



Virtual Beef

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In This Issue

- **Exploring options for extra forage in cropping systems...**When considering options for emergency forage or producing more forage in a cropping system, there are many factors that need to be considered to maximize overall yield. In his article, "The 'Long Game' of Creating More Forages After Row Crops – Fall Rye", Christoph Wand, OMAFRA Livestock Sustainability Specialist, explores the impact of timing of harvest, stage of maturity at harvest, and forage type on overall yield in a cropping system.
...pg 2
- **Selecting and Managing Heifers for Breeding...**Selecting replacements and ensuring timely breeding of heifers is an important aspect of a successful cow-calf production system. In this article, James Byrne, OMAFRA Beef Cattle Specialist, discusses key considerations for managing breeding heifers to set the herd up for success.
...pg 4
- **Understanding the principles of grounding an electric fence...**Grounding is an important aspect of maintaining an effective electric fence and avoiding malfunctions. Christine O'Reilly, OMAFRA Forage and Grazier Specialist, covers why grounding is needed, how to install a ground system, and how to tell if a fence is grounded properly in her article "Correctly Grounding an Electric Fence".
...pg 6
- **The importance of forage testing...**Feed testing is the backbone of any feeding program in livestock systems. Barry Potter, OMAFRA Agriculture Development Officer, discusses the importance of forage testing and key considerations for effective forage sampling, submission, and use of results.
...pg 8
- **Nancy Noecker has retired...**An ode to Nancy Noecker, cherished Calf and Heifer Specialist on OMAFRA's Beef Team, as she embarks on a new journey.
...pg 10

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The 'Long Game' of Creating More Forage After Row Crops – Fall Rye

Christoph Wand, Livestock Sustainability Specialist, OMAFRA, Guelph

Extra Forage in Cropping Systems

In 2016 and since, I've spent some time extolling the virtues of oats after winter wheat as a means to produce emergency forage, or more forage in general. This was a critical strategy in 2012 and 2016 for some producers facing shortage and was documented in volume 15, issue 50 of Virtual Beef in July of 2016

<http://www.omafra.gov.on.ca/english/livestock/beef/news/vbn0716a1.htm> and elsewhere. It featured the work led by Dr. Bill Deen of the University Of Guelph, with yours truly on the team.

With my focus on double-cropping as an emergency strategy, I have not spent enough time on how to produce even **MORE** forage, if a Fall or Winter crisis is not the immediate threat. It involves Fall-seeded, winter cereal silage and the data comes from the same body of work led by Dr. Deen.

Fall-Seeded, Spring-Harvested Cereals Overlooked?

Table 1 details the results comparing Fall-seeded winter wheat, fall (cereal) rye, and two varieties of triticale in their ability to produce forage as measured in each dry matter yield, and digestible energy (as TDN) the next Spring. This data was produced across a number of locations over 2013-2014 and 2014-2015. What it shows, is that if early harvest is desired (by June 1 or so) rye is a clear winner. The other species can catch up to, or surpass, the Fall rye yield but it takes two extra weeks to make this same physiological maturity (head). So, really the rye advantage is a **TIME** advantage more so than yield per se compared to these other 3 crop types. If the cover crop follows corn silage then it will enable soybean or a similarly timed crop to follow in the rotation.

Table 1. Average tonnes (T) yield in dry matter, total digestible nutrient (TDN) content and the stage of development of spring harvested cereals on similar harvest dates at research station trials (2013-2015). Fertilizer N rate applied was 50 kg-N/ha. (Adapted from Deen et al., unpublished 2016).

Rye Stage		Average Date	Dry Yield	Total Digestible Nutrients (TDN)	
Crop	Crop Stage			Energy Content	Energy Yield Harvested
				- % -	- tonne/ha -
All Head					
Rye	Head	June 3	4.0 ^c	69 ^a	2.7 ^b
Triticale (Fridge)	Head	June 16	4.8 ^{ab}	63 ^c	3.0 ^{a,b}
Triticale (Pika)	Head	June 16	5.2 ^a	65 ^{b,c}	3.3 ^a
Wheat	Head	June 16	4.3 ^{bc}	68 ^{a,b}	2.9 ^b
Rye Head					
Rye	Head	June 3	4.0 ^a	69 ^b	2.7 ^a
Triticale (Fridge)	+	June 5	2.7 ^b	76 ^a	2.0 ^b
Triticale (Pika)	Boot	June 5	2.9 ^b	76 ^a	2.2 ^b
Wheat	Boot	June 6	2.6 ^b	78 ^a	2.0 ^b
Rye Boot					
Rye	Boot	May 29	3.0 ^a	74 ^b	2.2 ^a
Triticale (Fridge)	Flag	May 31	2.0 ^b	79 ^a	1.5 ^b
Triticale (Pika)	Flag	May 31	2.3 ^{a,b}	78 ^{a,b}	1.7 ^{a,b}
Wheat	Flag	June 1	1.9 ^b	77 ^{a,b}	1.4 ^b

Note: Results for dry yields, energy content and energy yields with differing superscripts and different fill colour are statistically different.

The other comparison we should consider in choosing Fall versus Spring harvest is the same data you might have seen in that older VB article, used here again and given in Table 2 or some of my slide decks on the meeting circuit. What it shows (and I have failed to *emphasize*!) is that a spring cereal (oats) taken in a Fall harvest produces less total forage, and also does not have the soil coverage benefits of the living Fall-seeded, winter cereals. The one concern is that with Spring-harvested there is a risk of reduced yield of the subsequent crop, which would offset the yield advantage. This risk does not exist with fall harvested crops. The inputs and outputs of the Fall versus Spring harvest are given in Table 3 to explicitly contrast the leading scenario for each period according to the data collected.

Table 2. Spring cereal crop variety and seeding rate effects on average yield and TDN content harvested in late October (flag-boot stage) with 50 kg-N/ha at the Elora and Woodstock research station trials that evaluated fall harvested cereals in 2013 and 2014 (*Adapted from Deen et al., unpublished 2016*).

Crop	Dry Yield - tonne/ha -	Total Digestible Nutrients (TDN)	
		Energy Content %	Energy Yield Harvested - tonne/ha -
Barley	1.2 ^b	76.6 ^a	0.9 ^b
Oats (120 kg/ha)	2.4 ^a	74.4 ^a	1.8 ^a
Oats (80 kg/ha)	2.3 ^a	74.3 ^a	1.8 ^a
Oats + Peas	2.2 ^a	74.8 ^a	1.6 ^a
se ⁺⁺	0.22	8.9	160.3

Note: Results for dry yields, energy content and energy yields with differing superscripts and different fill colour are statistically different.

Table 3. Comparison of Summer-seeded oats and Fall-seeded cereal rye forages with respect to inputs and yields as adapted from Deen *et al.* body of work

	Oats	Cereal Rye
Seeding Date	August 15	October 1
Harvest Date (adapted)	October 31	May 29 (<i>next year</i>)
Harvest stage	Flag-boot	Boot
Yield (DM tonnes/ha)	2.3	3.0
TDN Yield (DM tonnes/ha)	1.8	2.2
Seeding rate	80 kg/ha	170 kg/ha
Fertility applied	50 kg N per ha	50 kg N per ha

‘Sow What’?

The bottom line is this...If you don't need the feed in the Fall or Winter to make up a critical shortfall in feed, and you are willing to risk replant timing, you might find that a Fall-seeded, Spring-harvested fall (cereal) rye forage is the higher yielding forage crop and could be better timed to consider as a double-crop. Being strategic, the choice will depend on timing of the feed needed, and that later may be better!

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Selecting and Managing Heifers for Breeding

James Byrne, Beef Cattle Specialist, OMAFRA, Lindsay

The backbone of a cow calf production system is the selection and integration of heifers into the beef herd. The replacement rate varies considerably between farms but on average lies between 10 to 20%. The decisions around which cow to cull ranges from age of cow, breeding success, calf quality, rearing success, temperament of cow, cow health etc. In the majority of cases, the age of the cow is the number one determinant on which cow should be culled.

Since the replacement heifer is the foundation of a productive cow herd, the choice of heifer and her development can greatly impact the economics of the farm operation through her genetics, future performance, and longevity. Time of first calving has a major influence on life time productivity, which is one of the most important traits to consider. Research has consistently shown that targeting first calving at 24 months maximises lifetime productivity, provided the cow continues to produce a calf each year. Research from Oklahoma State University College of Agriculture Sciences showed that heifers calving at 24 months produced 330 lbs of calf more over their lifetime than heifers calving at 36 months.

To calf at 24 months, heifers must be bred by 15 months of age. The onset of puberty in cattle is determined by weight, age and breed. Weight is the major factor. The age at which puberty occurs is breed dependant with larger, later maturing breeds coming into puberty later than smaller, earlier maturing breeds.

Table 1 - Weight (lbs) at which 14 – 15 month old heifers of different breeds reaches puberty

% of heifers in heat	Angus	Hereford	Charolais	Angus x Hereford	Simmental x British	Lim x British
50	550	600	700	550	650	650
65 - 70	600	650	725	600	700	700
85 - 90	650	700	750	650	750	750

Source: J. Field, OMAFRA

Table 1 shows the effect of weight on the % of heifers in a herd at 14 – 15 months of age which show first heats(onset of puberty). It demonstrates that earlier maturing breeds, e.g. Angus and Hereford, reach puberty at a lighter weight than larger framed breeds, e.g. Charolais and Simmental. Farmers should bear these target weights in mind when selecting heifers to breed. Larger framed breeds must weight heavier at the target breeding date, i.e 15 months, compared to smaller framed breeds. Feeding the correct nutrition to heifer calves, taking into account breed, is important to ensure heifers reach their target weight by 15 months of age.

Replacement beef heifers should attain 65 to 70% of their potential mature weight by the time they are bred at 14-15 months of age. From weaning to first breeding, heifers should gain an average of 0.56 kg to 0.80 kg (1.25 lbs to 1.75 lbs) per day or 115 kg to 160 kg (250 lbs to 350 lbs) total (depending on breed). For most breeds and crosses, heifers should weigh between 300 kg to 390 kg (650 lbs to 850 lbs) at breeding time.

Lifetime productivity rates are affected by feeding management during critical phases. Research has shown that energy intake in excess of requirement can lead to the infiltration of fat into the developing udder which may restrict milk production in those heifers as cows later in life. Poor milk production leads to poor calf performance and earlier culling than planned for that animal.

Table 2 - Nutrient Requirement for Replacement Heifers (growing at 1.25 lbs per day).

Medium Framed Heifers				Large Framed Heifers			
Body Weight (lbs)	Dry Matter Intake (lbs)	Total Protein (lbs)	TDN (lbs)	Body Weight (lbs)	Dry Matter Intake (lbs)	Total Protein (lbs)	TDN (lbs)
400	10.03	1.08	6.65	500	12.75	1.24	7.82
500	11.86	1.16	7.86	600	14.61	1.33	8.97
600	13.60	1.24	9.01	700	16.41	1.41	10.07

Source: J. Field, OMAFRA

Table 2 shows the ideal nutrient requirement of growing heifers at various body weights. Medium framed heifers have a lower feed requirement at the same weight as large framed heifers. Producers must be conscious of the frame type of heifer on their farm to avoid underfeeding or overfeeding.

Producers should plan breeding of heifers at least 3 weeks before breeding the rest of the herd. Heifers take longer to cycle post calving than mature cows. By allowing a 3 week gap at breeding, first calf heifers will likely show heats post calving at the same time as the main herd. A breeding season of 45 days is adequate for heifers provided they are in good nutritional status. To maximise the return from heifers, it's important to pregnancy check all heifers and cull those not in calf.

Heifers are very sensitive to calving difficulties. Research by Ontario Veterinary College has shown that on average 22% of first calf two year olds require assistance, and work by the University of Arkansas has shown that up 34% of first calf 2 year olds require assistance. Heifers must not be over or underfed as both conditions can lead to calving difficulties. The birth weight of the calf is related to genetics, less nutrition. Underfeeding will restrict the growth rate of heifers, reduce the size of the pelvis and increase the rate of calving difficulty. Overfeeding equally reduces the size of the birth canal due to excess fat deposition.

First calf heifers should be separated away from the main herd prior to calving. Calving should be monitored closely, but not obtrusively, to avoid increasing stress on the animal (which may delay calving), and provide assistance where necessary. The calving process tends to take longer in first calf heifers versus mature cows.

Always check that the newborn calf has sucked. First calf heifers are very inexperienced in allowing calves to suckle and assistance may be required. Great care must be taken when handling calves of heifers. A previously quiet heifer may become extremely dangerous and unpredictable post calving.

The best method to reduce the risk of calving difficulties with first calf heifers is to breed heifers to an easy calving bull. Calving ease is the relationship between calf birthweight and cow pelvic size. Research has shown that in 80% of cases where calves die at birth, they were normal, and presented in the correct "diving" position, but the cause of death was suffocation. These types of deaths are primarily due to a mismatch between calf birth weight and dam pelvic size. Calf birthweight varies between breeds and within breeds, but a clear distinction exists between smaller framed, earlier maturing breeds and larger framed, later maturing breeds. Producers should select bulls with low calf birth weight when breeding heifers.

Pelvic measurements have been used by some producers as a means of selecting heifers for breeding. The University of Nebraska has developed ratios that can be used to determine the calf birthweight that a heifer could potentially successfully deliver. Measurements are taken at 12 to 13 months of age using a pelvimeter and from those measurements a maximum calf birthweight can be determined.

In Australia, pelvic measurements are primarily used as a culling tool to successfully identify abnormally small or abnormally shaped pelvises rather than as a breeding selection tool. These situations, if left unidentified, are associated with extreme calving difficulty, resulting in caesarean delivery and even death of the calf, cow or both.

Good selection and management of heifers for breeding is critical to the genetic advancement of the herd and the long term profitability of the beef farming enterprise.

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Correctly Grounding an Electric Fence

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Key points:

- Improper grounding is the most common reason for electric fence malfunctions
- Install 90 cm (3') of ground rod for every joule of output from the energizer
- Ground rods should be more than 3 m (10') from each other
- Ground rods should be more than 23 m (75') from other grounds, waterlines, or utilities. Ontario One Call can help you locate publicly-owned infrastructure: 1-800-400-2255 or www.on1call.com. A private locator can be hired to find other buried infrastructure.

Improper grounding is the most common mistake that causes an electric fence to malfunction. Understanding electricity and all the jargon that goes with it can be a challenge. Luckily, thinking about water is often a great way to imagine electricity, so I'm going to draw some comparisons between electricity and water in this article.

Why do I need to ground my electric fence?

Just like water, electricity has a current. **Electric current** is a steady flow of electrons. Much like water runs downhill, electrons move towards a positive charge such as the soil (think lightning strikes), or the earth terminal on the fence energizer. Metal and water are good conductors of electricity because they hold electrons loosely and are relatively dense, which enables electric current to flow through them.

Electric current needs a circuit of conductive material to flow. A properly constructed electric fence is a potential circuit. Electric current is sent from the energizer through the fence wires. Ground rods are installed and wired back to the energizer. When an animal touches the fence, the circuit is closed, allowing the electric current to flow from the energizer, through the fence wires, through the animal, into the soil moisture, to the ground rods, and back to the earth terminal on the energizer.

Building an electric fence means creating a potential circuit; one that closes properly when something touches the hot wire and the soil at the same time. An electric fence is a psychological barrier: cattle learn not to touch the fence because the shock is unpleasant. Untrained animals or a non-electrified fence may enable livestock to go right through the fence, because it is not physically strong enough to stop them. To be effective, both the fence and the ground system must be installed so that they become a circuit, and a practical way to contain cattle.

How do I install a ground system?

Ground rods made of either copper or galvanized metal are available. While copper is more conductive, it also corrodes faster. Corroded metal is not a good conductor, and can prevent the circuit from closing. Galvanized rods will last longer than copper ones because they are protected from corrosion. Ground rods should stick out of the soil 10 – 15 cm (4 – 6"). Ground rod clamps have been designed to conduct electricity from the rod to the return wire, and work better than home-made clamps or those designed for a different purpose. Double check that brass clamps are used with copper rods, and dissimilar metal (non-corroding) clamps are used with galvanized rods. Mixing metals can make components corrode faster.

To ensure ground rods come in contact with enough soil moisture to complete the circuit, the best practice is to install 90 cm (3') of ground rod below the water table for every joule of output provided by the energizer. The **water table** is the level below which the ground is saturated with water, and the depth can vary greatly depending on location. Where the ground is dry or the water table is low, this may not be possible – dumping a bucket of water on each ground rod at regular intervals can help maintain contact. The length required can be divided between multiple ground rods but these must be spaced at least 3 m (10') apart, otherwise they act like a single ground rod.

In areas with a very shallow depth to bedrock, it may not be possible to bury rods deep enough to properly ground the fence. Some farmers have had success in these situations with the ground plates used to ground houses. These can be found at many hardware stores.

In addition to spacing out multiple ground rods for the fence, ground rods also need to be more than 23 m (75') away from any other grounds, waterlines, or utilities on the farm. Ontario One Call offers a "call or click before you dig" service, allowing landowners to request infrastructure location to identify where publicly-owned utilities are buried. Ontario One Call needs five business days' notice, but will arrange for someone to come out to the farm and identify buried infrastructure that may interfere with the fence grounding system. Ontario One Call can be reached at 1-800-400-2255 or online at www.on1call.com. Not all owners of buried infrastructure are registered with Ontario One Call, and privately-owned companies may need to be contacted individually. A locator service can be hired to locate these utilities and any infrastructure running between farm buildings, as these are generally privately installed and not covered by Ontario One Call.

Why do some electric fences contain ground wires?

In Ontario, climate affects the design of electric fences. If the earth is frozen or snow-covered, it can be difficult to achieve electrical contact; snow contains a lot of air, and ice holds onto electrons more tightly than liquid water. Often an animal touching a hot wire will not complete the circuit. This has led to many fences being built with alternating hot and ground wires, called a **ground-return system**. Hot wires are connected to the output of the energizer, while ground wires are connected to the ground rods. If an animal touches both the hot and ground wire at the same time, they close the circuit and receive a shock. This design keeps electric fences working throughout the year.

With a ground-return design, it is common for ground rods to be installed along the fence every 400 m (1300') to improve the grounding system.

How can I tell if my fence is grounded properly?

A volt meter touched to the ground rods should read less than 400 V. If the reading is greater than 1000 V, another ground rod should be added to the system.

Another sign that the fence is not grounded properly is stray voltage. **Stray voltage** is a difference in electric potential between two places that should not be different. With improperly grounded electric fences, it is most common to hear a ticking sound over a landline telephone, have problems maintaining an internet connection when the energizer is on, or interference with radio or television reception. Occasionally, poor grounding may send current through other metal items or water lines; if cattle are refusing to drink, check that their trough hasn't been accidentally electrified.

Most problems are caused by not having enough ground rods, installing ground rods in bad locations, or having loose or corroded ground rod clamps.

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Forage Testing Is Important

Barry Potter, Agriculture Development Advisor, OMAFRA, New Liskeard

Do you test your forages each year? Knowing the nutritional value of your hay or haylage helps farm management in a number of ways. First, it helps you determine if you are meeting your animal's dietary requirements or whether you need to supplement or avoid overfeeding

Secondly, baseline forage tests build a profile of your farm field fertility. They augment soil tests to show, for example, if you have enough potassium or phosphorus in your fields.

But are farmers testing their forages routinely? A recent survey of farmers in northern Ontario and northern Quebec indicated that only 16 % of Ontario and 43 % of Quebec respondents routinely test their forages¹. While almost 100 % of the Ontario respondents who test their forages go on to balance their feeding programs based on forage test results, only about half the Quebec respondents do so. Interestingly enough, of the farmers surveyed, 20 % of the Ontario farmers indicated they fed no mineral at all to their mature cows and bulls. In these situations where there is a lack of information on the nutritional attributes of available feed and no supplementation, there is risk of mineral deficiency issues.

Does that matter? Why bother testing forages? What can you do with the forage results if you have to feed what you have anyway?

There are many reasons to test forages:

- To feed the best quality forage to the animals that need it the most, including yearlings, bred heifers, and thin cows

¹ Lafrenier, Carole and Lamothe, Stephanie. 2018. Comparison of cow-calf production in northern Ontario and Quebec. Unpublished.

- To balance delivery of minerals according to animal requirements
- To provide adequate protein and energy to the various groups of cattle

When should you test your forages?

Dry hay can be tested immediately after harvest. It takes about a month after harvest to complete the "pickling" process (conversion of plant sugars to organic acids) of haylage or silage. At that point it can be sampled. A key difference between haylage or silage that has been freshly harvested versus haylage or silage that has been completely ensiled is the available protein in the forage. Protein can be degraded if the forage is not stored correctly.

From a ration balancing perspective, the amount of moisture in feed is the first parameter to consider. Results will be presented on an as-fed and on a dry matter (DM) basis. If you are comparing feeds, you need to compare on a dry matter basis. This accounts for the moisture difference in various feeds. To illustrate the difference between expressing results on a dry matter basis versus an as-fed basis, here's an example. A kg of dry hay contains 15 % moisture. A kg of haylage contains 50 % moisture. Both feeds may test at 15 % protein on a dry matter basis, but on an as-fed basis, the dry hay would test at 12.75 % protein (or 127.5 grams of protein per kg) and the haylage would test at 7.5 % protein (or 75 grams of protein per kg). Therefore, because nutrients are found in the dry matter portion of feeds and moisture levels in feeds can be quite variable, nutritionists balance rations on a dry matter basis to anticipate intake of nutrients more accurately.

How do we sample dry hay versus haylage?

With any forage, we are trying to get a sample (about 200 grams) to represent what is grown in a field or a group of bales. It is impossible to get an accurate sample using baled slices of dry hay, so a sample probe is essential. There are many different types of commercially available sample probes. "Push" types must be kept extremely sharp, while "drill" types that use either a hand brace or electric drill are more common. Many newer probes utilize a canister collection chamber that holds the core samples. Make sure the sample probe tip is sharp. Tips may be serrated or straight, as long as they cut cleanly and do not push aside stems particles. Dull probes will push material out of the core. Many probes can be manually re-sharpened. The cutting edge should be at right angles to the probe. The inside diameter should be between 3/8 and 3/4 inch. A smaller diameter may not cut the leaf/stem properly. A probe with a diameter that is too large may result in a sample that is too large for the lab. Avoid open augers that lose leaf particles when withdrawn from the bale. Sample probes should allow penetration 12 to 22 inches into the bales. Research has shown that an extra-long probe is probably not required for large round and large square bales. Take about 20 cores and mix together. From there, take a smaller composite sample (between 200-500 g) to send away to the lab.

For chopped haylage, take about 20 handfuls from different locations from an unloaded pile from the silo, feed bunk (feed must be freshly delivered), or the face of a bunker silo (take good care when taking samples from the face of a bunker). Mix the samples together well and take a smaller sample of the composite (between 200-500 g) to send away to the lab. Remember to keep samples cool and dry and ship to lab as soon as possible. Freeze samples with high moisture content if they cannot be sent immediately.

The other components we are most concerned about with a forage analysis are energy, protein and macrominerals. While energy may be the most limiting ingredient, nutrients work together. If one is not available at the required amount, the rest will not work together to provide the animal with its nutritional needs.

For more information on what you can find in a forage sample, check out the following link:

<http://www.omafra.gov.on.ca/english/livestock/dairy/facts/16-049.htm>

Testing forages provides a clear road map to providing the nutrients required for your beef cattle.



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Nancy Noecker Has Retired

OMAFRA Beef Team

Long-time OMAFRA employee and passionate beef team member Nancy Noecker has retired! At the time of her retirement, Nancy was serving as the Calf and Heifer Specialist out of Kemptville, Ontario. Raised near Moorefield in Wellington County and a U of G graduate, Nancy started her career in public service as a Red Meat Advisor in 1984. At this time, Nancy supported beef farmers in activities relating to data collection for improved herd management (the “Pink Book” days) working out of the Sudbury office and serving the areas of Sudbury, Muskoka, Parry Sound, Algoma, and Manitoulin. In 1985, still working as a Red meat Advisor, Nancy packed her bags and headed east. Despite an intense storm system that moved through the Barrie area on her moving day, Nancy managed to settle into Victoria County and started working out of the Lindsay field office. Nancy kept heading east and landed in the Kemptville field office in 1989, where she served as the Cow-Calf Specialist and then Calf and Heifer Specialist for nearly 29 years.

Nancy took on important files impacting the beef industry during her career with OMAFRA, including Red Meat Program initiatives, projects relating to transportation and animal health and welfare, effective animal handling and multiple other extension activities. She supported the sector through many challenges, such as the ice storm in Eastern Ontario in 1999 and the BSE crisis in 2003. Nancy’s unwavering commitment to the beef industry and passion for cattle was evident in all the work that she did. Her career-long dedication to learning, teaching, and helping people was highly valued by her colleagues and clients.

Nancy – thank you for all the work you have done and congratulations on a fruitful career. We will certainly miss you, but we are wishing you the very the best in your retirement!



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