through the pelvis of the cow delivery is possible. Bilateral traction can be exerted at this point to further pull the calf until we are a point before the pelvis of the calf enters the pelvis of the cow. As in the normal delivery, this is when the umbilical cord is compressed and the cow usually takes a break for a short period of time. This is a point when the calf should be allowed to breath on its own or oxygen can be administered. It is also a point with the oversized fetus where rotation of the calf should occur. This rotation is necessary to bring the widest part of the calf pelvis through the widest diameter of the cows pelvis (Figure 3). Once breathing has been established it is completion of delivery is possible in most instances. Occasionally calves are lost because of failure to allow calf to breath. Constant pulling on the calf at this point will not allow the calf to expand its chest and take in any oxygen and it is possible to lose the calf if breathing is not allowed.

The test for delivery of a calf in the backwards presentation but normal position and posture differ in that the fetus should be rotated 45-90 degrees by crossing the legs should occur before attempting delivery to take advantage of the widest diameter of the cow's pelvis. In addition the direction of pull on the calf is in a direction that is slightly up from a line straight out from the back of the cow (Figure 4).

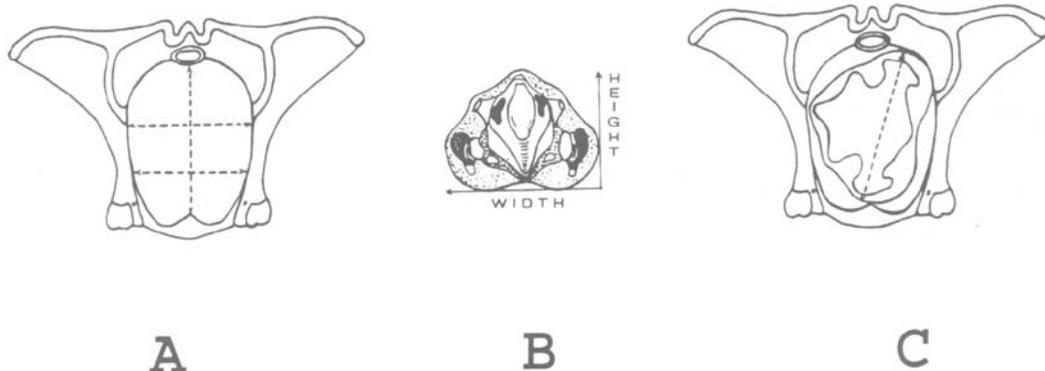


Figure 3. Relationship of Maternal Pelvis and Hips of Calf During Delivery. A: Maternal Pelvis Illustrating Various Diameters of the Pelvic Canal. The Greatest Diameter Is the Top to Bottom. B: Cross-section of Calf Hips Showing the Widest Section; C: Maternal Pelvis with Rotated Calf Demonstrating Advantage of Rotation During Delivery.

Traction can be applied in the amount of **three men** and should be applied **bilaterally** (both legs at the same time). The test for delivery is if **both hips of the calf can pass through the pelvis of the cow**. This is determined in most instances by the extension of the hocks of the calf beyond the vulva. If this is easily accomplished, possible delivery can be made. However, now we have very little time left to accomplish rotation of the fetus to a right-side up position for the chest of the calf to come through the pelvis of the cow and deliver the calf. We have probably no more than 2-3 minutes to complete the delivery. **If the test fails in either case call for professional assistance as surgical delivery is probably indicated if you want a live calf and maybe even a live cow.**

Elbow lock posture. If one or both of the forelimbs are not extended as they come into the pelvic inlet, the partly flexed elbows may lock on the brim of the pelvis and cause elbow lock. Repulsion of the fetal trunk and simultaneous alternate traction on the limbs will usually relieve the problem. The tests for delivery can then be applied and usually indicate delivery is possible.

Retained forelimb or hindlimb. The retained leg needs to be converted to a flexed carpus if a forelimb or a flexed hock if a hindlimb. Then apply simultaneous repulsion to the carpus or hock in a forward-upward-lateral direction and traction on the hoof in a medial-backward direction. These directions are relative to the cow. The hoof is guarded in such a way that protection of the uterus and the birth canal from tearing is possible. Then apply the tests for delivery.

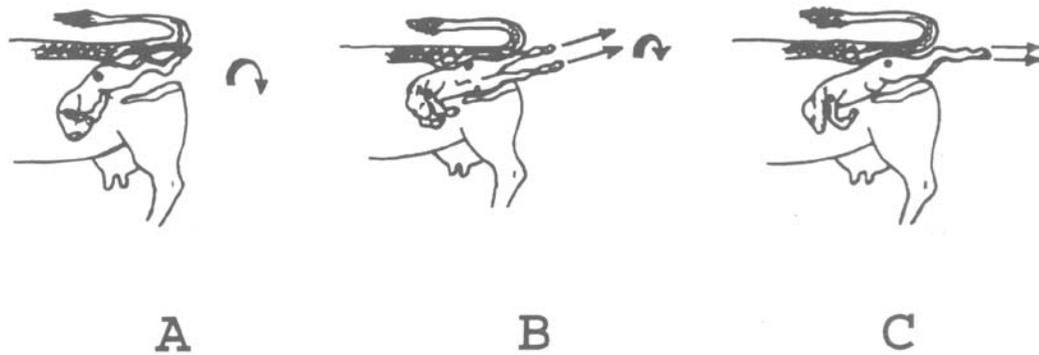


Figure 4. Delivery of Calf in Backwards Presentation. Cow Can Be Lying on Either Side. A: Calf Is Initially Rotated 45-90 Degrees Before Starting Delivery; B: Bilateral Traction Is Applied by Two Men or Equivalent. Direction of Traction Is Straight out to Slightly Dorsal until Hips of Calf Pass the Maternal Pelvis. Calf Is Then Rotated Back to a Right-side up Position and Delivery Continued. C: Direction of Traction Is Straight out until Calf Is Delivered.

Lateral deviation of the head. Opposing forces are usually required, one repelling the fetus, the other converting the deviation to normal position by traction. The principle is to make room for the head conversion by repelling the body of the fetus. The head should be kept upright if possible. The use of head or jaw snares may be used but should not be used for traction. One must be careful not to fracture the jaw. In addition, excessive repulsion of the fetus may rupture the uterus of the cow.

GUIDELINES IN CALLING FOR PROFESSIONAL ASSISTANCE

Once intervention is made the guidelines for additional professional assistance need to be followed. Professional assistance needs to be defined as someone who knows more about handling the problem than you do. The different level of experience among individuals will dictate what problems you are requiring assistance in. Regardless of the experience level, if these rules are followed the survivability opportunities of the calf and dam are increased. Some of the suggested guidelines are:

- Don't know** what problem they are dealing with!
- Know the problem and the solution but know** they are unable handle the problem!
- Know the problem and the solution; have tried and simply made no progress in 30 minute period!**

Further delays will simply put the calf in jeopardy.