A fortunate start of life is a key factor for long term productive success. Directly after birth, the newborn calf is challenged by the extra-uterine environment. The calf’s adaptive capacity can be impaired by the birth process. Without additional care, this impairment can have long term consequences. Newborn calf care to support its adaptive capacity is therefore an essential element of herd health management.

Onset of parturition
During gestation, the fetus receives essential elements such as oxygen, nutrients and hormones from the cow through the placenta. Within this nine month period the fetus matures into a 40 kg calf. At this point, the uterine space becomes limited and this triggers a stress response by the calf. Elevated stress hormones (corticoids) in the calf’s blood are registered by the mother. Consequently, a cascade of maternal hormone changes and feedback mechanisms initiates onset of the parturition process.

Birth process
Early uterine contractions stimulate calf rotation so that the head and the front feet are positioned towards the cervix. Pressure on the cervix initiates hormone release which causes smoothening of the muscles. This enables the calf to move into the birth canal as contractions continue. The cow’s hormonal changes promote softening of connective tissue, elasticity of the pelvic ligaments, and lubrication of the birth canal. As uterine contractions increase the calf moves into the birth canal. At some point the amniotic membranes rupture and the calf becomes hypoxic. This oxidative stress leads to increased calf movement which stimulates uterine contraction in favor of the parturition process. In general the calf is born in 3-7 hours after onset of parturition.

Dystocia
With extended calving time the risk of asphyxiation increases. Asphyxiated calves suffer from respiratory and metabolic acidosis which could be fatal at certain degrees. Birth process can be influenced by both the mother (breed, parity, body condition score, stress, weak abdominal contractions, narrow birth canal) and the calf (gender, birth weight, position) and these factors can even be related. In case of a difficult birth (dystocia), traction or even a caesarean section should be carried out to protect the health of both the cow and the calf.

Special neonatal care
The basic requirements for newborn calf care are a warm, dry environment, hygiene and sufficient colostrum supply. Calves that experienced dystocia and/or asphyxiation require special care to improve their survival chances. Studies have shown that the calf’s first priorities, body temperature stabilization and immunoglobulin uptake, are negatively affected by dystocia. This could be improved by management strategies:

Body temperature
Body temperature stabilization can externally be stimulated by: coat drying with a towel; sufficient dry bedding; a blanket; and placing under a heat lamp. Internally, the newborn calf uses its brown fat metabolism for heat production. Because brown fat reserves are limited, the calf depends on colostral fat to maintain its body temperature. Cold stressed calves show low activity and are unlikely to suckle. This impairs...
their thermoregulation and therefore their survival chances. In long term, this negatively affects growth rate and immune response. To avoid cold stress and its future consequences, it is important to stimulate the calf’s metabolism by early feeding of sufficient amounts of colostrum.

**Immunoglobulins**

For immunoglobulin uptake, the calf solely depends on colostrum. Calves who suffered from respiratory acidosis were found to have a decreased IgG1 uptake. Low passive transfer of immunoglobulins is a direct risk for the calf’s health status as it is continuously challenged by pathogens from the environment. These bacteria and viruses can cause diarrhea and respiratory diseases which are a serious risk to calf’s survival chances or future productive success. To ensure sufficient passive transfer in these calves, timely feeding of colostrum with a high immunoglobulin concentration is a must.

**The essence of good quality colostrum**

Asphyxiated calves are often weak and may have difficulties to stand and to suckle colostrum. If the colostrum uptake is insufficient, thermoregulation and immunoglobulin uptake are impaired. To ensure that the calf receives the required volume, bottle- or tube feeding is preferred above suckling at the mother. Nutritional value and immunoglobulin levels should be high enough to support the weak calf. Unfortunately maternal colostrum does not always meet these requirements. Especially in these cases, supplementing or replacing the calf feeding with a high quality colostrum replacer should be considered as an element of newborn calf management.

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Evine is a BSc and MSc Animal Science graduate from Wageningen University in The Netherlands. Within this study program she is educated on a wide range of livestock management aspects such as: Animal nutrition, Immunology, Epidemiology, Breeding and Genetics. Finally she specialized herself in Animal Health and Behavior with focus on Adaptation Physiology. Besides her scientific background she has personal experience in dairy farming. Therefore she understands the need for a high quality colostrum product as part of animal health management. She joined the Saskatoon Colostrum Company in December 2012.

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**ASK THE EXPERT:**

**Why is it important to remove new born calves from the dam as soon as possible?**

The new born heifer, the future of the dairy herd, is delivered to the world with no defense against diseases at all. Within a few hours it must consume a sufficient amount of good quality colostrum to provide it the initial defense in the form of maternal antibodies. These will slowly decay and will be replaced by the calf’s self-produced antibodies. Nevertheless, in the meantime the calf is extremely susceptible to many pathogens present in the calving pen environment. This is why any extra minute of the young heifer remaining in the calving pen exposes it to enormous amounts of pathogens that can risk its future survival and production in the herd. Many years of research have shown that the critical moment where calves are susceptible to infection from Mycobacterium paratuberculosis, the causative agent of the devastating Johne’s disease, is actually right after birth where calves are exposed to very small amounts of infected (and hence infectious) adult cow manure. This is often not the mother’s manure rather than another infected herdmate’s that recently calved in this pen. Further, in some dairies the calving pen is used to host also sick cows where the risk of infectious manure is even greater. Other pathogens such as salmonella and E. coli were also found to infect calves with very low amount of manure found in the calving pen. Finally, another important reason to remove the new born calf as soon as possible is that there is no way to measure how much colostrum the calf is actually suckling directly from its mother’s udder, especially if the calf is weak and late to stand after difficult birth. On the contrary, the use of bottle or feeding tube allows us to control the amount of the colostrum fed. Furthermore, the same pathogens mentioned above can be found both in the colostrum and on the dam’s nipple surface and hence being transmitted to the calf during its first meal. While some farmers believe that letting the cow lick its offspring helps vitalize it and hence stimulate it to stand sooner, good post natal care of calves will ensure this in addition to sufficient supply of high quality colostrum and the prevention of pathogen transmission.

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Send us your questions, comments or suggestions; we welcome your feedback!

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