

NSERC Industrial Research Chair in Dairy Nutrition: 5-Year Summary (Part 1)

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IRC in Dairy Nutrition Financial Supporters



NSERC Overview

The Natural Sciences and Engineering Research Council of Canada (NSERC) promotes and supports discovery research and fosters innovation by encouraging organizations to participate and invest in postsecondary research projects. One of the ways they do this is through appointment of Industrial Research Chairs (IRC). There are a number of IRCS in dairy research across Canada, with three currently being held by researchers in Alberta.

IRC in Dairy Nutrition

Before relocating to the University of Guelph in 2018, Michael Steele was appointed as an IRC for dairy nutrition at the University of Alberta. The specific goal for Dr. Steele's 5-year IRC program is to develop feeding and management practices for calves that will promote proper gut microbial colonization and development, thereby decreasing susceptibility to enteric infections and use of antibiotics, while increasing growth and future productivity. Dr. Steele conducted the majority of this research in Alberta, before transferring his IRC appointment in Ontario.



Performance Highlights

Over the first four years of his research program, Dr. Steele has had a large impact on the Dairy industry. Some of his performance highlights include:

Publications

- 42 peer-reviewed journal articles
- 41 conference presentations and posters
- 14 technical reports/extension articles

Highly Qualified Personnel Trained

- 7 post-doctoral fellows
- 8 PhD students
- 12 MSc students
- > 20 undergraduate students
- 6 visiting scientists

Presentations

- 50 presentations with industry and academics, reaching over 200,000 people

In November 2019, Dr. Steele hosted the **Smart Calf Rearing Conference** and **Producer Day** at the University of Guelph. The conference brought together experts in calf rearing from around the world to discuss neonatal management, calf health, plane of nutrition and calf welfare. In total, the scientific conference hosted 150 people from 14 different countries and the Producer Day welcomed more than 300 dairy producers.

Research Highlights

- Delaying colostrum feeding can compromise gut development and may increase risk of infection
- Calves fed good quality colostrum by either esophageal tube or nipple bottle resulted in the same blood IgG concentrations
- Cows parity can influence the concentrations of bioactive compounds in colostrum
- Feeding transition milk or a mixture of colostrum and whole milk can promote gut development and function
- No negative effects on glucose or insulin when calves were fed 8L of milk twice per day
- Calves fed 10 L/d vs. 5 L/d had a higher average daily gain
- Delaying weaning to 8 weeks resulted in greater starter intake and weight gain
- Calves fed an elevated plane of nutrition and weaned abruptly may experience hindgut acidosis
- Feeding heifers a high plane of nutrition after weaning resulted in:
 - Increased body condition score
 - Improved gut development
 - Enhanced reproductive tract development
 - Higher chance of reaching puberty by 30 weeks of age and higher number of ovarian follicles during the first estrous cycle



Future Direction

The research we have generated from the NSERC IRC has demonstrated that differing nutritional management strategies for dairy calves can result in great differences in growth performance, health parameters, and gut development. We plan to continue to pursue many areas of future research, including:

- Cow factors that influence colostrum synthesis
- Long-term effects of feeding transition milk
- Investigating fat quality in milk replacers
- Uncovering the effects of weaning on the lower gut
- Challenging traditional post-weaning nutritional programs

Uncovering these large knowledge gaps in calf nutrition and management will allow industry representatives and producers to make confident decisions that promote calf health, welfare and productivity in order to meet our ultimate goal - ensuring the long-term success of the Canadian dairy industry.

Looking for more information on Dr. Steele's research?

- [Part 2 and 3 of this article series](#) discusses feeding calves in the first days, weeks and months of life
- [List of scientific publications](#)
- "Nutritional regulation of gut function in calves: colostrum and milk" [Hoard's Dairyman Webinar](#)
- Extension Articles
 - "Bottles or bags – just get colostrum fed" [Hoard's Dairyman 2019](#)
 - "Healthy Get, Healthy Calf, Productive Future" [Bovine Veterinarian 2019](#)
 - "Transition milk boosts calves' digestive development" [Dairy Herd 2019](#)
 - "Rethinking how we feed milk to pre-weaning calves" [Progressive Dairy 2018](#)
- Information on the [2019 Smart Calf Rearing Conference](#)
- University of Guelph [bio and contact](#)