

A Disease Prevention Message from Beyond the Grave

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The Ontario Animal Health Network (OAHN) has been set up to help veterinarians and producers become more aware of new and existing animal disease issues in Ontario. As part of the bovine section of OAHN the Calf Disease Surveillance project began in 2016. The project assists veterinarians to do post-mortems on calves less than six months old who have died or were euthanized on a client's dairy, veal or cow-calf operation. The goal is to allow vets and herd owners to become more informed about causes of calf mortality so that specific preventive and treatment advice can be provided. Additionally, post-mortem results are monitored to track provincial calf disease trends.

So far, 102 calves from across the province have been post-mortemed and tested for causes of death and disease. Involvement in the project has been enthusiastic, with 48 veterinarians enrolling at least one calf. A full summary of the findings in the project will be shared when it concludes in early 2018.

In the meantime, interestingly and a bit surprising to many, four calves included in the project have been found to have selenium deficiency, also often referred to as White Muscle Disease (WMD). The four were all from different farms. Two came from cow-calf operations and two from dairy farms. All four calves had been treated by their owners for diarrhea and died in spite of treatment with fluids and antibiotics. Three of the four also had evidence that bacteria had spread in the bloodstream to other organs beyond the gut (septicemia). Without doing the post-mortems and laboratory testing, the producers and vets involved would have thought these calves died from the more obvious illness, diarrhea. Comments from some of the vets have highlighted that the underlying problem of selenium deficiency was not expected.

Based on some informal producer surveys by Ontario veterinarians it seems possible that some producers have become less conscientious about injecting calves with selenium supplementation products as a routine procedure. The calf post-mortem results suggest that there is a need to reinforce the importance of injecting all calves with selenium products at birth.

Selenium is an essential nutrient for cattle. It plays a critical role in the growth and function of cells that are part of the immune system. It also serves as an important anti-oxidant, working to prevent collateral cell damage when the immune system is activated. Crops grown in most parts of Ontario are deficient in selenium meaning cows cannot transfer enough selenium to calves before birth. Cows fed selenium supplements prior to calving will provide more selenium to their calves via the placenta prior to birth but the transferred amount is still insufficient and virtually all calves are born deficient. The colostrum of supplemented cows has about three times more selenium than milk but transfer to the calf depends on adequate intake and absorption of colostrum. We know from studies of the blood protein levels of newborn calves that colostrum intake by newborn calves can be highly variable on many farms. Even with adequate intake of selenium from colostrum the persistence of selenium in calf's body is short-lived. To counter this, all Ontario calves need to receive selenium by injection shortly after birth. The amount given should be discussed with your herd vet, as injectable products vary considerably in the amount of selenium they contain. The amount provided should be appropriate for the calf's weight. Over-supplementation gives no extra benefit nor duration of effect and at very high levels selenium can be toxic to calves.

In calves there is still a lot to learn about how neonatal selenium levels impact on subsequent calf health. It has been shown that when calf blood selenium levels are low the uptake of antibodies from colostrum is reduced. Experimentally, adding selenium directly to colostrum or "super"

supplementing calves has been shown to increase antibody absorption by as much as 40 to 60%. Since the process that allows antibody absorption across the calf's gut ceases by 24 hours after birth, these experimental methods show that to have an effect on the absorption of antibody from colostrum, selenium injection should occur very soon after birth.

Dairy calves injected at three days of age with a commercial trace mineral product that included selenium had a lower occurrence of diarrhea and a lower incidence of combined diseases compared to untreated calves during the first two weeks of life. This illustrates that the effect of selenium on the immune function of the calf is not just by the very early enhancement of antibody absorption but also via effects on the function and growth of the calf's own immune cells. More research is still needed to determine if additional selenium supplementation during the milk-fed period can provide longer term health and growth benefits for dairy calves. So far, the effects appear to be strongest in early life.

In weaned calves, injection of a selenium-containing trace mineral supplement at the time of vaccination has been shown to generate a better response to vaccination compared to control calves. This supports the important role of selenium in immune function related to immune activation and stimulation but has yet to be shown to have the same effect on vaccination response in younger calves.

Typically calves that show the visible signs of selenium deficiency (WMD) are alert but are weak or can't get up because they don't have the muscular strength to stand. They may also have heart problems as all muscle types (skeletal, cardiac and smooth) are affected to some degree. Most producers and veterinarians rarely see a case of uncomplicated WMD except perhaps in beef calves born to cows pastured without supplementation. However selenium deficiency can still be present and be predisposing calves to other problems. Subclinical selenium deficiency is difficult to recognize but when other common health issues such as diarrhea occur in calves, selenium supplementation protocols should be reviewed. Veterinarians may assume producers are injecting calves routinely but producers may have drifted away from doing this without fully understanding the necessity.

Selenium deficiency remains an important issue in Ontario. Calves can be affected when intake of selenium supplements by dry cows is inadequate and/or colostrum intake by calves is insufficient to provide adequate selenium. To dependably prevent selenium deficiency calves need to receive an injection soon after birth with an E/selenium product. Even though overt signs of WMD may not be seen subclinical selenium deficiency can cause calves to succumb to other problems.

Post-mortems of calves done as part of the OAHN Calf Surveillance project have been very revealing. A calf post-mortem can easily be done on the farm with little time investment or calves can be transported to the Animal Health Laboratory in Kemptville or Guelph. Further lab testing may or may not be needed depending on the initial findings. Talk to your herd veterinarian about what is involved.

Too often we think we know why calves have died but the Calf Surveillance project shows it's not always the case. Don't miss the chance to learn more about why a calf has died – the dead calves can't be saved but should not die in vain – their post-mortems can have important messages that will change calf management and prevent future problems.

