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## DEAR READER: LETTERS FROM A FAMILY FARM

# Remembering my school

As a child, I attended **Innerkip Central School**, which was about a 20-minute drive from my family farm. The school was small and had modest enrolment levels.

In my years there, the school typically had only one class per grade level. (There were a few years when a given grade level could have a class and a half – with a grade five class, for example, alongside a grade five/six split.) I knew everyone in my grade, as well as many of the other students.

The school's close proximity to my home meant that my parents could pick me up after basketball games or musical theatre practices. Mom could serve on the parent council. My school friends were only a short drive away, since the school drew students from a relatively small geographic area.

I honestly believe I can thank a number of elementary school teachers for helping me to become the person I am today.

**Mrs. Stock**, my first-grade teacher, assigned us daily reading homework – and my mother swore Mrs. Stock's class fostered my love of reading. (There's always a novel or two on my nightstand at home.)

**Mrs. McKenzie**, my third-grade teacher, helped me to develop self-confidence as a shy young girl.

**Mr. Hall**, my sixth-grade teacher, inspired my passion for writing and history. He hammered home the importance of spelling and grammar. (I think his teachings might be the reason I shuddered over the poorly-written essays I marked as a university teaching assistant.)

Mr. Hall also had a remarkable level of enthusiasm for Canadian history that he shared with his students. His lessons about the War of 1812 came alive with the rearranged desks and the wooden muskets. (Although I'm uncertain if such theatrics would still be permitted in schools today!)

Small rural schools – like the one I attended – are currently in the spotlight because of the provincial government's proposals to close and consolidate schools.

In this month's main feature, writer **Jim Algie** explores these potential closures, the impact on rural communities and families, and the protest efforts. Hopefully, rural students will still be able to learn from passionate teachers, participate in a range of extracurricular activities, and develop a strong sense of community and citizenship as the nature of Ontario's schools continues to evolve. **BF**

ANDREA M. GAL

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The business of Ontario agriculture

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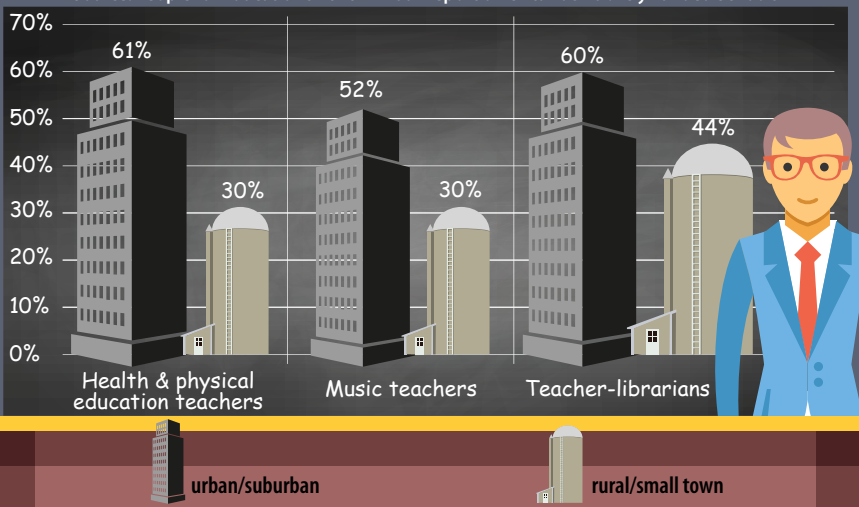
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# Radar to help track poultry disease

To better understand risks of avian flu transmission, the poultry industry is turning to the same type of radar technology that provides daily weather updates.



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Researchers at the **University of California** are now able to track wild bird movement with existing weather radar stations across the United States. Much like how radar can track rain patterns, the emitted signals bounce off of the birds, relaying their whereabouts, according to a university release.

In terms of the situation north of the border, “monitoring and tracking wild birds is something that we (in Canada) are very interested in because they are the major vector for avian influenza” transmission, says **Steve Leech**, national program manager of food safety, animal care and research for **Chicken Farmers of Canada**.

The **Canadian Wildlife Health Cooperative**, along with the **CFIA**, runs a wild bird surveillance program, testing both live birds and those found dead. “This (program) gives us an idea of what’s circulating and where it is,” says Leech. **BF**

## Global commodities supercycle trends

Navigating commodity markets can be a difficult process. **John Baffes**, senior economist at the **World Bank Development Prospects Group**, recently highlighted factors shaping the markets. “In the short-term, legislative and policy decisions can play a huge role (in determining prices) ... but in the long-term, it’s more so market conditions and technology,” Baffes said at the **Canadian Food and Drink Summit**.

Risk considerations for the commodity exchange include evolving energy sources and changing weather patterns. In addition, economic policies in parts of the south have recently supported the farm gate (protectionist national measures to restrict imported agricultural commodities), rather than consumer prices. **BF**

## Changes to wildlife compensations

Losing livestock to wildlife predators is like “living in a high crime neighbourhood,” according to **Jim Magee**, retired livestock farmer and a current wildlife damage investigator for **OMAFRA**.

The **Ontario Wildlife Damage Compensation Program** reimburses farmers for livestock losses due to predators where sufficient evidence is documented. The program changed Jan. 1 to reflect stakeholder recommendations and improve program integrity, according to **Adam Meyer**, program administrator for **OMAFRA**.

“A big change (for the program) is implementing more consistency and transparency in the (compensation) details,” he said. “Municipal partners had the difficult responsibility of determining a value for the (farmer’s) losses. Assigned compensation values have varied greatly for similar animals – OMAFRA is now taking on these responsibilities and standardizing them using industry market values.”

“We want to make sure producers are treated fairly and that they have clear expectations of the program,” said Meyer. “We’ve also greatly improved information resources for farmers and our municipal partners.” **BF**



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# RURAL ONTARIO NEEDS AFFORDABLE ENERGY TO DRIVE GROWTH

The need for natural gas across rural Ontario continues to be a top priority for the Ontario Federation of Agriculture (OFA) in 2017. The cold winter weather is another reminder of the importance of rural Ontario having access to affordable natural gas energy.

We need the government to commit to a real investment in natural gas infrastructure across rural Ontario to provide a competitive edge for farms and rural businesses. Ontario farmers, business owners and rural residents could save more than \$1 billion in annual energy costs if natural gas was accessible across the province. That's money that can be invested to create jobs and support a growing and vibrant rural economy.

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## A 'sweet' market opportunity

A new commodity may be on the horizon for those producers looking for another crop to add to their operation. The recently-formed **Ontario Innovative Sugarbeet Processors Cooperative (OISPC)** may soon be looking for farmers to grow more sugar beets for biochemical purposes.

Ontario producers currently grow 10,000 acres of these beets. The harvested crop is shipped to the **Michigan Sugar Company**, according to **Mark Lumley**, president of the OISPC. Lumley is also chairman of the **Ontario Sugar Beet Growers' Association (OSGA)** and a farmer.

Producers in Lambton and Kent counties harvest some of North America's highest sugar beet yields, a November OSGA release said. These beets also have some of the highest sugar content in the industry.

An economic study by the OSGA, the **Bio-Industrial Process Research Centre** and **Western Sarnia-Lambton Research Park** found it feasible to re-establish a southern Ontario supply chain and process the crop here, too.

"We're now onto the next stage – a more comprehensive, detailed study looking into engineering a sugar plant, the sugar process and the cost," said Lumley. "We are hypothesizing we will need 30,000 acres."

Why should producers grow sugar beets, according to Lumley?

"It's a higher value crop – more profitable than corn, soybeans and wheat," he said. "There's over 100 farmers growing them." **BF**



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## Are extra leaves robbing your yield?

Your soybeans may be overachievers to a fault, according to a new study by researchers at the **University of Illinois**.

Scientists found that soybean varieties typically produce more leaves than necessary – at the cost of yield.

Researchers removed one-third of emerging leaves on the plants and found yields were boosted by 8 per cent, according to a release. They predicted the yield rise stemmed from increased sunlight to lower leaves, reduced water demand and more efficient use of plant resources.

**Malcolm Morrison**, crop physiologist and research scientist for **Agriculture and Agri-Food Canada**, has also studied this topic by removing lower leaves on soybean plants.

"We could remove two-thirds of the leaf tissue without significantly

reducing yield," he said.

Soybeans used to be a wide row crop. Now, they are grown in narrow rows and the lower plant tissue often sits in shade from the thick canopy. "Seventy per cent of the light falling on a soybean canopy is intercepted by just the top 30 centimetres of the crop," leaving less light for the leaves below, Morrison said.

"The perfect solution would be to program the bottom leaves to die off as the light level dropped and the canopy closed."

Morrison has experimented with different row widths, as well as leaf shapes, to increase light penetration. At this stage, however, he has not yet made a direct and significant correlation with yield increases in soybeans.

The study was published in the journal *Global Change Biology* in November. **BF**



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## Greenbelt discourages farm investment

Ontario's Greenbelt, which prevents rezoning of prime agricultural land around the Golden Horseshoe, may have failed in its objective to protect farmlands. The region's farmers are less likely to sell their land but are also investing less in their farms, according to a recent study.

**Dr. Richard Vyn**, a professor at the **University of Guelph Ridgetown Campus** and an author of the study, says that the lower farm exit rate is misleading. Since land values have fallen in the Greenbelt, some farmers are "sitting on (their land) waiting for the policy to change."

The study drew findings from the Ontario Farm Income Database. After 2005, Greenbelt farmers were 2.1 per cent less likely to go out of business than those elsewhere in southern Ontario. On average, farmers in protected countryside claimed \$1,067 less capital cost allowance per year, which the study used as a measure of investment in the property.

Vyn explains that timing of such policies is crucial: "Likely agriculture was already starting to decline prior to the implementation of the Greenbelt." Agricultural land awaiting development is typically not farmed to its full potential. Meanwhile industry supports, such as supply companies, may have left as development encroached.

The study was published in the journal *Applied Economic Perspectives and Policy* in July 2016. **BF**

## A new livestock feed product

When you think of algae, a link with agriculture may not be the first thought that comes to mind. Algae-based feed products are, however, changing the way livestock farmers can market their products.

The **CFIA** has registered the first algae nutritional product of its kind, created by **Alltech**.

"This is the first (algae product) with the purpose of enriching the content of the omega-3 fatty acid docosahexaenoic acid (DHA) in foods of animal origin," the CFIA said in an email.

Livestock fed this product produce nutritionally-enhanced meat, milk and eggs that can be marketed as premium products.

"This is the first heterotrophically-grown (meaning it survives on organic matter from other organisms) algae product in Canada," says **Stuart McGregor**, general manager for Alltech Canada. The product "provides a sustainable alternative for DHA omega fatty acids."

If a "producer (already) has an omega-3 branding-type program, this would be a fantastic opportunity to rebrand or ultimately increase the value of their program by (marketing) a sustainable source of DHA," Alltech's McGregor says. **BF**



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## 'What is the legacy' of your family farm?

Only 27 per cent of operations have a formal succession plan and farms without a plan have a significantly greater chance of failure, according to a recent national survey by **Farm Management Canada (FMC)** and the **Agri-food Management Institute**.

Leading farm practices include: continual learning, making decisions from accurate data, seeking advisory help, following a business plan, engaging in risk assessments and monitoring farm budgets, **Heather Watson**, executive director of FMC, said at the **Canadian Food and Drink Summit**.

In terms of ensuring a successful farm business, some industry representatives suggest the importance of intergenerational creativity.

"Over 90 per cent of businesses don't make it from generation two to generation three, so I would say talk to other family businesses. There is no one-size-fits-all,"



**Margaret Hudson**, CEO of **Burnbrae Farms**, said at the Summit.

Successful intergenerational farming can be thought of as a family culture, says Watson.

"Ask what is the legacy this farm has created and how do we want to continue into the next generation," she says. **BF**

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# RURAL SCHOOLS ON THE CHOPPING BLOCK

Ontario's Ministry of Education plans to consolidate and close schools but rural activists are pushing back to save their communities.

*by JIM ALGIE*



Majesta McClure and Wayne Elder and their children, James, Ewan and Leah, pose in front of the Chesley District Community School.

**K**ington Collegiate and Vocational Institute, the high school that educated Sir John A. Macdonald, Canada's first prime minister, CBC hockey commentator Don Cherry and members of the rock band Tragically Hip, plans to close.

Another historic collegiate – Owen Sound Collegiate and Vocational Institute, most famous for the schooling of Billy Bishop, the First World War flying ace, and Agnes Macphail, the first woman elected to parliament – closed last fall.

More school closures will follow. The schools are casualties in a new round of accommodation reviews and multi-million dollar school system adjustments mandated by Ontario's Education Ministry in the name of improved course selection and declining enrolments.

Community activists have begun wondering, however, why the process targets so many rural schools. These activists have begun to question the accuracy of the demographic projections used to calculate school board strategies.

In some rural areas, proposed school closings ignore likely areas of imminent growth. In Bruce County, for example, a pending \$8 billion refurbishment of the world's largest nuclear generating station is expected to yield at least 3,000 direct new jobs and increase the community's population.

For rural students, school closures mean longer bus rides and barriers to after-school activity and parental involvement. For rural communities, the consolidations pose a social and economic threat that pits neighbours against one another.

The closures also leave school boards at the mercy of ministry funding formulas that some say favour costly new capital construction over less costly options. That's particularly true where rural schools provide a singular, community focus.

The newly-formed Ontario Alliance Against School Closures (OAASC) estimates that 500 rural schools face major change, including closure.

The alliance, which has been



**MPP Bill Walker with Eric and Sarah Grant, students at Paisley Central School, participated in the Nov. 21 protest at Queen's Park over rural school closings. This school has been identified, in the accommodation review plan by the Bluewater District School Board, as likely to close.**

rapidly growing since September, produced a protest on Nov. 21 at Queen's Park. Activists from as far north as Sudbury, as far southwest as Sarnia on the Michigan border and as far east as the Quebec border attended the event. As many as 200 protesters gathered on the legislature steps outside as opposition members inside peppered Education Minister Mitzi Hunter with questions and petitions.

Hunter and Premier Kathleen Wynne defended current policy and government plans for new school spending. But protest momentum continued to build through December. For rural Progressive Conservatives such as Bill Walker, MPP for Bruce-Grey-Owen Sound, it seems at times like a political gift.

MPPs Walker, Steve Clark (Leeds-Grenville), Monte McNaughton (Lambton-Kent-Middlesex) as well as Jim McDonnell (Stormont-Dundas-South Glengarry) have hammered the rural schools theme hard in the legislature.

Ontario Federation of Agriculture board members are likewise taking leadership in their communities on an issue that concerns not only farmers but also their non-farming,

rural neighbours.

Federation director Pat Jilesen and his wife, Beth, raise sheep on a 200-acre farm about five minutes' drive from the central Bruce County village of Paisley, which has a population of 1,003. Jilesen – along with other parents, local municipal representatives and business representatives – has joined a pitched battle to save the community's only remaining school.

Because of school boundary rules that still puzzle Jilesen, his elder son, Noah, began formal education at the ripe old age of three and rode a bus for more than an hour to Port Elgin instead of Paisley, five minutes from home. Seven years later, Noah, 10, and Elsa, seven, still ride the bus to Port Elgin.

"I can't think of a better, renewable economic development commitment from the government than to keep the schools open," Jilesen said in an interview over coffee at Back Eddie's restaurant in Paisley. He cited frequent Wynne government commitments to agriculture and to rural development which profess "the importance of keeping rural communities vibrant."

But the issue isn't only about agriculture. A growing segment of people from high-cost urban areas of Ontario has lately begun to identify lower-cost housing and emerging work opportunities in rural areas, Jilesen said.

The farmer-owned Gay Lea Foods Co-operative, for example, announced in November a \$60 million doubling of existing 80-employee facilities at the Teeswater plant in southern Bruce, part of the company's \$140 million investment in new milk processing. Feihe International Inc., the China-based infant formula producer, announced the opening in early December of a 200-job processing plant in Kingston to make goat-milk infant formula.

In the central Grey County village of Markdale (pop. 1,325), Chapman's Ice Cream, Canada's largest independent ice cream manufacturer, predicts imminent expansion of its existing 600-person workforce. Vice-president Ashley Chapman, whose parents David and Penny established the firm

in 1973, has joined the debate over school closings with an offer of corporate financial aid to preserve a school in Markdale for current and future employees' children.

Bruce County council has approved a \$20,000 study to examine the ins and outs of demographic projections used by the Bluewater District School Board as part of its continuing accommodation review. In late November, a joint meeting of Grey and Bruce County councils resolved to seek from provincial officials improved consideration of the community impact of local school closings.

One municipal councillor in the southern Bruce community of Brockton researched birthrates and found an increase in local childbirths by as much as 46 per cent and 27 per cent at two area hospitals beyond the census data used in school board analysis.

Susan MacKenzie, the OAASC's founder, became involved when Lambton-Kent school board officials

first proposed closing Sarnia Collegiate Institute & Technical School (SCITS) where her son is a graduate. Built in 1922, SCITS is to close after the completion of \$16 million in renovations at St. Clair Secondary School, which will accommodate SCITS students in the city's south end. As a result, the board is turning its back on a building that features a 750-seat auditorium and swimming pool, MacKenzie said.

A long-time school council member, MacKenzie has weathered four pupil accommodation reviews. After she heard about the board's decision to close SCITS, she said in an interview, "Just looking at the building ... you know that it's the wrong decision.

"The building is in great shape. I started looking through the reports and got into the facility condition index information; to me it's scandalous," MacKenzie said. The index measures needed improvements. But related funding for new construction, MacKenzie maintains, skews the

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McRae photo



**Shawn McRae farms near Bainsville and is a parent representative on a school accommodation review underway in the Upper Canada District School Board. Here, Shawn poses with his family. On steps: Shawn and Tara’s sons Duncan and Malcolm. Left to right: Shawn and son Alastair, Tara, Ron (Shawn’s father) and Carolyn (Shawn’s mother).**

process against future uses for existing buildings.

“I think the motivation is: (the provincial government is) halfway through (its) mandate, there’s an election in two years and ... they want to say they put all this spending into education and ‘Look at all the new schools we’ve built.’”

Shawn McRae and his wife, Tara, cash crop about 500 acres near the hamlet of Bainsville, 40 kilometres from Cornwall. He represents parents in the accommodation review begun by the Upper Canada District School Board. They are considering a proposal to close S.J. McLeod Elementary School where McRae’s two youngest children are students. The school was built in the 1960s on land donated by his great-uncle; McRae’s mother once taught at the school, and he and his sisters attended elementary school there.

His two eldest boys now attend Char-Lan High School in Williamstown. The school takes its name from former municipalities of Charlottenburg and Lancaster townships. Under the current review, both schools could close, McRae said. He remains cynical about current consultations.

“I think what frustrates a lot of people (is) ... we used to ... make more local decisions,” McRae said. “Both at the local government level as well as the school system, the dollars stayed in the community and things were arguably run efficiently because of that local nature.”

People for Education, a Toronto-based charity that conducts and commissions education research, expects to complete a detailed study of the current round of accommodation reviews this spring, executive director Annie Kidder said in an interview. The organization’s 2016 annual report in May documented that students living in small towns and rural and northern communities are “less likely to have music or health and physical education teachers,” among other services. (For further information, see the infographic on page 4.)

Kidder acknowledged a recent “surge in school closing notices.” Provincial policy changes within the past four years curtail funding that once allowed regional boards to maintain schools below design capacity, she said.

“There was funding for declining enrolment to help boards ... deal with their declining enrolment,” Kidder said. “That funding is slowly being cut because the province had wanted boards to – the polite word is – ‘consolidate’ schools to deal with the fact” of declining enrolment.

“There are schools that will close and probably should close,” she said. “What we’re concerned about is we seem not to be able to take account of the exacerbation of the policy as it’s working right now in terms of the impact on small towns, rural Ontario and northern Ontario.” **BF**

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# Chesley family faces possible loss of local school and agriculture curriculum



The Specialist High Skills Major Agri-Business program is based at the Chesley Community School. Here, students can learn about agriculture.

**M**ajesta McClure and Wayne Elder met at Chesley District High School in central Bruce County.

Now settled with three children and 65 beef cows on the farm where Wayne grew up, the couple had assumed their children would follow them to CDHS. This fall, for the second time in five years, the Elders have had to fight for that idea.

Their old high school is known now as Chesley District Community School. The school got its new name when the Bluewater District School Board's last accommodation review

juggled local facilities to include children from kindergarten through to grade 12.

This fall, the school became the focus of study again. The school board is considering a proposal for the Chesley/Paisley area that could close the only elementary school in Paisley by 2018 and move all Chesley secondary school students elsewhere.

The issue is more than simple nostalgia for the Elders. They identify the school with the qualities of community and family life they hope to maintain, such as growing cattle and crops in an area of the province

where their forebears have thrived for generations.

The McClures ran a historic, local feed mill. Wayne is a 2002 graduate in agriculture from the University of Guelph. He farms with his father, Keith, whose early education occurred in a one-room school about two miles away. Elders have farmed here since 1861.

Wayne rode buses to school when he was a kid, as do his two school-aged children now. They attend Sullivan Community School, a small elementary school just north of the Grey County village of Desboro.

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**The local community has mobilized in an effort to save the Paisley Central School.**

Although not currently earmarked to close, the Desboro school does have board-identified capital deficiencies that work against its future.

“We recognize that ... our kids will be sitting on a bus for some amount of time, but we think one-and-a-half to two hours is too long,” Majesta said during a Saturday afternoon interview in the kitchen of their brick farmhouse. She is an elementary school teacher currently on parental leave.

The longer the bus ride, the greater the risk of highway accidents in dangerous winter weather for which the region is known. Time spent with relatively little adult supervision also potentially exposes children to undesirable acts, such as bullying. Transport time interferes with extracurricular activities and part-time jobs. Long distances between home and school also hinder parental participation in events such as breakfast clubs or Christmas concerts.

“The longer the kids are on the bus, the less ready they are to learn when they get off, if they’re hungry and tired and maybe kind of grouchy,” said Majesta.

The possible loss of Chesley’s high school program also complicates the future of the Bluewater board’s highly touted Specialist High Skills Major Agri-Business program at a time when it’s increasingly important to encourage candidates to learn about promising new developments in agriculture, Wayne said. Chesley’s agriculture curriculum provides participants with workplace training in first aid, livestock medicines and hazardous substances.

The program received a 2007 Premier’s Award for Agri-Food Innovation Excellence and allows graduates advance standing in first-year agriculture programs at the University of Guelph. In 2016, agriculture teacher Dennis Watson received the prestigious Tommy Cooper Award, presented annually by the Grey and Bruce County federations of agriculture, for contributions to agriculture.

Bluewater school board officials have promised to preserve the agriculture major program even if general high school programs shift away from Chesley. School trustee Marilyn McComb is among the few Bluewater officials to speak publicly during the review about the need to preserve the program.

In an e-mailed response to a *Better Farming* inquiry, McComb cited the region’s agricultural importance. A livestock barn, a greenhouse and maple syrup processing facilities are all part of the existing program which relies on community financial support from the Kinsmen club and area farmers. Participants also benefit from work placements on area farms and in agri-businesses and from the use of area farmland for cropping.

“It is crucial that the students have access to a barn, preferably in Chesley, and that students interested in pursuing a career in agriculture have access and transportation to this program from wherever they live,” McComb said.

“It gets complicated; there are questions,” Wayne Elder said of a continued agriculture program in the absence of a high school in Chesley. “The fact that we have this agriculture program which has been ... recognized by the University of Guelph, has won all these awards and runs every year. (But) we just don’t feel that it has the same viability either on its own or in another location, and I’m worried that in the transition it will get lost in the shuffle.” **BF**

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# Parents debate the future of three local schools



Chapman's photo

**Ashley Chapman, vice-president of Chapman's Ice Cream, has joined the debate over school closings with an offer of corporate financial aid to preserve a school in Markdale.**

**A**t a packed meeting in early December in the gymnasium at Beavercrest Community School in Markdale in Grey County, parent representatives in an accommodation review committee squared off.

The parents were there to study the Bluewater District School Board's plans for the future of three elementary schools along a 28-kilometre stretch of Highway 10 in central Grey County. They contended like trial lawyers over their community's existing schools.

Board officials, who declined an interview request, had slated Beavercrest for closing at the end of the current school year. Beavercrest's defenders highlighted the school's central location and proximity to the hospital and other village services, including municipal water. They also noted that the region's major employer, Chapman's Ice Cream, has 600 employees and is growing.

Beavercrest parents also questioned well water quality at nearby Holland-Chatsworth Central School. Board reports recommend that this school receive improvements and an influx of new students when Beavercrest closes.

Built in 1950 and featuring three subsequent additions, Beavercrest has projected five-year capital renewal costs of \$2.6 million, judging by a board report. Enrolment is about 119 students short of the school's 314 pupil capacity.

Holland-Chatsworth school is located near a tiny crossroads settlement that does not have much other nearby infrastructure. It is about 18 kilometres north of Markdale (pop. 1,350). For their part, Holland-Chatsworth parents provided reassuring safety reports on well water inspections. They expressed enthusiasm about their 50-year-old school and the prospect of raising student enrolment to fill 340 pupil spaces.

Meanwhile parents representatives appointed to the review process for Macphail Memorial Elementary School in Flesherton (pop. 543), 10 kilometres south of Markdale, questioned the board and Ontario Education Ministry analysis that shows the Flesherton school can handle as many as 80 additional students in the coming shake up. Macphail dates from 2004. This school has minimal capital renewal needs, hosts the area's French immersion program and serves 507 students

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**Beavercrest Community School in Grey County is slated for closing at the end of the current school year – but local protests rage.**

– 92 students short of capacity.

The meeting became a polite-but-pointed tag-team competition: senior board officials answered parents’ leading questions as a panel of trustees watched. Final decisions are expected in March.

Audience members, who weren’t allowed to ask questions, grumbled amongst themselves about the need for changes in provincial policy about how these decisions are made.

During a break, Beavercrest advocates approached those from Holland-Chatsworth to shake hands and promise no hard feelings. But Beavercrest had an ace up its sleeve, and everyone knew it.

Two weeks earlier, Ashley Chapman, the vice-president of Chapman’s Ice Cream based in Markdale, had attracted *Toronto Star* news coverage when he promised to help fund a new, or renovated, Markdale school as part of a new community centre. Board officials, although non-committal, were clearly interested.

“It’s not supposed to be an against-each-other process,” Kara Borowski, a Holland-Chatsworth parent, said in a subsequent interview. A small-scale

poultry farmer, market gardener and mother of two children (the elder attends kindergarten at Holland-Chatsworth), Borowski said she appreciated the Beavercrest parents’ gesture but added, “We’re just trying to do what we think is best for our kids and our community.

“It’s a terrible, terrible feeling and a terrible thing for the board to put us up against,” she said.

Grey Highlands municipality council, which manages a sprawling population of 9,500 covering much of southern Grey County, has also become involved. The council offered \$100,000 to cover two years’ rent for unused space at Beavercrest.

Grey Highlands’ administration operates from leased office space in an annex to a county-owned seniors’ home and is deeply engaged in efforts to expand and revitalize Markdale.

That’s partly because of the continuing expansion of Chapman’s Ice Cream, now Canada’s largest – by volume – independent ice cream manufacturer.

But municipality officials also talk about a growing nearby settlement of Mennonites (who do send their children to public schools). They cite

pending housing proposals and other expected growth.

The Grey Highlands’ offer buys time to sort out the details of Chapman’s involvement in school redevelopment, deputy mayor Stewart Halliday said in a joint interview with mayor Paul McQueen.

“With our resolution, we knew there had to be some skin in the game to catch their attention, and it certainly has,” McQueen said.

Ashley Chapman hopes for a project with diverse funding and other components that may respond to provincial policies favouring schools as part of community hubs. The concept could include new recreational facilities such as a pool and/or library, Chapman said in an interview.

“The municipality would put up a



**Mayor Paul McQueen**

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chunk of money and we would have to work through one of the not-for-profit organizations in the community to donate our money,” Chapman said. In early December, the family-owned firm announced a 100,000 square-foot

expansion that Chapman figures will add 100 employees within a year and another 300 within five years.

A village school is “one of the basic things to get people into the area,” he said. Bluewater board enrolment

projections were based on a 2013 consultant’s report that Chapman argues is out of date.

“Here we are three years later and this community has changed; it’s growing,” he said. **BF**

## School board co-operation and recent funding increases benefit rural education, says ministry spokesperson

Since 2003, annual funding for rural school boards has increased by \$1.12 billion, said Heather Irwin, an Ontario Education Ministry spokesperson, in response to a *Better Farming* inquiry.

Irwin issued the statement after *Better Farming* requested an interview with Education Minister Mitzi Hunter, MPP for the Toronto-area riding of Scarborough-Guildwood. Irwin’s statement emphasized the importance of co-operation among neighbouring school boards in current accommodations planning.

“By coming together, and utilizing shared spaces, some schools may be able to offer better program options that would not be offered in a smaller classroom environment,” Irwin’s statement said. She cited examples in Sturgeon Falls where French- and

English-speaking boards share a secondary gym, library and cafeteria facilities.

“This is about recognizing the need for Boards to work with each other and their communities to find the right solution to ensure students have the best learning environments possible,” the statement said.

“We remain steadfast in our commitment to ensuring that students in rural Ontario have an equal opportunity for an excellent education,” Irwin said.







Part of rural education funding includes Grants for Student Needs to offset higher-cost materials and resources and declining enrolment. These grants have increased since 2012-13 by more than \$199 million.

Since 2003, per pupil funding has increased by \$4,508 (63 per cent), the ministry statement said. **BF**



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## A short history of Ontario schools consolidation

- 1941 – Ontario population: 3,700,000.
- 1948 – Ontario had 6,800 elementary schools, including 4,400 with one classroom and single teacher. There were 239 high schools, 114 continuation schools and 60 vocational schools.
- 1950 – 40 per cent of schools lacked inside toilet facilities; a third of rural public schools and half of separate schools lacked hydro.
- 1961 – Ontario fertility rate of four children per woman almost doubled from the 1936 rate of 2.2.
- 1964 – Ontario Education Minister William Davis eliminated historic, single school boards, declaring townships the administrative unit for public schools in rural areas.
- 1968 – Limited French-language education rights established.
- 1969 – During county board consolidation, counties became the basic school administration unit despite widespread protests. Education costs became an explosive political issue.
- 1969 – Education Act amendments allowed the province to impose school board spending limits.
- 1970 – Ontario Federation of Agriculture proposed farm tax strike over education issues.
- 1971 – Ontario population: 7,600,000.
- 1985 – Full public funding for Catholic separate school system.
- 1985-90 – Separate school enrolments rose from 63,000 to 171,000 as public school enrolments declined.
- 1986 – Full French-language education rights established.
- 1995 – Premier Mike Harris's Common Sense Revolution proposed a \$400 million school funding cut.
- 1997 – Education Act revisions introduced provincial control of all education revenue, including provincial grants and local property tax levies, while cutting total number of school boards in half.
- 1999 – High school program reduced from five to four years.
- 2002 – Ontario Ministry of Education actual budgets, 2002-03 school year: operating, \$14.399 billion; capital, \$670.8 million. Average daily enrolment, 1.997 million students. Student transportation grant, \$629.267 million. Average utilization of facilities, 85.7 per cent.
- 2016 – Ontario Ministry of Education projections for the 2016-17 school year: operating, \$22.864 billion; capital, \$1.493 billion. 3,980 elementary and 927 secondary schools; average daily enrolment, 1.952 million students. Student transportation grant, \$896.6 million. Average utilization of facilities, 78.6 per cent.
- 2016 – Ontario population 13.983 million, 14.9 per cent in rural areas and 85.1 per cent in urban areas. **BF**

Sources: R.D. Gidney, *From Hope to Harris: The Reshaping of Ontario's Schools* Toronto: University of Toronto Press, 1999; Ontario Ministry of Education website; and Ontario Ministry of Finance website.



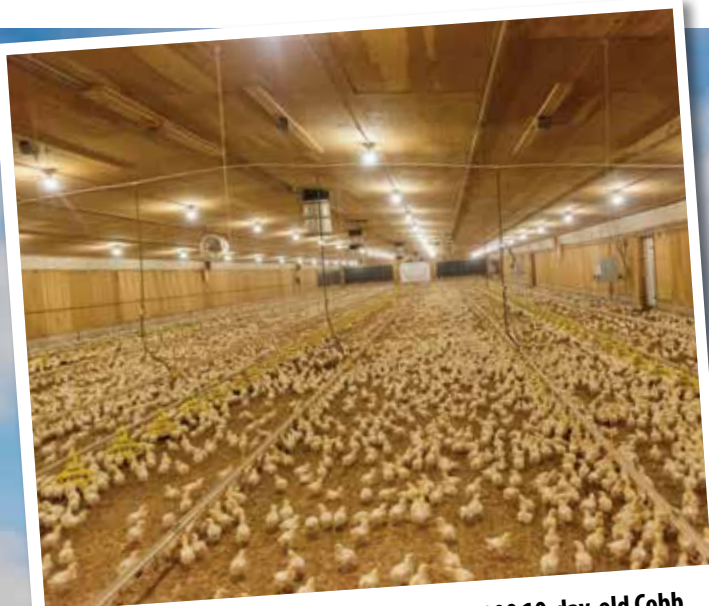
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# Working to keep up with demand

This Cambridge poultry farm is helping to satisfy the high demand for chicken. A focus on safety and innovation enables the family to keep production flowing.

by KYLE RODRIGUEZ



A softly-peeping mass of approximately 34,000 10-day-old Cobb breed broiler chicks roam a single story of a Whistlebare Poultry Farm barn. When they arrive, the mixed-sex chicks have only been out of an incubator for 12 hours.

Mark Hermann, owner of Whistlebare Poultry Farm, left, and his son Jonathan walk across fresh December snow toward one of the five poultry barns housed on their two properties in Cambridge. Mark's father Harry, who emigrated from Germany in 1957, built and sold two houses in the area to fund a down payment on the first farm in 1967. Harry passed the business along to Mark in the mid-1990s. In addition to raising poultry, the family also grows soybeans, corn and winter wheat.



Canadians love their poultry. According to Agriculture and Agri-Food Canada, Canadians consumed 31.86 kilograms of chicken per person in 2015 – more than any other meat. Meeting this growing consumer demand is big business. Canadian poultry and egg production generated \$4.04 billion in revenue, or 6.8 per cent of cash receipts of the country's farming operations. No province has more poultry producers than Ontario, with 39 per cent of the nation's production capacity.

Mark Hermann, owner of Whistlebare Poultry Farm in Cambridge, is one of over one thousand chicken producers in the province. Taking over from his father Harry, a European immigrant who built the business, Mark now works alongside his son, Jonathan.

Together, Mark and Jonathan raise over 150,000 birds every eight-week quota period. Mark and his family are incorporating innovative technologies to maximize production, while maintaining the safety and ethical standards of the industry. **BF**



Mark points out the ventilation holes in the black SolarWall siding on his barn. The dark-coloured paint heats pockets of air trapped in corrugated paths beneath the surface, which can then be automatically vented into the building. This renewable energy system helps reduce input costs for the farm during winter and can be bypassed during the hot summer months.



Jonathan and Mark remove their outside footwear in the barn's entry room and put on boots reserved for working in that building. The small bench is placed as a marker beyond which outside footwear must not pass. Workers also sanitize hands when entering and leaving buildings to help prevent the spread of disease between units.



As Mark unlocks the door to a chicken barn, a bright yellow sign reminds all entrants of biosecurity measures intended to limit the spread of pathogens between flocks. With the potential threats of avian influenza, salmonella and other outbreaks, all workers and visitors must follow strict protocols to stop the transmission of diseases and viruses.

Mark checks the status of the automated control system in the anteroom to the barn. The LCD display shows the projected growth curve of chicks over their 32-day stay leading up to market. The same readout is available on his smartphone and computers. The system sends alerts to farmers if there is a disruption to food supplies or water pressure, or if the barn's temperature or humidity reach critical levels.



Jonathan checks the automated feeder system in a freshly set-up barn. In addition to dispensing measured amounts of food, the line is attached to a winch system that automatically lifts feeders to match the height of birds as they grow. The assembly can also be raised to the ceiling so that it is out of the way when cleaning the barn floor.



A 16,000 square foot, double-story barn stands vacant and ready to accept 21,000 newly-hatched chicks in two weeks. The break in occupancy is meant to allow any pathogens left by the old flock to die off before they can be transferred to the next batch of chicks.



20-year-old Jonathan Hermann, left, and his father, Mark, stand between two poultry barns on their second property in Cambridge. Jonathan has just completed an associate diploma in agriculture at the Ridgetown campus of the University of Guelph and will work on the family farm full-time. He also plans to study for his Class AZ driving licence which will allow him to take on an even greater role in the family business.

# Satellite images: Multi-use, multi-purpose

Increasingly reliable technologies provide clearer resolutions. Is it time to use satellite imagery to help you manage your crops?

by JENNIFER JACKSON

To some, monitoring the growth of 30,000 acres of corn may seem like a logistical nightmare. To others, this task may be a challenge that requires the use of some innovative technology.

Just ask Charles Lalonde, biomass project coordinator at the Ontario Federation of Agriculture. When Lalonde was given this task, he looked up – way up – to space.

Lalonde, along with other researchers, began using satellites to aid in the crucial first year of a biomass project which plans to turn corn

stover into cellulosic sugar.

Lalonde and his team needed to predict the biomass yields of corn that would be available for the project. The acres spanned southwestern Ontario. A drone just wouldn't cut it for this task, he says.

“With satellite images, we can work with farmers to identify which fields are the highest-yielding fields,” says Lalonde. “We can determine this (information) in late July and therefore map out the logistics of the

harvest. Without (this information), we would have to wait until the farmers disclose grain yields.”

The images provided Lalonde and his team with a good indication that

the amount of residue available to be removed from the fields was in fact sufficient for the needs of the sugar plant.

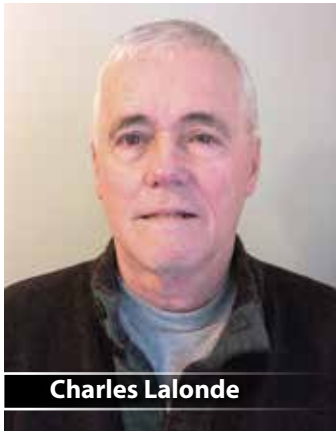
“The satellite imagery offered a very quick and accurate snapshot, based on not only what we know from research, but also when verified from a field level,” says Lalonde.

On a project as large as Lalonde's, satellites could be a game-changer in terms of efficiency.

But the imagery can also prove handy locally, says Karon Tracey-Cowan, founder of AgTech GIS, a precision ag company that acts as a conduit between satellite imagery providers and clients.

Satellite imagery has “expanded hugely,” she says. “Agri-businesses are bringing in more industry services, such as satellites and drones.”

It is an exciting time for satellite



Charles Lalonde



Agriculture and Agri-Food Canada and the Canadian Space Agency photo

With increasing numbers of satellites orbiting earth, satellite imagery providers hope to soon acquire new images daily, depending on cloud cover.



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Satellite imagery has helped Lalonde's team predict corn biomass well before harvest.

imagery, Tracey-Cowan says. "Those who use it are learning something (new) every time" they work with this imagery.

"It can serve to point out areas of concern not readily observed from the ground or it can corroborate information from other sources, such as yield performance regions."

**Determining crop health**

Satellite imagery can play an important role in monitoring fields and using it may be the first step in evaluating crop health.

Satellite images can be used many ways, says Richard Marsh, product manager at Farmers Edge.

"The sensors (from the satellites that are) used to measure the electromagnetic radiation (that is reflected off vegetation) are sensitive to wavelengths that our eyes simply cannot see," he says. So in this sense "a healthy crop doesn't 'look' like anything to us. For this (data) to be useful to others, areas with poorer vegetation are (traditionally) assigned red colours, and areas of high vegetation are assigned green."

This data collection is well known by Nathan Wainscott, an agriculture technology specialist at WinField United, a company that provides training and information to retailers on its R7® satellite tool.

The R7® tool can specifically capture the normalized difference vegetation index (NDVI) of crop fields to assess general health.

The NDVI is based off of the reflection of infrared light (wavelengths) that shines down and the amount of light that shines back," says Wainscott.

The tool assesses the NDVI of a crop field and associates the density and health of the crop with a colour. Plants lacking in biomass development could be affected

by numerous ailments, such as pest damage or disease pressure, says Wainscott.

"Our eyes contain receptors that are sensitive to red, green and blue light. The relative amounts of light in these wavelengths received by the eye are then interpreted by the brain as color. Healthy vegetation appears green to our eyes because it reflects sunlight more highly in the green wavelengths than it does in the blue and the red," explains Andrew Davidson, manager of earth observation operations for Agriculture and Agri-Food Canada.

"Remote sensors work the same way, except these 'eyes in the sky' (satellite sensors that scan the earth's surface) can also sense in wavelengths not seen by the eye. Near-IR, shortwave-IR, and

thermal-IR are examples.

"Observations collected in all of these wavelengths can be combined digitally in creative ways to monitor crop type, condition and biomass," he says.

This scaling enables farmers to get a close yield prediction, Wainscott says. Digitally with the NIR image, "we can break the field up into a number of zones (red, green, etc.) and pull ears directly from those zones." The tool can determine exactly how much area each zone covers and, after the ear yield data is entered, can give a more customized yield prediction.

"There will always be a scale of colour on an image. Red (with the R7® tool, for example) does not necessarily mean the area is bad; you have to look at how large the scale is from the red to green," he says. "(Satellite imagery) will never replace boots on the ground (for scouting.

The images) direct the farmer to go to specific spots (of concern) in the field." The farmer doesn't need to "walk the typical W scouting pattern."



Karon Tracey-Cowan



Nathan Wainscott



Satellite imagery used in NDVI analysis for a growing crop can also be applied to bare soil analysis, according to Tracey-Cowan, who commonly supplies clients with bare soil imagery classification.

“We can classify the light-reflection value (of the soil). This (classification) helps create a zone style map (and shows us where) to go out and soil sample. This data can (be added) to other soil information (farmers) have, such as yield maps.

“We use the colour to understand patterns: (the satellite images) don’t tell (farmers) everything but (provide) a different perspective.”

Davidson and his team at Agriculture and Agri-Food Canada use these technologies for monitoring the state of, and change over, Canada’s agricultural landscape.



Andrew Davidson

Crop type, condition and biomass, as well as surface soil moisture conditions, are all mapped and analyzed using data from a variety of satellite sensors using sophisticated software, according to Davidson.

Steve Redmond, a precision ag specialist for Hensall District Co-operative (HDC), has also found a fit for

satellite crop monitoring with clients.

Interns at HDC use satellite imagery to monitor fields and have been testing the technology by scouting problem areas indicated in the images, Redmond says.

“If the image can help you go directly to the problem spot, it can help scouting,” he says. “When you scout, you sometimes only really see a small percentage of the field. Whether you are scouting yourself or paying

for the service, satellite imagery can maximize efficiency. It could cut your time scouting crops in half.”

In fact, improving scouting efficiency is one of the most common uses for satellites in agriculture, says Ryan Schacht, an agriculture representative at Planet Labs Inc., a satellite image provider. The other most common uses for satellites in crop health include creating management zones and identifying nutrient deficiencies.

**Logistics**

There are many types of satellites available for use. The intended use of the images determines the satellite type.

“To map crop type at the field level, we use Landsat 8 and RADAR-SAT-2; for soil moisture, we use SMAP (Soil Moisture Active Passive); and for crop condition, we use MODIS (Moderate Resolution Imaging Spectroradiometer),” says Davidson. “These sensors differ in terms of their spatial resolutions

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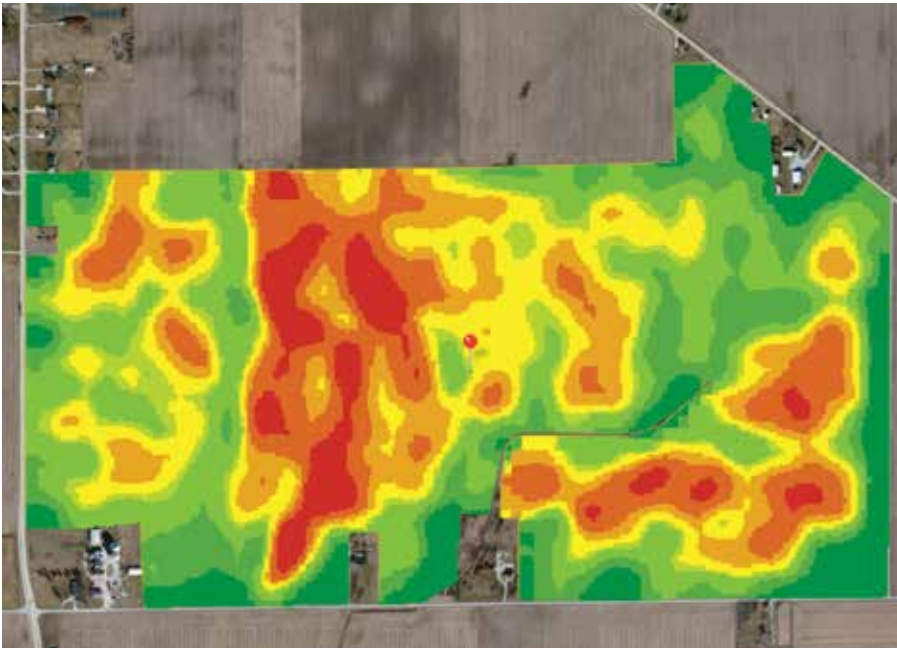
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Nathan Wainscott, Winfield United photo



**Using a colour scale and the normalized difference vegetation index (NDVI) of a crop field, tools such as the R7® tool can display zones of differing biomass, density and health of the crop.**

(pixel size), temporal resolutions (repeat frequency) and spectral resolutions (number of wavebands that are imaged). Some sensors will be more suitable than others for certain applications.”

Agriculture and Agri-Food Canada has a geospatial viewer where the public can access these data products. The viewer “allows you to view and analyze image products – the final output of our integration of imagery to create customizable and usable information.”

The advantage of using the geospatial viewer is that the actual output data files on their own – which are also available through the Government of Canada’s open data portal – are of limited use without specialized software and the associated expertise needed to interpret them, he says.

“Farmers can see and use the data if they want, but the real power is in the information provided to agencies that support the farmers,” says Davidson.

The frequency with which the satellites take images is also important, says Marsh.

“Numerous (satellite) groups around the world are racing to build constellations of microsatellites no

larger than a box of shoes,” he says. “With hundreds of those shoeboxes orbiting earth, individual groups are expecting to (capture) the earth every single day. That frequency of data will make satellite imagery (more) actionable because it will be much more reliable.”

Schacht similarly stresses the importance of frequency.

“When you look at crop health, it’s crucial to look at your crop at the right time,” he says. “It’s being able to have the image available at a reliable cadence and having it available opportunistically at the farmer’s interest.”

Planet Labs currently has 60 satellites in orbit now and is planning to launch another 116 in the coming months.

“We have been able to offer service-level agreements to 85 per cent of the earth every two weeks, factoring in clouds. If there were no clouds, we could provide a re-visit rate of every week,” he says. “Satellites also need to be able to source reliable

imagery in terms of geography, (while) providing a resolution that is relevant for operations at a field management level.”

Wainscott similarly stresses the consistency of the satellites.

“The satellites are 100 per cent reliable that they will fly, but when the satellite does fly over (it will either be) cloudy or clear,” he says. “You are at the mercy of Mother Nature.”

Because of the uncertainty of weather, it’s important to have many satellites in orbit to ensure access to many images.

“Our goal is to get an image every 10 to 14 days,” he says.

Providers like HDC, Farmers Edge and WinField United can make images available to a farmer’s or agronomist’s device – whether it’s a smartphone or tractor computer – fairly quickly and effortlessly.

Schacht, for example, says he is able to provide retailers or clients with their images in 24 hours or less.

“In the context of precision ag, timely information is important,” he says. “You (typically) need 24 hours or less to make a decision.”

Another important logistical component of satellite imagery is the scale.

For example, “RapidEye (the satellite) can image 6 million square kilometres per day. The resolution for RapidEye is measured in five metres; for perspective, a drone may have a resolution of

around five centimetres,” says Marsh.

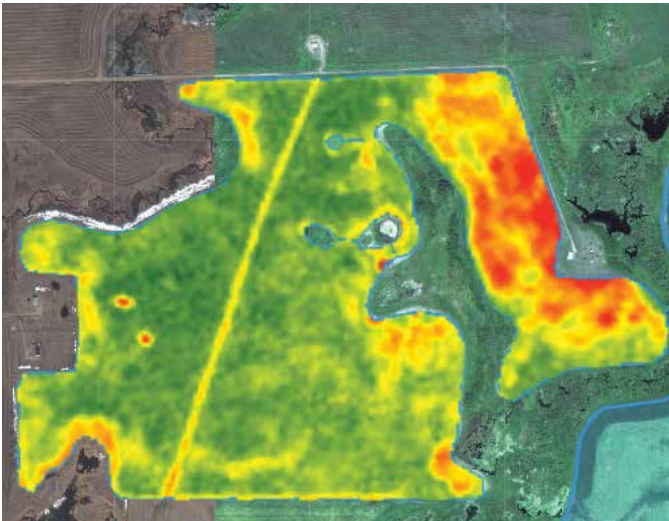
But this fine resolution is not necessary for satellite use in ag at this stage, says Tracey-Cowan.

“On some of our agriculture land, two-centimetre data is too detailed for what we are achieving” with satellite imagery, she says. “If we are using satellite imagery to assess zones in the field which can benefit from being treated or managed differently (with the variable rates of inputs), then the resolution only needs to



**Ryan Schacht**

Richard Marsh, Farmers Edge photo



With applications such as this health map, data from the NDVI of a field is digitally translated into simple colour zones for easier interpretation.



Planet Labs Inc photo



With near-infrared images, dense green vegetation reflects the infrared light, shown on the image as red. This image shows Lethbridge, Alberta in 2015.

meet the limitations of the equipment. There is a place for both high-resolution imagery for understanding very detailed responses in the field, and less-detailed imagery looking for trends in the field for zone management purposes.”

**Conclusions**

Satellite imagery is finding a place in many areas of the agricultural industry.

Government groups, provincial groups, academia, agricultural insurance companies and industry organizations and participants use satellite imagery for data collection, says Davidson.

Schacht also notes the uses of this imagery. “Agricultural (commodity analysts) have been interested in the imagery. They use the data to assess global yields and crop supplies.”

Crop insurers have also been considering the benefits of the data. “They are looking into automating claims. They could pick (weather damage) on the imagery such as where the damage happened and how much,” says Schacht. “It’s a big time and cost saver.”

Schacht even has a customer who is now looking into using the imagery to automate an irrigation system.

It seems the possibilities for the use

of satellite imagery for Ontario’s farmers continue to evolve. **BF**

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# The next wave of farming intelligence arrives in North America

Robotics, artificial intelligence, machine learning and predictive analytics promise to change agriculture yet again.

by MARK JUHASZ



Panelists at the University of Toronto's Rotman School of Management event on October 27: (left to right) Diane Wu, CEO of Trace Genomics; Lee Redden, co-founder of Blue River Technology; Katya Kudashkina, CEO of UDIO AgTech; Max Bruner, CEO of Mavrx; and moderator, Ravi Mattu from the *Financial Times*.

The impact of 21st-century information technologies on agriculture will be profound.

The interaction between applied technologies and agriculture is growing. We are at a unique moment where data, produced in many forms, is now matched with the models and algorithms to make better sense of it.

How will robotics, artificial intelligence (AI), machine learning (ML) and predictive analytics affect the production of food? What ethical questions should the decision makers who support these technologies ask?

Panelists recently discussed these issues at the University of Toronto's Rotman School of Management at an

event titled Machine Learning and the Market for Intelligence. They included representatives from Trace Genomics, UDIO AgTech, Blue River Technology and Mavrx.

## AI, ML and the production of food

"We take a data-driven approach, using software and ML which does not require upfront capital costs of installing sensors, (that) is very easy to use and takes five minutes per field to set up," says Katya Kudashkina of Toronto-based agricultural software company UDIO AgTech. "It is predictive and oriented to create a balance between costs and yields. (There are) so many inefficiencies in

(the deployment of) resources in farming today that we believe this is where data science and ML can play a big role."

Mavrx, a California-based precision ag company, works with farm clients to provide a range of field data. Imaging and crop management applications track nutrient, irrigation, hydrology and fertility specifics.

Trace Genomics, co-founded by Diane Wu and based in California, provides predictive data analysis of soil microbiome health and ML sequencing techniques to predict yields.

"We see soil as the womb of agriculture, and its health is essential.

If you have soil issues, they might be apparent only at the end of the season. We offer genetic fingerprints of soil,” Wu says.

“We are not telling farmers how to farm. We are figuring out what machine learning will do better, scaling it and providing insights to farmers (who) get the value back from all their hard work.”

Blue River Technology, another California company, also emphasizes precision farming. Its “plant-by-plant” diagnosis monitors for optimal growing conditions.

How are established farming companies responding to the next generation of AI start-ups and entrepreneurs? Case IH and New Holland, for example, unveiled prototypes of autonomous field tractors in the fall. Farmers may one day operate these tractors equipped with a range of technologies such as LiDAR (laser-sensing) guidance.

Some of these “high-tech” applications in farming, such as global positioning systems (GPS) or drone imagery, are not shockingly new.

So what brings AI to the forefront now?

In 2015, nearly 500 ag-tech companies drew USD\$4.6 billion in investment, double the amount from the previous year, reports AgFunder, a U.S.-based equity crowdfunding site that connects individual and institutional investors with high-growth ag-tech and food companies.

Amid the enthusiasm for these new information and technology investments, farmers should keep in perspective that applications have different uses with particular commodity types, locations and production models, and need to integrate often disparate but growing ways of information gathering. Farm management will require thinking across database applications toward a unified platform of the farm operation; mobile devices will provide the user with access to ideally coherent, complete data.

We can increasingly see data integration and information sharing improve the benefits of AI. Farm Hack, which is based in the United States, provides users with an open source, online data platform to share “appropriate technology” innovations. Members manage and discuss everything from water conservation and soil health to greenhouses.

Farm Hack worked with the United States Environmental Protection Agency to gather data across farming systems to validate information that helps inform both government policy and farmer decision-making.

In 2009, the Food and Agriculture Organization of the United Nations reported that by mid-century agricultural production will need to rise significantly to meet demand. The situation is further complicated because some intensely farmed regions where crops such as rice and wheat are produced have “yield plateaued.”

### Bringing AI to agricultural innovation and addressing the data gaps

These developments are on the radar of Ontario-based farm organizations. At the interface of agriculture, crop



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**Depending on the type of agricultural commodity, data analytics bring attention to various missing links.**

production and information management, partnerships between provincial institutions are combining efforts for greater impact.

Karen Hand, leader of the Ontario Precision Agri-Food (OPAF) project and founder of Precision Strategic Solutions, encourages the adoption of technologies that allow for real-time linkage between platforms and applications to align data with agronomic models and analytic tools.

Depending on the type of agricultural commodity, data analytics bring attention to various missing links. Max Bruner from Mavrx, for example, noted the “missing granular data related to hydrological models, especially in field drainage. We need better topography and sloping data to manage nutrients.”

There are different perspectives on data use. Tyler Whale, president of Ontario Agri-Food Technologies, says “decision support tools can analyze data and contribute to effective management when stored in a system that allows the owner to manipulate and understand the algorithms used, skimming data to amplify for impact, accuracy and depth.”

Karen Hand of OPAF values the “integration of all possible disparate data sources, enabling intercommunication of devices. Think of this as a digital highway, connecting data communities to develop robust informative decision support systems that our farmers need.”

Dan Tukendorf, program manager for the Ontario Fruit & Vegetable Growers’ Association, considers “the need for information about changing demographics and demand. Our producers want to grow what consumers want and the different fruits and vegetables that are needed. The development of some varieties, such as those from orchards and vineyards, have longer timelines, so we want the info on where demand is going and the right amount of that product.”

New data analytics applications and services need to

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have a clear financial benefit for the farmer. Ryan Koeslag, executive director of Ontario Bean Growers, asks: If an application makes “you do x, y and z, does it result in bottom-line increases? ... Does it have calculations that translate to advantage? With a million things on the go, it can't be another marginal input.”

### Policy to promote the benefits of AI and data analytics

Farm organizations see their support of a vibrant agri-food sector often driven by unique local public and private policy considerations.

Trace Genomics takes data seriously. “We generate a lot of genetic data,” says Diane Wu, CEO of the company. “This could be taken by third parties, so we put a lot of thought and legal work into protecting our client's data in a way that has not been done before. We need to address this in terms of education to alleviate some of the fear that farmers might have.”

Ontario must also remove barriers that get in the way of adopting these

applications. “Until we have broadband optics, we don't have the capability,” says Don McCabe, past president of the Ontario Federation of Agriculture.

“We need to speed up the process to do the job of broadband for these new technologies to come along to start seeing how they can immediately add value and allow Ontario farmers to remain competitive.”

How will we ensure that the benefit of these applications is clear in return-on-investment value, is evidence-backed and maintains public trust?

We are now able to imagine information and computerized possibilities that did not exist before: assessing soil modifications, checking plant response rates, analyzing heat and weather image patterns, managing plant and herd robotics, and linking health and genetic diagnoses.

Managers and users who collect farm data will continue to face important discussions about security, ownership and confidentiality. Whale

mentions “mitigating the risk of adoption where the new technologies need to work in harmony with the art of farming in how well the application understands the many intricacies of agriculture with so many variables and management styles.”

“Information and knowledge from data can only be realized when the context of the data is truly understood,” adds Hand.

“We need to use these powerful new analytic tools with our eyes wide open.”

“We require clear issues of ownership of data and who has what when,” says McCabe. “We want to move into this arena and represent farmers' interests.”

Adapting to the evolution of data capacity and its analytics is a tall order. Further application in on-farm experience and collaboration across the research and transfer spectrum are required.

But these new technologies, as long as they are used responsibly, promise great possibilities. **BF**



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# Hands-on ag learning through travel

**Paul Patenaude, an eastern Ontario dairy producer, believes family support and diverse agricultural experiences were central in shaping his role in his family's 600-head operation.**

by JENNIFER JACKSON



Paul Patenaude

As long as Paul Patenaude can remember, farming has been the only thing he's wanted to do. Being a fifth generation dairy farmer in a tight-knit family operation, agriculture has always been one of his passions.

Patenaude, 24, is the youngest of seven owners – all family members – running La Ferme Gillette Inc. in Embrun, in the United Counties of Prescott-Russell. (Patenaude was proud to explain that all four of his grandfather's sons are co-owners of the farm, along with Paul, his cousin and his sister.) The operation includes three separate facilities, one of which Paul manages. The family milks 600 cows in total.

Raised on the farm, Patenaude enjoys owning a part of the family business. "If I need them (my family), they are only a phone call or short drive away," he says. "It's not always easy (working with family), but I feel we are pretty good at it."

Both of Patenaude's parents worked on the farm when he was growing up – and Patenaude became involved at a young age, too.

"I was homeschooled for seven years with my two sisters," Patenaude says. "As long as our daily bookwork was completed, we were allowed to go work in the barns. We also had classes dedicated to farm management and farm safety.

"Homeschooling gave me flexibility. I have been fortunate enough to tag along with my dad on business trips to Japan, Germany, Holland, Scotland, and the northeastern United States to visit dairy farms and shows."

After graduating Kemptville College with a diploma in agriculture, Patenaude also managed to



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**Paul Patenaude**

travel and to work on dairy farms in both Alberta and Australia.

Patenaude made the decision to move back home following the death of his grandfather, to whom Paul attributes much of the farm's success. "I credit my father and grandfather for the majority of knowledge I use day-to-day on the farm," he says.

Patenaude remembered his grandpa when opportunities arose to expand the farm. "I was willing to move and expand the farm. See it grow. That's the way my grandpa would want it."

#### **Describe your role on your farm operation.**

This is my new role (managing my own facility part of the family farm). Before, I enjoyed working with genetics and in the show barn, but I wanted to manage my own operation. I also contribute to the (production of) crops and help out on the main farm when they need help.

#### **How many people does your farm employ?**

We have 15 full-time and three part-time workers – two of which work in my barn.

#### **Hours you work per week?**

In the summer it can get up there but on average it's around 75 hours per week.

#### **How many emails do you receive per day?**

If you include junk and spam it is about nine but, other than that, three. I don't rely on emails very often – mostly texting or calls.

#### **How many texts?**

I'll throw 50 texts out per day. Is that a lot? It depends. 35 to 50.

#### **Hours a day on a cell phone?**

Maximum an hour, probably under an hour a day.

#### **What about your smartphone?**

Every day I use my smartphone, I rely on it quite a bit. Any person my age I imagine does.

Whether it's for the herd itself or to use Internet, it's always by my side.

#### **Email or text?**

Text is the way to reach me. If you email me, I might not get back to you for three days.

#### **Any favourite apps?**

DHI (Dairy Herd Improvement), it's pretty handy to have in my phone. If I want to see how close a cow is to calving, I can look it up. And I don't have a computer on my farm, but I don't necessarily need one anymore.

The Weather Network is a must for me, whether it's the temperature, wind or rain, I'm checking it at least twice a day. I also use the NHL and social media apps quite a bit.

#### **Does anyone else in your community use social media?**

Social media, like Facebook and even Snapchat, is a way I keep in touch with other farmers my age.

#### **Hours a day on the Internet?**

For work it would be under an hour. In total, one to two hours a day.

#### **How often do you travel?**

The last big trip I took for vacation was Australia for three weeks and New Zealand for three weeks.

#### **Number of hours in the office each day?**

Not very many. It's not my depart-

ment; I'm more hands-on. The bookwork is minimal in my facility.

### What do you like best about farming?

I like producing quality Canadian milk with quality care from my animals. I like how dairy farmers are part of a community and are always willing to help everyone out. And I like being able to walk to work. Other than that, I love the lifestyle.

### What do you like least?

There are a few things, like when something breaks, like my manure pump yesterday. It gets frustrating when my day doesn't go as planned because of (a breakdown).

### What is the single most important advice you've received or lesson you've learned?

This is a tough one for me. When I was working in Alberta, the hospital (herd) manager sat me down and said "Paul, if you take away one thing from this farm, it's to work smart, not hard."

He's a really good guy and I learned a lot from him. If he didn't have to break his back over something, he didn't. Farmers work hard enough. Even today I thought of (this advice) when using a leaf blower instead of a broom. Get the job done, but save your body pain.

### What's your management philosophy or guiding management principle?

Treat employees with respect and you'll receive it in return.

### What's your top tip about farm succession?

Having a succession plan is key to organizing farm assets for a smooth transition from one generation to the next. Also, hold regular meetings. Whether (they're) over coffee or breakfast.

In my case, and probably a lot of people's cases, we're family, so we get together and discuss (plans). No one is left in the dark, and everyone's on the same page. For us, we meet normally over breakfast.

### Are you involved in any committees, boards, associations, or volunteer efforts?

I volunteer with a 4-H dairy club. Last

year, I was the leader. This year, I took a step back but still help out, judge 4-H dairy Holsteins and hold meetings.

For the 11 years I was (eligible), I was in a dairy 4-H (club). I also was in cropping 4-H, farm safety 4-H, and horse 4-H – one year of horse 4-H was enough for me.

I am also a Royal Canadian Legion member at the Russell Branch. When things slow down a bit, I have some plans.

### What are your hobbies?

I play softball and basketball. I snowboard. Any sports in general I enjoy watching and playing, but those are my big ones. I'm wearing a Jays shirt right now, actually.

### What was the last book you read?

I'm not a huge reader. I read a lot of dairy magazines – a favourite of mine is *Holstein International*.

### What does your family think of farming?

I'm the fifth generation, (so) it's a passion that runs deep in my family. I also live with my girlfriend on my farm. She loves agriculture and works in the industry.

Dianna isn't a farm employee but she's in the barn everyday helping out. It's nice to have her support. She may argue a bit when I don't get the weekend off that I planned to have off. But if she didn't, then I would probably be working every weekend.

### What's your most important goal?

My most important goal is to run a successful dairy operation and to produce quality Canadian food in an evolving industry.

### How do you define success?

Waking up every day and enjoying what I do. Feeling proud to call myself a dairy farmer, and to build a life and to live off the farm.

### Is your vehicle messy or neat?

I'd say it's neat. I don't have a designated farm vehicle myself yet but I like to keep my car neat. It's in the process of happening.

### What are three items on top of your desk?

It's not a typical office, it's more my own space built into the barn. But it always has my CQM (Canadian Quality Milk) binder, an employee hour log book and yesterday's coffee mug.

### What was the last piece of equipment you bought for your shop?

It was a piece of machinery – a 22-tonne silage wagon we bought last spring.

We ordered another one, we like it so much. It's another way to make our operation more efficient.

### What's the best time of day?

Just after morning chores, breakfast – a.k.a. coffee time and SportsCentre.

### What's your most memorable crop/production year?

For us, it would have been 2015. It was a great growing year for eastern Ontario.

We had record yields in our corn silage and our haylage. **BF**

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# Basis contracts: what they are and when to use them

Just as the grain markets change, so should the techniques farmers use to navigate the markets, according to some commodity experts.

by JENNIFER JACKSON

DarcyMausby/iStock /Getty Images Plus photo



**“Basis is all of the market valuation factors which exist between the point of the grain transaction and the commodity futures market,” said Stephen Kell.**

**W**hen it comes to contracting grain, it can be easy to get lost in the various terminology – especially when deciding between contract types, such as basis and flat price contracts.

Stephen Kell, a grain merchandiser with Parrish & Heimbecker, knows the importance of properly using the different contracts according to the market environment.

“Farmers should look at their selection of grain contracting tools (different contract types) the same way they’d look at a set of wrenches when they are working on a piece of machinery,” he said.

Market situations vary and require different types of contracts – much like how wrenches fit on different sizes of nuts.

“Trying to use the wrong sort of contracting tool based on the way the market has set up does not work any better than trying to use a five-eighths wrench on a three-quarter nut,” says Kell.

More specifically, a basis contract – as opposed to a flat price contract – is an example of a tool that can be very useful under the proper circumstances and risky when not.



**Stephen Kell**

This month, Kell, Frank Backx (commodity analyst and trader for Hensall District Co-operative) and Jenny Moyse (grain originator for Cargill’s Melbourne

location) delve into the topic of basis contracts. These experts explain how basis contracts can bring either risk

or benefit to the producer depending on market conditions.

### What is basis?

To understand basis contracts, one must first develop a good understanding of basis.

“Basis is all of the market valuation factors which exist between the point of the grain transaction and the commodity futures market,” said Kell. “The Chicago Mercantile Exchange (CME) corn futures contract is what corn is worth delivered to Chicago. The factors (that) differentiate the value of the commodity in our marketplace from the Chicago delivery point, such as freight, handling, local supply and demand differences, are all rolled up into the basis portion of the price.”

When contracting grain at an elevator, for example, basis is a component of the flat price you receive when signing the contract, according to Moyse.

“Basis is derived from the net price (or cash price) plus or minus the commodity futures,” said Moyses.

Backx further explained the factors that influence basis.

“The further you are from Chicago (for corn sales) will result in a (less attractive) basis at your location – freight rates are a major component,” said Backx.

The basis is normally decreased in value at harvest time, when there is ample supply available, according to Backx. Likewise, basis typically increases in value through the storage season, as farmers are not necessarily supplying end users with what they demand.

“Sometimes an end user (like a grain elevator/terminal) may need to get coverage for a short-term order, such as filling the last of a boat for export,” he said. “This can cause a short-term spike in basis” to attract sellers.

To Kell, another key component to keep in mind with regard to basis is the exchange rate.

“Because the futures portion of the price is in U.S. dollars, and the cash transaction with a Canadian farmer is typically in Canadian dollars, the basis portion of the price also includes the currency exchange component of the price,” said Kell.

“Most of the changes in basis which Canadian farmers see in the marketplace are due to changes in the exchange rate.” This is because the other components of basis do not typically change from day to day, or even week to week, said Kell.

Backx said the exchange rate is the most volatile part of basis for Ontario producers.

“To correctly predict basis in Ontario, you need to (largely) predict the CAD (Canadian dollar) direction – this is nearly impossible,” he said.

### Basis contracts

A basis contract differs greatly from a flat price contract and should be managed accordingly, these industry representatives say.

With a basis contract, farmers can lock in a basis while hopefully



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waiting for a short-term gain in futures price. The futures price is locked in at a future date at the farmer's discretion. Farmers can enter into such a contract to secure a desirable exchange rate – which, according to Kell, is a good use of a basis contract.

Waiting to lock in a futures price does provide other benefits, according to Moyse. Some benefits include the “upside opportunity (that can be found in rising) futures, some storage fees can be avoided and a desired delivery period (can be) locked in.”

In addition to these benefits, basis contracts do come with risk. On top of the risk that futures could decline, growers also have to monitor the futures and decide when to lock them in, according to Moyse. There is also no chance to take advantage of any narrowing basis, as the basis would already be locked in.

For Backx, the farmers' risk in basis contracts may be too great; he normally does not recommend them to clients.

If a farmer does not want to lock in futures, “the basis contracts have to be rolled forward before the delivery month the basis is on,” said Backx. “If you are on March futures, (for example, the contract) has to be moved forward before the end of February. (Because) there is usually carry in the futures, (farmers) end up with a lower basis – plus grain dealers charge three to five cents per bushel to do the roll.”

“Rolling a basis contract works well in a market where the futures are inversed and very poorly when the futures are in a carry position,” said Kell.

An inverse market means that the nearby futures values are higher than the deferred futures months. This situation often happens when grain supplies are tight. “In these situations, rolling the basis contract will result in an increase in the basis level of the contract. However, inverses only occur when the commodity is scarce. No inverse futures markets exist in our ag commodities (currently) due to the substantial supplies of corn, wheat, and soybeans,” said Kell.

When there is a carry in the futures, prices are lowest for the closest delivery contract as there is a good supply of the commodity in question. “In these situations, the futures spreads are essentially paying people to

carry (or store) their grain to the further away delivery periods,” said Kell. When you roll a basis contract in this type of market, however, the contract holder will be paying more than they would be to simply store the grain; the seller will need to pay the carry in the futures to cover the merchant's cost to roll the hedge.

“For example, if a person rolled a

December wheat basis contract at the end of November when the December futures were \$3.90 and the March futures were \$4.12, the resulting roll (would cost) \$0.22 per bushel. (This cost is) more than simply paying storage; rolls can be costly,” according to Kell.

### Flat price contracts

In flat price contracts, by comparison, farmers lock in both the futures and the basis at the same time. Consequently, these contracts are unaffected by any falls or rallies in the market.



Jenny Moyse



Frank Backx



DarcqMaulsby/Stock/Getty Images Plus photo

**The basis is normally decreased in value at harvest time.**

Flat price contracts, or deferred delivery contracts, “are easy to understand, provide the farmer with the locked-in net price, have no downside risk from basis or futures moving, have no fees (as there is no rolling), and the contract is final,” said Moyse.

The main negative aspect of these contracts? “There are no upside price opportunities,” she said.

### Final tips

“I recommend producers only do flat price contracts, and sell incrementally by breaking their crop into five equal parts,” said Backx. “Forward selling one to two increments before planting is advised if prices are in the profitable zone.”

Moyse, in contrast, saw benefits in basis contracts if the conditions are favorable. For her these benefits include the opportunity to play the futures when it is speculated they will increase in strength and being able to lock in a suitable basis when it is speculated the basis will weaken.

Kell similarly believed there are times when the market will pay for farmers to create basis contracts and have them rolled forward. This situation occurs when grain supplies are tight and there is no carry in the market, he said. **BF**

# Managing soil organic matter content

When planning crop rotations, it is important to consider the specific crop's impact on soil organic matter (SOM). Other tools, such as cover crops, manure and compost also impact SOM.

by DALE COWAN

Soil organic matter content and soil health are closely linked when it comes to defining healthy soil. Many farmers and industry representatives struggle with defining soil health in a single word or sound bite to convey its importance for sustainable crop production.

What we all agree upon is that soil has three basic components that work together: physical, chemical and biological. Soil organic matter has a positive impact on all three

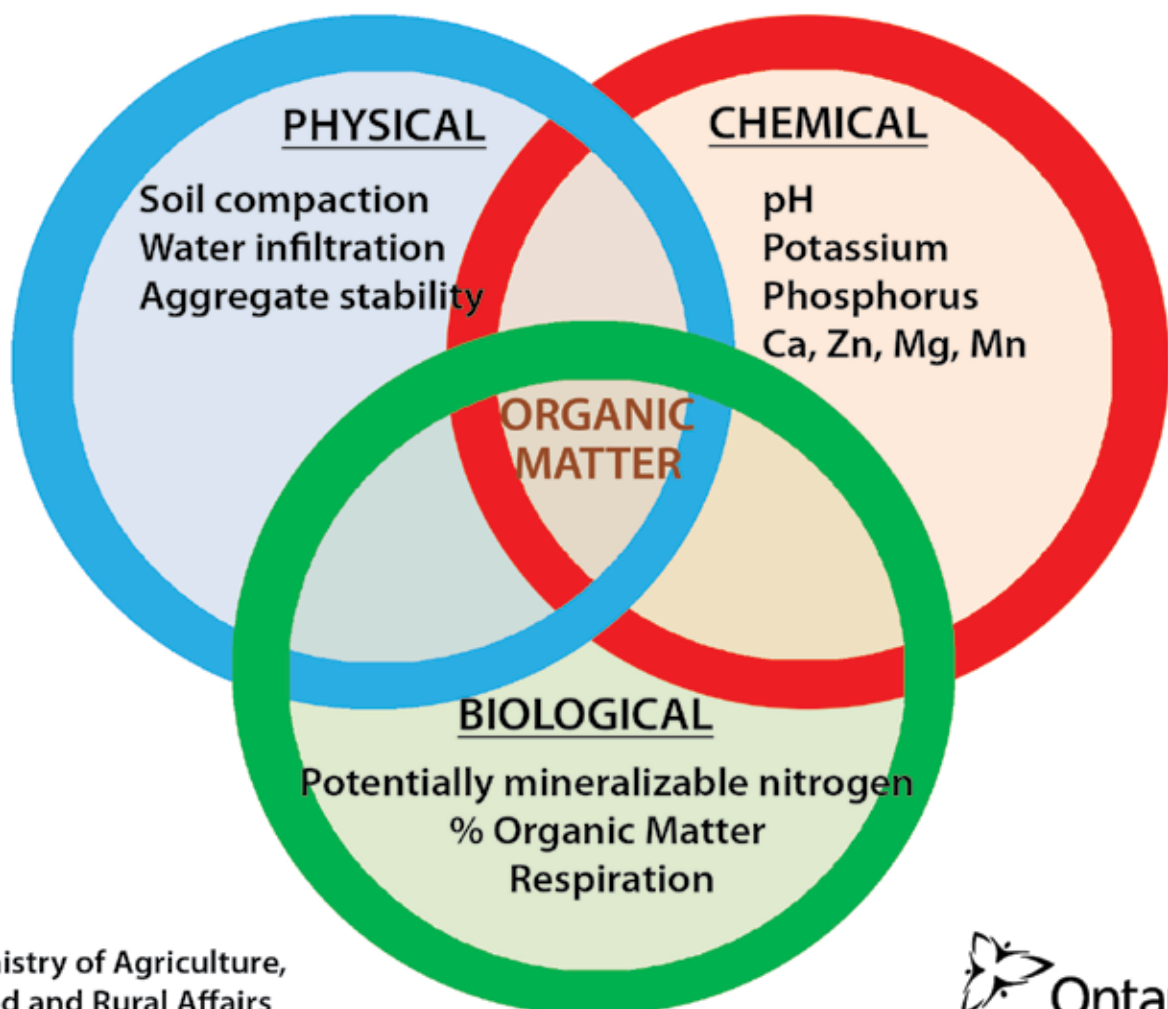
areas. The graphic below developed by the OMAFRA Soil Health Workgroup puts it all in perspective. The three components overlap each other. In the centre, where all three components intersect, we see the role of soil organic matter (SOM) in connecting all components together into one system. This system conveys the various aspects of soil health and how they work together to support the sustainability of soil, our most important asset.

## Understanding soil organic matter

Determining SOM content in any of your fields requires a soil test. Submitting a representative soil sample to an accredited lab and requesting a SOM test will provide you with a result expressed as a percentage.

A typical loamy soil in a corn-soybean-wheat rotation may have a SOM level of 3.0 to 5.0 per cent. Most lab analysis methods actually measure organic carbon and convert

## COMPONENTS OF SOIL HEALTH



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This system conveys the various aspects of soil health and how they work together to support the sustainability of soil.



**Submitting a representative soil sample to an accredited lab and requesting a SOM test will provide you with a result expressed as a percentage.**

that to SOM by multiplying by a factor of 1.8. To look at it another way, the 3.0 to 5.0 per cent SOM is 1.7 to 2.7 per cent organic carbon.

Soil organic matter is derived from plants growing in the soil itself. SOM content is not static; it is constantly changing over time. We often refer to three components of SOM as (1) the active or living, which is all of the micro-organisms; (2) the dead, which is recently-added crop residue or biosolids, manures and composts; and (3) the very dead or humus, which is the long-term stable component of SOM.

Other references suggest SOM has only two components: (1) the active, which includes both the living and the dead that change forms easily by action of soil microbes; and (2) the passive or humus that resists changes and contains a higher lignin content.

SOM and the resulting soil health effects offer many benefits and societal services which are worth noting – just from the biological component alone:

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**A corn-soybean-wheat rotation produces a lot of residue.**

(Source: Mario Tenuta, Department of Soil Science, University of Manitoba, Soil Health Research Forum, Guelph, Nov. 28.)

**Crop residue impacts on SOM**

The question becomes: how do the various crop residues in a rotation impact the SOM content?

There are three things to understand when determining how crop residues impact SOM (or any other organic additions).

First, there is an annual loss of SOM due to normal microbial respiration of CO<sub>2</sub>. That annual loss ranges from 0.5 to 5.0 per cent. To determine the total amount of SOM in an acre we assume soil weighs 2,000,000 lbs at a depth of 6 inches (15 cm). Therefore a soil with 3 per cent organic matter contains 2,000,000 x 3 per cent = 60,000 lbs/ac. Applying the loss factor produces a range of 300 lbs to 3,000 lbs. For illustration we will use a value of 2 per cent which indicates an annual loss of 1,200 lbs/ac of SOM.

Second, we need a way to calculate crop residue additions, so we use harvest indexes. A harvest index is the grain yield divided by the sum of grain yield and above ground stover yield. For corn, soybean and wheat that ratio is approximately 0.5. This ratio indicates for every pound of grain produced there is a pound of stover. In addition to above ground biomass we need to include the root mass. For corn there is equal biomass both below and above ground. For soybeans, there is 20 per cent more biomass below ground and for wheat there is

60 per cent more below ground.

The third piece to understand is retention factors: after the microbes have had their fill, only 10 to 20 per cent of the residue is retained as permanent SOM. We will use a middle factor of 15 per cent retention for our example below.

Putting it all together, we're working with a typical corn-soybean-wheat rotation with 2,000 lbs of straw sold off and 3 per cent organic matter soil.

Crop	Yield bu/ac	Total residue produced lbs/ac	Retention of residues at 15% lbs/ac	Annual SOM loss at 2% lbs/ac	Gains (losses) SOM lbs/ac
<b>Corn</b>	190	21,280	3,192	1,200	1,992
<b>Soybeans</b>	48	6,336	950	1,200	(250)
<b>Wheat</b>	100	13,600*	2,040	1,200	840
<b>Total</b>		<b>41,216</b>	<b>6,182</b>	<b>3,600</b>	<b>2,582</b>

\* 2,000 lbs of straw sold.

As illustrated, a corn-soybean-wheat rotation produces a lot of residue – over 41,000 lbs. After respiration by soil micro-organisms, only 2,582 pounds are left to contribute to SOM. In this case, the remaining amount would change the soil test value theoretically by 0.13 per cent (2,582/2,000,000 lbs x 100).

When corn yields approach 250 bushels per acre, the net contribution to SOM jumps to 3,000 lbs/ac from 1,992 lbs/ac. Higher-yielding corn supports removal of some stover to support the emerging bio economy without negatively impacting SOM.

To cover the annual loss of SOM in this example requires a breakeven addition of 8,000 lbs of crop residue/acre/per year.

Let's look at two years of soybeans and one year of wheat with the same amount of straw sold (2,000 lbs):

Crop	Yield bu/ac	Total residue produced lbs/ac	Retention of residues at 15% lbs/ac	Annual SOM loss at 2% lbs/ac	Gains (losses) SOM lbs/ac
<b>Soybeans</b>	48	6,336	950	1,200	(250)
<b>Soybeans</b>	42	5,544	831	1,200	(369)
<b>Wheat</b>	80	10,480*	1,572	1,200	372
<b>Total</b>		<b>22,360</b>	<b>3,353</b>	<b>3,600</b>	<b>(247)</b>

\* 2,000 lbs of straw sold.

As the above table shows, a rotation of two years of soybeans and a year of wheat, accompanied by the sale of 2,000 lbs of straw, does not help to build SOM. As a matter of fact, this rotation would theoretically result in a drop in SOM by 0.01 per cent.

**What do cover crops contribute?**

Let's consider red clover under-seeding in wheat, working with the assumption that by fall the red clover reaches a height of 18 inches.

From my forage testing days at the lab we assumed as a thumb rule 200 lbs of dry matter per inch of plant height. That assumption would equate to 3,600 lbs of above ground growth.

A 15 per cent retention of residues adds 540 lbs of biomass. This more than covers the SOM volume lost by selling one short ton of straw (300 lbs).

Red clover makes both rotations (corn-soybeans-wheat and soybeans-soybeans-wheat) better just from the SOM contribution – without consideration of the nitrogen contribution to a subsequent corn crop.

**What does manure contribute?**

Manure and compost or any other organic source is subject to the same processes as crop residues. With manure and other non-agricultural source materials (NASMs), you need to be aware of moisture content and calculate additions based on dry matter.

As an example, 40,000 lbs of solid dairy manure with 25 per cent dry matter adds only 10,000 lbs of dry matter. At 15 per cent retention, this manure is adding 1,500 lbs of organic residue to cover the annual loss (due to normal microbial respiration of CO<sub>2</sub>) in our example of 1,200 lbs, resulting in a net contribution of 300 lbs of SOM.

Liquid sow manure at 5,000 gallons per acre and 2 per cent dry matter is adding 1,000 lbs of dry matter. With a 15 per cent retention, the manure is only adding 150 lbs to go toward covering the annual loss of 1,200 lbs of SOM.

A word of caution when considering NASMs for building SOM: you must always consider the nutrient content.

Otherwise, as you apply large amounts of NASMs to obtain organic matter, you may over apply nutrients which may not be needed for optimum

crop production. Most likely, that nutrient would be phosphorus. (Even though it may be in an organic form, where it will be subject to the phosphorus cycle, it will breakdown into inorganic ortho-phosphate ions indistinguishable from ortho-phosphate found in commercial sources. Excess phosphorus is excessive phosphorus regardless of the original source.)

There is more to soil health than

simply the amount of residues from the various rotations. The length of time that soil has living roots in it also builds better soil biology and soil structure. One of the benefits of winter wheat in a crop rotation is the fact it grows for nearly 11 months of the year.

Dr. Bill Deen, an associate professor at the University of Guelph, and Dr. David Hooker, a field crop agronomist and assistant professor at Ridge-




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**“If selling the straw makes it economical to keep wheat in the rotation, then grow wheat and sell the straw,” says Dr. Deen.**

town Campus, have aptly demonstrated that wheat in the rotation enhances the yield of the successive crops of corn and soybeans. As a matter of fact Dr. Deen has said, “If selling the straw makes it economical to keep wheat in the rotation, then grow wheat and sell the straw!”

At a recent Soil Health Research Forum in Guelph, Dr. Deen shared the below economic assessment of taking the long view on complex rotations that include wheat and its impacts on the rotational crops.

This analysis demonstrates a greater benefit to the wheat in the

rotation than just the current price of wheat. A \$142.27 contribution per acre and 100 bushels of wheat per acre lowers the breakeven selling price of wheat by \$1.42 per bushel. This approach requires a leap in faith and is not something you can cash at the bank – at least not right away.

	\$/ac
<b>4% increase in corn: 7 bu @\$4.50/bu</b>	\$31.50
<b>12% yield increase in soybeans: 5.5 bu @ \$12.50/bu</b>	\$68.75
<b>Increased drought tolerance yield stability</b>	??
<b>Reduced N requirement: 26.4 lbs @ \$0.55/lb</b>	\$14.52
<b>Cover crop red clover 50 lbs N @ \$0.55/lb</b>	\$27.50
<b>Reduced tillage</b>	??
<b>Ability to sustainably sell crop residue</b>	??
<b>Herbicide resistance management</b>	??
<b>Total contribution from wheat</b>	<b>\$142.27/ac</b>

**Conclusion**

Soil health is top of mind with farmers, agri-businesses and government policy makers.

Soil health is key to building resiliency in agriculture to lessen the impact of climate change, to mitigate greenhouse gas emissions, sequester carbon, and as a solution to reducing nutrient losses and phosphorus loading into surface waters.

There are many opinions on how to improve soil health. The good news is it is in our DNA as good stewards of the land to continue the improvement process, starting with understanding soil organic matter contributions. **BF**

*Dale Cowan, CCA-ON, 4R NMS, is a senior agronomist with AGRIS Co-operative Ltd. and Wanstead Farmers Co-operative Ltd.*

# The problem with no-till?

While some producers are firm believers in no-till farming, this production practice can also raise challenges – some of which are outlined below.

by PATRICK LYNCH



**Tillage kills weeds. Typically weed control costs are higher in no-till operations.**

**M**y wife Sandra and I do a lot of driving. We have driven across Ontario, gone through the northern United States and into the Maritimes. During these road trips we talk. One day she asked, “What’s wrong with no-till? Why don’t all farmers plant no-till?”

I said “Good question.” And as I thought about it I came up with a number of reasons and explanations.

I told her, “The first (reason) is that no-till has been oversold. The no-till advocates talk about all of the benefits of no-till without explaining some of the pitfalls.”

“Like what?” she asked.

“Well, first, tillage kills weeds. And there is a transition of weed types. There are more perennial weeds. Perennial weeds that can be somewhat controlled with tillage. Typically weed control costs are higher in no-till operations,” I explained.

“Then there are the soil fertility issues. When we started no-tilling in

the ‘70s we told farmers that the soil must have good drainage. pH issues had to be addressed and soil fertility levels had to be good.

“With our current yield levels we cannot get enough fertilizer on with starter fertilizer. We must broadcast some. And this broadcasted fertilizer must be worked in or it can increase phosphorous (P) runoff. And the same problem occurs with lime. We must work in lime.

“Leaving residue on top of the ground helps spread diseases. Ten or fifteen years ago the pathologists like Albert Tenuta with OMAFRA were telling us that leaving all the corn stalks on the ground increased the amount of Fusarium inoculum. Some hard core no-till proponents disagreed with these realities.

“Then there is the definition of what no-till is. Real no-till means no tillage at all – slot planting. Some of the first research and on-farm trials in Ontario were with slot planting. But now we do tillage as we plant.

Whether it is a cart in front of the planter/drill or very aggressive coulters, many people who say they are no-tilling really are not no-tilling. If you use aggressive tillage like using a coulters cart or aggressive



**Real no-till means no tillage at all – slot planting.**



Now we do tillage as we plant.

“He said, ‘Most of those fields have manure applied the previous summer.’

“Eric, you claim to be no-tilling but you work all your corn ground the summer before to work the manure in,’ I said.

“Well in my defense I really am a modified no-tiller. I don’t work the ground because I want to but because I have to,’ Eric said.

“And then there are the special circumstances where no-till doesn’t work. Dairy farmers will plant alfalfa and leave it down for three years. All this time the land is not tilled. Then for numerous reasons, including reducing compaction, incorporating nutrients and controlling weeds, these farmers will mouldboard plow.

“These acres are adding more to the general soil health and organic matter levels than fields that are no-till soybeans three out of four or five years. But because these near-continuous soybeans are ‘no-tilled,’ many people in our

coulters before your no-till planter, this practice would typically be defined as no-till. But if you use conservation tillage the previous year, this practice would be considered differently.

“For years I have debated with

Eric Kaiser from central Ontario about no-till. Eric is a firm believer in no-till. He once told me that he no-tills all his crops. I called him on it once. I said, ‘Eric, how much of your corn ground do you apply manure to?’

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Patrick Lynch is an independent CCA-ON. He has won a number of awards for his service in the industry, including the Certified Crop Advisers (ON) Award of Excellence in 2013 and the OAC Outstanding Service Award in 1999. Patrick has written for Better Farming since its inception.



Dale Cowan, CCA-ON, 4R NMS, won the International Certified Crop Adviser’s Adviser of the Year Award in 2016. He has advised growers on cash and horticultural crops for over 35 years. His areas of specialization include sustainable agronomy and precision agriculture.



Andrea Gal is active in her family cash crop operation. She has worked with field crop research trials, focusing on responsible nutrient management. Andrea combines this hands-on knowledge of crops with a passion for writing, developed through the completion of her PhD in ag history.

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No-till soybeans.

industry see them as okay.

“And then there are the organic farmers. I work with organic farmers. Tillage is an integral part of their crop production practices. These farmers use cover crops, rotation and tillage. Are they treating the soil worse than the conventional farmers? Or are they just treating it differently?”

“Then there are the growers who no-till and refuse to agree with research findings. Just last night I had a discussion with a no-tiller. I told him that we have to do some tillage to break the channels that go down into the tiles to reduce P runoff. He said, ‘I disagree with that research.’

“But I believe the biggest problem

with no-till is the attitude of some no-till promoters. I get a sense from these folks that if you are not no-tilling you are inferior. Either you are not good enough a farmer to no-till or you just don’t care.

“This attitude upsets me. Farmers farm land the way they feel is best for them and their land. If their opinion differs from others, who is to say who is right and who is wrong?”

“I guess the worst-case scenario is if these no-till promoters are vocal enough to persuade the government to enact some type of guidelines that prevents farmers from working their land the way they believe it should be worked. And I just don’t like to have farmers criticized for how they farm.”

To all this, Sandra said, “Oh and now I know. At least that is your opinion.” **BF**

*Consulting agronomist Patrick Lynch, CCA-ON, formerly worked with OMA-FRA and Cargill.*



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## Precision Profit

### Is precision fertilizer application right for everyone?

Precision control systems are more common on farms today and variable rate fertilizer application is becoming one of the most widely adopted options to manage fertilizer application rates and avoid run off from over application.

Is this technology right for everyone? Not necessarily. Studies have shown smaller, relatively flat fields often have a uniform soil type and a consistent distribution of nutrients. In these situations a straight rate applicator is just as effective at getting the right nutrients applied as a variable rate machine. However, many farms in Ontario have at least some rolling ground and can be challenged with several soil types in one field.

Ontario producer Tony DeBruyn farms with his son Jonathan in Chatham-Kent working their own land and doing custom work on corn, soy & occasionally some wheat acres. The DeBruyn's also farm some rolling fields near Lake Erie.

In order to maximize his yields DeBruyn has been using variable rate application for some time. For the DeBruyn's variable rate application is a matter of putting the product where it's needed most.

"We looked at variable rate when it first came out. The co-op we work with would take soil samples and naturally they thought that more fertilizer should be put on the poorer soils. However, that's not the case, said DeBruyn. "We found that our poorer soils can only produce so much. The better soils are really able to increase yields with the proper nutrients applied."

Along with focusing fertilizer where it's needed to maximize yields the DeBruyn's are also using variable rate technology to manage their environment impact.

"We're near Lake Erie and we're concerned about algae blooms



**Salford BBI MagnaSpread3**

and what new regulations the government may come out with regarding fertilizer application. We decided we wanted to put our fertilizer where it's going to be the most beneficial. That way we're increasing yields and creating less run off with the fertilizer" DeBruyn added.

Continuing their goal to improve application methods on their land, and through the custom work they do, the DeBruyn's have spent the last five years researching the variable rate blends they'd like to apply and finding an applicator that could meet their needs.

***"We decided we wanted to put our fertilizer where it's going to be the most beneficial. That way we're increasing yields and creating less run off with the fertilizer." Tony DeBruyn***

The DeBruyn's recently purchased Salford's BBI MagnaSpread3 multi-product spinner spreader. DeBruyn's Salford spreader is capable of creating a blend of 3 fertilizers at once and varying the application rate for each product on the fly to match the prescription that they have had created based on soil sampling.

The spreader is ISOBUS compatible which has allowed him to keep using the same GreenStar™ 2360 terminal that he uses for other precision operations on his farm.

Application equipment that is ISOBUS compatible allows one terminal to move between the tractors and control various implements. Although ISOBUS isn't fool proof compatibility, depending on firmware versions and terminal "unlocks", the fact remains that using one control terminal across multiple implements is a great way to maximize the farm's investment in precision controls.

When asked about the learning curve to setup his new spreader for multi-product, variable rate application DeBruyn said he was nervous at first but when he got his machine he was impressed with how easy it was to get started. Having a scale kit on the spreader helped make calibration easier.

"We were surprised with how easily the GreenStar™ display connected to the controller and allowed us to run the spreader. With one person it took about 30 minutes to calibrate."

DeBruyn emphasized that variable rate application requires precision. Consistent soil sampling is important to build the prescription maps. Also spreader calibration and knowing the density of the product you're spreading is very important for accurate, uniform application.

DeBruyn says in his operation they will double check the product density when they notice the material consistency change even if it's coming from the same truck load of fertilizer. This ensures they have accurate application.



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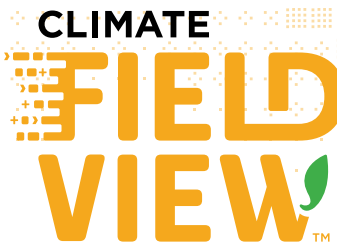
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The RiteHeight® is extremely adaptable and works on any type of new or used 3-point hitch, trailed, or self-propelled sprayer with some type of electric-over-hydraulic solenoid control valves to move the booms. RiteHeight® works with all common hydraulic designs.

Installation is simple because there are just four main items: Controller with display and keypad, Interface (or Junction) Box, Sensors (up to five), and cables.

Once installed, a TEST menu shows whether all the connections are correct. You have to spend a few minutes in the MACHINE SET-UP menu to enter, for example, the number of sensors and the type of hydraulic system (Open or Closed). Then you move the sprayer to a safe spot outside, unfold the booms, and run the auto SELF CALIBRATION step. This allows the computer to learn your sprayer's behavior.

Time for a test run! Set the target height in the CONFIGURATION menu. Watch the boom as you drive through the test area. Quite often the defaults for parameters such as DELAY FOR UP, DELAY FOR DOWN, QUICK RAISE HEIGHT, etc. work well. However, you may find room for improvement. The CONFIGURATION menu allows you to adjust parameters as needed.

At spray time set the optimal target height. Choose the operating mode: Bare Ground, Partial Canopy, or Full Canopy. Use Partial Canopy when you can see the ground from the driver's seat and you want the system to follow the ground and ignore echoes from the canopy.

Greentronics offers optional ISOBUS compatible systems that allow operating the entire RiteHeight® system from a Universal Terminal screen on compatible displays from John Deere, Outback, Trimble, Ag Leader, and others. Advantages are: the RiteHeight® menu system is easier to view and use on large touch screen displays; cab clutter is reduced.

Some users install the RiteHeight® sensors on their Y-Drop systems where correct boom height is necessary to optimize placement of liquid fertilizer in row crops.

RiteHeight® allows operators to make on-the-go adjustments to target height. A Center Boom sensor can be installed for auto height control of the center boom, or to function as a reference for the outer sensors. For wide booms or for working in severe terrain and crop conditions, a 4-sensor system can be installed to improve performance. The RiteHeight® system is easy to over-ride and constantly monitors for operator input. When a manual input (for example, the right hand boom) is detected, auto height control for that boom will be suspended. The other boom(s) will continue in auto mode. To re-engage auto mode, the operator touches Down on his switch and RiteHeight® takes over again.

The RiteHeight® system has been available since 2007. Customer input has driven many improvements over the years and operators with older RiteHeight® systems are advised to contact Greentronics about upgrade options.

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# Niagara College develops technology path to power tomorrow's farms

In an era of large farms, and reduced farm labour, it is essential to make farm work more efficient with scalable technologies. Dr. Mike Duncan, his Niagara College team, and several industry partner collaborators are doing just that.



**Dr. Mike Duncan**

Mike Duncan is in his fifth year as the Natural Sciences and Engineering Research Council of Canada's (NSERC) Industrial Research Chair for Colleges (IRCC) in Precision Agriculture & Environmental Technologies. You may have seen or heard Mike discuss his work, most recently as a featured speaker at the

Precision Agriculture Conference in both 2016 and 2017. Over the last 4+ years, Mike has developed scalable digital tools for farm businesses. He and his team at Niagara College do this by analyzing, interpreting, and visualizing agricultural data (yield, topography/elevation and more). In collaboration with the Ontario Ministry of Agriculture, Food & Rural Affairs (OMAFRA) team members, Ontario Certified Crop Advisors/consultants and Ontario grain farmers, Mike and the team have developed the Crop Portal web tool to process agricultural yield, soil, elevation data, and more. It enables data to be cleaned, processed, and turned into valuable management zones for variable rate farming in a time efficient manner.

The Crop Portal is free to members of Grain Farmers of Ontario (GFO), and can be explored now by visiting [cropportal.niagararesearch.ca](http://cropportal.niagararesearch.ca).

Mike is also collaborating with Ontario grain farmer Rick Willemse to develop

Rick's **ReservoirRx** variable rate system as an online digital tool, that can be used by any Canadian grain farmer/CCA/consultant. **ReservoirRx** can save as much



**Rick Willemse**

as 20% on fertilizer costs\*, while achieving yield goals.

During this research phase, we anticipate **ReservoirRx** will be available for a limited number of fields at no charge for the 2017 season (qualifying fields will be reviewed for eligibility). You can learn more at [cropportal.niagararesearch.ca](http://cropportal.niagararesearch.ca).

For more information contact Gregor MacLean, Research Project Manager ([gmaclean@niagaracollege.ca](mailto:gmaclean@niagaracollege.ca)).

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For more information contact Gregor MacLean, Research Project Manager ([gmaclean@niagaracollege.ca](mailto:gmaclean@niagaracollege.ca))

\*Dependent on current field fertility and input costs



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# SOLVING THE PRECISION AGRICULTURE PUZZLE FOR PROFIT

For Joe Dales, this year's conference theme was an obvious decision.

"During the summer and fall of 2016, as I spoke with ag technology businesses and precision farmers, I kept getting the sense that it's now all about fitting the pieces together, to complete the precision puzzle.

"There are so many exciting new tools available, now the task at hand is for all of us in production agriculture to work together and integrate them together, so that it benefits the farmer by saving time, money and increasing yields. The machinery, software, data and agronomy pieces need to fit together well to help us realize the full potential of these innovations.

"It will take time and effort but I am impressed with how the companies and farmers are working together to overcome the gaps and provide practical solutions."

Dales is vice-president and a founder at Farms.com and he's been organizing the Farms.com Precision Agriculture Conference since 2014.

The event runs Jan. 31 and Feb. 1 this year at the Best Western Lam-

plighter Inn in London. More than 30 Ag Technology businesses will be showcasing their industry-leading innovations at the trade show component this year and more than 300 precision ag enthusiasts, farmers, agronomists and agri business professionals are expected to attend.

The conference speaker agenda is world-class with excellent international experts, ag business specialists, agronomists, and some top precision farmers coming to share their insight and experiences.

"I'm really excited about the conference this year," says Dales. "We're at the point where we are seeing such conclusive data on how precision technology is helping increase yields, profits, and benefit overall farm management.

"New this year, we are working with Better Farming to select a number of new products and services from around the world for an Ag Innovation Showcase which we will be presenting on the website afterwards."

There is still time for farmers to sign up to attend the conference, by checking the website at [www.Farms.com/PrecisionAgriculture](http://www.Farms.com/PrecisionAgriculture) or emailing [precisionag@farms.com](mailto:precisionag@farms.com).



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## SOLVING THE PRECISION AGRICULTURE PUZZLE FOR PROFIT



The 2017 conference will bring together more than **300 precision ag enthusiasts** - international speakers, precision agricultural businesses, agronomists and leading precision farmers who will share how to harvest the value of technologies on the farm.

The Farms.com Precision Agriculture Conference & Ag Technology Showcase tradeshow features more than 20 of Precision Agriculture's leading businesses. The tradeshow provides attendees with opportunities to network and see new technologies first hand.

**The Popular Precision Farmer Panel** will return. Precision Ag farmers will share their practical experiences with new technologies & data on their farms.

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**Wade Barnes**, a leader in Precision Agriculture and founder of Farmers Edge. Wade leads a team of 250+ dedicated precision agronomists, technology innovators, and sustainability experts.

**Denise Hockaday**, Climate Commercial Lead - Canada, Climate Corporation. Denise is responsible for the Canadian launch and growth for The Climate Corporation, a subsidiary of Monsanto, which aims to help farmers increase yields and reduce risk through Climate FieldView™ insights and decision tools.

**Lisa Prassack**, President of Prassack Advisors, Agri Food Innovation Expert & Data Strategy Consultant. Lisa Prassack has over 20 years of experience working with big data analytics. She specializes in working in tandem with innovative agri-technology companies & farmers by providing critical market understanding with data-intensive solutions.

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# Planning for the future?

## Here's why you should gift your farm

A significant amount of wealth can be tied up in farm businesses—including partnerships and corporations. Our financial experts at Collins Barrow consider succession planning an ideal opportunity to distribute that wealth on a tax-free or tax-deferred basis. Much of this wealth is eligible for capital gains exemptions, allowing it to be passed on to future generations who continue to farm, without a heavy debt burden.

So as you plan for the future of your farm business, consider the tax benefits of gifting your farm assets.

### Who can receive a gift?

Generally, a farming gift—which can apply to almost any kind of farm asset except inventory—can be given to a child or a grandchild. However, the definition of “a child” can include a broad range of people, from a stepchild to the spouse of a child.

### Transferring tax-free

If you meet the definition of a qualified farm property, including farm partnership or a qualified farm corporation share, you can transfer wealth to another generation without a tax impact. In a sense, you're passing that tax on to the next generation, but if the current tax laws remain in effect, they can employ the same strategies when succession planning for their heirs.

Essentially, these gifting options are set up to allow successful farm businesses to be passed on generation to generation.

### Maintaining ownership

Our industry experts at Collins Barrow help farmers choose which plan (there are many options) is best for them to transfer property, while still maintaining ownership in some way. For instance, if you transfer your farmland to a family member, but maintain

beneficial interest, you are allowed to live there for a lifetime. You can also reorganize your business as a farm corporation and still maintain control, passing the growth on to a child without any tax consequences.

### Common mistakes

As beneficial as gifting can be, there are a number of common mistakes that can be made when working through the succession process (especially if you don't have the benefit of expert advice, like what our Collins Barrow professionals provide). For one, attempting to transfer an asset that you're not allowed to. If you transfer inventory during your lifetime, it's got to be at fair market value, not cost base. Another common mistake is attempting to transfer property in order to gain a benefit through the Income Tax Act. For example, if you're transferring farmland in an attempt to multiply your capital gains exemption. Say you have land that is worth \$4 million and you only have \$1 million of gain exemption and you're trying to get three or four family members involved, so you don't pay any tax. Unfortunately, this is not allowed, and the entire capital gain can be attributed back to the transferor if the property is sold or an agreement to sell occurs within three years.

To navigate the pitfalls that can occur if you (a) transfer the wrong asset, (b) contemplate a sale or (c) fail to hold on to an asset for long enough, be sure to contact an expert. Your Collins Barrow advisor will keep you out of trouble—and ensure you maximize all the tax benefits available.

**John Bujold, B.Sc., CPA, CA**, is a partner at Collins Barrow SGB LLP. He provides accounting, auditing and tax services to a wide variety of clients, including not-for-profit, commercial, individual, professional service and farm clients.

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# Growing your growing business

When most people think about shrewd business strategy and bold entrepreneurial spirit, an urban skyline is more likely to spring to mind than a rural sunset. And yet, we know that some of today's most enterprising business people are the hard-working producers who are also working hard to grow their businesses.

"Growing a farm business requires innovation and creativity," says Gwen Paddock, national director of agriculture at RBC, where a dedicated team of agriculture specialists help producers capture opportunities, plan for the future and mitigate risk.

The agriculture industry is evolving and continues to face environmental, economic, demographic and social issues, such as an aging farm population, climate change, food safety, and international competition—just to name a few.

"For your business to progress, you may need to incur debt to invest in cutting-edge technologies or adopt more modern business practices that will attract younger farm talent," says Paddock, who also offers the following advice for growing your farm business.

**DO YOUR RESEARCH:** Check the demand for a specific product to be sure there is a solid market for it, and if there are any distribution issues, such as a high rate of spoilage.

**EMBRACE TECHNOLOGY:** Modernizing operations with new technology can increase efficiency and productivity for greater yields with less waste and help farms of all sizes to meet growing demands.

**DEVELOP YOUR HUMAN RESOURCES:** When expanding, you can't do it alone. Hiring requires training and guidance, but the right staff can free up your time. Also, working with other farmers through business partnerships and collectives can help everyone succeed.

**ACCEPT GOOD DEBT:** Review your business to understand how much debt you can manage and explore the different financial options such as term loans, leasing or farm mortgages to finance expansion.

Visit [rbc.com/farmadvice](http://rbc.com/farmadvice) to find the agriculture banking specialist nearest you.



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## Real Estate Predictions for 2017

It's no surprise that Farmland accounts for the biggest proportion of a farm's assets. Experts say that in 1981, land made up 54% of the value of total farm assets, but that by 2015, the value of land assets had increased to 67% of total assets. Where is real estate going in 2017 in Ontario?

In September, Farm Credit Canada (FCC) released its Ag Economics Outlook for Farm Assets and Debt 2016-17. The report notes three important takeaways that are relevant to farmers that are thinking of buying or selling farmland in 2017.

First, FCC believes "Canadian agriculture remains in a strong financial position." The report notes that the industry is healthy, but acknowledges that it "could face some challenges as farm income flattens and land appreciation slows."

Second, FCC is predicting that increases in farmland values will slow down.

Third, total farm asset values are in line with recent trends in farm cash income, according to FCC. This means that "Farmland values have appreciated faster than crop receipts in the last five years. Yet, financial risks remain

manageable as the outlook for interest rates and net cash income are supportive of the balance sheet." FCC continues by saying it "remains prudent for agricultural operations to be flexible enough to amend business plans if the outlook for borrowing costs and/or profitability moves in a different direction."

The FCC report says that land was less affordable in 2015 than in previous years, "not just because value went up across the country, but also because appreciation in land values has outpaced increases in total farm revenue." In Ontario, the affordability of land was identified as being "meaningfully different" than its historical average.

Farmers looking to buy or sell farm property should look for real estate agents who specialize in farm and rural properties in Ontario. Visit [Farms.com/RealEstate](http://Farms.com/RealEstate) to find a real estate agent in your area that specializes in farm properties. The [Farms.com/RealEstate](http://Farms.com/RealEstate) site also allows farmers to search for farms for sale by farm type – there are plenty of farms for sale to choose from. The site welcomes 7,500 visitors to the site each month -- 7,500 farmers who are considering farm property.



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# Specialized hydraulic filters can protect precise mechanical components

To ensure the optimal performance of piston pumps, the hydraulic fluid needs to be kept free from contamination. Consider the who, when and how of maintaining these systems.

by RALPH WINFIELD

Many years ago, it was common practice to examine hydraulic fluids for unusual colour changes. We rubbed these fluids between our fingers to check for that lubricity feel and then checked the magnet on the drain plug to see if metal particles had collected there. Those were the days when we used gear pumps that had high-clearance values. These pumps only provided fluid power for lift rams or three-point hitches.

Those days are long gone. We now have piston-type pumps with variable output that must provide clean hydraulic fluid continuously to hold loads or provide variable flow rates to drive hydraulic motors.

The clearances between the pistons and cylinder bodies are measured in microns ( $\mu\text{m}$ ) not the thousands of an inch that some of us used many years ago. Let us put those figures in perspective.

Here is an example. Have you checked the thickness of a page of the *Better Farming* magazine? Not likely, so I did it for you. My micrometer shows that the page thickness is 0.0025 inches. A mil is one thousandth of an inch.

When 0.0025 inches is multiplied by 1,000 that gives me the thickness in mils which becomes 2.5 mils for the page. Each mil is 25.4  $\mu\text{m}$ . So, the page is 63.5  $\mu\text{m}$  thick. You might argue that you can see the edge, but trust me if that edge was in particles you cannot see particles that are smaller than 100 microns in diameter.

Many newer piston-type hydraulic pumps are now designed with the tolerances most of us associated with diesel-injection pumps. The pistons must be selectively hand-fitted in a constant temperature fluid bath. To



**These are the inner workings of a typical, continuously variable output hydraulic pump. Leakage/lubrication is dependent entirely on piston clearance.**

avoid contamination damage, or jamming, the fluid must be kept free of particles as small as 10  $\mu\text{m}$ , with 30  $\mu\text{m}$  particles being the upper limit. Please keep in mind these small particles are all well into the non-visible range.

### Piston pumps

A typical variable displacement piston pump is shown in the accom-

panying photo. Note there are no rings or seals on these pistons. A small amount of clean hydraulic fluid will bypass these pistons to lubricate and cool them. A central orifice in each piston allows fluid to pass down and lubricate the foot pads that run against a variable angle foot plate that is tilted or angled to vary the pumping rate.

Variable rate pumps are required



The filter head will be marked with a flow direction arrow or inlet and outlet will appear at each port.

for many applications where constant or intermittent fluid flow is required to control functions. Some of these functions are continuously variable transmissions (CVTs) or hydraulic grapples used to hold tree stems being pulled behind log skidders.

#### Hydraulic filter ratings

In recent years, a considerable amount of research has been directed to a “multi-pass” test to rate hydraulic filters. The “beta-ratio” ( $\beta$ -ratio) derived from the multi-pass test has become one accepted method of determining filtration efficiency as a percentage collection of particles in a specified micron particle size range, e.g. 10 to 30  $\mu\text{m}$ .

New filter media, usually arranged in a pleated format to enlarge available surface area, has been developed to increase the “dirt retention capacity.” Note that the fluid must always flow from the outside of the filter to the inner core, which is smaller in diameter. The filter head will be marked with a flow direction arrow or the words

“inlet” and “outlet” will appear at each port.

The  $\beta$ -ratio is a simple term that provides the filtration efficiency of a given filter in removing particles of a stated micron size range. The filtration efficiency is the ratio of the number of particles within the stated micron size range which enter the filter, compared to the same size range of particles which pass through without being trapped by the filter. This filtration efficiency is reported as a percentage value. As would be expected, the efficiency is higher for the larger particles.

This  $\beta$ -ratio permits a filtration efficiency to be calculated for a specific filter element. Many filter manufacturers are now stating those two ratings ( $\beta$ -ratio and filtration efficiency) on their filter cartridges.

For a graphic display of these parameters please do a Google search of “hydraulic filter beta ratings and the multi-pass test.” If you open one of the top search results, figure one provides an excellent illustration of typical filter

## HAVE A STORY IDEA?

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**A pressure gauge will indicate fluid bypass and/or filter condition. A prewired red light from a pressure transducer is even better.**

performance. Figure two illustrates the dirt-loading characteristic that follows, as well as the resulting pressure drop that occurs across the filter.

#### **Dirt loading of filter elements**

Performance rating is very important but it also raises the question of how much dirt a filter can hold before the pressure drop across the filter becomes excessive.

The rapid rise in pressure drop across the filter occurs after a relatively long time, even though the dirt addition was continuous. What this means is that every hydraulic fluid filter should have a pressure-monitoring device in place so the operator can observe pressure drop – but especially any sudden pressure rise. A sudden rise often effectively indicates a component failure in the hydraulic system.

On “cold start up” of a closed-centre hydraulic system, the fluid can and will temporarily bypass the filter.

Virtually every filter head has a 25-pound per square inch (psi) relief valve to permit fluid bypass. A pressure gauge can be placed at the filter location or preferably moved up to the operator dash. A light, usually red, can also be used to alert the operator when a filter bypass is occurring.

If the light stays on after the fluid is warmed, the filter should be changed immediately. The question of changing the fluid is up for debate. If you have access to fluid testing by an equipment dealer or an outside party, it is probably well worth the cost.

A fluid test indicating a high level of contamination might indicate that there is or has been a mechanical component failure. See the photo on page 79 of a failed bearing component. When a mechanical component failure has occurred, a total hydraulic system cleanup is essential.

#### **Unfiltered lubrication**

Many small gear sets, such as sun

and planet gear sets (often located directly at drive wheels), do not have filtered lubricant available. It is critical that the small quantity of lubricant be changed regularly.

Gear sets located at the center of virtually every mechanical front wheel drive (MFWD) tractor are prime examples of these small gear sets needing regular lubricant changes. If a MFWD tractor is used regularly – especially in the winter – that gear case should be drained and flushed at least once a year. You will probably see some small metal flakes in the fluid which will give it a yellow or golden colour.

Planetary gear sets cost much more than the cost of materials and the labour required to flush those units once a year.

Many other final drive gear cases on combines, etc. should have the gear oil changed on a regular schedule – probably once a year. Check with the operator/service manual or your dealer.



This type of carrier bearing failure causes significant fluid contamination.

**Who/when/how**

As an owner of combines or self-propelled field sprayers or even larger tractors, you have decisions to make.

*The who:* Do you have the in-house capability to test and evaluate fluids and filters? If not, you should get your dealer to send samples for

testing or find an independent laboratory that can do the fluid testing for you.

*The when:* This is usually once a year – well before the time of need for the unit. If repairs are necessary, they can be completed in the off-season to eliminate costly down time.

*The how:* This involves your shop facilities and staff. Do you have trained help and the tools and equipment necessary to undertake the task safely?

**Summary**

Having an understanding of the hydraulic and mechanical systems you own or operate is very important so that you can make astute observations and decisions.

Missing an important clue can be very expensive for farmers – especially if it takes a key piece of your equipment out of service at a critical time.

Paying the dealership to test fluid and run other tests/observations can be money well spent. The decision on who carries out the filter/fluid changes or does other preventative maintenance is highly dependent on your skills, help and physical (shop) facilities. **BF**

*Ralph Winfield is a retired professional engineer, farmer and technical writer.*

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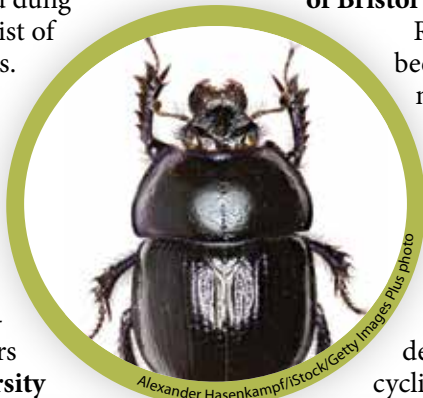
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## The benefits of dung beetles for pastures

Farmers can add dung beetles to their list of beneficial insects. These beetles help to kill and halt the development of troublesome parasites found in cattle manure, according to researchers from the **University**



Alexander Hasenkampf/iStock/Getty Images Plus photo

of **Bristol** in the United Kingdom. Researchers found dung beetle activity dried out manure, killing parasites that rely on the manure moisture. “The conservation of dung beetles on farmland today is extremely important for their role in dung degradation, nutrient cycling, pasture fertility and

because now we have seen that they can contribute to reducing economically deleterious livestock parasites on farms,” **Bryony Sands**, a study researcher, said in the university release.

“These beetles may be important in cow welfare, as cows are severely affected by parasites found in their intestines.”

The study was published in the *Journal of Applied Ecology* in November 2016. **BF**

## Studying gluten-free wheat possibilities

Farmers are one step closer to the cultivation of wheat varieties for the gluten-free market.

Researchers from the **Technical University of Madrid** analyzed multiple wheat varieties, including both modern and old varieties, to study and scale the different proteins in gluten.

“Learning about the different varieties (can) enable production techniques to be developed to (breed)

a variety of wheat with no toxicity while maintaining the viscoelastic properties of gluten,” **Marta Rodríguez-Quijano**, co-author of the study, said to the *Information and Scientific News Service*, a Spanish public news agency.



mareandmare/iStock/Getty Images Plus photo

She hopes the study will aid in providing individuals who suffer from celiac disease with products that will improve their quality of life.

The study was published in the December edition of *Food Chemistry*. **BF**

## Does grocery store lighting impact milk sales?

Ensuring good-tasting, farm-fresh milk may be as simple as changing the lightbulbs in the grocery store, according to researchers at **Virginia Tech University**. Researchers found that exposing milk to fluorescent light – as opposed to LED lighting – alters the taste profile of



Chad Baker/Jason Reed/Ryan McVay/Photodisc photo

milk, while also reducing its nutritional content.

Poor lighting may be one of the reasons milk consumption has been declining over the past several decades, **Susan Duncan**, professor at Virginia Tech’s

College of Agriculture and Life Sciences, said in a university release.

“Milk is delicious and nutritious and we want to find ways to protect both of those characteristics to help the industry and provide an even better product to consumers,” she said.

The study was published in the *Journal of Dairy Science* in November 2016. **BF**

## Million-dollar U.S. farms on the rise

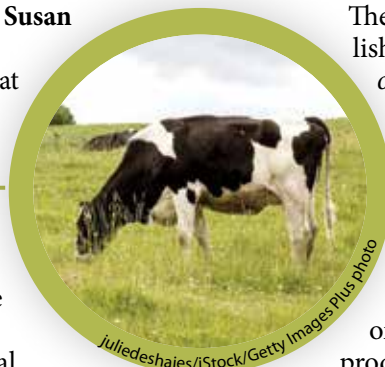
Ninety per cent of farms in the United States are classified as small farms, with a gross cash farm income (GCFI) of less than USD\$350,000 annually, according to the **United States Department of Agriculture’s America’s Diverse Family Farms**. This group of farms, however, accounts for only 24.2 per cent of total U.S. production values.

Although the majority of farms are

classified as small, large farms are producing more than ever.

“Since 1991, agricultural production has shifted to million-dollar farms, with GCFI of one million dollars or more, including both family and non-family farms,” the report said.

Million-dollar farms now account for half of the total American farm



Juliedeshaies/iStock/Getty Images Plus photo

production, as opposed to one-third of production in 1991.

The report found that 38 per cent of larger million-dollar farms (\$5,000,000 GCFI) specialize in specialty crops, and 25 per cent in dairy production.

The annual report was published in December 2016. **BF**



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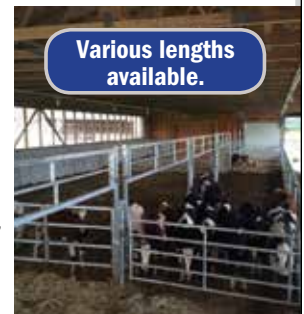
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\$350,000	\$1,615.16	\$745.47
\$400,000	\$1,845.90	\$851.96
\$500,000	\$2,307.38	\$1,064.95
\$600,000	\$2,768.85	\$1,277.94
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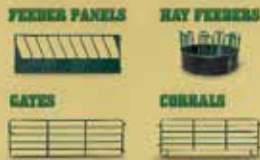


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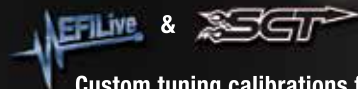
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## Enjoying tropical fruits in the early 20th century

by ANDREA M. GAL

In February 1913, Mabel Brown, who farmed 100 acres in Carleton County, “had oranges for tea” when company visited.

And Brown was not the only one serving this type of treat. While many of us may think Ontario farm families relied on home-grown fruits in the early 20th century, diaries and account books show that household production was only part of the story. Rather, farm families also ate some imported fruits – including coconuts, pineapples, oranges, lemons and bananas.

Usually, families bought only small amounts of tropical fruits. Jemina Hannah Leeder of Bruce County, for example, often bought between six and 12 lemons, oranges or bananas at a time in the 1910s and 1920s.

Families ate these fruits fresh or sometimes used them in baking. Mary Ann King of Welland County, for example, made coconut layer cakes in 1902. Florence Allen of Lennox and Addington County enjoyed a piece of lemon pie when visiting friends in January 1930 and Velma Beaton of Wellington County baked banana cake in May 1938.

Even in the early 20th century, farm families were connected to continental and global markets. **BF**



Natikka/Stock/Getty Images Plus photo



Rachel Gingell and her family's 1952 Ford 8N.

## In the Shop with Rachel: The Ford 8N is a classic for a reason

by RACHEL GINGELL

Built from 1948 to 1952, the Ford 8N is one of North America's most loved tractors. More than 500,000 were manufactured and many are still in use today. (Many of the 8N's close cousins, including the Ford 9N and the 2N, are also in use.)

The Ford 8N is a lower horsepower tractor. There's no power steering. The hydraulics and PTO are not live.

It's a simple, basic tractor without many of the modern conveniences you'd get in a new tractor today. What you do get in the 8N is rugged reliability.

There are plenty of small chores around the farm for which the Ford 8N is perfect. The three-point hitch makes it a versatile tool.

I use one frequently for blading the driveway, brush hogging, and pulling a wagon to and from the woodpile.

The Ford 8N is the standard of reliability, built to last for generations. While these tractors require occasional maintenance, there are no significant design flaws.

The 8N is easy to work on. It's an excellent first tractor for a budding mechanic, with a straight-forward design and easy-to-find parts.

The laws of supply and demand really work for you with an 8N tractor. With so many of these machines still in use, the price and availability of parts can't be beat.

You can have a lot of fun with a Ford 8N, too! My dad and I worked together one year to put a flathead V8 in a Ford 8N. We liberated the perfect 4.3 Chevy engine from an old Astro van that we found at my uncle's salvage yard. While an Astro isn't exactly the most impressive of vehicles, the engine got a whole new lease on life inside that tractor!

If you are looking for an inexpensive, rugged, reliable tractor for basic chores, the Ford 8N can't be beat. **BF**

*Rachel Gingell works alongside her father, repairing and re-selling tractors.*

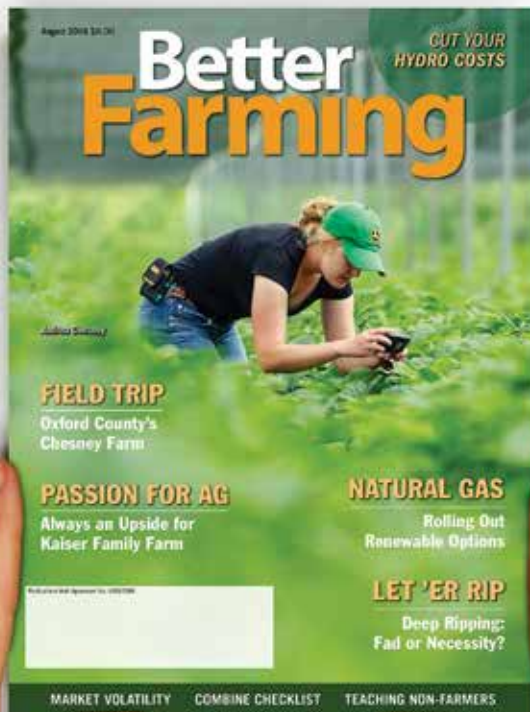


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