



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 broilers and laying hens. 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 product quality (i.e., meat and eggs).

Why we do it

Feed represents 65 – 75% of production costs for most livestock and poultry producers. Consequently, managing feed costs is an integral part of profitability and long-term economic sustainability for individual producers and the industry as a whole. We strongly feel that our research program is making measureable progress in providing producers with the information necessary to manage

feed costs using the wide array of domestic feedstuffs available.

Novel feedstuffs and co-products

The domestic poultry industry is heavily reliant on imported feedstuffs, such as corn and soybean meal. Prices for these commodities fluctuate in response to demand from world markets, exchange rates, and other influences outside of producers' control. These ingredients will likely continue to feature in Canadian poultry rations, but it is important that producers have a range of viable options for local feedstuffs to manage feed costs in an environment where commodity prices are unpredictable.

Many of the co-products (e.g., canola meal, distillers grains with solubles (DDGS)) and novel feedstuffs (e.g., pulse crops) we have studied have been part of the Canadian agricultural landscape for decades. Limited, opportunistic, or regional use of these commodities in poultry feeding means that reliable information and experience may be lacking. A major focus of our group's activities has been to fill in the information gaps necessary to support decision making by producers and nutritionists seeking to control feed costs, optimize performance, and reduce nutrient excretion.

Increased utilization of domestically produced feed commodities by the poultry industry has spinoff benefits for other agricultural and bio-industrial sectors. Increased demand for feed quality grain legumes (e.g., field pea, faba bean) supports higher prices for these commodities. This may also encourage a greater acreage to be grown, thereby increasing availability. Likewise, increasing consumption of locally produced co-products (e.g., canola meal, DDGS, camelina cake) in poultry feeding supports profitability and expansion of value-added activities in the Canadian agri-food sector.

Processing

A common issue with expanded use of co-product feeds for poultry is fibre content. From a practical standpoint, fibre acts as a diluent and reduces energy and nutrient availability in feedstuffs. Certain fibre types are also known to reduce nutrient

digestibility in poultry by different mechanisms. Fibre content therefore can be an obstacle to high dietary inclusions of co-products in commercial poultry diets.

Our group has been actively investigating several processing technologies to counteract the negative effects of fibre in co-product feedstuffs, thereby increasing their value for poultry feeding. When evaluating a new processing technology our assessment criteria include:

- ⇒ *Cost effectiveness* – does the marginal improvement in feed value exceed the cost to apply the technology?
- ⇒ *Throughput* - is the technology applied to batches or is it continuous?
- ⇒ *Scalability* – can this technology be applied at both the farm level and at a large-scale plant?

Some of the processing technologies we have studied recently include:

- Air classification
- Fractionation (based on particle weight and size)
- Extrusion
- Roller-milling (whole seed flax and camelina for layers)

Product quality

Many research groups that study feedstuffs for poultry tend to focus heavily on performance metrics in their evaluation. Our group's philosophy around feedstuff evaluation is slightly more holistic. Performance certainly is important, but the quality of the end product (i.e., meat, eggs) must also be acceptable. A novel feedstuff may deliver acceptable performance, but if the quality of the end product is not, we believe this has to factor into recommendations that come out of our research.

This philosophy is illustrated by our recent

collaborative studies with University of Saskatchewan, investigating feeding high dietary inclusions of camelina cake to layers.

In order to get camelina cake listed in Schedule IV of the *Feeds Act*, we have studied the effects of high dietary inclusions of camelina cake on performance and indicators of toxicity. However, we also looked at how camelina cake affected egg quality parameters, egg component weights, and egg fatty acid profiles, and even looked at sensory evaluations of eggs from camelina cake-fed birds (collaboration with Dr. Wendy Wismer of University of Alberta).

It is our hope that this additional information will help to facilitate the acceptance of camelina cake by the feed and commercial poultry industries in Canada.

Where we do it

Our research group collaborates extensively with researchers and industry partners both in Alberta and across Canada. Some of our collaborators on our poultry related-work have included:

- Atlantic Poultry Research Institute, Dalhousie University
- Department of Animal and Poultry Science, University of Saskatchewan
- Feeds Innovation Institute, University of Saskatchewan
- Department of Agriculture, Food and Nutritional Science, University of Alberta
- Poultry Research Centre, University of Alberta
- Animal Health Branch, Alberta Agriculture and Rural Development
- Canadian Bio-Systems (Calgary, AB)

We are always on the lookout for new collaborators who share our vision of a vibrant, competitive and sustainable Canadian poultry sector. We share our expertise and research-based information about

Camelina cake: why is it such a big deal?



Camelina (~40% oil) is an oilseed that is related to canola. In addition to several favourable agronomic characteristics, camelina oil also possesses a fatty acid profile (high in polyunsaturates, including omega-3's) which make it particularly well suited for aviation bio-fuel production. A factor limiting camelina production however is that the co-product cake/meal that results from oil extraction does not have regulatory approval to be fed to livestock or poultry in Canada. The residual oil in camelina cake (~10-12%) not only increases its energy content, but could also serve as a source of omega-3 and antioxidants for the enrichment of meat and eggs.

Sale of co-products is an important determinant of the market price that processors are willing to pay for the seed. As a result, camelina is at a competitive disadvantage with canola and flax. This in turn influences cropping decisions and likely will limit the acreage grown annually. Since specialty processors require a reliable tonnage to be economically viable, it is unlikely that a large capacity processing facility would be built. The key to changing the status quo lies in creating a market for camelina co-products.

feedstuffs with other researchers and industry professionals to assist them in being more successful.

The bulk of our poultry-related research activities take place at facilities located at the Edmonton Research Station, which is situated on the University of Alberta's South Campus in South Edmonton.

Our bird studies are conducted at the **Poultry Research Centre (PRC)**. The Centre is home to a variety of research facilities, housing systems and infrastructure that allows a range of possibilities, from intensive digestibility studies to performance studies under simulated commercial conditions, to carcass evaluations at the pilot-scale processing plant. We are fortunate to have access to the world-class expertise and the range of capabilities offered at the PRC to support our research activities.



Poultry Research Centre



Environment and Metabolism Unit



Ag-Food Discovery Place

Our pilot-scale value-added processing activities are conducted primarily at **Agri-Food Discovery Place (AFDP)**. Capabilities exist there for controlled particle size reduction, various dry and wet fractionation processes, screw- and expeller-pressing and solvent-extraction of oil from oilseeds.

In past studies evaluating extrusion technology, we accessed extruders operated by Alberta Agriculture and Rural Development in Brooks, AB. We are also



Expeller press at AFDP

excited about the upcoming addition of single-screw extrusion capability at AFDP within the next 18 months.

Processing of ingredients and production of mixed feeds is conducted at the **Environment and Metabolism Unit** using pilot-scale equipment owned by our research group, including:

- High precision, small (<50 kg) and medium (50 – 350 kg) batch mixers
- Hammermill
- Rollermill
- Seed cleaner
- Cold-pelleter
- Pellet durability tester



'Cold' pellet press

At this facility, we also warehouse a variety of test ingredients collected at several locations to accurately represent feedstuff variability.

For larger batches, we rely on the University of Alberta feed mill located a short distance away. The mill has most of the capabilities of a commercial feed mill, including large bulk storage, material handling, steam pelleting and computerized mixing.

Our commitment to industry engagement

Our vision is a vibrant, competitive Canadian poultry industry that takes advantage of the bounty of local feedstuffs generated in the Prairies to manage feed costs. While we do periodically engage in basic research, our group's focus is applied research that has direct application to the commercial industry. This strategy involves how best to communicate our results through extension activities.

Over the past several years, our extension activities have included:

- Research posters at the joint annual general meetings of the provincial poultry commodity groups in Red Deer, AB
- A strong presence at the Poultry Research Centre annual general meeting and poster session
- Participation in the Atlantic Poultry Conference and annual Prairie Poultry Meetings
- Representation at the Poultry Science Association meetings

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!