

Feeding Milk and Colostrum to Dairy Calves:

How Canadian Dairy Research Supports the Code of Practice

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Over the last 25 years, the University of British Columbia (UBC) Animal Welfare Program has conducted research that has led to the improvement of animal care and welfare in Canada and around the world. Dairy cattle welfare researchers, Dan Weary and Marina (Nina) von Keyserlingk, are key leaders in this program. Through their NSERC Industrial Research Chair (IRC) in Dairy Cattle Welfare, funded in part by the Dairy Farmers of Canada, they have been investigating novel approaches to addressing industry-wide topics, including milk and colostrum feeding practices for calves.

What Does the Code Say?

The *Code of Practice for the Care and Handling of Dairy Cattle* (Code)¹ was updated in March of 2023. With this update came revisions to Canada-wide requirements for milk and colostrum feeding practices for calves. Specifically:



- ➡ In addition to previous diet requirements for growth and health, calves must receive a diet that promotes satiety. The Code defines satiety as a feeling of fullness, or hunger that has been satisfied.
- ➡ Minimum daily quantities of milk or milk replacer required for calves are as follows:
 - Newborn calves must receive at least 15% of their birthweight.
 - Calves from 7 to 28 days old must receive at least 20% of their birthweight.
- ➡ Colostrum quantity and timing of delivery requirements remain the same, but the Code now specifies that they apply to both male and female calves.

Key Takeaways

Receiving sufficient colostrum is critical for both male and female calves.

Calves should receive ample milk in the first weeks of life, as they have limited ability to digest solid feed, it promotes good welfare, and can improve productivity.

Producers should ensure they are feeding calves above the minimum required volume of milk or milk replacer per day, which varies based on their age and weight.

In Canada, the proAction® program is implemented on all Canadian dairy farms and its requirements are aligned with the previous Code.



DFC has committed to incorporating the 2023 Code requirements into the program. This work is currently underway by proAction's Animal Care Technical Committee. **The 2023 Code updates on milk allowance for calves are aligned with the proAction requirement for calves under 1 month old to receive a total daily intake of 20% of their body weight.**



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What Does the Science Say?

Excellent colostrum and milk feeding is essential to the health, productivity, and well-being of dairy calves, yet some farms face challenges in achieving good results. Researchers Weary and von Keyserlingk, and their team at UBC, have provided valuable insights into improving colostrum and milk feeding practices, including practical strategies for measuring and motivating success on farms.

HOW CAN COLOSTRUM MANAGEMENT BE IMPROVED?



The importance of colostrum for calf immunity is well known, and it is a longstanding Code requirement to feed 4 liters of good quality colostrum within the first 12 hours of birth, with the first meal given as soon as possible². However, colostrum management remains a challenge on some farms and UBC researchers have provided some ideas for improvement:

- ➡ **Benchmarking:** The UBC team found that providing farmers with benchmarking reports, which compared calf immunity and growth parameters to other farms within their region, was effective in prompting impactful management changes³.
- ➡ **Monitoring:** Another contribution by the UBC research team to colostrum science focused on measuring success using total protein and immunoglobulin concentrations in blood samples. By sampling calves up to 10 days of age, the researchers found that the optimum time for testing is 1 to 3 days, but testing can be reliably done up to 9 days of age⁴. Such monitoring can help inform better colostrum management strategies.

WHY WAS COLOSTRUM PROVISION FOR MALE CALVES EMPHASIZED IN THIS CODE UPDATE?



The care of male dairy calves is a societal concern. Research led by Dr. von Keyserlingk has explored the complexities of achieving better welfare outcomes for this population^{5,6}.

Through UBC research, Canadian experts in male dairy calf rearing and marketing emphasized the importance of providing male calves with good colostrum to improve their welfare as they transition to calf rearing facilities⁷.

DO CALVES REALLY NEED MORE MILK?



A highly influential study led by Dan Weary in 2002 found that calves allowed to consume milk freely ate an average of 8.8 kg per day until weaning, which corresponded to less hay and starter intake⁸. Several other UBC studies, summarized in a review by researchers Weary, von Keyserlingk, and Khan, supported the idea that preweaned dairy calves can safely consume 20% of their bodyweight per day in milk⁹.

Science suggests that feeding calves high levels of milk offers several advantages, including:

- ➡ Higher preweaning weight gain
- ➡ Improved feed efficiency
- ➡ Reduced incidence of disease
- ➡ Reduced hunger
- ➡ Greater ability to express natural feeding behaviours

WHAT ARE POTENTIAL DOWNSIDES TO FEEDING MORE MILK TO CALVES?



In their comprehensive review on milk rations in dairy heifers, the UBC team acknowledged that high milk intake can suppress solid feed consumption, but this is also influenced by the method of weaning and calf housing⁹. Other UBC studies have supported gradual weaning based on feed intake rather than age¹⁰, and housing calves in pairs or groups in the preweaning period¹¹, to reduce the risk of low feed intakes and a corresponding decline in health or growth after weaning in calves on high milk rations.

WHAT IS THE BEST WAY TO DELIVER MILK TO CALVES?

While the Code does not stipulate a specific feeding method, best practice recommendations include feeding calves milk through a teat.

Research suggests that:

- ➡ Teat feeding encourages natural sucking behaviour¹².
- ➡ Teat feeding over bucket feeding can reduce cross-sucking and other undesirable oral behaviours¹³.
- ➡ Feeding from a well-designed teat offers improvements in satiety and digestive function¹⁴.



HOW CAN I MAKE SURE THE CALF DIET PROMOTES SATIETY?

- ➔ **Adequate volume:** UBC researchers have provided valuable insights into assessing hunger in calves. One study found that calves fed restricted milk (10% of body weight) ate more quickly, were more active and competitive, and spent more time at the feeder, suggesting they were hungrier compared to those fed ad libitum¹⁵. These behaviours can serve as indicators of hunger and satiety.
- ➔ **Frequent meals:** In a review of milk feeding practices, researchers noted that calves fed fewer than 2 or 3 meals per day experienced higher feeding motivation and possibly hunger¹³. While ensuring adequate milk volume is critical for satiety, increasing meal frequency should also be considered.



How Can Producers Use This Information?

- ➔ **Self-evaluation:** Producers should consider the ideas brought forward by the UBC team and other researchers on milk and colostrum feeding strategies. Adjustments may be warranted in the volume of milk provided, method of feed delivery, meal frequency, weaning approach, and housing strategies to optimize calf health, welfare, and productivity.
- ➔ **Measure and manage:** Calf immunity, growth, health, and behaviour can all be indicators of success in colostrum and milk feeding. Regular monitoring of these outcomes can help identify issues and motivate ongoing improvements.



Where is the Research Headed?

Future research will focus on how colostrum and milk feeding practices impact calf health, productivity, and behaviour in different farm settings.

Additionally, understanding how to motivate farmers to improve their colostrum and milk feeding remains a key area of focus, helping the dairy industry tackle these challenges⁶.

The Bottom Line

- ➔ Colostrum is essential for both male and female calves.
- ➔ Feeding calves adequate milk is required, and benefits their welfare and productivity.
- ➔ Monitoring success in colostrum and milk feeding can help farms improve.

To meet updated Code requirements, producers should:

- ➔ Provide male and female calves 4 liters of good quality colostrum within 12 hours of birth, with the first meal occurring as soon as possible, and no later than 6 hours after birth.
- ➔ Provide calves with at least the minimum required volume of milk or milk replacer, which varies based on their age and is based on bodyweight percentage (15% for newborns, 20% for 7 to 28 days old).
- ➔ Monitor calf growth, health and hunger to ensure their nutritional program is effective.
- ➔ Work with a qualified advisor for further guidance on calf feeding strategies.



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