

Calving Assistance and Immediate Postpartum Care

Maarten Drost

Department of Large Animal Clinical Sciences
University of Florida, Gainesville

Causes of Calving Difficulty

Calving difficulty represents a major economic loss to the beef cattle industry. The most common cause of difficulty in young cows, particularly heifers, is a disproportion between the size of the calf and the size of the birth canal of the dam. Seventy five percent of the time the difficult birth (dystocia) is due to the calf. The calf which should weigh from 6 to 10% of its dam's weight, may simply be too large. Such oversize is particularly likely when cows and heifers of breeds which have a relatively shorter gestation period, are bred to bulls of breeds with a longer gestation period. The genetic make-up of the calf determines its gestation period. Fetuses gain from 1 to 2 lb during the last 2 wk of gestation, hence the addition of 7 to 10 d may result in an extra 10 to 20 lb of body weight which in turn may make the difference between an unassisted vaginal delivery and a dystocia. The calf may also be at fault when it is presented abnormally in the birth canal, or when its posture (the extension of its head, neck and legs) is incomplete. Weak or dead calves do not participate in their delivery by lining up correctly and, as a result, frequently predispose the cow to calving difficulties. Twins occasionally try to enter the birth canal at the same time. Finally, some dystocias are due to malformations of the calf such as two-headed monsters, calves with ankylosed ("frozen") joints, spinal deformities and hydrocephaly.

In 25% of the cases of calving difficulty the dam is at fault, especially when they are heifers. The pelvis may not have fully developed in heifers which were bred when they were too young. There are three additional potential areas of constriction of the birth canal, the cervix, the junction of the vagina and the vulva, and the lips of the vulva. Dystocia may also

be due to such less common causes as torsion of the uterus or abortion of a large (dry) fetus accompanied by poor preparation of the birth canal, or pelvic deformities.

Signs of Calving

Increasing udder development is one of the earliest signs of impending parturition. Early enlargement occurs in heifers during the fourth month of gestation. In cows, enlargement of the udder may not become apparent until 2 to 3 wk before parturition. Just prior to parturition, the udder secretion changes from a sticky serum like discharge to colostrum, a thick, yellowish, opaque secretion.

Detection of changes in the pelvic ligaments by simultaneous external and rectal palpation is an accurate method of determining the onset of parturition in most cattle. Slight relaxation first becomes evident a few days before term, when it is possible to displace the posterior border of the ligament up to 1 inch by using moderate pressure. A slight dropping of the muscles over this region and a slightly raised tailhead become apparent in a few animals at this time. The onset of progressive relaxation of the ligaments coincides with the onset of cervical softening and dilation. Complete relaxation of the caudal border of the pelvic ligaments is generally followed by parturition within 12 h.

Signs of discomfort and restlessness do not usually appear until the cervix has dilated sufficiently to admit a hand. Slight dorsal arching of the back is apparent at this time, but definite straining does not begin until the first water bag (chorioallantois) nears the vulva. Hydrostatic pressure by the fetal fluids contained within the intact membranes assists in complete disappearance of the cervix. Stretching of the

vagina reflexly causes contractions of the abdominal muscles, and during one of these contractions the chorioallantois ruptures. Following rupture of the membrane, there is a temporary weakening or cessation of the abdominal press, which resumes as the second water bag (amnion) nears the vulva. The thick, slippery, slimy amniotic fluid provides lubrication for the delivery. The average interval between rupture of the chorioallantois and the amnion is about 1 h.

Once the amniotic sac bursts, regular intermittent straining begins after a brief rest period. As labor progresses, there is a gradual increase in the frequency and duration of the abdominal contractions, and straining sometimes becomes nearly continuous during the last few minutes before parturition. The greatest delay in expulsion of the calf occurs when the head reaches the vulva. At this stage little outward progression takes place during each series of contractions, and the calf frequently slips back into the vagina between bouts. This feature is most obvious in heifers, in which stretching of the vulva takes more time. Once the head of the calf has passed through the vulva, the rest of the body follows rapidly.

Calving Assistance

The ideal area for cows to calve is out on grass in a level pasture free from standing water and free from bush, where cows can readily be observed. Small calving pens usually become muddy and contaminated. If assistance is needed and can be rendered out in pasture that would be preferable but it is usually a problem in terms of restraint and the availability of an ample supply of clean water. When range cows in the process of calving are moved from pasture to strange surroundings such as working pens, labor frequently stops for a period of time. Calves should not be delivered while the cow is in a chute because the animal invariably goes down during the process. A chute can be used to place a halter on the cow after which she should be released while tied low to the front of the chute or low to

a nearby post allowing plenty of room to work behind the cow.

The minimum supplies needed to provide assistance at the time of calving are, a liberal supply of clean water, two buckets, soap, lubricant, two obstetrical chains plus handles, oxytocin, and 7% tincture of iodine. In addition it is helpful to have a curry comb, a supply of frozen colostrum, a nipple bottle, an esophageal feeder and, at times, a calf puller available. If there has been no visible progress for 2 h after the appearance of the amnion the cow should be examined to determine the cause for the delay. Heifers are slower to dilate and should be given more time than cows, however, there should be evidence of progress. The calf will often live for 8 to 10 h in the uterus after the beginning of true labor which begins with the rupture of the water bag.

The golden rule of obstetrics is CLEANLINESS and LUBRICATION. Before the cow is examined internally the tail should be tied to her neck and the anus, vulva and pinbones should be thoroughly washed with soap and water. Next the arms of the operator should be washed with soap and water, and lubricated. Soap or detergents must not be used as lubricants because they de-fat and remove the natural lubrication from the walls of the birth canal. Commercial lubricants like carboxymethylcellulose do not have this problem. They should be frequently reapplied to the arms and hands during repeated entries into the birth canal. Mineral oil and vaseline make very good, lasting lubricants.

Examination

The internal examination is aimed at determining whether the calf is presented head first (anterior presentation) or tail first (posterior presentation) and whether the head and neck and both limbs are present and fully extended. At the same time it should be decided whether the calf is alive or not. If the head and neck are turned back along the side of the calf the abnormal posture must first be corrected before the calf can be

extracted. Abnormal posture is most common in calves which are weak or dead, or extremely large. Correction is generally made by pushing the body of the calf back into the cow to make room for manipulation and retrieval of the retained part. It will depend on the experience of the operator and the degree of retention whether the help of a veterinarian is enlisted at this time. Finally, the decision must be made whether there is sufficient room for the calf to be delivered.

Guidelines

The following guidelines are those used at the obstetrical clinic of the University of Utrecht, The Netherlands, to determine whether vaginal delivery of the calf is possible.

Anterior presentation. The entire head resting on the knees and both feet must be presented in the pelvis. Chains are looped around each foot just below the dewclaws with the large link on top so the pull comes off the dorsal surface. Then, 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 will be sufficient room to pull the calf. The reason is that 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.

Posterior presentation. It is much less common, perhaps 10 to 15% of the time, that calves are born backwards. This presents two problems, 1) the blunt shaped hindquarters are less efficient in dilating the birth canal than the cone shaped head and neck, and 2) the umbilical cord becomes pinched while the head is still inside the dam. Again, chains are looped around each foot below the dewclaws with the large link at the front of the foot so the pull comes off its dorsal surface. If it is possible for two people to pull both hocks on a rotated (see below) fetus far enough for the hocks to appear at the lips of the vulva, then it will

be possible to deliver the calf by way of the vagina.

Preparation of the Cow for Extraction

There is no extreme urgency to immediately pull the calf. In fact, it will save time and reduce stress on the calf to first properly prepare the dam. While the cow is still standing she should again be washed with soap and water, and the degree of dilation of the soft tissues of the birth canal should be evaluated. With folded fingers, both well lubricated arms are inserted into the vulva and vagina like a wedge; then the tissues are stretched by pushing the elbows outward. Up to 20 min may be required in some heifers to fully dilate the vulva and the vulvo-vaginal sphincter. The preparation will not only minimize tearing but it will also speed delivery once the process of extraction is started. Next the cow is cast. She can be laid down by tying her head low to the ground to a post and by tying a long rope around her neck with a nonslip knot and then by placing two half hitches around her body. The first half hitch is placed tightly just behind the front legs, the second just in front of the hindlegs and in front of the udder. By pulling on the free end of the rope straight behind the cow, she will go down and can then be rolled onto her right side. The advantages of laying her down is 1) she can angle her pelvis more favorably by bringing her legs forward and she can slightly spread her legs, 2) the assistants can sit on the ground and exert more pull, 3) the calf does not have to come up out of the abdomen against the force of gravity, and 4) she does not fall down in the middle of the extraction process.

Rotation of the Calf

The entrance into the bony pelvis (pelvic inlet) of the cow is shaped like an egg with the small end down. This means that the diameter is taller than it is wide, and wider near the top than near the bottom. A cross section of the pelvis of the calf shows that it is wider at the hip joints (which are located below the hocks), than it is tall. Therefore, rotation of the calf allow its widest

portion (the hips) to come through the greatest diameter of pelvic inlet. The calf must be rotated before its hips have entered the pelvic inlet. The operator positions himself on his knees next to the udder of the cow. For a calf in anterior presentation rotation is started as soon as the head has come out. The operator passes his arm nearest the cow between the legs of the calf and above the head. The other hand and arm are passed completely underneath the calf, and the hands are folded near the base of the neck. The head can then be pulled toward the knees of the operator which rotates the calf while traction is applied. During this traction the two assistants should exchange chain handles so that the person on the right pulls on the left leg of the calf, and vice versa for the other person, which further aids in rotating the calf.

When the calf is in posterior presentation, rotation must be started as soon as the operator has access to the legs, that is, before the fetal hips have entered the pelvic inlet. Again the cow is laid on her right side. Everything should be ready before the final pulling is started because once the umbilical cord is pinched the oxygen supply to the calf is shut off. Handles should be attached close to the calf so they need not be moved once the calf is half out of the cow. Once the hips of the calf have passed, the back of the calf is rotated back to line up with that of the cow and the calf is pulled in a direction parallel to the hindlegs of the cow.

All pulling is done intermittently and only when the cow strains, upon command of the operator. This allows the cow, the calf and the assistants brief periods of much needed rest before the next maximum effort. The only exception to this is when the hips of the calf that is coming backwards have just come through the vulva. These calves cannot breathe because the head is still in the uterus and their oxygen supply via the umbilical cord has been cut off. Continued traction is applied until the calf has been delivered.

Care of the Calf Immediately after Devivery

Delayed passage through the birth canal in the face of a faltering placenta compromises oxygenation of the calf. Although the animal is able to breathe as soon as the nose passes the lips of the vulva, expansion of the chest is restricted by the narrow birth canal. This situation is seriously aggravated when continuous forced traction is applied. As soon as the head passes the lips of the vulva, traction should be interrupted, the nostrils cleared of mucus and cold water applied to the head.

Again, when the calf is completely delivered, primary attention is directed toward establishing respiration. Mucus and fetal fluids should be expressed from the nose and mouth by external pressure of the thumbs along the bridge of the nose and the flat fingers underneath the jaws, sliding from the level of the eyes toward the muzzle. If the calf fails to start breathing on its own, it may be suspended by the hindlegs with the head off the ground. Next, excessive mucus and amniotic fluid are expressed from the airways by applying slow, bilateral pressure with the hands along the chest from the costal arches to the neck. This is done once and firmly. The airways are most effectively cleared by suction.

Respiration is stimulated by many factors, but only ventilation of the lungs, cooling and certain drugs allow us to render help immediately. The best stimulus for respiration is ventilation of the lungs. Cooling is a very important respiratory stimulus that can be achieved by simply pouring cold water over the head of the calf. Brisk rubbing of the skin or tickling inside the nostril with a piece of straw also has favorable effect. The phrenic nerve can be stimulated with a sharp tap on the chest slightly above and behind where the heartbeat can be felt.

Artificial Respiration

The calf is placed on its side and the mouth and nostrils are cleared of mucus. An assistant holds the mouth open and extends the tongue of the calf to allow air to pass freely. While kneeling at the backside of the calf, the operator uses one

hand to grasp the upper part of the top front leg, while the other hand is pushed a little ways underneath the last rib. Next, the chest wall is elevated by lifting the front leg and the edge of the ribcage until the calf is almost lifted off the ground. This expands the chest. During a short pause the lungs are given the opportunity to expand. The latter expansion is slow because the lungs are still "wet", never having been inflated. Next the chest walls are firmly compressed with flat hands. These movements are repeated approximately once every 5 sec, whereby the major effect is aimed at the inspiration.

As a rule, no expiratory sound will be heard until after several resuscitatory movements. Initially, very little air will be aspirated as the lungs begin to expand. This treatment may be maintained for 15 min while other methods to stimulate respiration are employed, e.g. cold water or drugs. When spontaneous respiratory movements occur after a few minutes, they are immediately supported, after which the rhythm of the artificial respiration is resumed.

The major advantage of this prompt intervention is that the lungs are immediately supplied with oxygen. In addition, the heart is massaged, and a pumping action is exerted on the large vessels of the heart, stimulating circulation.

After the frequency and
50REWRITE SUBSTDATA(f spontaneous respiration have reached an adequate level, the calf is briskly rubbed dry. The calf is then placed on its chest with the front legs extended and spread out and the hindlegs in a dog-sitting position extended alongside the body. This facilitates expansion of the chest. A handful of straw may be placed bilaterally in the armpits to keep a weak calf from falling over.

Once respiration has been established, the umbilical stump is disinfected and dried by submersion in a clean cup of 7% tincture of iodine. The calf is examined for the presence of cleft palate, contracted tendons or other congenital defects.

Colostrum

Early ingestion of colostrum is essential for the newborn calf. The protective effects associated with the transfer of colostrum immunoglobulins have been amply demonstrated, both in the field and experimentally. The composition of colostrum changes rapidly to that of normal milk during the first 3 d of lactation.

The calf should consume at least 6% of its body weight in colostrum within 6 h after birth. If the calf is reluctant to nurse, the colostrum should be given by stomach tube. Slightly bloody colostrum can safely be fed to calves if it is otherwise normal. Grossly abnormal colostrum, such as from a cow with acute mastitis, must be discarded. Providing adequate amounts of colostrum will not necessarily prevent diarrhea, but it will aid in the prevention of subsequent septicemia. Immunoglobulins (Ig) are absorbed from the intestine for only a short time after birth, and the efficiency of absorption decreases linearly with time. Furthermore, "shut down" is different for each class of immunoglobulin. IgG can be absorbed for 27 h and IgA for 22 h, but IgM is absorbed for only 16 h. Thus, a calf that nurses for the first time at 10 to 12 h of age could still acquire high levels of IgG and IgA, but little IgM. As a consequence, such calves are very susceptible to colibacillosis.

Care of the Dam Immediately after Delivery

After the delivery of each calf the uterus must be checked for the presence of another fetus. At the same time the birth canal is examined for trauma. Next the udder is examined for the presence of colostrum and the possibility of blind quarters or mastitis. After an assisted delivery, 50 units of oxytocin are administered intramuscularly to the dam to expel air, fetal fluids and blood from the uterus and to lessen the likelihood of uterine prolapse and retained placenta. The cow is made to stand, again to reduce the possibility of uterine prolapse, particularly after a forced extraction, and to assess

the extend of possible nerve damage during delivery.

Intrauterine antibiotic therapy (4 gm of oxytetracycline) is given at this time if cleanliness was compromised or if prolonged assistance was required. It is important that the medication be placed between the endometrium and the fetal membranes and not merely dropped into the lumen of the uterus. In the event of trauma to the birth canal, broad-spectrum systemic antibiotics are administered as well.

Trauma to the Birth Canal

Damage to the cervix, vagina, vulva or the bony pelvis may lead to fatal hemorrhage or infection or to disability due to fractures, dislocations or paralysis.

Minor lacerations and bruises are common, particularly of the vulva and cervix after forced extraction. Mild lacerations need not be sutured. However, they frequently become infected, especially if the tissues are traumatized and devitalized or if retention of the fetal membranes occurs. Infected lacerations result in swelling, pain and persistent straining. Treatment consists of use of parenteral broad-spectrum antibiotics and epidural anesthesia, which gives temporary relief from straining.

Lacerations of the vagina generally occur at the junction of the vulva and vagina, particularly in fat heifers. A large fetus may be preceded by a cuff of perivaginal fat that ruptures during forced extraction when it is halted by the constriction of the vulvo vaginal junction. Perivaginal fat is extruded through the laceration in the vaginal wall. The defect occurs most frequently in the lateral wall of the vagina and may be repaired or left to heal without suturing. Systemic antibiotics are given.

Hemorrhage from the birth canal may be due to a torn caruncle or caruncular stalk or to the attempted premature removal of the fetal membranes. Administration of 50 units of oxytocin aids in control of hemorrhage by contracting the uterus and its vessels. Laceration

of the cervix produces particularly serious and persistent hemorrhage, which cannot be controlled with the injection of oxytocin.

Conclusion

Calving cows, and particularly heifers, should be provided with regular and frequent supervision. Prompt attention when there are calving delays greatly enhances calf survival and minimizes damage to the cows which translates into earlier rebreeding. The golden rule of cleanliness and lubrication must always be observed. By following the guidelines for determining whether a calf can be delivered by simple extraction it can quickly be decided when the assistance of a veterinarian is needed. There is no excuse for indiscriminate pulling by trial and error. The latter is likely to kill the calf and injure the dam. The veterinarian has the added options to perform a cesarean section when the calf is alive, or a partial or complete fetotomy in the case of a dead calf. A fetotomy is an operation whereby the calf is dismembered and(or) cut into smaller parts inside the uterus to enable delivery through the vagina, thus avoiding abdominal surgery.

Sources of Information

Current Therapy in Theriogenology. 1980. 1st Ed. D.A. Morrow (Ed). W.B. Saunders Co., Philadelphia.

Current Therapy in Theriogenology. 1986. 2nd Ed. D.A. Morrow (Ed). W.B. Saunders Co., Philadelphia.

Handbook of Bovine Obstetrics. 1980. V. Sloss and J.H. Dufty (Ed). The Williams & Wilkins Co., Baltimore.

Veterinary Obstetrics and Genital Diseases (Theriogenology). 1986. 3rd Ed. S.J. Roberts (Ed). David and Charles Inc. North Pomfret, VT.

Veterinary Reproduction and Obstetrics. 1982. 5th Ed. G.H. Arthur, D.E. Noakes and H. Pearson (Ed). Bailliere and Tyndall, London.

)