Livestock and Plastic Use

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What is it?

Plastics are widely used in agriculture for a variety of purposes. Common uses on livestock farms include bale wrap, silage cover, and materials for artificial insemination. Many of these plastics are single-use and are difficult to recycle due to the contaminates on their surface. The majority of plastics are derived from crude oil, with high environmental costs, including greenhouse gas emissions and water use.

Recent technology breakthroughs have led to the development of more sustainable single-use plastic alternatives which are not so taxing on the environment as traditional plastics are. The growing need to cut down on pollution and non-biodegradable products has influenced the agriculture industry to try and reduce plastic use.

Change within the industry has been seen in the change of materials used for feed bags which have most commonly been made of plastic and are difficult to recycle. Some companies have begun using paper or biodegradable plastics for feed bags. Small changes like these have lasting impacts down the line regarding plastic waste, water use and emissions.

Why it matters to the Ontario Livestock industry:

- The Government of Canada, through the *Single-use Plastics Prohibition Regulations* (SUPPR) has a target of zero plastic waste by 2030.
- In October 2020, the Government of Canada released a Science assessment of plastic pollution. Plastic is polluting rivers, lakes and oceans, harming wildlife, and generating microplastics in the water we use and drink here in Canada.
- A **pilot** study done by the Plastic Soup Foundation conducted at the Vrije Universiteit Amsterdam found that after screening a variety of samples from livestock, specifically cattle and pig farms in the Netherlands, there was a presence of plastic particles. The study found that plastic particles are present at detectable concentrations in modern-day livestock feed and in the animals that eat it and in products from the farm.
- There is not enough information on how microplastics in the soil could affect the food chain and human health. Some plastics contain toxic chemicals and can transport germs, disease and chemicals. The production of effective biodegradable alternatives for agricultural plastics has potential to significantly decrease the livestock sector's environmental footprint.

What can livestock farmers do?

Livestock farmers will have to evaluate their own systems to see if some or any of their current plastic use can be made more sustainable. If there is any flexibility with their current practices there are alternatives available.

The Pensini and Marangoni labs at the University of Guelph have been collaboratively developing bio-based materials as substitutes for agricultural plastics, using either zein (a corn protein) or edible oil. Zein films containing cutin from tomato peels are impermeable to water and flexible, but do not stretch (Hood, 2021). Films made from oil are an improved option. They can be sprayed on surfaces to make them impermeable. Alternatively, they can be manufactured as prefabricated, impermeable, flexible and stretchy films (Hood, 2022). While plastics are pretty hard to beat in regard to durability, cost, flexibility, and weight, oil-based films have good performance and are an environmentally friendly alternative. They are well suited as silage wrap or mulch (Fig. 1).

Figure 1 Pre-fabricated impermeable film obtained from linseed oil, oleic acid, calcium and an oxidizer, used as mulching film in a field trial at a garlic farm.

With a single-use plastic ban on the horizon, getting ahead of the problem may be in the best interest of the farmer. Testing plastic alternatives will aid the development of new products.

- Complete an assessment of the plastic use in your operation and consider alternatives where they exist.
- Contact Dr. Erica Pensini if you would like to test bio based plastic film on your farm.

Research Gaps

- Development of alternative storage systems for feeds.
- Development of biobased plastic replacements.
- Recyclable plastics for on farm use

Innovation Gaps

- Once biobased plastic replacements are available, there may be changes required with equipment in order for them to be used in a commercial manner. An example is the plastic wrap used to cover round bales. Round balers are now very common on livestock farms.

For more information

1. Dr. Erica Pensini at the University of Guelph, at epensini@uoguelph.ca.

2. LRIC at info@livestockresearch.ca

Additional resources

- *Single-use Plastics Prohibition Regulations* (SUPPR)
- Science assessment of plastic pollution
- Plastic particles in livestock feed, milk, meat and blood.
- The UK Plastics Pact

References

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