Client education.
Options for training personnel on the farm in reproductive management
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Introduction
Dairy farm workers, and to a lesser extent employees on a beef cattle operation, play a major role of success in the areas of artificial insemination, heat detection, pregnancy diagnosis, obstetrics and even advanced reproductive technology. This requires a team effort whereby the veterinarian serves as the coach. With the motto that a picture is worth 1,000 words, s/he can use the Visual Guide to Bovine Reproduction to illustrate the various processes.

The veterinarian needs to coordinate the activities of the farm workers in conducting a successful breeding program and measure this success with early pregnancy diagnosis. The team must be proactive during the calving season to minimize calf losses and injuries to the dam. The latter will optimize subsequent fertility. Teaching farm workers about accidents during gestation will stimulate their general interest and motivate them. Success with embryo transfer and in-vitro fertilization programs is based on the quality of the basic reproductive management program.

Emphasis will be placed on the subject of obstetrics to serve as a model for an on-farm training program.

Keywords: Client education, artificial insemination, pregnancy diagnosis, obstetrics,

Artificial insemination
While veterinarians have handed the task of actual insemination over to technicians, it is important that inseminator understand the basic anatomy of the reproductive tract as well as the timing of ovarian activity. It is recommended that the ovaries are not routinely palpated near the time of ovulation. Appreciating the role and function of the follicles and the corpus luteum and the critical sequence of events is helpful (Subject: Reproductive Technology).

The importance of accurate heat detection is currently underestimated and underutilized on many farms. Teaser bulls with surgically deviated penises and equipped with chin-ball markers are excellent estrus detectors (Subject: Estrus Detection).

Pregnancy diagnosis
The first suggestion, after insemination, that the heifer or cow is pregnant is her failure to come back in heat. Physical changes in the uterus can be palpated per rectum. Asymmetry between the uterine horns, especially in heifers, starting around 4 weeks of gestation is the first indication. This is followed by the detection of the presence of fluid. The chorio-allantoic membrane slip can be felt around 5 weeks, and shortly after the presence of the amniotic vesicle. Experience and a gentle touch are required during these early stages prior to 6 weeks. Progressive development of the fetus is illustrated under the Subject: Pregnancy.

Ultrasonography has further advanced the technique and the accuracy of early pregnancy diagnosis (Subject: Ultrasonography). Early pregnancy can also be determined by the presence of pregnancy associated glycoproteins in the blood of pregnant cows, approximately 25 days after insemination.

Calving management
Calving management has traditionally been approached in a passive manner. On large dairy farms the 24/7 supervision and care of the calving pen is generally delegated to employees with varying degrees of knowledge and skill in obstetrics. This first line of defense is important because early intervention not only prevents calf losses but also protects subsequent fertility. However, too often the first reaction when a cow is in labor is to immediately hook onto the calf and start pulling, frequently with a calf puller.

The person assisting must be clean and should follow some simple guidelines to determine whether a calf can be pulled with reasonable force, or whether the delivery will require more drastic measures such as use of a calf puller, cesarean section or fetotomy.

A secondary problem is that calving difficulties rarely occur at a predictable or convenient time, when there is adequate help. Unfortunately, both haste and delays lead to injuries to the calf or to the dam, or to both.
Signs of calving

Progressive udder development is one of the earliest signs of the approach of calving. Early enlargement occurs in heifers during the fourth month of pregnancy. In cows, enlargement of the udder may not become apparent until two to three weeks before calving. Finally, the teats become turgid and lose their wrinkles. The lips of the vulva also become larger and softer, and lose their wrinkles. As the pelvic ligaments relax, the tail head appears to become slightly raised. The onset of progressive relaxation of the ligaments coincides with the onset of softening and dilation of the cervix. Complete relaxation of the posterior border of the pelvic ligaments, the so-called bands, is generally followed by delivery within 12 hours. Rupture of the first water bag heralds the onset of true labor. Following rupture of this membrane, there is a temporary weakening or cessation of straining, which resumes as the second water bag (amnion) enters the vulva. The thick, slippery, slimy fluid contained in this bag provides lubrication for the delivery once it ruptures. The average interval between rupture of the first and the second water bag is about one hour.

Calving assistance

The minimum supplies needed to provide assistance at the time of calving are a ready supply of clean water, two buckets, soap, lubricant, two obstetrical chains plus handles, oxytocin, and seven percent tincture of iodine. When there has been no visible progress for two hours after the appearance of the membranes, the cow should be examined to determine the cause of the delay as well as the type of assistance she may need. 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 eight to ten hours in the uterus after the beginning of true labor that begins with the rupture of the first water bag. The golden rules of obstetrics are CLEANLINESS and LUBRICATION. It takes from two to six hours for the cervix to completely dilate in the average cow, and from four to ten hours in the average heifer. The actual expulsion of the calf takes from one to four hours in the cow and from two to six hours in the heifer. The fetal membranes (afterbirth) are normally delivered in one to eight hours. They are considered retained if not delivered within 12 hours.

The plan

It is very important to not start to pull, by trial and error, on the first exposed part of the calf. A flowchart of the sequence of events and what to do at each step is also presented in the Visual Guide to Reproduction, http://drostproject.org. The internal examination is aimed at determining whether the calf is presented head first (cranial presentation) or tail first (caudal presentation) and whether the head and neck and both limbs are present and fully extended. At the same time it is decided whether or not the calf is alive.

Guidelines to determine if there is room

Cranial presentation (head first) The entire head resting on the knees and both feet must be presented in the birth canal. Chains are looped around each foot just below the dewclaws with the large link on top so the pull comes off the dorsal surface. There will be sufficient room to pull the calf, if one person can pull the first leg until the pastern is 15 centimeters outside the vulva and, next while holding the first leg in this position, if again one person can pull the second leg equally far outside the vulva. At these distances both shoulders of the calf will have passed both iliac shafts, and the pelvic inlet. The diameter of the calf is greatest at the points of the shoulders.

Caudal presentation (backwards) Approximately five percent of the time calves are born backwards, and almost 50% of those lead to dystocia. 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 compressed against the pelvic inlet 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, when the cow lying on her side, it is possible for two people to pull both hocks on a rotated (see below) calf far enough for the hocks to appear at the lips of the vulva, then there will be sufficient room to deliver the intact calf by way of the vagina.

Preparation of the cow for pulling the calf

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; next the tissues are stretched by pushing the elbows outward. Up to 20 minutes 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; usually on her right side. 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 non-slip 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 hind legs and in front of the udder.
By pulling on the free end of the rope straight behind the cow, she will be made to lie down and can then be rolled
onto her right side. The advantages of laying her down are: 1) she can angle her pelvis more favorably by bringing
her legs forward and she can slightly spread her legs, 2) the people pulling 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

A cross section of the entrance into the bony pelvis (pelvic inlet) of the cow is shaped like that of an egg
with the small end down. The vertical diameter of the pelvic inlet is greater than the horizontal diameter
[bob163.jpg]. This means that the opening is taller than it is wide, and wider near the top than near the bottom. On
cross section, the pelvis of the calf is wider at the hip joints (which are located below the hooks), than it is tall. The
horizontal diameter of the fetal hips is greater than the vertical diameter [bob164.jpg]. Therefore, rotation of the
calf allows its widest portion (the hips) to come through the greatest diameter of the pelvic inlet. However, the calf
must be rotated before its hips engage the pelvic inlet [bob165.jpg]. The hip joints of the calf are sometimes too
wide to pass horizontally through the pelvic inlet. To anticipate and prevent this, the hips should routinely be
rotated to permit passage through the bony pelvic inlet [bob166.jpg]. The operator positions himself/herself on
his/her knees next to the rear legs and udder of the cow [bob148.jpg]. For a calf in cranial presentation, rotation is
started as soon as the head is outside the vulva. The operator passes his/her arm nearest the cow between the legs of
the calf and above the neck. The other hand and arm are passed completely underneath the calf, and the fingers are
locked near the base of the neck. The head can then be pulled toward the knees of the operator who rotates the calf
while traction is applied.

When the calf is in caudal 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 cast 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.

All pulling is done intermittently and only while the cow strains, upon command of the operator. This
gives the cow, the calf, and the assistants brief periods of rest before the next maximum effort. The only exception
to this rule is when the hips of a 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.
Continuous traction is applied until such a calf has been delivered.

Care of the calf immediately after delivery

Delayed passage through the birth canal in the face of a faltering placenta compromises oxygenation of the
calf. Although the calf is able to breathe as soon as its nose passes the lips of the vulva, expansion of its chest is
restricted by the narrow birth canal. This situation is made much worse when continuous forced traction is applied.
As soon as the calf’s head has passed the lips of the vulva, traction should be interrupted, the nostrils cleared of
mucus, and cold water applied to its head. When the calf is completely delivered, immediate 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. The common practice of suspending the calf by the hind legs to "clear the lungs" must
be questioned [bob142.jpg]. Most of the fluids that drain from the mouth in these calves come from the stomach,
and the weight of the intestines on the diaphragm makes expansion of the lungs difficult. The most effective way to
clear the airways is 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. Sudden cooling is a very
important respiratory stimulus that can be elicited by simply pouring cold water over the head of the calf. Cold
water elicits the gasp reflex that aids in the expansion of the lungs. Brisk rubbing of the skin or tickling inside the
nostril with a piece of straw also has a favorable effect.

Accidents of gestation/teratology

For the purposes of client education it is interesting to be able to illustrate a number of uncommon
conditions to aid in the explanation of differential diagnoses. For example, the difference between hydrops allantoi
and hydrops amnii. How the adventitious placentation of a cow with hydrallantois makes her unsuitable for rebreeding; how the profiles differ from one-another and from a cow with bloat. How a vaginal prolapse differs from a uterine prolapse in timing and appearance.

Teratology can be subdivided into fetal monsters and congenital anomalies. How does one explain a Schistosomus reflexus, or a globosus amorphus? A picture is worth a 1,000 words in those cases.

Turn to reference 1 and select the Subjects of Accidents of Gestation and Teratology.

**Advanced reproductive technology**

The category of Advanced Reproductive Technology is a slightly esoteric for the purpose of training farm personnel. Yet, images may help explain the process of embryo flushing, and illustrate the developmental stages of the early embryo from day to day (Subject Reproductive Technology).¹

**References**


**Images**

Illustrations of the various procedures, instruments, and anatomical specimens may be viewed in the Bovine Reproduction Guide under the respective Subjects. To view an individual image, select Search on the Home Page and enter the file name (e.g. bob136.jpg. Alternatively, the QuickSearch box in the lower right hand corner of each images can serve the same purpose.