Virtual Beef

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Ministry of Agriculture, Food & Rural Affairs

Ontario

Taking Stock:
Understanding Feed Inventories Now for Strategic Winter Feeding

Megan Van Schaik, Beef Cattle Specialist, OMAFRA, Guelph

Understanding feed inventories in advance of winter feeding can help you anticipate any shortages and plan accordingly. Without this information, you may find yourself in a situation where your feed costs are higher than expected or performance takes a hit. However, if any winterfeeding shortages can be anticipated in advance, feeding strategies that will help you stretch supplies can be implemented and abrupt ration changes can be avoided. Two fundamental pieces of information are needed to assess your feed inventories and determine if your feed stores are adequate for the winterfeeding period:

- The quantity and quality of feed you have stored
- Animal requirements

Assessing Stored Feed

Understanding the amount of forage stored on a dry matter basis allows for an accurate comparison of the amount of stored forage to anticipated intake. Weight and moisture content are two variables necessary to calculate the total amount of dry matter in stored baled forage. Keep in mind that these variables can differ between lots and cuts. Moisture content can be measured using a Koster tester, a microwave oven test (with less accuracy), or through lab analysis. *Table 1* provides an example of an inventory calculation for baled hay.

Table 1. *Example of inventory calculation for baled hay*

Hay type	Moisture (%)	Average weight of bales (lbs)	Number of bales	Dry matter per bale (lbs)	Total dry matter(lbs)
1st cut dry hay – home farm	12	1000	125	880	110,000
1st cut dry hay – purchased	14	900	40	774	30,960
2nd cut wrapped – home farm	55	1400	80	630	50,400
Total Dry Matter (lbs)					**191,360**

Adapted from Hamilton, Kyle, and Potter (2007)

The amount of feed contained within a bunker silo can be calculated if the capacity of the bunker silo, feed type and density of the stored feed are known. Silage density can be determined by taking cored samples from the bunker and weighing them against the known area of silage removed from the bunker. Alternatively, silage density can be estimating using tables available through the University of Wisconsin Team Forage Harvest and Storage website.

For example, a filled bunker silo with dimensions of 20’ x 12’ x 40’ has a volume of 9600 cu ft (width x height x length). If the density of the silage is determined to be 45 lb/cu ft (as-fed), the total weight of the bunker is: 9600 cu ft x 45 lb/cu ft = 432,000 lb (as-fed). At 65% moisture, the weight expressed in dry matter is 151,200 lb.

The University of Wisconsin Forage Team website has some excellent calculators to help estimate the amount of ensiled forage in storage, including a silage pile capacity calculator, silage pile dimension calculator, bunker silo density calculator, and bunker silo sizing calculator. These resources can be found at http://www.uwex.edu/ces/crops/uwforage/storage.htm.

Animal Requirements

To understand livestock requirements, livestock type (cows, weaned calves, yearlings, etc.) and numbers of each must be known. Rules of thumb can be used to estimate dry matter intake at various stage of production (*Table 2*).

Table 2. *Forage intake "rules of thumb" for cattle (% of body weight)*

	Straw and poor quality forage	Medium quality forage	Good quality forage
Growing and finishing cattle	1.0	1.8-2.0	2.5-3.0
Dry mature cows and bulls	1.4-1.6	1.8-2.0	2.3-2.6
Lactating cows	1.6-1.8	2.0-2.4	2.5-3.0

Adapted from Okine and Yurchak (2004)

Table 3 provides an example of calculating total forage needs for your herd.

Table 3. *Example calculation to estimate forage requirements, assuming intake of good quality hay at 2.5% of body weight (dry matter/day)*

Animal type	# of animals	Average weight (lb)	Length of feeding period (days)	Forage requirements per head per day (lbs of DM)	Total forage requirements over feeding period (lbs of DM)
Dry cows	70	1300	270	32.5	614,250
Bred replacement heifers	11	900	270	22.5	66,825
Weaned replacement heifers	10	600	270	15	40,500
Total DM requirements over feeding period (lbs)					**721,575**

Adapted from Hamilton, Kyle, and Potter (2007)

As *Table 1* suggests, forage quality will influence grain and supplementation needs. Intake of lower quality forage is limited due to its slower rate of passage, so supplementation with grain will likely be required to meet energy requirements. Environmental conditions will also influence supplementation needs. For example, the energy requirements of cattle typically increase in the winter due to cold temperatures, moisture, and wind.

Other Important Considerations

While the "rules of thumb" provide approximate forage intake figures to help assess inventory and consumption, it is important to also understand the quality of your feed. Feed testing and working with a nutritionist to formulate rations are recommended practices to ensure the nutritional requirements of cattle are being met and input costs are minimized. Any potential for spoilage must also be considered and factored into your inventory assessment. Dry matter losses for covered dry hay bales, elevated or on a pad, can amount to 4% to 17%, while uncovered dry hay bales stored on the ground can yield inventory losses from 5% to 61%. *Table 4* provides figures on typical losses associated with various storage methods for ensiled forages.

Silo Type	Moisture (%)	Total DM Losses (%)
Silage bags	60-70	9-14
Wrapped silage bales	50-60	15-20
Upright tower	65	13-19
	60	11-17
	50	11-17
Bunker, no cover	70	24-34
	60	30-43
Bunker, covered	70	16-23
	60	18-34
Stack, no cover	70	37-47
	60	45-58
Stack, covered	70	17-27
	60	21-34

Table 4. *Typical losses associated with various storage methods*

Adapted from Holmes and Muck (2000)

When You Have a Feed Shortage

If you determine you will be short of feed, consider strategies that will help you stretch supplies:

- *Extended or alternate grazing options.* If conditions will allow, consider extended grazing on stockpiled pasture, corn stubble, or cover crops into the fall. The more forage cattle can consume on pasture, the less stored forage must be used in the winter months. Explore opportunities for custom grazing or leasing land for cover crop grazing. Strategies such as strip grazing can help to minimize waste and make the most of the forage available for grazing. Using the example of 70 beef cows from *Table 2*, if the grazing period is extended by 30 days into the fall, the amount of stored forage required over the feeding period can be reduced by 68,250 lb (dry matter).
- *Reduce spoilage and waste during feeding and storage*. Nutrient and dry matter losses can be minimized with proper storage. Waste during feeding can be reduced by using feeders that limit losses. Feed waste eats into your forage supply.
- *Purchase feed or identify alternative feed sources.* Work with your nutritionist or feed consultant to determine cost-effective feed ingredients that can be included in your ration to stretch forage supplies. Freight costs, dry matter content, storage capacity, and product shelf-life must all be considered when assessing alternative feed ingredient options.
- *Reduce stress from cold temperatures, moisture and wind.* Exposure to the elements increases energy requirements and dry matter demand.
- *Wean calves early.* Early weaning of calves reduces the energy demands on dams and helps to preserve forage on pasture. The benefits of early weaning must be assessed against market prices for calves in a given year.
- *Culling/liquidating.* Start with culling open cows and heifers, and then consider cows and bulls with health, conformation, and performance issues.

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Know the Amount of Feed in Your Pasture: A Dry Matter Yield Estimation Tool

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What is a Falling Plate Meter?

A falling plate meter is a tool that can be used to estimate dry matter yield within grazing pastures (Rayburn and Lozier, 2003b). The falling plate meter is comprised of an acrylic plate and a meter stick. To estimate dry matter yield, the acrylic plate is lowered against a meter stick in the center of the plate onto the grass. At the point the plate is entirely held up by the grass, a bulk height measurement can be acquired on the meter stick (*Figure 1*). Often, in pasture management, a pasture height measurement is used to estimate dry matter. However, bulk height is a more accurate estimate of dry matter yield when compared to other nondestructive methods because a plate meter accounts for the density of the sward (Rayburn and Lozier, 2003a). Once a plate meter is calibrated, producers look up the average bulk height of their pasture on a chart which tells them the approximate yield.

Figure 1. *Falling plate meter used to acquire bulk height measurement on pasture*

A falling plate meter can only be an effective tool in specific settings. This tool loses precision as grass matures; therefore, only yields of grass in a vegetative state can be estimated accurately (Castle, 1977). Like the structure of mature grass, yield of species with more woody stems such as alfalfa cannot accurately be estimated (Griggs and Stringer, 1988). Measuring pasture post-grazing depends on the state of the grass. If swards are trampled severely and no longer upright, a falling plate meter is not of much use (Li *et al*., 1998). For the same reason, it is not possible to accurately measure the yield of lodged grasses using this tool.

Current Research

Previous research on falling plate meters has focused on geographical locations with primarily one dominant grass species in pastures. In comparison, Ontario pastures have a vast biodiversity of grass species. This makes it difficult to relate studies previously conducted in other locations to Ontario's unique pastures. Therefore, a calibration of the falling plate meter must be completed specifically for pasture within Ontario.

To form the calibration curve, bulk height measurements and dry matter yields were taken for each sample. The dry matter yield was calculated using a tool called a quadrat which outlines the same area of grass the plate meter is being used on. In this case, the area of the quadrat is 0.092903m^2 (12 in. by 12 in.) The grass is then clipped at 5cm above the ground, the minimum height at which ruminants should graze down to. The sample is weighed, dried and weighed again to determine the dry matter content. Yield is calculated and reported in kg/ha using the following equation: $Yield\ \left({}^{kg}/_{ha}\right) = \left((Dry\ weight\ (g) \cdot 0.001) \cdot \left(\frac{10000}{Metric\ Quadrat\ Size}\right)\right)$. Bulk height values on the x-axis are then graphed against yield on the y-axis to create a correlation between bulk height and dry matter yield (Figure 2).

After 12 weeks of sampling from May 14th, 2019 to August 7th, 2019, a preliminary calibration curve was developed, showing a relatively high correlation between bulk height and dry matter yield (*Figure 2*). The plan is to continue sampling over the next few years to build a statistically robust calibration curve across many different weather patterns over differing seasons.

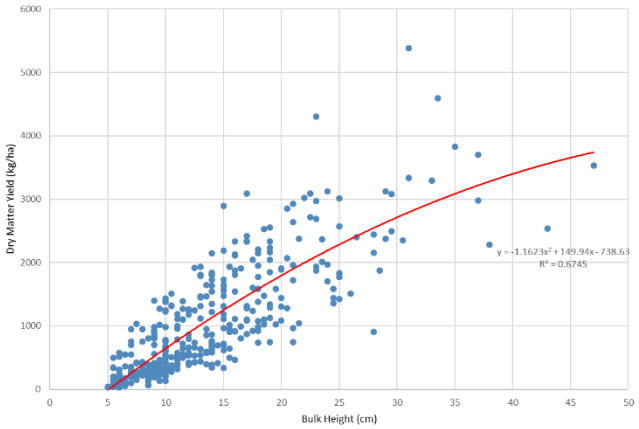

Figure 2. *Dry matter yield calibration curve based on samples taken from May – August 2019*

Research Implications

This type of inexpensive, easy to construct, pasture measurement tool would allow Ontario farmers to take measurements of their own pastures with minimal training. The ability to accurately estimate yield on pastures would not only help put a value on pastures but will also help producers implement best management practices to optimize performance of cattle on pasture.

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Understanding the Benefits of Creep Feeding

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The choice to creep feed beef calves or not can be a difficult decision for a cow-calf producer. The reason for this difficulty lies in the fact that there is no one-size-fits-all answer. Cow-calf producers must consider several important variables, all of which will determine if the choice is the correct production and economic one. Creep feeding has both a biological and economic effect and these effects must be considered simultaneously.

The typical cow-calf production system in Ontario involves the rearing of spring-born calves with their dams at pasture for a 6 to 8 month period, at the end of which those calves are weaned and either sold or retained for backgrounding. Creep feed is often introduced to compensate for reduced milk yield from declining forage quality on pasture and ultimately to improve calf weaning weights. Creep feeding is also advocated as a means of reducing weaning stress in calves through the familiarization to a solid and palatable feed and has been shown to decrease morbidity in feedlots.

The type of creep feed to be fed depends on the quality of forage being consumed by the calf. The more indigestible a forage is, the more slowly it digests and the longer it takes to move through the rumen. Highly digestible forages, however, disappear quickly and take up little space in the rumen. Consequently, calves consuming highly digestible forages allowed *ad libitum* access to creep can consume higher amounts of concentrate. For producers, this observation means that calves consuming high quality forages should be offered a salt-limited high protein calf creep to limit intake, whereas calves consuming poor quality forages should have access to nutrient dense, energy-rich calf creep to compensate for the lower energy available from poorer quality forage.

A study by Lusby *et al.* (1986) found that limit feeding creep feed to measured daily amounts increased animal performance, gain:feed efficiency, and profitability. Research by Moreil *et al.* (2017) showed that beef calves limit-fed creep feed gained 0.4 lbs per day more than control calves fed no creep, where both sets of calves grazed similar pasture. These results agree with previous studies.

Overfeeding calves creep feed can lead to the production of heavy, fleshy calves. Buyers typically discount fleshy calves because the plane of nutrition these creep-fed calves have received up to this point is usually greater than the plane of nutrition the calves will be placed on in a backgrounding program. In the feedlot, over-conditioned calves grow slower, are less feed efficient, and cost more to finish compared to calves in ideal condition. This can be a double blow for cow-calf producers selling over-conditioned calves. Sellers incur additional costs associated with creep feed, then may take a lower price compared to those selling calves in ideal condition.

The biological response to creep feed is well understood but the economic response to creep feed is also significant to cow-calf producers as this determines if creep, even in the presence of a known production response, should be fed. The economic response to creep feed depends on the cost of creep, feed efficiency and the potential market price for those calves at the target sale weight at the time of sale. The economics of creep feeding improve as the price of calves increases.

Table 1. *Sample calculation to assess the effect of no creep feeding versus creep feeding on price received*

	No Creep	Creep
Weaning Weight (lbs)	500	550
Amount of creep fed (lbs/calf)	0	300
Calf Price ($/lbs)	$2.30	$2.10
Calf Value ($)	$1,100	$1,155
Cost of Creep @ $0.10/lb ($/calf)	-	$30.00
Profit/Loss from creep feeding ($)	**-**	**$25.00**

Table 1 (above) provides a sample calculation to assess the effect of no creep feeding versus creep feeding on price received. In this case, it was profitable to creep feed as the creep-fed calves were heavier at the time of sale compared to those calves that received no creep, even though the creep fed calves received a lower price per pound.

Consideration of the difference between current average daily gain without creep and the potential increase in average daily gain with creep is critical to determine the true economic response to creep. If the difference between average daily gain without creep and the average daily gain with creep is small, the feeding of creep is unlikely to be profitable unless the cost of the creep feed is low. In this circumstance the feeding of a small amount of grain is beneficial for bunk training and to help reduce the stress of weaning. Creep-fed bull calves have been shown to have a smaller reduction in growth rate post weaning than creep-fed heifers. It has been suggested that this occurs because the larger framed bull calves can use creep more efficiently to lay down more muscle than fat compared to heifers.

Feeding programs that alter the growth rates of animals in one phase of growth often influence the subsequent phase of growth. The effect of creep feeding on post-weaning performance appears to be dependant on the energy intake of calves post -weaning. Creep-fed calves fed to grow at moderate rates of gain (1.5 lbs per day or less) post-weaning tend to grow slower than non-creep fed calves. However, when placed on high energy finishing rations after weaning, calves in good condition that have been effectively creep-fed eat more feed and gain faster during the first month due to the familiarity to solid feed and feeding bunks. Thus, the success of a creep feeding program is dependent on managing intake, creep quality, and calf condition for every grazing season.

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Low Quality Forage with DDGS for Pregnant Cows

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There has been an increase in corn production in North America in recent years, leading to the uptake of feeding corn byproducts such as corn stover to cows as a low-quality roughage source. With increased production of biofuels like ethanol, there are also many valuable byproducts that can be used as feedstuffs. Being that winter-feeding cattle is a very

expensive part of a cow-calf operation, finding less expensive feed alternatives is important to an operation's success. A study by Kennedy *et al.* (2016) explored the feeding strategy of supplementing corn dried distillers grains plus solubles (DDGS) to late gestation beef cows fed low quality forages. The primary goal of the study was to investigate the impact of supplementation on:

- eating behavior
- body condition
- reproduction

What They Did

The study utilized corn stover, corn silage and DDGS to feed to Angus or Angus X Simmental late gestation cows. Twenty-seven multiparous cows were divided into two groups: a Control group (CON) and a Supplemented (SUP) group. Both groups were fed a free-choice base diet of corn stover and corn silage for 10 weeks before calving. The base diet was marginally deficient in net energy and deficient in rumen degradable protein according to the NRC 1996 model. The SUP group was fed DDGS twice daily at a rate of 0.3% of body weight (DM basis). After calving, all cows were put on a ration comprised of corn stover, corn silage and DDGS for the first part of their lactation.

Results

From this study, we learned that late gestation cows fed a low-quality forage with DDGS experienced the following:

Eating Behaviour: During late gestation, Supplemented cows consumed more feed per day and spent more time eating versus the Control cows. Supplemented cows ate forage at a faster rate and consumed forage in larger meals over the Control cows in the study. Control cows ate more forage meals overall. Into early lactation, Supplemented cows continued to spend more time eating, and consumed more per minute over the Control cows. Control cows continued to average more meals per day than Supplemented cows in early lactation.

Body Condition: As seen in the graphs below (*Figure 1*), during late gestation all cows started at a Body Condition Score (BCS) of approximately 3.5 (Canadian BCS system). The Supplemented group did not change significantly over the course of gestation. The Control group, however, dropped to a BCS of approximately 3 at calving, losing an average of 0.5 BCS through gestation. Supplemented cows gained body weight at a rate of 1.27 kg/day, whereas Control cows lost body weight at a rate of 0.23 kg/day over the gestation period. In early lactation, both the Control and Supplemented cows lost body condition initially.

Reproduction: Supplemented cows had heavier calves than the Control Cows. Control and Supplemented cows both had similar pregnancy rates at rebreeding.

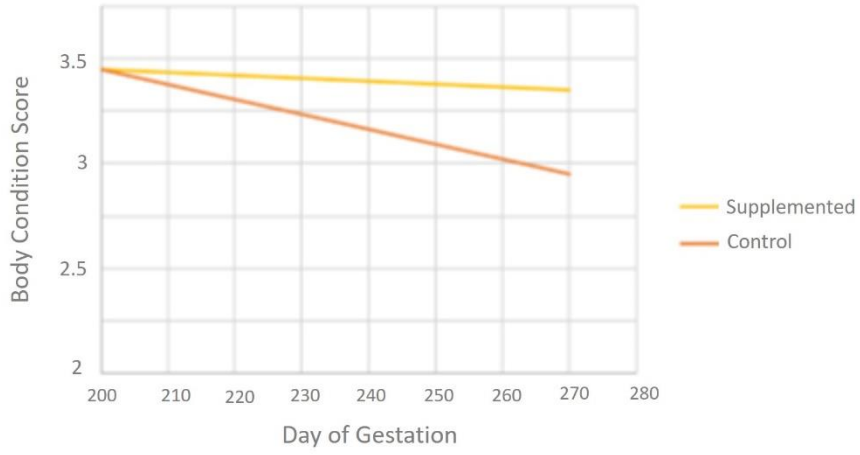


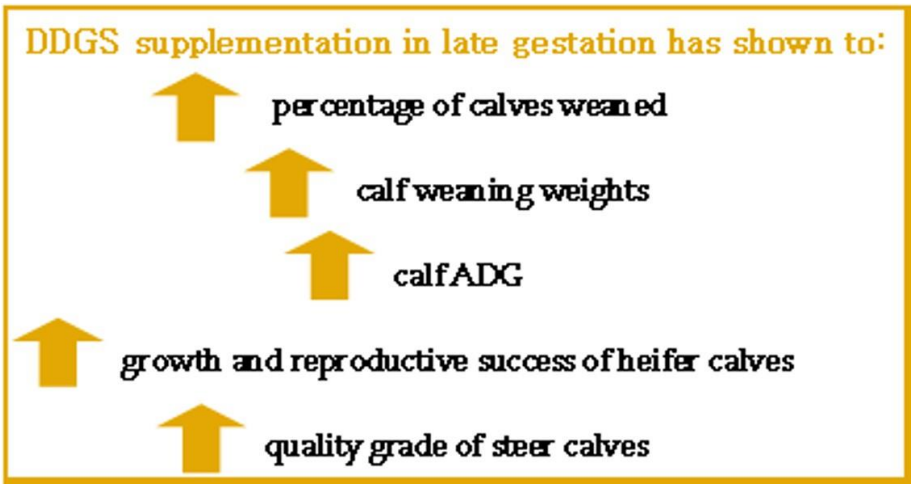
Figure 1 – *Body Condition Score (Canadian Body Condition Score system) during late gestation*

Implications for the Beef Industry

A possible explanation for the benefits seen in the current study is that in the Control diet, there is a high amount of fibre

that contributes to a gut fill effect, where cows are not eating enough to meet their net energy (NE) requirements. This leads to weight loss. In the Supplemented diet, there is a higher amount of rumen degradable intake protein that leads to increased microbial activity. This causes increased nutrient utilization, increased ruminal fermentation, increased overall digestion of feedstuffs and ultimately, better animal performance.

The findings of this study suggest that there are many opportunities to incorporate corn byproducts in late gestation cow diets. Using available corn byproducts as a winter feed provides options to reduce feed costs in cow-calf production. When effectively incorporated into rations, DDGS has proven to be beneficial in maintaining Body Condition Score and body weight in late gestation cows, leading to effective fetal programming and improved overall beef cow productivity and profitability.



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Focusing in on Disease Prevention to Fight Resistance: The FAAST Initiative

Steve Roche, ACER Consulting

It's safe to say that we all strive to do what we can to prevent disease. But sometimes, even with comprehensive health management programs, disease can creep in. Traditionally, antibiotics have been an important tool that has helped us control pathogens and respond to issues like bovine respiratory disease in cow-calf and feedlot operations. But, what if these drugs we are accustomed to using to treat and resolve common conditions are no longer effective? This is a reality we might face due to antimicrobial resistance

Antimicrobial resistance refers to bacteria and other microorganisms that can survive even in the presence of drugs (like antibiotics) that are designed to kill them. Resistance is one of the biggest challenges we face in livestock agriculture. Without action, this growing threat will affect our ability to treat health conditions with the drugs were are used to using. **In order to address this problem, we must continue to enhance our disease prevention practices.**

The Ontario Veterinary Medical Association, together with ACER Consulting and OMAFRA have teamed up to develop the Farmed Animal Antimicrobial Stewardship (FAAST) Initiative. FAAST is an online hub designed to help livestock producers and veterinarians fight resistance. It's a one-stop-shop for all things antimicrobial stewardship. It offers a variety

of tools and resources on biosecurity and animal health strategies to reduce the use of antimicrobials in our food producing animals without compromising production or food safety. These resources are available at www.amstewardship.ca

As part of this initiative, online learning modules called FAAST Reviews are being developed. Each one is designed to provide producers and veterinarians with simple tools, tips, and strategies to improve animal health and reduce the use of antimicrobials. The first species-specific FAAST Review is focused on the Ontario beef industry.

What's Included
Calves face a unique set of challenges when they are weaned and enter into a backgrounding or feedlot system. The Antimicrobial Stewardship in the Ontario Beef Industry FAAST Review discusses preconditioning and disease prevention programs designed to set calves up for success in their transition from early life and weaning to arrival at the feedlot. This module also discusses:

- Vaccination protocols to ensure herd immunity
- Weaning practices to reduce stress in calves
- Castration and dehorning
- How to identify sick animals
- Causes of bovine respiratory diseases and diarrhea
- How to treat cases of neonatal diarrhea and bovine respiratory disease to maximize animal health and production

We have also created a few general FAAST Reviews that apply to all audiences, regardless of livestock species, including:

Introduction to Livestock Medicines
This is an updated version of OMAFRA's original "Livestock Medicines" course. Topics such as the different classes of antimicrobials, how they work, proper medication storage, administration, handling, and how to read medication labels are covered. It's your guide to using medicines safely and to ensure we obtain optimal animal health and maintain food safety.

Antimicrobial Stewardship
This FAAST Review walks through how producers can work with their veterinarian to reduce the use of antimicrobials without compromising animal health. We can do this by following the 5 R's of antimicrobial stewardship:

- **Responsibility:** developing standard operating procedures and ensuring farm staff are trained for the administration of medication in livestock, as well as treatment protocols to ensure medications are used appropriately

- **Reduction:** this covers reducing the need for antimicrobials by increasing biosecurity measures to limit the entry of disease on the farm, as well as good animal husbandry practices to keep animals healthy

- **Refinement:** finding the right drug, for the right condition, at the right dosage to ensure treatment success

- **Replacement:** using vaccines and preventative strategies to prevent illness whenever possible

- **Review:** monitoring and recording treatments to benchmark and identify areas for improvement while fostering continuous improvement

Regulations on Antimicrobial Use and Access
This FAAST Review discusses current regulations relating to antimicrobial use and access. As of December 1st, 2018, producers are no longer able to purchase antimicrobials unless prescribed by a veterinarian. This means that producers were required to have established a valid Veterinarian-Client-Patient-Relationship (VCPR). What constitutes a VCPR is at the discretion of a veterinarian. Check this FAAST Review out to learn more about how to set up a VCPR, and the other rules on antimicrobials.

The FAAST initiative also features an up-to-date news feed, videos describing antimicrobial use and stewardship, as well as podcasts from veterinarians representing several commodity groups.

Of particular interest to Ontario's beef producers is a podcast featuring a conversation with Drs. Peter Kotzeff and Van Mitchell, two beef veterinarians in Ontario. Tune in to learn about their thoughts on how to be stewards of antimicrobials, and hear about the impact of Calf Clubs to encourage good management to minimize the risk of disease in these groups, and boost sales prices.

The Farmed Animal Antimicrobial Stewardship Initiative (FAAST) aims to tackle resistance head on through education, collaboration, and engagement across the value chain. Our mission is to help Ontario veterinarians, farmed animal owners, and their representative organizations. Visit us at www.amstewardship.ca or contact us at info@amstewardship.ca. This project is funded in part through the Canadian Agricultural Partnership, a federal-provincial-territorial initiative.

Everyone who uses or prescribes antimicrobials has a role to play in fighting the spread of antimicrobial resistance.

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Raven Predation Producer Survey: Input Appreciated

Allison Brown, Small Ruminant Livestock Assistant, OMAFRA, Guelph

A two-part Raven Predation Project is currently underway. This study is being conducted by Jillian Craig, Small Ruminant Specialist and Allison Brown, Small Ruminant Livestock Assistant with the Ontario Ministry of Agriculture, Food and Rural Affairs. Part one involves coordinating a province-wide survey to collect information on the magnitude of raven predation on sheep and beef farms. We are looking to collect benchmark data, increase awareness and improve mitigation strategies through feedback from sheep and beef farmers. Part two includes trialing non-lethal raven deterrents on Ontario sheep farms to collect data on the effectiveness of the deterrent. Aggregate survey results will be published in industry magazines though Ontario Sheep Farmers (OSF) and Beef Farmers of Ontario (BFO) in the later part of 2019.

If you are experiencing raven predation, we would appreciate your feedback through completing the survey.

Sheep Survey Link: https://www.surveymonkey.com/r/V9B2G7R
Beef Survey Link: https://www.surveymonkey.com/r/VQGJ65W

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Ontario Ministry of Agriculture, Food & Rural Affairs

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