

# Hitting the ground running

**Catching a calf before the cow has a chance to begin cleaning it is a challenge, but Amanda Fischer was able to capture 27 male Holstein calves over the course of several months** BY ANNE COTE

WHEN AMANDA FISCHER left the town of Glen Morris, Ontario to study at the University of Guelph she didn't anticipate moving to Edmonton to pursue a Masters degree. But, as she worked on her undergraduate degree in Animal Biology, her interest in research grew. Because of her interest in finding ways to improve early life nutrition feeding strategies in the neonatal calf, she was introduced to Dr. Michael Steele at the University of Alberta and became his Masters student.

This spring she presented the research she'd undertaken under the

guidance of Dr. Steel - evaluating the advantage of feeding colostrum to calves immediately after birth, even before the mother has a chance to lick them clean - and won first prize in the 2017 Western Canadian Dairy Seminar presentation competition.

Catching a calf before the cow has a chance to begin cleaning it is a challenge, but Fischer was able to capture 27 male Holstein calves over the course of several months. The dairy farm where Fischer collected the calves had a herd of 150 cows. Because the farm uses artificial insemination (AI)

but doesn't ascribe to timed AI, preferring to inseminate cows as they come into estrus naturally, they don't have a specific calving season.

Fischer says, because calves are born without passive immunity, they depend on the passive transfer of immunoglobulins (IgG) from colostrum to protect them from disease especially during the preweaning period.

Her curiosity was peaked by the lack of data on when bacterial colonization actually began in a newborn calf as 39 to 55 per cent of preweaning calf mortalities were typically due to the failure of passive transfer of IgG from colostrum and lack of the ability to produce IgG.

She thought that the earlier the calf absorbed IgGs through passive transfer from colostrum, and, the sooner it could produce its own IgGs, the less likely it was to die prior to weaning. To prove this idea she undertook a study "to investigate how delaying the first colostrum feeding can impact the passive transfer of IgG and the colonization of bacteria in the distal intestine of neonatal calves."

Fischer said the time between the birth of a calf and its first pooled colostrum feeding varies depending on the amount and type of surveillance that's available in the barn.

So, even though at least 41 per cent of dairy producers have reported giv-



Amanda Fischer receives congratulations from Dr. Michael Steele (University of Alberta) for her first place win in the 2017 Western Canadian Dairy Seminar presentation and poster competition.

ing the first colostrum meal to a calf within two hours following their birth, many may not be aware of a birth until the calf is six hours old or older.

The 27 male Holsteins in Fischer's study were housed at the Dairy Research and Technology Centre at the University of Alberta and divided into three groups. The first group received their colostrum feeding within 45 minutes of birth. The second group received their first colostrum feeding at 6 hours after birth and the third group was fed at 12 hours after birth. Regardless of which treatment group they were in, calves were fed cooled pasteurized colostrum containing 62g of IgG per litre at a rate of 7.5 per cent of their body weight (average body weight was 43 kg) or 3.2 litres of colostrum with 198g of IgG. The feeding was administered through esophageal tubes.

The calves were also fed milk replacer by bottle every 6 hours at 2.5 per cent of birth body weight until they were 48 hours old.

Fischer noted that the amount of IgG in the colostrum was also important because the calves failed to absorb an adequate quantity of IgG when the colostrum given to them contained less than 10g of IgG per litre.

Usual on-farm practice for evaluating the levels of IgG in the calf's system is to take a single blood sample anywhere from one to seven days after birth. Fischer's study allowed researchers to evaluate the degree of passive transfer of IgG much sooner and more frequently.

Blood samples were taken every three hours from birth to 51 hours. At this point the calves were euthanized and intestinal tissue and digesta of the ileum, distal jejunum and colon were extracted and studied.

One of the many challenges Fischer and her colleagues faced, besides waiting up all night for a calf to be born, was learning how to create and manage a jugular catheter to facilitate the collection of blood samples. She said it took almost a month of training before

she was ready to use the catheter on a live calf.

Fischer also looked for differences in the speed colonization of specific bacterial species occurred when calves received their first feeding of colostrum immediately after birth, at six hours and at 12 hours.

By the end of the study Fischer had discovered that calves fed colostrum in the first hour of life absorbed, on average, 50 per cent of the available IgG into their blood stream and they had a higher "higher abundance of total bacteria attached to the distal jejunum". Calves fed first colostrum at 6 hours and 12 hours only absorbed 35 per cent of the available IgG and has less bacteria attached to the distal jejunum. The presence of bacteria in the lower digestive tract is essential to good health as the calf ages, she added.

Fischer's findings verify older studies that reported IgG transfer is optimal during the first four hours of a calf's life, but it also shows that there is a

drop in absorbency rates of IgG when calves are fed at 6 hours and beyond. The early feeding of colostrum also indicated a higher colonization of beneficial bacteria in the colon compared to calves fed later.

Fischer noted that both increased IgG and beneficial bacteria in the intestine "are hypothesized to assist in protecting the calf from enteric infections during the pre-weaning period." Her findings also emphasize the importance of good barn surveillance so calves aren't left more than four hours without their first colostrum feeding.

In addition Fischer discovered that there's a higher prevalence of transfer of E.coli in the ileum of calves fed colostrum immediately after birth. However, because she didn't measure what type of E.coli, good or pathogenic, were present, she's left the door open for more research into how early colostrum feeding helps the intestine protect preweaned calves from disease. 