Monitoring Fetal and Neonatal Well-being in the Cow: Review

O. Szenci DVM, *PhD, DSc*
Szent Istvan University, Faculty of Veterinary Science, Clinic for Large Animals, H-2225 Ullo – Dora major, Hungary, oszenci@univet.hu

The profitability of cattle breeding is greatly influenced by the rate of calves born alive and reared to adulthood. In spite of the speedy development of animal breeding, perinatal mortality is still very high (4 to 7%) and constitutes approximately half of total calf losses. Perinatal mortality (stillbirth) is interpreted as the death of mature calf fetuses during calving or in the first 24 hours of postnatal life. Direct and indirect asphyxia were suggested as the causes of death, because in 73 to 75% of the calves which died in the perinatal period no pathological changes were detected. In a recent study, occurrence of asphyxia in calves dying perinatally was 58.3%. Due to disturbances occurring during parturition in the uteroplacental circulation as resulting from the rupture of fetal membranes and uterine contractions, all fetuses develop a more or less severe hypoxia and a consequent acidosis. The duration of survivable asphyxia always depends on the reserves of glycogen in the heart muscle.

The survival period for calves with induced anoxia ranges from four to eight minutes. Four of six fetuses subjected to four minutes of anoxia survived, whereas all others died when the umbilical cord was clamped for six or eight minutes. The degree of asphyxia can be evaluated by measuring the acid-base parameters in the blood. It is indispensable for the veterinarian to have knowledge of the physical events taking place during parturition in the foetus, in order to allow the earliest possible recognition and aversion of dangers threatening the fetus. The use of indwelling catheters or frequent blood samplings after rupture of the amniotic sac in the cow has made it possible to monitor fetal acid-base changes during late gestation and calving. Throughout the latter part of gestation, umbilical venous blood pH, pCO_2 and pO_2 values were found to be remarkably stable. It is only after rupture of the umbilical cord that there is a fall in blood pH associated with high lactate and pCO_2 levels. A slight fall in pO_2 also occurs half an hour (umbilical artery) and five minutes (umbilical vein) before delivery. According to others, the first significant changes in fetal pH, blood gases and lactate concentration in normal calving occur after the start of abdominal straining. At this stage, uterine contractility is greatly enhanced so that a reduction of uteroplacental blood flow can be expected.

In practice it is generally not possible to measure the acid-base balance of fetuses or newborn calves. Therefore, alternative methods are used to evaluate fetal and neonatal well-being in the cow. A fetus can be evaluated by measuring the interdigital, bulbar, swallowing and anal reflexes; pulse rate of umbilical cord; and heart rate measured by cardiotopography. Neonates are evaluated using modified Apgar schema, vitality score system, and T-SR, which is the time between birth and attainment of sternal recumbency.

At present, the main emphasis should be placed on prevention of asphyxia of calves to be born, since instruments suitable for a reliable clearing of respiratory passages, and for artificial respiration of calves under practical conditions are not yet widely available. At the same time, profitability factors still play a decisive role. The most important breeding objectives can be achieved only by those daily operational approaches which may lead to a reduction in the number of calvings that must be assisted. In the case of difficult calving, the mode and time of calving assistance should be chosen with regard to profitability factors, and in a manner to allow the least possible shift of the calf's acid-base balance towards acidosis. Before applying traction, the measurements of the soft birth canal should always be considered. When dilatation of the soft maternal passages is not sufficient, they must be expanded nonsurgically or surgically (episiotomia lateralis) and obstetric lubricants should be used to avoid tractions longer than two to three minutes, and rib and vertebral fractures associated with excessive traction. In case of hip lock flexion, the respiratory airways must be cleared to avoid severe asphyxia. Throwing cold water over the calf's nape and administration of respiratory stimulants are also expedient. Traction should be discontinued until respiration has become rhythmical. In posterior presentation, the above measures are especially important, since ultimately strangulation of the umbilical cord endangers the life of the fetus.

If prolonged traction is expected (based upon the size of the fetus and the measurements of the maternal soft birth canal as related to one another or, in doubtful cases, from the result of the short test traction), Caesarean section should be performed to save the calf and to prevent injuries of the maternal birth canal. In the

case of Caesarean sections, the sooner the surgical intervention takes place after the rupture of foetal membranes, the lower the proportion of newborn calves with severe asphyxia will be. Recent studies have shown that before making a decision as to the mode of calving assistance in an animal hospital, the results of acid-base balance determination from blood samples (withdrawn from the v. metacarpalis superficialis volaris or v. matatarsalis dorsalis lateralis, or from the v. digitalis dorsalis communis III dorsomedialis or from the umbilical blood vessels) should be considered. Routine use of complex treatment of calves born with severe asphyxia may reduce postnatal calf losses. Particular attention should be paid to providing sufficient amounts of colostrum, since the lack of colostrum uptake is accompanied by increased susceptibility to infectious *Escherichia coli*.

Epidemic of Mycoplasma Mastitis in a Colorado Dairy Herd Following Expansion from 350 to 2,500 Milking Cows

Hirst H, *DVM, MS;* **Garry F,** *DVM, MS;* **Wenz J,** *DVM, MS*
Integrated Livestock Management-Animal Health Population Institute, Colorado State University, Fort Collins, CO 80523

Introduction

Over the past two decades, dairies in the Western United States (US) have been expanding by purchasing cattle from various sources within the country.[1] During year 2001, cow numbers in the West increased by 72,000 head, while the dairy cow population in the rest of the country declined by a total of 163,000 head.[2] The National Animal health Monitoring System (NAHMS) study conducted in 1996 reported that 44% of operations brought cattle onto their dairies during 1995. Among herds with 200 or more milk cows, 65% of herds brought cattle onto the dairy from an outside source.[3] Avoidance of severe losses from introduction and spread of disease requires biosecurity practices at multiple checkpoints, plus a plan for handling problems that occur. The objective of this herd report was to describe an epidemic of *Mycoplasma* (Myco) mastitis in a recently expanded Colorado dairy herd and to analyze reasons for the outbreak.

Materials and Methods

In September of 2001, the original herd of 350 milking cows was moved to a new facility (60-stall rotary with separate parlor for milking hospital cows). Heifers and cows for the expansion were purchased from approximately 15 sources over a one year period. A single bulk tank milk sample from each purchased lactating herd was cultured for Myco, and cattle were not moved to the new facility until negative bulk tank Myco results were obtained. Purchased lactating cattle were not tested prior to entering the milking strings upon arrival at the new facility. The only sampling performed for Myco testing was on cows that recently calved (fresh cows) or had a clinical mastitis episode during and following the expansion. Cows that tested positive for Myco on more than one occasion were only included as a new case on the initial positive culture result.

Results and Intervention Steps

All bulk tanks from purchased herds were culture-negative for Myco. Over a period of 17 months, 12,700 cultures were tested with a total of 560 new cases (4.4% of all milk cultures; 22% of final lactating herd size). The first epidemic of Myco mastitis occurred in March 2002 (200 cows), and many of these cows were sold. A second epidemic occurred in November 2002 (145 cows). Approximately 88% of Myco culture-positive cattle had a previous negative culture during an earlier hospital parlor visit. Investigation revealed that cow-to-cow spread was being facilitated via improper disinfection of milking equipment and general contamination of the hospital milking parlor environment with Myco organisms.

Hospital parlor personnel were trained to prevent spreading the organism among cows being milked in the hospital parlor. Key points in this training program included the following: 1) behavior and recognition of Myco mastitis, 2) prevention of the transmission of Myco organisms at milking time, 3) proper intramammary treatment technique, and 4) methods for disinfection of milking machines using Dyne[a] solution. In the four months following implementation of new hospital procedures and employee training, the number of new Myco infections has been drastically reduced to one to two