APPENDIX 11 – FEEDING INITIATIVE

Overview

The objective of this initiative is to improve the competitiveness of Alberta feed grain production and its utilization through livestock. Feed grains include wheat, barley, triticale, hulless barley, peas, co-products of sufficient volume such as DDGS, canola meal, wheat millrun and the possibility of new crops down the road. It will be accomplished through supporting research and development projects, attracting investment into the feed grain production and feeding sector, accelerating commercialization of leading edge technology and strengthening supply chain and value chain's business relationship.

ACIDF is looking for research and development proposals that can deliver practical, clear results to industry around 3 strategic priorities. The strategic priorities are:
1. "Feed Utilization" The more efficient utilization of feed grains by the livestock sector.
2. "Feed Value" The development of technologies that would permit the identification of feed grain attributes that would allow the value of feed grain to be properly determined by growers and feeders. This will optimize value capture by both the feed grower and the feed user.
3. "Innovation in Breeding" The investment in product development through increased investment in public and /or private research and plant breeding dedicated to feed grain.

The Feeding Initiative deliverables include:
- New processes or technologies in feed processing.
- New technologies and practices to better determine feed quality and value.
- Evidence for use by industry of analytical feed quality control.
- Economic impact of the new technologies in industry as evidenced by enhanced feed efficiency and /or lower cost feeding strategies.
- Additional cumulative investment from other sources.

Under the agreement with the ALMA (Alberta Livestock and Meat Agency), $8 million has been allocated to the Feeding Initiative. ACIDF is responsible for its administration and funding. It is to be fully committed by 2013. Preference will be given to proposals that are augmented by partnering with other funding agencies, industry and commodity groups to leverage the investment. Overall leverage expected is the new $8 million from the ACIDF/ALMA Feeding Initiative and $24 million of other financing for a total of at least $32 million new investment in improving feed competitiveness.

Eligibility

Eligible projects under this initiative are research and development projects in the 3 strategic focus areas that are expected to contribute to the growth and development of the crop and livestock industry in the Province.

Research organizations, companies or industry groups may apply. Investment may be made outside of Alberta, where in the best interest of the initiative.

Decision Criteria

Research and development projects will be prioritized to meet the following criteria:
- Identified priority of industry with a measurable chance of success and impact.
- Clearly defined deliverables and identifiable benefit to one or more of Alberta's crop and livestock sectors.
- Thorough assessment of size and specifics of economic benefits to who and specific impacts of project on production / business risk of feed suppliers, feed users, feed manufacturers and other supply chain and value chain participants.
- A clear, well defined technology transfer and commercialization effort outlined and implementable with adequate resources and partners / investors.
- Ability to show measureable practical solutions around feed grain production and utilization that industry will easily adopt and that commercial adoption is underway.
- Exemplify superior scientific design and delivery.
- Includes a well-defined team with appropriate qualifications, leadership / project management ability, and access to appropriate resources for the task.

Program Funding Information (Proposal Expectations)

Proposals will be accepted for all 9 of the identified investment targets. Priority will be given to those proposals meeting objectives within the following "six" targets:

1. Feed Utilization
       1.1 Processing Grain
       1.2 Co-products
       1.4 New Processing Technology
2. Feed Value
       2.1 Feedlot Efficiency
       2.2 NIR Adoption
3. Innovation in Breeding
       3.1 A 4% Yield Curve

Proposals meeting objectives within one of the "six" priority investment target areas and that are strongly leveraged with other funding sources will be the highest priority. The fund is required to leverage the $8 million within the Feeding Initiative fund to at least $32 million. Leverage may vary by project but overall these are the targets for the Feeding Initiative.

Final reports are required to demonstrate industry buy-in and measured economic impact of the research and development project.

Questions and Clarification

Questions and points of clarification can be addressed to:
Rob Hand, Feeding Initiatives, ACIDF at
Telephone 403 872-8262 or Email:rob@acidf.ca

Feeding Initiative Investment Targets:

Strategic Priority 1 - The more efficient utilization of feed grains by the livestock sector.

Investment Targets:

1.1 **Processing Grain** - Improve ruminant feed cost per unit of gain by evaluating how traditional processed small grain varieties and/or agronomic practices affect animal performance.

1.2 **Co-products** - Leverage sources of energy from readily available co-products of sufficient volume with traditional feed grain utilization to lower feed cost per unit of gain.

1.3 **Additives** - Utilize additives (including enzymes) to improve feed cost per unit of gain.

1.4 **New Processing Technology** - Evaluate and adopt new processing technology to improve feed cost per unit of gain.

Strategic Priority 2 – The development of technologies that would permit the identification of feed grain attributes that would allow the value of feed grain to be properly determined by growers and feeders.

Investment Targets:

2.1 **Feedlot Efficiency** - Determine what is driving feedlot feed efficiency (cost per unit gain) that can be measured and adopted by the industry using scientifically accepted protocols.

2.2 **NIR Adoption** - Drive rapid adoption of NIR technology via new and established industry networks.

2.3 **Safe Feed** - Reduce detection costs of mycotoxins and antibiotic residues in DDGS using NIR technology.

Strategic Priority 3 – The investment in product development through increased investment in public and/or private research and plant breeding dedicated to feed grain.

Investment Targets:

3.1 **A 4% Yield Curve** - Determine and demonstrate complementary plant breeding and agronomic management strategies that combined deliver a 4% compound annual yield curve increase in feed cultivars of the following crops – barley, wheat, triticale and peas.

3.2 **Alternative Crops** - Expand adoption of alternate crop platforms as feed grain options.

Investment Target Details:

1.1 Processing Grain (Priority)

Investment Target: - Improve ruminant feed cost per unit of gain by evaluation of how new or traditional processing methods of small grains of different quality and/or agronomic practices affect animal performance.

Objective: Upon completion of this research, the industry will have sound recommendations on how to process and feed small grains to feedlot animals and what affect grain quality and/or agronomic practices will have on feed cost per unit of gain.

Expected Outcomes:
1. Targets a 4 to 6% reduction in feed cost per unit of gain.
2. State of the art recommendations for how to process and feed small grains in ruminant rations.
3. Leads to market signals to the crop producers of what the livestock sector can best utilize.
4. Recommendations for feed grain processing and co-product inclusion in the diet.
5. Managing feed degradation rates to control acidosis, enhance animal performance and health.

Additional Comments:
The challenge is to use processing technology better for barley, wheat, triticale and hulless barley. Proposals should demonstrate ability to manage feed grain degradation rates related to:
1. Feed grain variety differences, grain growing environment and genetic interactions (GxE).
2. Effect of processing: Grind size or dry roll processing on starch, fibre and protein degradability; Nutrient degradability of small grains as affected by co-product inclusion;

1.2 Co-products (Priority)

Investment Target: - Leverage sources of energy from readily available co-products of sufficient volume with traditional feed grain utilization to lower feed cost per unit of gain.

Objective: At the completion of this research, the industry will have data on digestible components in feed grains and co-products and will be able to use that information in the formulation of animal diets to lower feed cost per unit of gain.

Expected Outcomes:
1. Target a 4 to 6% reduction in feed cost per unit of gain.
2. Fermentable products included in a database and used by industry
3. Animal performance enhanced .
4. NIR equations to predict fermentable starch, fibre, protein and fat.

Additional Comments:
There are gaps in the description of both grains and co-products and their relationship to animal performance, specifically:
1. Co-products of significant volume: e.g. wheat millrun, wheat/corn DDGS, canola meal, split and pea screenings.
2. Digestible energy profiles such as digestible starch, fermentable carbohydrate and fibre, and protein and its link to performance and intestinal health for grow-finish pigs and for sows.
3. Managing energy content and cost in complete swine feeds.

4. Influence of co-product processing method and maximum inclusion rate, the effect of other ingredients in the diet and the management of negative feed aspects.

1.3 Additives

Investment Target: - Utilize additives (including enzymes) to improve feed cost per unit of gain.

Objective: At the completion of this research, industry will have adopted hard recommendations that can lower feed cost per unit of gain based on the inclusion of additives such as enzymes with specific co-products in swine and poultry diets.

Expected Outcomes:
1. Target a 4 to 6% reduction in feed cost per unit of gain.
2. Hard recommendations on enzyme use with co-products will minimize user spending money when no benefit can be derived, i.e. the ability to predict enzyme – co-product response.
3. Leads to a more diversified feed base.
4. Reduced environmental impact.

Additional Comments:
There are Canadian registered enzymes where the benefit relative to co-product use is not completely defined. Proposals may address the use of registered or unregistered (new) enzymes in Canada.

Novel approaches such as the use of micro-organisms to deliver enzymes pre-feeding or other methods to pre-treat feeds before being fed would be considered. The result is that the enzymes work on the ingredient rather than working within the gut of the animal.

1.4 New Processing Technology (Priority)

Investment Target: - Evaluate and adopt new processing technology to improve feed cost per unit of gain.

Objective: At the completion of this research, the evaluation of new or the refinement of existing processing techniques will allow grain, co-products and distressed crops to be processed in ways that enhance nutrient availability, animal health and food safety and lead to lower feed cost per unit of gain.

Expected Outcomes:
1. Targets a 4 to 6% reduction in cost per unit of gain.
2. Results in improved animal performance, safety and quality assurance.
3. Leads to more diverse, expanded feed base.
4. May lead to specific market oriented products.

Additional Comments:
The issue is that feed ingredients are increasingly more expensive. Deriving more from processing is necessary to either lower feed cost per unit of gain or to enhance end product quality traits.

The challenge is to develop or find new procedures or refine existing methods to increase digestion and utilization of feed ingredients (grains, co-products, distressed crops) that can demonstrate:
1. Improved nutrient availability e.g. enhanced digestibility of fibre; managed degradation rate of starch; control particle size distribution
2. Improved gastro-intestinal health and food safety
3. Application of biotechnology in feed processing

4. It can work for both on-farm and commercial processing

2.1 Feedlot Efficiency (Priority)

Investment Target: - Determine what is driving feedlot feed efficiency that can be measured and adopted by the industry using scientifically accepted protocols.

Objective: At the completion of this research, industry will have knowledge of what combination of NIR measurements provide for the highest correlation to animal performance and provide a basis for industry to calculate feed grain market value based on animal performance.

Expected Outcomes:
1. Targets a 4 to 6% reduction in feed cost per unit of gain.
2. Industry changes their purchasing metrics. A shift from ingredient pricing to nutrient purchases will enhance diet formulations resulting in lower feed costs per unit of gain.
3. Leads to evaluation and use of alternate feedlot grains - triticale/hulless barley, other ingredients.
4. Leads to less feed fed which means lower feed costs, higher potential for profit, less manure to dispose of, fewer greenhouse gases and possibly shorter days to market.
5. Leads to crop grower outcomes including specific grain value characteristics to drive price; step further away from bushel weight and variety pricing; and may affect agronomic practices (cost of inputs) that optimizes the value of the product.

Additional Comments:
NIRS (near infrared spectroscopy) has the potential to enhance feed efficiency by identifying which feed grains provide the best performance. Gaps exist in relation to what feed grain characteristics correlate/drive feed efficiency.

2.2 NIR Adoption (Priority)

Investment Target: - Drive rapid adoption of NIRS technology via new and established industry networks.

Objective: Within three years of funding, two network types will be developed; a.) an international NIRS network dealing with the technology of sharing NIR data and its interpretation; and b.) a "pilot" NIRS business network for joint livestock and crop use.

Expected Outcomes:
The development of one NIR research network and a "pilot" business network will capture value through more information delivered in a timely practical format and will lead to business outcomes that include:
1. Short term:
    a. Farm and industry users understand limitations of NIR technology use.
    b. Sample/analysis sharing in user community to fine tune calibrations.
    c. Lead to enhanced animal performance such as feed efficiency or carcass traits and reduced costs per unit of gain.
    d. Will set feedback mechanisms for communication that drive NIR technology adoption.
2. Long term:
    a. A shift from being ingredient oriented to nutrient oriented leading to alternative pricing formulas based on quality parameters.
    b. Market signals that link livestock industry quality needs to those factors that will give crop producers greater returns.
    c. Farm oriented tools for NIRS collection.

d. Knowledge of feed grain composition that can drive differentiated end products.
e. Leads to information being shared along entire supply chain.
f. Leads toward new market opportunities, builds a connected industry to link the supply chain participants, stimulates new ideas through to practice.

Additional Comments:
We are prepared to support project work related to "NIRS adoption along the crop growing to livestock feeding supply chain":
1. Proposals as to how to design a user group to promote commercialization of NIRS technology.
2. Proposals to increase the level of penetration of NIRS technology throughout the industry.

Key to moving this investment target is leadership within industry to build the collaborative mechanisms for a working model that suits supply chain participants.

2.3 Safe Feed

Investment Target: - Reduce detection costs of mycotoxins and antibiotic residues in DDGS using NIR technology.

Objective: At the completion of research, there would be accurate NIR equations, approved by CFIA that predicts the level of selected antimicrobial and mycotoxin residues in DDGS. Note: Each antimicrobial or mycotoxin contaminant requires its own unique NIR equation.

Expected Outcomes:
1. More rapid and lower cost for DDGS analysis.
2. Higher confidence in DDGS's feed safety.
3. Increased DDGS co-product use. NIR equations would lower the risk and allow for higher diet inclusion rates.

Additional Comments:
In western Canada, the presence of fusarium damaged kernels in cereal grains is growing. As more virulent strains of the disease spread the ability to accurately secure feed supplies that meet tolerances will be increasingly difficult and expensive without new cost effective testing procedures. Accurate NIR equations, acceptable to CFIA would be a benefit to the food industry and the crop and livestock industry since the manufacturers must supply feed that is free of contaminants.

Proposals must demonstrate potential to reduce testing costs, improve testing accuracy for feed processors and or lead to more confidence in feed supplies with feeders.

3.1 a 4% Yield Curve (Priority)

Investment Target: - Determine and demonstrate complementary plant breeding and agronomic management strategies that combined together provide for a 4% compound annual yield curve increase in feed cultivars. Eligible crops are barley, wheat, triticale and peas.

Objective: Over the next 5 years, facilitate ongoing plant breeding research that focuses on higher crop yields and the rapid adoption of agronomic practices that optimize yields and farmer returns so that crops (eligible crops are barley, wheat, triticale and peas) will have a sustained compound annual yield curve increase of 4%.

Expected Outcomes:
1. Higher yielding and enhanced feed quality in new cultivars.
2. Feed germplasm better adapted to western Canadian climatic conditions.
3. Increased selection of cultivars and agronomic practices that will drive higher yields due to better understanding of the relationship between specific cultivars yield potential and specific agronomic practices.
4. Increased supplies of feed grains in western Canada.
5. Increased dry matter and energy production per cropped acre.
6. Faster adoption of new feed cultivars across multiple crop platforms.
7. Enhanced competitiveness of both crop and livestock sectors.

Additional Comments:

We are prepared to support feed grain development (increased available energy per acre) showing a sustained minimum 4% yield curve growth rate. Proposals must demonstrate measureable success over the 5 years of the project and a progressive sustainable relationship with farm gate productivity in the following 3 years.

The strategy is about using the right genetics first and providing complementary agronomic practices to optimize yields and per acre returns to producers. Driving adoption of better agronomic practices can be a practical issue and strategies that drive adoption must be part of any plans going forward.

To facilitate the movement to a 4% yield curve over time in some or all of the target small grains the following 4 areas of research and development associated with breeding high yielding feed cultivars have been identified as targets:

In the short term – 3 to 5 years
1. Create public/private partnerships to leverage existing public germplasm and research capacity that would lead to the development of high yielding feed cultivars.
2. Executing strategies to increase the capacity for and focus on breeding high yielding feed cultivars within the existing breeding network in western Canada. For example, the development of NIR as phenotype selection tools for use in similar manner as a plant breeder would use genetic markers may rapidly improve capacity for phenotypic evaluations.
3. Executing strategies that improve the speed of commercial introduction for new cultivars. For example strategies that facilitate more rapid seed bulk up prior to actual cultivar registration.

In the longer term – research that will drive higher and more consistent yields more than 5 years out.
1. Facilitate development of feed grain that have traits associated with reduced abiotic and biotic stresses allowing cultivars to reach their full genetic yield potential. For example research that focuses on diseases like Fusarium with the objective of improved resistance and research that will identify functional genes with a high level of phenotypic expression in areas like efficient nitrogen use and efficient water utilization.
2. Bring in / or develop new technology into new cultivars that provide nutrient use efficiency, water use efficiency / drought resistance, cold tolerance as a way of getting a longer growing season.

To facilitate the movement to a 4% yield curve over time in some or all of the target small grains the following area of research and development and technology transfer associated with agronomics have been identified as targets:
1. Agronomics for different high yielding genetics.

3.2 Alternative Crops

Investment Target: - Expand adoption of alternate crop platforms as feed grain options.

Objective: Over the next 5 years, this research and development project would have the potential to expand adoption of alternative crops by evaluating their suitability to our environment, the production risks associated with them, management strategies to address the risks and the potential improved returns to crop producers and livestock feeders with these crops as major feed ingredients in rations.

Expected Outcomes:
1. New alternate crops bring new markets, new processing investment and diversify the production base. E.g. corn grain, soybeans, peas, fababeans, camolina.
2. New alternate crops provide grain and/or co-products as livestock feeds.

Additional Comments:
Corn and soybeans are the basis for the feeding industry in other jurisdictions that Alberta competes with in feeding livestock. These areas have significantly different climates than Alberta but advanced genetics and improved management practices may result in these crops being a viable feed alternative in the province. To be adopted these crops will need to display production consistency and profitability from year to year.

Proposals would need to include both breeding (lower heat unit, earlier maturity) and agronomic practices and other management practices to drive high yielding feed cultivars in the case of corn and feed by-products in the case of soybeans. Proposals will need to identify and address barriers for adoption and technology improvement that will lead to a growth in acres over time.