

## Who we are

We are a small group of researchers within the Livestock Research and Extension Division of Alberta Agriculture and Rural Development (AARD) in Edmonton.

The Monogastric Feed Research Group consists of **Eduardo Beltranena** (Research Scientist/Lead), **Matt Oryschak** (Research Associate), and **Miranda Smit** (Technical Writer/Research Assistant).



Eduardo Beltranena



Matt Oryschak



Miranda Smit

## What we do

We conduct applied monogastric feed research mostly involving nursery and growing-finishing pigs. Our research program focuses on 3 key areas:

- 1) Increasing utilization of novel and underused cereal grains, legumes, oilseeds, their fractions and bio-industrial co-products.
- 2) Identifying cost-effective processing strategies to improve feeding value and reduce the effects of anti-nutritional factors in feedstuffs.
- 3) Studying the effects of dietary inclusion of novel feedstuffs and co-products on growth performance, dressing, carcass characteristics, and pork quality.

'Fractions' include starch, protein, and fibre that are the main components of cereals, legumes, and oilseeds. For example, from canola meal we produce low- and high-fibre fractions; the low-fibre fraction is targeted to feeding nursery pigs whereas

the high-fibre fraction is targeted to feeding sows.

'Co-products' are what's left from large-scale bio-industrial or human food processing. Co-products are not useless by-products to trash, but instead have economic value. For example, the main co-product of crushing canola seed for human food oil consumption is canola meal. The main co-product of fermenting wheat grain to produce ethanol for gasoline inclusion is wheat distillers grains and solubles (DDGS). Both of these co-products are high in protein and phosphorus that pigs can readily convert into pork.

Our low-cost processing methods aim to increase digestibility and absorption of nutrients from individual feedstuffs. We utilize processing also to reduce the effects of naturally-occurring compounds in feedstuffs that interfere with the digestion and absorption of nutrients like glucosinolates, phytate, trypsin inhibitors, insoluble fibre, ergot, etc.

Feeding bio-industrial or food industry co-products and even some grains may reduce the feed intake of pigs, decreasing their weight gain, and the efficiency in which pigs convert feed into pork. Yet feeding co-products can be very cost-effective. We thus target establishing both maximum and optimum feed inclusions of these feedstuffs and issuing recommendations to maximize producers' profit margin after subtracting feed cost.

Feeding certain feedstuffs for example enhances fat colour whereas feeding others reduce pork firmness. We identify opportunities to enhance pork attributes and address threats to pork quality that result from high feed inclusions or prolonged feeding of feedstuffs that are cost effective. We therefore find the best compromise between pork quality and profitability for both producers and packers.

Figure 1 is a graphical overview of AARD's pork program with examples of feedstuffs and variables we consider in our research.

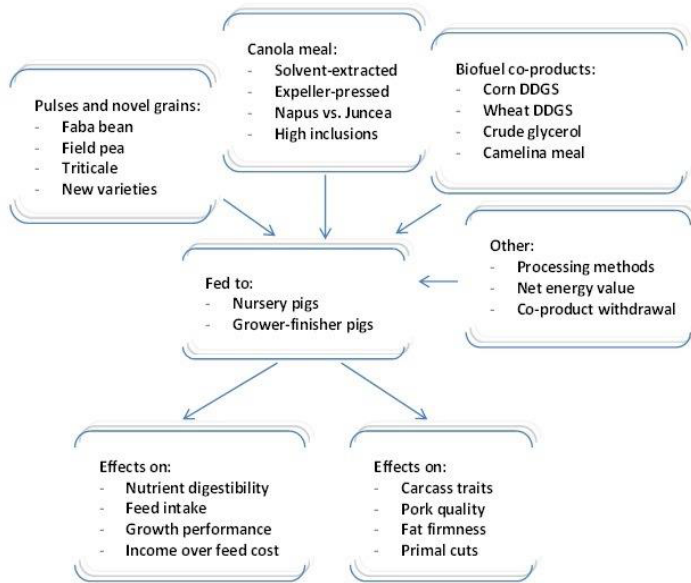


Figure 1. Graphical overview of pork research conducted by ARD’s Monogastric Feed Research Group

## Why we do it

- Feed represents 65 - 75% of the cost of pork production. Reducing feed cost is central to all our research projects. It is the main determinant of profit margin for pig producers.
- Research into the feeding value of locally-grown pulses allows western Canadian pork producers to reduce their reliance on imported soybean meal. This effort increases market demand for rotational crops (e.g., field pea, faba bean) and assures that lentil, chickpea, field pea that do not meet export grade (e.g. splits) are utilized for feeding pigs.
- Canada exports 2 out of 3 hogs either as pork or live animals. Thus, our carcass traits and pork quality research is critical to assuring quality attributes to preserve consumer confidence and expand Canada’s pork export markets.
- Expanded production of ethanol and bio-diesel in Western Canada generates large quantities of DDGS and canola cake. Feeding these not only highlights the pig as convertor of bio-industrial co-products into pork, but also creates local markets to sell the co-products to, which reduces distribution costs.

- Our research into the feeding value of fractions and co-products permits a single crop to be utilized for human food, bio-industrial applications and animal feed, thereby creating opportunities to add value to raw, undifferentiated agricultural commodities.
- We focus on how to get more out of feedstuffs by increasing digestibility and thus largely reducing nutrient excretion in manure. Domestic and foreign pork consumers must have confidence that Alberta is an environmental steward and a leader in farm animal food products.
- Our research directly benefits pork producers and packers, and indirectly benefits crop growers, bio-processors, rural economic development, and entices exports. We thus facilitate the growth of rural Alberta communities, enabling producers, processors, and agri-businesses to succeed and be self-reliant in a highly competitive global economy.



Figure 2. Commercial-scale trials involving up to 2200 hogs are conducted at the Drumloche test barn at Lougheed, AB

## Where we do it

Our research group emphasizes both applied and collaborative research. Our growing-finishing pig trials are large, commercial-scale. For years, we have collaborated with Gowans Feed Consulting conducting trials at the Drumloche test barn at Lougheed, AB. Trials there involve 1100 to 2200 hogs housed in pen groups fed by a robot, and slaughtered at fast-line abattoirs. We either collect pork samples at these abattoirs or 10 to 20% of hogs are slaughtered at Agriculture and Agri-Food Canada Lacombe. Collaboration with AAFC scientists there permits breakdown of primal cuts



into lean, fat and bone, detailed evaluation of pork quality, and even sensory evaluation of attributes of cooked pork. Processed pork products are prepared and evaluated by taste panels at Alberta Agriculture's Food Processing Centre in Leduc (Figure 3). Bellies are brine-injected, smoked, and sliceability determined there.



Figure 3. Preparing breakfast sausage from hogs fed corn and wheat DDGS at Alberta Agriculture's Food Processing Centre in Leduc, AB

Our digestibility and nursery trials are conducted at the Swine Research and Technology Centre. In collaboration with Dr. Ruurd Zijlstra at the University of Alberta, co-supervised students focus on establishing nutrient digestibility of individual feedstuffs; others evaluate maximum and optimum inclusions in nursery pig diets.



Figure 4. Expeller-pressing canola seed at AFDP, University of Alberta South Campus, Edmonton, AB

We conduct pilot-scale feedstuff processing at Agri-Food Discovery Place (AFDP), University of Alberta South Campus in Edmonton. Capabilities exist there for controlled particle size reduction, dry and wet fractionation, oilseed screw-pressing, expelling (Figure 4), and oil solvent-extraction. Small-batch

hammer-milling, rolling, mixing and cold-pelleting (Figure 5) for nursery and digestibility trial diets we conduct at the Metabolic Unit using our own equipment. We also warehouse an array of test ingredients there collected at several locations to evaluate feedstuff variability. Typical grinding, 1-tonne mixing and steam-pelleting are available to us at the University of Alberta feed mill. Feedstuff extrusion work we conduct at Alberta Agriculture's pet food plant located at CDC South in Brooks.



Figure 5. Alberta Agriculture's pellet press and cooling conveyer for nursery diets at the Metabolic Unit, Edmonton, AB

In summary, we are a small research group, yet focus on the big picture: pork producers' profitability and pork quality. By increasing feed utilization of Prairie-grown cereals, pulses, oilseeds, their fractions, and food/bio-industrial co-products, we reduce the producers' main cost of production: feed. We increase feedstuff digestibility to reduce nutrient excretion and obtain predictable pig performance. We care a great deal about how feeding Prairie feedstuffs affects carcass traits and pork quality to preserve and expand domestic and export markets. We trust our research efforts benefit rural development, contributing to economic growth, and the self-reliance of crop farmers, pig producers, pork packers, and food/bio-industrial processors.

For information about our research program or details about projects described on our website, please contact us. We'd be happy to hear from you!