



## **Cross Sector Livestock Research Priorities**

**February 2020**

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## Overview

This document provides an overview of research priorities for the Ontario livestock industry as of February 2020. This will be used by the Ontario Ministry of Agriculture and Food (OMAFRA) as they develop research priorities for the 2020 Alliance (OMAFRA / University of Guelph) call for proposals. It is also useful to sector organizations as they consider opportunities to work collaboratively on common issues. Several input documents (table 1) were used to identify priorities ranked across sectors. Research questions by sector for each priority area are provided.

### Input documents used to prepare cross sector research priorities for the Ontario livestock industry

*Table 1 – Documents used to determine research objectives*

| Sector      |  |
|-------------|--|
| Beef        | Report from the LRIC-facilitated meeting of Beef Farmers of Ontario (BFO) Research Committee Oct 2019, also drew on Beef Cattle Research Council (BCRC) document   |
| Pork        | Pork Research Call Document (2019) which has an overall focus on: “Testing potential improvements to swine industry practices”   |
| Poultry     | Poultry Research Strategy 2014-2020; and the Canadian Poultry Research Council (CPRC) research priorities document and confirmed with Ontario poultry producer organizations. LRIC will be working with the four poultry groups in 2020 to update this document. |
| Sheep       | Report from the LRIC-facilitated session on behalf of Ontario Sheep Farmers (OSF) in 2018  |
| Goat        | Report from LRIC-facilitated session of the Goat Value Chain Roundtable Dec 2019   |
| Veal        | Ontario Veal Farmers (OVF) submitted research priorities used for their call for proposals   |
| Aquaculture | Report from LRIC-facilitated session on behalf of the Ontario Aquaculture Association (OAA) in Feb 2019  |
| Forage      | Report from LRIC-facilitated session for Ontario Forage Council (OFC) in Oct 2019: BFO, Dairy Farmers of Ontario (DFO) and OSF participated  |
| Equine      | Report from LRIC-facilitated industry session in 2018, Equine Research Priorities 2019-2024  |

### Note on Dairy priorities:

Dairy Farmers of Ontario (DFO) is not currently a member of LRIC, however LRIC, by nature of its mandate, deals with issues relevant to all livestock sectors. The rating of forage related priorities for the dairy sector is derived from the Ontario Forage Council (OFC) research priorities meeting at which DFO was an active participant.

## Overarching concerns:

Across the many livestock sectors there were several high priority, overarching concerns. These include the need for **better “innovation”** where innovation is defined as the process of driving change by farmers based on research results. As one past Guelph faculty member noted, research is turning dollars into knowledge while innovation is turning knowledge into dollars. The diagram below shows that this broad, yet critical area of work includes KTT, extension, advisory services and in some sectors, sales and service. Though each sector used slightly different language (e.g. KTT), the issue was raised by most sectors: beef, pork, poultry, sheep, veal, aquaculture, goat, equine and OFC.

**Research = Turning \$ into Knowledge**


**Innovation = Turning Knowledge into \$**

**Research Result**



**Change on Farm**



- 
- ✓ **KTT**
  - ✓ **Extension**
  - ✓ **Advisory Services**
  - ✓ **Sales and Service**
  - ✓ **Education**
  - ✓ **Training**

*Photos courtesy of BFO*

Additional areas of concern included: having a clear assessment of the **economics** of making use of research results on farm; ensuring that both **modern facilities and HQP** are available to do leading edge research; advancements that help to deal with the chronic **labour** shortage being experienced by all of agriculture; and a solid understanding of the **market and shifts** occurring within that market. Having a **close working relationship between faculty and industry** was noted and LRIC has responded by introducing a mentorship program for early stage University of Guelph faculty. Response has been great with seven faculty now involved.

## Common high priority specific areas of research:

High priority research areas include:

1. Development of a comprehensive **net impact analysis of livestock production**. This is needed to inform a concerted effort to communicate facts showing that livestock production is, by far, net beneficial to the environment and society. Of particular note, the net impact of including forage in livestock systems must be documented and promoted.

- Means that can be employed by the livestock industry to contribute to the effort to avoid **antimicrobial resistance** while maintaining or improving productivity and profitability. This includes research to ensure knowledge of appropriate drug use withdrawal times.
- Effective means of **euthanasia**.

### New areas worthy of consideration:

The emerging field of **Artificial Intelligence** (AI) is set to revolutionize many aspects of life, livestock production included. It would be wise to be proactive in this area and obtain a head start on this technology, utilizing real needs at the farm to guide this area of research.

There is a clear need for **360-degree research/analysis**. The livestock sector, in many respects, is under threat, often by people using one small part of the whole picture (e.g. GHG emission) while ignoring other critical considerations (e.g. soil health).

The renewal of research facilities is well underway and needs to be completed. This is not just an Ontario need. The Canadian Poultry Research Council notes in their priorities document the need for a **modern poultry research facility** in Ontario.

### Determining priority areas across sectors:

Using all of the available sector priority ranking documents, each area by sector was scored as high priority (H), medium priority (M) or non-priority (blank). Using a scoring method of 2 per H ranking and 1 per M ranking, the table below shows the resulting relative ranking of priorities across all livestock sectors.

**Table 2 – Priorities across sectors**

| Area                        | Beef | Pork | Poultry | Sheep | Goat | Veal | Aqua-culture | Equine | Dairy | Score |
|-----------------------------|------|------|---------|-------|------|------|--------------|--------|-------|-------|
| Health                      | H    | H    | M       | H     | H    | H    |              | H      |       | 13    |
| Nutrition                   | M    | H    | H       | H     | H    | H    |              | H      |       | 13    |
| Welfare                     | H    | H    | H       |       | H    | H    | M            |        |       | 11    |
| Environment                 | H    | H    |         | H     |      |      | H            |        |       | 8     |
| Forage                      | H    |      |         | H     | M    |      |              |        | H     | 7     |
| Production systems          |      | H    | H       |       | H    | M    |              |        |       | 7     |
| Product quality/development | M    | H    | M       | M     |      | M    |              |        |       | 6     |
| Food Safety                 | H    |      | M       |       |      | H    |              |        |       | 5     |
| Data                        | M    |      | H       | M     |      | M    |              |        |       | 5     |
| Economics                   |      | H    | M       |       |      | M    |              |        |       | 4     |
| Genetics and Reproduction   |      | H    |         |       |      |      | H            |        |       | 4     |
| Marketing                   |      | M    |         |       |      | H    |              |        |       | 3     |

**Table 3 – Health**

| Sector     |  |
|------------|--|
| Beef       | Antimicrobial Resistance.Antimicrobial Use (AMR/AMU): benchmarking and alternatives<br>Improving gut health<br>Chute-side test for vaccination immunity<br>Better understanding/prevention of Bovine Respiratory Disease (BRD) and lameness  |
| Pork       | AMR/AMU and alternatives<br>Herd health  |
| Broilers   | Understanding and response to on farm practices affecting AMR (all poultry)<br>Development of vaccines (all poultry)   |
| Eggs       | Understanding of and vaccine or management practices to avoid False Layer Syndrome   |
| Turkey     | Production systems that enable a reduction in AMR<br>Better ways to implement biosecurity on farms   |
| Hatcheries | Understanding metabolic disorders in developing chicks   |
| Sheep      | Withdrawal times for off label products<br>AMR/AMU and alternatives<br>Ewe vaccinations to reduce mortality and morbidity of lambs<br>Effective determinants of parasite loads   |
| Goat       | Improved control of Caprine Arthritis Encephalitis (CAE)<br>Withdrawal times for off label products<br>Kid health  |
| Veal       | Reducing AMU<br>Calf Transport - Age, stress, transfer from farm origin to all points<br>Housing - Benchmarking cleaning disinfection and measuring impact<br>Management Practices - Benchmarking current practices and investigating ways to improve<br>Co-mingling calves - Reducing disease transfer in co-mingled calves |
| Equine     | Real time assessment of impacts of physiological stress<br>Rapid stall-side testing (e.g. respiratory)   |

**Table 4 – Nutrition**

| Sector |   |
|--------|---|
| Beef   | Improving feed efficiency and the nutritive value of alternative feeds (different by-products, grains, and forages).<br>Improving calf feeding systems. |
| Pork   | Feed costs<br>Precision feeding   |
| Eggs   | Examine relationship between diet and behaviour<br>Use of diet to improve egg quality and barn environment  |
| Turkey | More precisely defined nutritional requirements for various life phases   |

|        |   |
|--------|---|
| Sheep  | Impact of grazing winter wheat or rye<br>Strategies to optimize ewe body condition score in accelerated rearing systems                       |
| Goat   | Need updated, meat and dairy goat-specific ration formulations<br>Better understanding of nutrition related diseases (e.g. pregnancy toxemia) |
| Veal   | Investigate alternative feeds and colostrum production to improve efficiency and calf health  |
| Equine | Effect of high protein diet on acid/base balance<br>Effect of dietary antioxidants on post-exercise inflammation resolution                   |

**Table 5 – Welfare**

| Sector      |  |
|-------------|--|
| Beef        | Effective pain control<br>Welfare during transport (need for rest stops, impact on behaviour and physiology)<br>Impact of housing and ventilation on welfare |
| Pork        | On-farm euthanasia techniques, barriers to euthanasia, transportation, behaviour vices, space allowance  |
| Broilers    | Effective and humane euthanasia (all poultry)  |
| Eggs        | Improved housing systems   |
| Turkey      | Improved transportation  |
| Goat        | Effective pain management<br>Euthanasia  |
| Veal        | Reducing disease transfer in co-mingled calves in various production systems<br>Improving welfare of male dairy calves throughout the supply chain           |
| Aquaculture | Best practices for culture, euthanasia, shipping and slaughter   |

**Table 6 – Environment**

| Sector      |  |
|-------------|--|
| Beef        | Need for documented, comprehensive role/impact of beef production<br>Specific priority to capture information on Green House Gas (GHG) emission and carbon sequestration in Ontario grasslands |
| Pork        | Improving ecological footprint<br>Environmental sustainability   |
| Broilers    | Improved housing environment for workers and birds (all poultry)   |
| Eggs        | Identify management practices to reduce carbon footprint   |
| Sheep       | Need for documented, comprehensive role/impact of sheep production, particularly wool as a replacement for synthetic fibers  |
| Aquaculture | Development of scalable recirculating aquaculture systems<br>Development of benthos and sediment monitoring systems  |
| Equine      | Documentation of the environmental footprint of the industry   |

**Table 7 – Forage**

| Sector |  |
|--------|--|
| Beef   | New species and better genetics<br>Comprehensive systems approach to pasture management  |
| Sheep  | Pasture management to reduce parasite loads  |
| Equine | Forage quality and respiratory conditions  |
| All    | Need for documented, comprehensive role/impact of including forage into livestock production systems, including soil health and biodiversity<br>Fertilizer recommendations that match today's genetics<br>Methods to accurately and effectively measure on farm forage yields<br>Identify yield of comparable options to alfalfa<br>Extending the grazing season through crop selection, genetics and management |

**Table 8 – Production systems**

| Sector     |   |
|------------|---|
| Pork       | Improving barn environment (temperature, ventilation, light cycle)  |
| Eggs       | Create a facility in which new and evolving systems can be evaluated and compared   |
| Turkey     | Improved litter management to avoid breast blisters   |
| Hatcheries | Identify factors affecting hatchability, substandard chick quality and livability<br>Determination of chick gender prehatch |
| Goat       | Housing and handling equipment  |
| Veal       | Investigate breeding strategies and engage the dairy sector to determine those that can benefit dairy and veal producers    |

**Table 9 – Product Quality and Development**

| Sector |  |
|--------|--|
| Beef   | Improved grading system                          |
| Pork   | Meat quality and safety                          |
| Eggs   | Prolonged shelf life                             |
| Sheep  | Impact of dietary ingredients on meat quality    |
| Goat   | Organisms affecting milk quality                 |
| Veal   | Determine factors that will improve meat quality |

**Table 10 – Food Safety**

| Sector |   |
|--------|---|
| Beef   | Avoiding and quickly addressing food safety issues<br>Rapid and cost effective in-plant detection of microbial agents   |
| Veal   | Develop best practices for sharing of information between dairy and veal producers through tools such as traceability<br>Drug Labelling & Approvals/Depletion Studies that take into consideration the metabolism of calves and veal cattle |



**Table 11 – Data**

| Sector   |   |
|----------|---|
| Beef     | Functional traceability that benefits all along the supply chain  |
| Broilers | Data as an input to smart agriculture (all poultry)               |
| Eggs     | Benchmark data needed to plot progress in environmental impact    |
| Sheep    | Need for benchmark industry data                                  |
| Goat     | Need for benchmark industry data                                  |
| Veal     | Benchmark production practices and correlate with health outcomes |
| Equine   | Effective traceability<br>Baseline of disease trends              |

**Table 12 – Economics**

| Sector |  |
|--------|--|
| All    | Cost of production for various production (e.g. housing) systems |

**Table 13 – Genetics and Reproduction**

| Sector      |  |
|-------------|--|
| Pork        | Hyperprolific sows and related issues (runt pigs, lactation, etc)<br>Improving longevity of breeding stock |
| Broilers    | Selection for improved immunity (all poultry)  |
| Eggs        | Selection for hens that retain shell quality later in life   |
| Turkey      | Solutions for leg problems, roundheart   |
| Sheep       | Genetics that have lower lamb mortality and morbidity  |
| Goat        | Genetic evaluations for meat and dairy   |
| Veal        | Evaluate the relationship between high immune responding cows and calf health                              |
| Aquaculture | Develop a formal breeding program for Ontario Rainbow trout  |

**Table 14 – Marketing**

| Sector |                                      |
|--------|--------------------------------------|
| Pork   | Marketing and consumer trends        |
| Eggs   | Better predictors of consumer trends |

## Summary:

The Ontario livestock industry is highly appreciative of the commitment to research by both the Ministry of Agriculture, Food and Rural Affairs and the University of Guelph. While there are many research needs across Ontario's livestock sectors, priority areas have been identified along with three overarching concerns and emerging new areas of research that warrant investment. There is a clear opportunity for all parties to work more collaboratively to improve innovation to ensure that research results are implemented on Ontario livestock farms.