

Agtech CENTRE Innovator

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HARNESSING TECHNOLOGY TO BOOST LIVESTOCK PRODUCTION

Canada's livestock industry is using new advances in technology to meet production challenges.

Profitability remains the bottom line for the success of livestock operations, but today it means far more than dollars and cents.

Manure management, odour control, food safety, greenhouse gas and particulate emissions, animal welfare and environmental management are just a handful of the many challenges that can make or break livestock production as a viable and rewarding enterprise, for both individual operators and Canadian agriculture as a whole.

More than ever, the key to meeting these challenges is technology, says Rick Atkins, AgTech Centre Manager and Branch Head of Engineering with Alberta Agriculture, Food and Rural Development (AAFRD). Success depends not only on developing new options, but also on understanding their benefits and implementing the best choices for each operation.

The forefront of innovation

“Those in livestock production today recognize that technology plays a critical role in helping the industry remain competitive and in helping it deal with many important issues,” says Atkins. “For the industry, the key to capturing the greatest benefit from technology is supporting its development, along with related evaluation and research, and transferring the resulting technologies, management practices and knowledge into the hands of industry.

“As a long-time player in agricultural technology, AAFRD’s Livestock Engineering Unit has seen a major increase in support for this effort. That bodes well for the future competitiveness of the industry.”

Practical solutions to industry challenges

Technology-based solutions are emerging to tackle a range of obstacles for the livestock industry.



How to measure odour, a complex and subjective sensory perception? Develop innovative and reliable methods of measuring odour emissions from a variety of sources.

How to sift through a mind-boggling array of new technology options? Run them through expertly-designed “boot camp” evaluations that provide objective information for producers to make the best purchasing or management decisions for their operations.

How can the industry adapt to sudden changes in handling mortalities from livestock operations? Develop innovative, low-cost methods for composting mortalities.

Those are just a few examples of technology developed in part by the AAFRD Livestock Engineering Unit.

“Our focus is consistent with that of the industry – to support the development of practical, production-ready technology and management practices,” says Atkins. “This type of innovation has to have an impact and pay immediate dividend.”

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TACKLING MAJOR LIVESTOCK ISSUES

Technology gives the industry new power to lead on several key fronts.

The livestock industry's interest in technology is driven by the need to overcome the challenges that play a fundamental role in profitability and sustainability.

Understanding and controlling odour

Today's livestock producers know reducing odour is vital to the long-term success of their industry. But proven, cost-effective technology is essential to do the job right and keep it manageable.

One of the Livestock Engineering Unit's key efforts is to concentrate on analysing and measuring odour, and on developing technological solutions to manage and reduce odour emissions. Key technologies being studied include biofilters, oil sprinkling to mask odour, and diet manipulation as ways to reduce odour.

Helping drive these advances is the Odour Control Team, a group of scientists and engineers from AAFRD, the Alberta Research Council and the University of Alberta. This effort and the broader movement toward improved odour reduction technology is a developing area, but already there is significant progress, particularly in evaluating current technology and identifying areas for improvement.

"Odour management today is much more than a simple byproduct of livestock production," says Atkins. "It's about an industry taking steps to operate and grow, sustainably. The good news is that science-based knowledge and strategies are becoming the basis for providing solutions."

Transforming manure from waste to resource

Canada's livestock industry produces a significant amount of manure every day. Some view this as an enormous management challenge, but in reality it's a tremendous opportunity.



"With advances in scientific knowledge, we now have a much better understanding of the value of manure," says Atkins. "Combining this knowledge with improved management practices provides the industry with new options for turning manure from a potential waste into a valuable environmental and economic resource."

One of the best examples of turning manure into a valuable product is composting. Using aerobic decomposition, composting in a windrow not only reduces the total volume, but it breaks down manure into a humus-like product that can be applied as a soil amendment. The compost has less odour than raw manure and producers benefit from agronomic nutrient value.

However, composting is a delicate process with many steps that need to be handled properly. The Livestock Engineering Unit helps guide management strategies by testing different composting technologies and approaches, and providing the results to producers. A key component of this effort is devising systems that meet government regulations for manure management.

Innovative emerging technologies for manure management include new temperature monitoring systems to boost composting efficiency and improved windrow turners that cut labour and increase composting effectiveness.

PARTNERING TO DRIVE SUCCESS

The Livestock Engineering Unit specializes in producing technology and related information that supports agricultural sustainability. To meet this goal, it collaborates with, and offers services to, a variety of partners, from individual inventors, small businesses and livestock producers, to major manufacturers, government, and public and private interest groups. It provides expertise in several areas related to technology, including development, testing and evaluation, research, and information and technology transfer.

Working with partners of all stripes helps keep the Livestock Engineering Unit's work in line with industry needs, says Atkins. Direct support through testing agreements, along with resource-sharing partnerships, play a major role in broadening the Unit's productivity.

"Producers in particular are key partners in keeping our work in line with industry needs," he says. "We work directly with producers, encourage their feedback on all aspects of our work, and welcome their questions and comments at any time."



Boosting efficiency through animal welfare

Animal welfare is not only a growing expectation of society, it is increasingly recognized by the livestock industry as a major opportunity to increase productivity.

“As we learn more about animal behaviour, clear correlations have emerged between good animal welfare practices and healthier, more productive animals,” says Atkins.

However, because it’s difficult to measure how an animal “feels,” a major challenge for the industry is developing animal production practices that can be measured and fine-tuned. This is where new technology plays a critical role.

The Livestock Engineering Unit works in many areas of animal welfare, with a focus on measurable indicators, standards and management strategies.

Sustainable agricultural management

Underlying all issues is the need for Canada’s agricultural industry to survive and thrive as a profitable, sustainable enterprise. Livestock and crop production are intertwined in this effort, which includes economic, environmental and social components.

“The agricultural industry faces an array of specific challenges that come and go, but the fundamental issues remain the same,”

ENGINEERING A TECHNOLOGY BOOM

***Leading in technology requires a
balance in three core areas.***

The idea is the seed, not the solution. For the livestock industry, the measure of technology’s success is not just how innovative a new idea is, but how well it can be applied in the field to make a positive impact on the bottom line.

“There are many great ideas that sit on the shelf,” says Rick Atkins. “For our livestock industry to succeed, we need to identify the best ideas and transform them into real-world solutions that get into the hands of producers and industry.”

says Atkins. “The industry recognizes that in order to succeed, it must operate profitably and responsibly, in line with society’s expectations and the stewardship practices necessary to ensure future production.”

The Livestock Engineering Unit shares this outlook, he says. Its agenda is set by both public demands and the needs of the industry, with priorities based on their importance to sustainable agriculture.

A good example of a broad-based sustainable management initiative is the Livestock Engineering Unit’s involvement in efforts to develop Beneficial Management Practice manuals. These manuals, based on applied research, technology evaluations and experience, provide the industry with practical guidelines for meeting public regulations on everything from new building expansions to manure management and animal care.

Integrating crop and livestock production

In tackling major issues, the livestock industry has also long recognized that its success is inextricably tied to that of other agricultural sectors.

On the technology front, advances that improve crop production and management often cross over to benefit livestock production. Strategies that harness manure as a resource for crop production are a leading example, as are feed technology advances and land management strategies.

There are also many technology improvements that offer broad benefits not restricted to any one agricultural sector. Advances in alternative energy, fuel efficiency and building design are just a few examples.

To capture these crossover opportunities, many engineers and technologists in the Livestock Engineering Unit are also part of crops work and other efforts in the AAFRD Engineering Branch. Major components of this broader effort include design, developing standards for production systems, new measurement systems, and the packaging of information.

Developing new technology

Where to begin? A simple question. Not always a simple answer.

Ideas spring up from many different places - from the farmer’s field to the research centre and beyond. To capture the best ones and support their development, the Livestock Engineering Unit serves as a sounding board and testing hub for the concepts from these many sources.

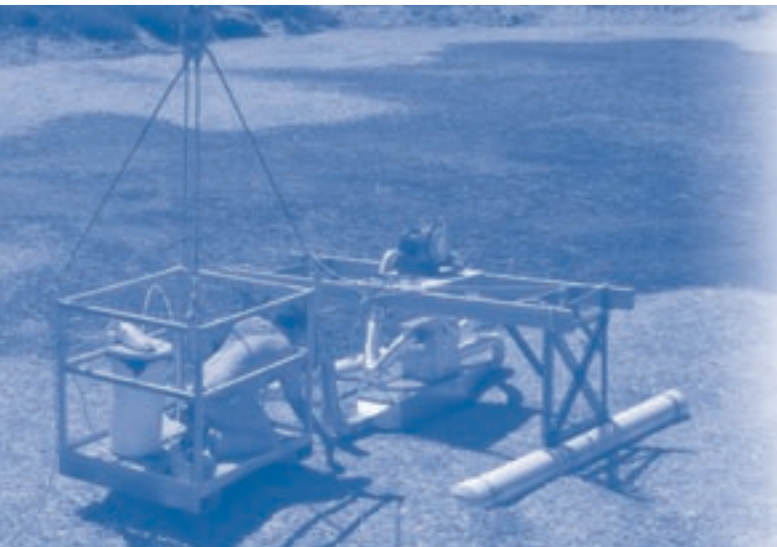
Some come from individual innovators, small business or major manufacturers. Others are spawned from AAFRD’s public mandate and the many priorities it encompasses. Whatever the source, the Livestock Engineering Unit offers state-of-the-art test facilities through its partnerships and the latest in engineering expertise to evaluate and shape ideas to give them the best chance of making an impact in the industry.

“One of the most important things we do is provide a resource to support the development of new technology,” says Atkins. “The focus is to get ideas off the ground and mould them into tangible solutions for the industry.”

Testing and evaluation

Developing technology is one thing. Developing successful technology is another. Typically, the difference between the two comes down to testing and evaluation, says Atkins.

A major service provided by the Livestock Engineering Unit is to evaluate new farm equipment and technology used in the agricultural industry. Through independent evaluations, staff outline the applications and limitations of technology and equipment. Whether commercial products or pre-market prototypes, technological innovations are put through their paces for power requirements, work rates, safety features, general suitability for use in different environments, and a range of other factors. All work is performed with an eye toward improvement, playing a key role in spurring further innovations.



“High-quality testing and evaluation are key to the successful implementation of all new technologies,” says Atkins. “Not only does testing help separate the winners from the losers, it uncovers the finer points of how different options will impact different operations and management systems. At the research and development stage, testing and evaluation also serve a critical troubleshooting role that raises the quality bar on resulting products.”

The Livestock Engineering Unit works directly with machinery and technology manufacturers and sometimes with individual inventors and innovators, to get the job done. “We have the expertise in testing and analysis and the equipment to do the job – those components are critical for developing technology,” says Atkins. “No matter who we work with, we’re always thinking about the end user –

if there isn’t a clear benefit for the customer, ultimately there will be no benefit to anyone.”

The key to testing and evaluating is being able to measure statistically. Having or developing a measurement system and being able to stand behind those numbers is critical to technology development and the integrity of the information produced.

Fundamental to all Livestock Engineering Unit analysis is an examination of how technologies are likely to affect individual operations. Much of this work involves working directly with producer groups and associations.

Information and technology transfer

No knowledge or technology is worth anything if it doesn’t get into the heads and hands of those who can use it.

The Livestock Engineering Unit makes an aggressive effort to transfer technology and knowledge, as an integral part of all its testing and technology development activities. It has built a reputation for integrity and has gained the trust of the industry by providing timely, unbiased information for the past 20 years. Staff are also leaders in extension and resource services.

“In the field, we offer presentations, demonstration days and sponsored clinics in specialized topic areas,” says Atkins “We provide information to the industry on the results of our activity in a variety of communications materials, including this *AgTech Innovator* newsletter.”

For example, watch for information on odour management including measuring odour levels from compost windrows, lagoon surfaces and barns, as well as studies evaluating biofilters and diet manipulation to control odours. Animal welfare topics include group sow housing and enriched laying cages for hens.

Mortality composting of spent hens and large animals will be covered, as well as environmental analysis of biofilters and vegetation filter strips. Information on alternative energy options such as biodiesel, wind and solar power will be available. There will also be assistance in accessing producer services and publications, such as the Canada Plan Services for Farm Buildings.

The AAFRD Livestock Engineering Unit welcomes input from producers, industry and others. Contact: Agricultural Engineering Technical Services Division, Alberta Agriculture, Food and Rural Development Phone: (780) 427-2181 Fax: (780) 422-9745.