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Advancing technology drives new options for cutting livestock odour

New tools on the way will give producers cost-effective solutions for reducing odour while keeping them competitive.

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.

"Successful odour control strategies go hand-in-hand with strong research and development to back new technologies," says Ike Edeogu, odour control specialist with Alberta Agriculture, Food and Rural Development (AAFRD). "We're getting a lot of interest from producers about odour reduction options, and the good news is advances in technology are giving them new tools with good, practical potential."

In Alberta, helping drive these advances is the Odour Control Team, a group of scientists and engineers from AAFRD – which includes the AgTech Centre in Lethbridge – 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.

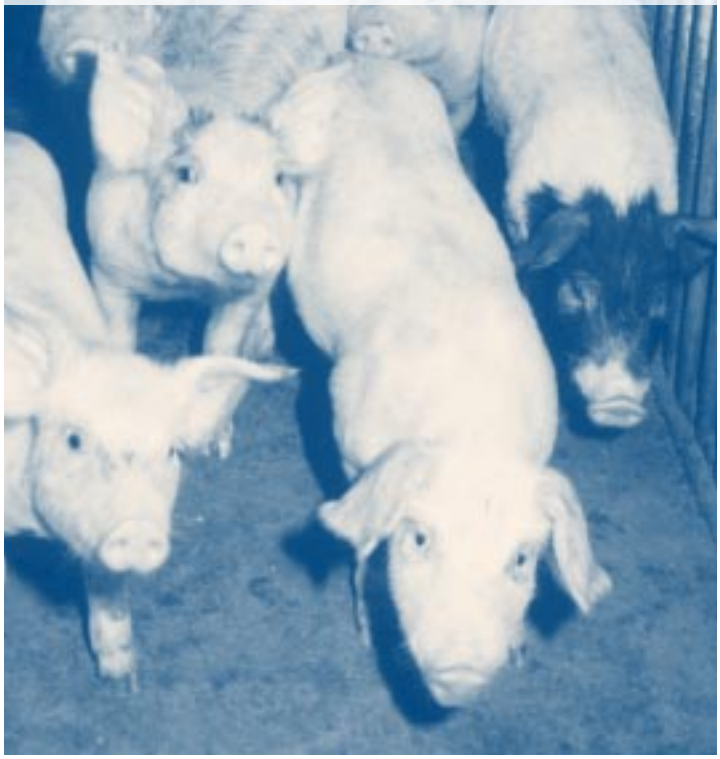
"The evaluation criterion that is critical to producers is cost-effectiveness," says Edeogu. "In our various studies, we've identified several technologies at various stages of development that all look promising for the future."

Biofilters for cleaner, fresher air

Biofilters are used as part of a barn's ventilation system. Biofiltration systems require a biodegradable porous material for the air to flow through, such as bark mulch, and a device that applies moisture to the filter. A moist filter attracts valuable microorganisms, which are needed to break down odorous compounds in the air as it flows through the system.

"Biofiltration is likely one of the best options to control livestock odours," says Edeogu. "Biofilters are relatively cheap to use, maintenance is simple, and odour reduction can be as high as 90 percent."

The microorganisms are key to the process, says Edeogu. "Some people think they need to add microorganisms to these systems, but honestly, if you build it right, they will come."



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The Odour Control Team is working to develop low-cost systems that use material readily available in Alberta. The Team is also examining operational parameters for the most effective biocontrol systems.

Lagoon covers keep a lid on odour

On the surface, lagoon covers are self-explanatory – they cover the entire lagoon and trap the odorous gases emitted by the manure. But there's more to the process than that. Modern-day lagoon covers not only trap odour, they release it in a controlled way that dramatically reduces its potency. This is accomplished by a series of pipes and exhaust fans regulated by the producer. Producers can choose between man-made or natural materials for the cover.

"Geotextile covers, made from a synthetic fabric, are highly effective, but are costly and difficult to install," says Edeogu. "They can also be hard to manoeuvre when emptying the lagoon. Straw covers are relatively inexpensive but require monitoring to ensure that rain or wind has not reduced the cover's effectiveness. A straw cover works best when spread evenly and with consistent thickness."

Today's lagoon covers trap odour, but further technological improvements to make them more practical for producers are still needed, says Edeogu.

Manure additives offer broad options

Producers have a number of options when it comes to using manure pit additives to control odour, but all have varying degrees of effectiveness. They come in four main categories.

Masking agents. These compounds have a strong, but non-offensive odour of their own. When added to manure, the compounds' odours mask the offensive odours.

Counteractants. Compounds that cancel out odours or neutralize them.

Adsorbent additives. Additives that have a large surface area that can adsorb odour compounds before they are released into the environment.

Chemical oxidants. Compounds that chemically oxidize odorous compounds or that reduce the microbial activity responsible for the offensive odours.

Both the cost and effectiveness of these additives depends on the type of additive and the type of odorous compound being dealt with. "There isn't one miracle cure – additive or otherwise – for eliminating all livestock odours," says Edeogu. "We have to remember that odour is a complex entity, made up of numerous compounds, and every situation is different."

Future Odour Control Team research into manure pit additives may help remove the guesswork for producers, says Edeogu.

Composting delivers results for manure solids

To compost or not to compost. That decision is largely made based on the amount of manure produced by the operation and the amount of time and money the producer is willing to spend, says Edeogu. Using aerobic decomposition, which means with oxygen present, composting turns manure into a valuable resource by breaking it down into a humus-like product that can be applied as a soil amendment. The resulting product is less odorous than raw manure and producers can benefit from its nutrient value.

"There are several benefits to composting manure," says Edeogu. "It helps eliminate odour by reducing ammonia in the manure while at the same time increasing the manure's value."

A composting system is relatively easy to set up, but it requires significant space and capital investment. A windrow-type system requires land that meets provincial regulations for composting.

The capital investments are the windrow turners, which are key to compost production. They help optimize the temperature and oxygen levels of the compost windrow. AAFRD researchers at the AgTech Centre in Lethbridge have tested seven turners for their ability to produce high quality compost to help producers choose the right compost turner for their operations.

Producers must also keep in mind that composting can only be used with manure solids. That makes it a good choice for feedlot and poultry operations, but difficult for swine operations that produce largely liquid manure.

Diet manipulation stops odour before it hits

Diet manipulation involves altering the animal's diet in order to produce manure with fewer odorous compounds. There's a general hypothesis that if the amount of nitrogen in an animal's diet is reduced, the manure odour will be reduced as well.

"There's a fair bit of diet manipulation research work around the world," says Edeogu. "But, there is still a lot more needed. This is a relatively new area and it will take some time before we have good information for producers."

Alberta researchers are concentrating much of their effort in projects that alter the amount of protein in an animal's diet.

But this research is challenging, due to a lack of commercial feed options, says Edeogu. Commercial feed producers haven't released feed lines that have lower nitrogen levels, and it will likely take some convincing on the part of researchers before feed companies start altering their feed formulas.

A key part of the overall diet manipulation research effort will be projects that study the gain of animals fed altered diets, says Edeogu. "It'll be great if diet manipulation is successful in reducing manure odour. But we have to make sure that gain isn't compromised. In one current study, we're examining the carcass quality of animals fed non-traditional diets."

Oil sprinkling research still needed

Oil sprinkling is most often used to control dust in barns, and for that, it's very effective. Producers spray their animals manually with biodegradable oil, often canola oil, which reduces the amount of dust given off by the animals. Oil sprinkling can reduce dust in the air by as much as 75 percent.

New research is now underway to determine if oil sprinkling is an effective way to control livestock odours. "The idea is that dust may trap odour and carry it in the air," says Edeogu. "This may be a myth, but if there's something to it, oil sprinkling may have some potential."

Until there's better information, Edeogu suggests producers choose proven odour control technology. "Research will determine if oil sprinkling is effective for odour control. But until we have conclusive proof of its effectiveness, it shouldn't be introduced into a livestock operation."

Key trends drive odour management progress

Growing interest from producers and the public are moving technology and research advances into the fast lane.

What's driving odour management? "There are several things," says Rick Atkins, AgTech Centre Manager and Branch Head of Engineering for Alberta Agriculture, Food and Rural Development (AAFRD). "And now we're on the fast-track, big time.

"Odour management today is much more than a simple by-product of livestock production," says Atkins. "It's about an industry taking steps to operate and grow sustainably, a society with raised expectations that are driving legislation, and advances in technology development and research that aim to provide practical solutions."

These collective efforts have made odour management a front-burner issue, he says, and they reflect four key trends that are driving new thinking and producing results.

New science-based expectations

Society has raised its expectations for odour management, and this is a key factor driving new legislation governing the industry, says Atkins. The good news is that science-based knowledge and strategies are becoming the basis for both setting expectations and providing solutions.

"The new rules for confined feeding operations in Alberta are a good example of how effective odour management has become not just an issue but a requirement," he says. "Progress toward science-based tools for both measuring and controlling odour will help manage expectations and lead to practical solutions."

A changing rural population, with both growing numbers and greater urban sprawl into farmland, and the trend toward larger-scale livestock production are big reasons behind the greater societal awareness and expectations, he says. A framework for dealing with odour issues that is based on knowledge rather than emotion will help guide industry growth through this period of change.

Strong producer interest

Feedback to AAFRD indicates that producers understand the new expectations of society and the importance of proper odour management to their business and their future, says Edeogu.

"We've only been focused on odour control for the past four or five years, and one of our biggest challenges right now is keeping up with demand. Producers want odour control technology solutions faster than we can provide them."

It's a nice problem to have, he says. Producer interest will help drive the research and development effort, and many expect good adoption of new technology and information as it becomes available.

Progress linked to knowledge

On the front line, success in odour management will ultimately depend on producers having access to quality, technically-competent information on the latest technology and knowledge, says Edeogu. "This will allow producers to make well-informed economic decisions."

A major ongoing effort by the Odour Control Team is to produce an Odour Control Manual based on its own research and other relevant literature. The manual will provide general information about odour, odour control options – including information about cost, design criteria, efficiency – and worksheets to help guide producers through an odour assessment of their own operations and to help them develop a plan for odour control.

This is part of broader efforts by the team, the AgTech Centre and others to get relevant information into the hands of industry.

Technology advances backed by ramped-up R&D

New technologies backed by strong research and development are playing an increasingly important role in improving how odour is measured and controlled.

One example of this trend is the Alberta Odour Control Team, established in 1998 by a group of AAFRD, University of Alberta and Alberta Research Council engineers and scientists. "The team's mission is to use science-based, engineering approaches to address the issue of livestock odour," says team member and AAFRD odour control specialist Ike Edeogu.

"This includes two main components. First, we are working towards the development of protocols for odour sampling and measurement. Second, we are evaluating technology as a means of identifying proven control options and supporting the development of further tools and strategies. This effort is still relatively new, but we are making good progress, and the overall amount of expertise and resources in this area is growing rapidly."

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