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Field Notes

TOM HENRY

Digital burgoo

Some thoughts on the digital age:

--It is the conceit of every generation to think they live in remarkable times. We believe the internet sets us apart from generations past because of the speed and breadth of connectivity. But we forget that over 200 years ago the Napoleonic semaphore known as *le système Chappe* could deliver a message—via a network of hundreds of signal towers—from one end of France to the other in hours. Built to convey military orders, it suffered the same fate as the internet, becoming a vehicle to announce tabloid-cover type news such as the birth of Napoleon's son then, just before the system was eclipsed by the telegraph, it was used to send news of winning lottery numbers across the regime. Sound like a familiar tawdry use of technology?

I recall, age 19, in 1980, walking by a payphone in Grey-mouth, New Zealand, where I had gone for my first solo "away" trip, and being blindingly vexed to think that within moments I could be speaking with my family back home in small town Vancouver Island. The world had shrunk to the size of a rotary phone dial a long, long time before the internet.

So: the internet is not so much revolutionary in terms of speed but moreso in terms of access to speed. Now the privilege of announcing to the world the birth of a son is not limited to emperors; we can all do it!

--The wisest thing I ever heard regarding the internet was delivered by a humble market gardener who was an early adopter of social media marketing. "Nothing is free," he said. Meaning: whenever we retrieve information on-line (as I just did last night while Googling "hog barn ventilation") there is a form of commerce going on. I have received information, but as payment so too has Google and the like, who can sell that information about me and my tastes and desires to outfits selling barn ventilation. And of course we are all becoming aware of more sinister on-line manipulations of our personal information. So: on-line information is *not* free; it has a price, though the depth and breadth of that price has yet to be determined. But the nature of this commerce is so new it may as well be feudal

tithing; it will take time to sink into our brains. *Is this search worth the price I am going to pay? Yes? No?*

--A common complaint is that access to on-line information and entertainment is leading to a decline in what some people call situational awareness. On our farm this means workers are listening to podcasts or itunes while they go about chores, which in at least one way has a real appeal to me. I mean, who doesn't like the thought of a young woman listening to Jarrod Diamond talking about the wisdom of traditional societies while mucking out sheep jugs? But this entertainment comes at a cost. Headphones clamped to her head, is this farmhand aware of the water running from the broken line, of the ewe who has broken into the grain room and who is banging a bucket around, of the feed truck backing up to the bin? Access to online entertainment is definitely leading to a decreased awareness on the farm.

But there's a more obtuse loss of situational awareness, or so some claim. Here's the argument: the more we run our farms on spreadsheets, GPS, and remote control ventilation systems for barns (you know where *that* came from) the greater the loss of awareness of what is real, or used to be considered real—the health of the soil, as measured by the farmer's hand; the feel of the barn, as sensed by the shepherd.

But, again, that seems to me ascribing more to modern technology than warranted. Yes, GPS is taking the farmer's hands off the wheel, but the wheel, and the tractor itself, took the farmer off the land in a much greater way, decades ago. The digital era is really just another part of a continuum that has seen farmers step further and further away from the direct action of putting a seed in the ground and tamping it down. How far back do we trace this continuum—to Jethro Tull and his mechanical seeder? To Gutenberg and his press, which took knowledge of farming from people's brains and put it between the covers of books?

To this farmer, admittedly a bit of a Luddite, it seems the more things change the more they stay the same.



Ducks or chickens but not both

I agree with Amy Hogue (“Going Quackers for Ducks”, Nov/Dec 2018) that no farm animal is more delightful to watch than a duck. However, having raised both ducks and chickens for twelve years, I have reservations about housing them together. Firstly, ducks are attracted to water, well, like a duck takes to water! Between their copious drinking, splashing and excreting, the bedding or ground (if you put the water outside), becomes sodden very quickly. This is detrimental to a chicken’s feet and respiratory system.

Secondly, as Hogue points out, young ducks require less protein than young chickens. The most crucial time for proper feed balance is when they are developing their adult wing feathers at about three months of age. Too much protein results in “angel wing”, a condition in which the last joint of the wing fails to develop so that the wing (or wings) stick out laterally instead of lying along the body. Muscovies seem especially prone to the condition. One time I left the farm for three days, leaving my son to feed the ducklings. He mistakenly gave them chick instead of duck grower, and that was enough to cause several cases of angel wing. The condition is treatable if you can manage to catch it early and can manage to keep bandaging around the duck, but who needs it?

One more reason for separating ducks and chickens . . . hens can be vicious toward small ducklings. I have had several unfortunate encounters in the farmyard where hens have ripped the down and skin off the heads of ducklings, usually killing them. And there is nothing sadder than a dead duckling.

At our farm, we have Muscovies, Rouens, Buffs, Khaki Campbells and a Runner. The Muscovies keep well apart from the other breeds, by the way, and are best housed separately. My ducks keep the yard bug free and love slugs, which the chickens won’t eat. Like Hogue I would encourage any small farmer to keep a flock. Delicious food and entertainment, all rolled into one package!

*Sandy Easterbrook
Kettle Crossing Farm
Bergen, AB*



Sandy Easterbrook with a Muscovy. A Muscovy with ducklings.



From the frying pan into the fire

First of all, we all love your magazine. Your articles are so interesting. It takes us a while to read them so as the magazine is sitting around, visitors read it and get interested in mushrooms and ducks and just everything.

I am writing about the article on cast iron fry pans. I like seasoning with lard, son uses oil, brother in law does not allow his to be washed, just wiped out if that.

I had gas stoves and electric stoves and had build-up on the bottom (of my pan.) My new stove is an induction stove —

I made sure I could use my cast iron on it before buying it — and I thought I might scratch the (stove) top so I wanted to clean them. Years ago we had a house fire and our cast iron came out of the fire slick and clean — just seasoned it and back in business. Didn’t want to do that again so I asked my brother to put them in his bonfires this summer, gave him two, so I had one left to use. They were perfect. Great way to make your cast iron like new.

Keep on with a great Canadian magazine.

*Linda Freiburger
Greenock, Ont*



Jerusalem artichoke shepherd's pie

Way back in 2014, one of your readers wrote to *Small Farm Canada* magazine and shared that he had a Jerusalem Artichoke cultivar which grew well in Zone 2b. I found Mr. Bouffard's telephone number and called to ask if he would share some of his tubers. Patrick graciously obliged and sent some tubers through the mail.

These have grown wonderfully on our land in Sault Ste Marie, Ontario. Not only do they produce large, plump, crisp tubers, but they also provide blossoms that feed many pollinators through the late summer. The following is one of our favourite recipes:

Jerusalem Artichoke Shepherd's Pie

- 2 cups Jerusalem artichoke roots (cut into 1" pieces)
- 2 cups potatoes (cut into 2" pieces)
- 3/4 cup sour cream
- 2 tablespoons butter, bacon fat or lard
- 1 onion (finely chopped)
- 1 carrot (finely chopped)
- 1 celery stalk with leaves (finely chopped)
- 3 cloves garlic (minced or crushed through a press)
- 1 1/2lb ground meat (venison, beef, pork or poultry)

Seasonings:

- 2 tablespoons minced oregano leaves (or 2 teaspoons dried)
- 2 tablespoons minced basil (or 2 teaspoons dried)
- 2 tablespoons minced parsley (or 2 teaspoons dried)
- 2 tablespoons ketchup (our Canadian produced French's is best!)
- 2 teaspoons coconut aminos or soy sauce
- 1/2 teaspoon molasses
- 1/2 teaspoon apple cider vinegar
- sea salt and pepper (to taste)

1. Put Jerusalem artichokes and potatoes in pot, add one inch of water. Bring to boil then steam simmer until tender. Drain, mash until smooth and add sour cream, salt and pepper to taste.
2. While roots are cooking, sauté onion, carrot and celery in large frying pan for about 6 minutes until they begin to soften, add the garlic and sauté a few minutes more (garlic can burn if added too soon).



Tubers from Louise Robillard's Jerusalem Artichoke cultivar.

3. Add ground meat to the veggie mixture and cook until browned and crumbled.
4. Mix seasonings together and add to the meat mixture (this seasoning mix lends a great sweet and sour flavour to the meat). Stir well and spread mixture into a greased baking dish.
5. Spread mashed roots on top and bake in 400F oven until top is lightly browned (about 30 mins).

*Notes:

- If in a hurry, seasoned sausages make a great meat mixture without having to mix up the seasonings. Remove the meat from sausage casings and crumble into frying pan.
- Double the recipe for quick left overs the next day.

Small Farm Canada is a wonderful tool that can help us all share the best of what is on our farms and home gardens. I am grateful for what I call my "Patrick Sunchoke Patch". When I chatted with Patrick back in 2014, he was looking for a good line of Chantecler chickens. I was not able to help him at the time and don't know if he was ever successful at finding any. Perhaps one of your readers might be able to today?

Thank you for a wonderful publication!

Louise Robillard
Sault Ste. Marie, Ont.

TECHNOLOGY

Spare parts, made to measure

The 3D-printing revolution could keep older tractors running longer

“Keep ’er going” is the mantra of cash-strapped farmers everywhere. So you lubricate and you tinker and you keep your fingers crossed.

At some point, though, something’s going to break — and that’s when you discover that replacement parts are scarcer than hens’ teeth.

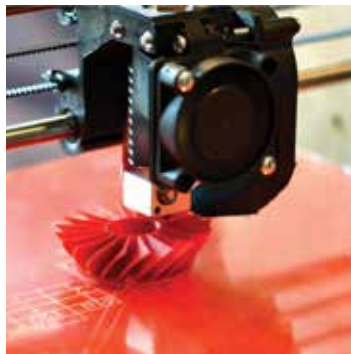
David Smith understands your frustration. He runs BuyAnyPart, an online company based in the U.K. that specializes in hard-to-find bits of machinery, with a catalogue that boasts more than 500,000 items. But sometimes, what their customers need simply isn’t available. That’s why the company launched a new service last fall: 3D printing.

“Farmers can find themselves spending more time looking for a part than fixing the machine,” Smith says. “We aim to change that.”

3D printing, also known as additive manufacturing, allows you to construct an object one ultra-thin layer

at a time. A range of different technologies are available, from the thermoplastic printing possible with a \$1,000 machine from Best Buy to advanced direct metal laser sintering, which uses high-powered lasers to fuse metal powders.

According to Smith, today’s materials and printers have evolved to the point where a 3D-printed replacement can be just as durable as the original — or even better. And while BuyAnyPart may be unique in targeting the farming sector, 3D-print shops are popping up



“3D printing will transform the spare parts market,” says one digital product manager.

News Flash! 3D Printers to Change Farming

Instead of buying crappy tools that break you can make your own crappy tools on site!



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in communities large and small.

Ideally, the process starts with technical drawings, although photos and part dimensions are often sufficient. If those aren’t available, a good fabricator may be able to get the specs they need from your worn-out or broken part. Pricing depends on the size and shape of the part and the material used to make it.

In addition to cost savings, the 3D-printing revolution brings big environmental benefits; you don’t need to consign your 1970 Farmall to the trash heap just because the radiator fan cracked. And according to a 2017 *PwC report*, it’s also good for parts suppliers. Instead of keeping big inventories of parts that are rarely ordered, they can simply print on demand. “3D printing will transform the spare parts market,” says one digital product manager quoted in the report.

Step one, however, is spreading the message that this approach is both effective and affordable. “At the moment it is still seen as something high-tech that is out of reach,” Smith says.

~Julie Stauffer

LIVESTOCK

Worm control in goats and sheep

US organization is clearing house for research

One of the main challenges in raising goats and sheep is controlling internal parasites. Year after year, the problem is getting even more difficult to address as parasites develop resistance to chemical dewormers.

The American Consortium for Small Ruminant Parasite Control is looking for solutions and sharing their findings with farmers. The consortium's website contains articles on how to do fecal egg counts on the farm and assess the level of wireworm infection using FAMANCHA scoring (based on the colour of the inside of an animal's eyelid).

Looking for alternative to chemical dewormers? You'll find articles on all sorts of options. Spoiler alert: many of the natural remedies have a limited effect, if any, on parasites. Commercial herbal compounds,

for example, were found to have no effect on internal parasites, whereas studies were mixed as to the success of garlic and pumpkin seeds. Pine bark in the diet, however, was found to inhibit growth or kill worms.

Visit the website to learn about the use of copper oxide wire particles or diatomaceous earth in pest control. There are also articles about the effect of feeding tannins, such as chicory, sainfoin, birdsfoot trefoil and sorghum. You can sign up to the WORMINFO Listserv to get the latest news in your email inbox.

*For more information: American Consortium for Small Ruminant Parasite Control
acsrpc.org or wormx.info*

-Janet Wallace



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HENDRIX GENETICS

BUSINESS

Black walnut trees as investment opportunity

PEI farmer sells saplings that will eventually pay off

Prince Edward Island's Havenloft Tree Nursery, now in their first year of public operation, have a very particular business model. It's not just about selling trees as something to beautify a property or to increase its value; the nursery's black walnut tree saplings are promoted as an investment opportunity in and of themselves, through benefits to be reaped from both the nuts and timber that can eventually be harvested and sold.

"I used to work in the mutual fund industry," explains owner Jesse Argent. "I dealt a lot with American stocks and mutual funds. I basically started hearing some brokers and some clients down in the States talking about these, they called them 'tree IRAs' — a reference to US saving plans known as Individual Retirement Accounts. After the housing market crash, people were looking for alternative methods to save money, to invest money. The planting of black walnut trees and high value hardwoods was something that was gaining a lot of ground."

In addition to the black walnuts, Argent's plantations are cross-planted with hazelnuts and American chestnuts and he's looking at fruiting trees that are compatible. He says that whether a customer is interested in planting 50 trees or 500 trees, the benefits are the same but the scale is different.

"You can grow these trees on your own property," says Argent. "They're wonderful shade trees. They never blow down, I'll tell you that. They'll snap in half before they'll blow down because those tap roots go straight down and there's no pulling them up."

When the trees mature, walnuts will begin to fall from them. They could be for personal use, but with enough trees, the walnuts could become a business on their own. The lumber from the trees is also valuable; Argent says that if someone eventually wants to get rid of one of the trees it's likely that companies would be willing to remove them and pay the owner a tidy sum.

The business is not without challenges. Argent says he couldn't imagine a worse year for weather to start his business; a rainy winter and killing frosts late into June meant that his orchard didn't get as much growth as he would like.

The trees have to be planted strategically as well, as their roots secrete a toxin called juglone, which would inhibit certain other types of trees and plants in their vicinity. Apple trees, tomatoes, potatoes and anything in the nightshade family would be adversely affected.

However, Argent says, corn or soybeans should be fine and may actually benefit from how juglone inhibits weed growth. Regardless, Argent works with many clients to develop a detailed agroforestry management plan.

In the long run, Argent hopes that the walnut tree proliferates to the point where it creates a new industry; the only place where black walnut trees are grown significantly in Canada is in Ontario, and Argent says that mostly just serves a local market.

"This is an industry that's worth billions of dollars, that really has been cornered by the United States. It would be really great if we could start this new market in Canada."

~Matt Jones



Jesse Argent is betting that there's a future in black walnuts.

PHOTOGRAPHY

We Feed the World photo exhibit celebrates small farmers

A new photo exhibit is celebrating the massive contributions of small farms and farmers around the world. We Feed the World is an initiative led by the Gaia Foundation, designed to raise awareness of the fact that the majority of the world's food supply comes from small farmers. Over three and a half years, 47 photographers documented farmers in 52 countries showing the many faces of food production.

“When you're working in the environmental movement, you're very aware of things like the fact that 70 per cent of our food is produced by organic farms or small size farms,” says project director Francesca Price. “There's a misconception that we need an industrial food system or technologies like GMOs in order to feed a growing global population.”

The exhibition includes over 300 images that demonstrate the incredible diversity of small scale food production in the world, from Puerto Colombia in the Colombian Amazon to Todjedi village in the African nation of Benin. A Canadian farm is also included, portraying the Chicot Family, members of the Ka'a'gee Tu First Nation, who for three generations have hunted and foraged on the shores of Tathlina Lake in the Northwest Territories.

Photos from We Feed the World were displayed at Yellowknife City Hall this winter. Price says while further Canadian exhibitions are possible, they may also develop exhibits focusing on specific nations in the future, with titles such as We Feed the World Canada.



Colin Seis overlooks his flock of sheep on Winona Farm in New South Wales, Australia. He almost lost everything in a brushfire 25 years ago, but rallied using pasture cropping techniques.

Image: Katrin Koening



PHOTOGRAPHY



A goat is fed in Burkina Faso's Bassieri Village where women have formed a co-operative farm.
Image: Andrew Esiebo



A young member of the Kleiner family spends time with chickens on the family's 30-acre mixed agroecological farm in Argentina's North-Eastern province.
Image: Jordi Ruiz Cirera



Members of the Chicot family hunt, fish and forage for food on Tathlina Lake, NWT.
Image: Pat Kane

NEW PRODUCTS

Chisel Ripper provides deep tillage options for small farms Doesn't leave clumps or ruts

Ohio farmer Jeff Sberna saw a gap in the market place for a tool to provide deep tillage on his farm. Now, he's looking to bring the J&D FarmBuilt Chisel Ripper to other North American farmers. The device will dig depths of up to 15" with 20 to 25 hp per shank, depending on soil conditions—the lack of horsepower required makes the device highly efficient.

"We had lower horse powered tractors and I couldn't break through the hard pan with what equipment I had," says Sberna. "Nothing I could get deep enough and even with a chisel plow, even with larger horse power, you couldn't break through. It just kind of rode on top of the hard



The J&D FarmBuilt Chisel Ripper provides a useful solution for deep tillage capable of breaking through hard pans.

pan. I was looking for ways to use what I had to open up the hard pan soil, for better drainage."

With help from family, Sberna started to work on the device. Several prototypes later, there are now two varieties of the Chisel Ripper available for sale—smaller five foot units which are kept in stock and larger 12-13 foot units which are built on a per-order basis. Each unit has their

own advantages. The larger model includes a trash cutter on the front, while the smaller unit requires less horsepower to pull. But both versions offer the same basic benefits.

"The chisel ripper shatters the forward motion," says Sberna. "Which lets air into the group and aerates the dirt and also allows it to pull easier and go deeper into the dirt and open up the hard pan. By spacing it out more, I leave firm dirt in the middle and I don't disturb all the dirt—every time you go through, you leave firm dirt in the middle."

Sberna says that the forward motion in shatter doesn't bring up big clumps or leave big ruts in its wake. Though he's never had a need to do so himself, Sberna says that other tractor attachments can be used at the same time as the Chisel Ripper to level the dirt or for other purposes.

"It's different than what's out there—it might look similar, it looks like a chisel plow, but it's really a whole different thing," says Sberna. "We've even had a dry year this year and high gravel, it helped out where areas back before we started using the chisel ripper, would never produce anything. I can remember the ground before that, there'd be nothing, now they're helping to hold moisture and breaking down the hard patterns."

The J&D FarmBuilt Chisel Ripper is available through AMS Incorporated (www.amsincorporated.net)

—Matt Jones

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BOOK REVIEW

Tunnel visions

The Year-Round Hoophouse: Polytunnels for all seasons and all climates.

By Pam Dawling. 2019. [yup, 2019, I got an early copy] New Society Publishers. 309 pp.

Reviewed by Janet Wallace

The Year-Round Hoophouse is a comprehensive guide to using unheated high tunnels for season extension. As for the claim “for all seasons and all climates,” I was skeptical when I read that the author is from Virginia — Zone 7a with 176 frost-free days. After reading the book, however, I think this an excellent resource for Canadian growers. We just need to shift the seasons a bit; plant what the author calls ‘winter crops’ as our ‘fall crops.’ Dawling makes this simple by providing clear information on the temperature thresholds for crops.

For the winterkill details, as with the other information in the book, Dawling uses her own experience. And this is what makes the book great. She provides detailed information on how to build a greenhouse and replace the plastic. Half the book is devoted to crops — varietal choice, harvesting tips and planting, tips. Another critical section is devoted to problem-solving regarding issues with pests, nitrates, storm damage and more. The book covers heat-loving crops, such as tomatoes, okra and ginger, as well as cool-loving crops. Novice and experienced growers may use this as a reference guide to growing in hoophouses and other structures from cold frames to elaborate greenhouses.

Hoophouse tips

- Before putting the plastic on the hoops, tie the plastic around tennis balls at evenly spaced intervals along the length. This prevents the plastic from tearing when tension is applied with ropes and make it easier to handle the plastic.
- Build a coat rack and tool rack inside the hoophouse.
- Batavian lettuce, even varieties such as Summer Crisp, have great tolerance to heat and cold. Note — this is not the same as Crisp-head or Iceberg lettuce, which has no frost tolerance.
- Water lettuce before a mild night is expected; just-watered plants have less resistance to frost.
- Maruba santoh is a non-heading celery cabbage that matures in 35 days.
- Although it sounds labour-intensive, one way to get spinach started in hot weather for early fall harvest is to sprout seeds in a jar in the fridge. Add sand or oatmeal if the sprouts start to clump together.
- In the winter, wait until greens have received four to six hours of sunlight before harvesting them.
- Turmeric is hardier and easier to grow than ginger in the hoop-house.
- Dense plantings provide a continuous canopy, which helps protect crops from frost damage.
- Using row covers inside hoop-houses can provide extra protection from the cold but also lead to much higher nitrate content in greens grown in low light.

Bite Back



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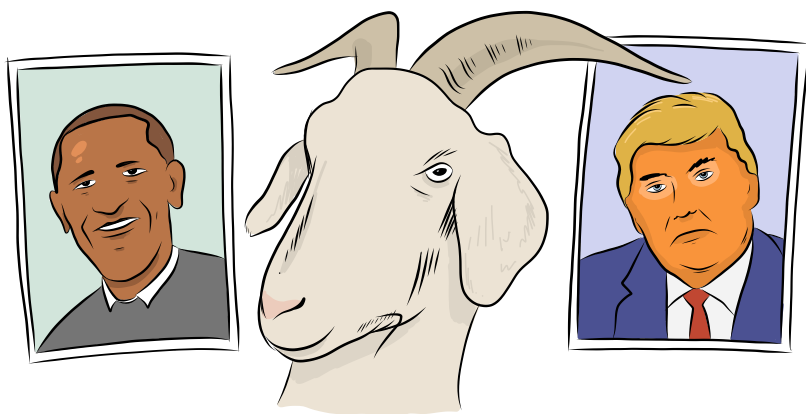
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Smiling? Frowning? Your goat can tell

British scientists tried to work out whether goats could tell if a person looked angry or happy, and if a person's facial expression would affect goat behaviour. Human emotions are expressed in many ways, such as posture, tone of voice, speed of gait, etc., but the researchers decided to focus on facial expressions. They tested the reaction of goats to gray-scale pictures of human faces, images of people that the goats had never encountered. In half the pictures the people were smiling. In the others the people frowned as though angry.

The goats could choose to walk towards one of the two pictures. They tended to approach the smiling face first and spend longer with the smiling face.



“Overall, we found that goats preferred to interact first with happy faces, meaning that they are sensitive to human facial emotional cues. Goats interacted first, more often and for longer duration with positive faces when they were positioned on the right side. However, no preference was found when the positive faces were placed on the left side,” write the scientists. The goats didn't show any preference for male or female faces, just whether the image was smiling or frowning.

Christian Nawroth, Natalia Albuquerque, Carine Savalli, Marie-Sophie Single, Alan G. McElligott. [actual spelling of his name] Goats prefer positive human emotional facial expressions. Royal Society Open Science. August 29, 2018. Volume 5. 180491.

Transforming Fading Photographed Memories into Art on Canvas



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Using seaweed to curb climate change

Methane released from ruminant ‘burps’ can contribute to global climate change. Scientists in at least three continents are looking at ways to reduce the release of this potent greenhouse gas by livestock.

One of the key players in this research is PEI dairy farmer Joe Dorgan. Dorgan had noticed that his cows in a paddock near the shore tended to produce more milk and get pregnant faster than the cows kept inland. He observed the animals eating the storm cast seaweed and wondered if that was the cause. This questioning eventually led to a study by Canadian researchers. Along with the health benefits from seaweed, the scientists found a surprising effect; seaweed could reduce methane emissions of the animals.

One of the scientists, Rob Kinley, moved to Australia and continued this line of research. Kinley found that including particular types of seaweed at just two per cent of the diet could lead to a 99 per cent reduction in methane emissions. Now scientists in California are also finding promising results from giving dried seaweed to dairy cows. They find that mixing the seaweed with molasses makes it more palatable. Apparently, British scientists using artificial rumens in the lab discovered that curry powder could also serve to reduce methane emissions. The challenge, however, was when the scientists tried to apply their findings to live animals — they discovered that cows don't like curry.

Diane Nelson. Can Seaweed Cut Methane Emissions on Dairy Farms? University of California, Davis: Food & Agriculture. May 24, 2018.

Rob D. Kinley and Alan H. Fredeen. In vitro evaluation of feeding North Atlantic stormtoss seaweeds on ruminal digestion. Journal of Applied Phycology. December 2015, Volume 27, Issue 6, pp 2387–2393.

Insect allies or enemy agents?

Stranger than fiction and much more frightening, an agency of the US Department of Defense is enlisting insects to help transmit genetically engineered (GE) viruses to plants.

“It may not be obvious to humans, but the life of a plant is full of peril,” according to the Defense Advanced Research Projects Agency’s website. The Insect Allies page states “National security can be quickly jeopardized by naturally occurring threats to the crop system, including pathogens, drought, flooding and frost, but especially by threats introduced by state or non-state actors.”

The Insect Allies program employs insects, including leafhoppers, whiteflies and aphids, to spread genetically engineered viruses quickly and thoroughly in a field of crops. When the insect, which is likely a crop pest, bites a leaf or pierces a plant stem, the GE virus is transmitted into the plant tissue. The virus then replicates inside plant cells and changes the plant according to the plan of the scientists, agencies and/or corporations that produced the virus. The research is now being conducted inside greenhouses and buildings, not in fields.

Right now, farmers who want genetically modified crops would buy GE seed, plant it, wait for the crop to grow and then wait for the crop to express the marketable traits (e.g., tolerance to herbicide). If the Insect Allies program becomes commercialized, a farmer could just release insects into their mature crop and the crop would quickly change.

How would the plant change? We don’t know; the answer lies in whatever design the scientists had and if the plan worked. Maybe the plant would develop resistance to a disease or drought tolerance.

How does the farmer contain the bugs in his own field? The plan is that the bugs die within two weeks after their release, but what if they don’t? And how far can they travel in two weeks? And what about the seeds, either harvested or volunteers, from these plants?

What if the bugs aren’t being released by the farmer but instead are being released by the military or a rogue element? And what if the virus doesn’t give the plant disease resistance but instead infects the plant with a disease?

Despite the assurances of the Department of Defense that the goal is to protect crops, the project raises alarming questions. In a paper recently published in *Science*, a team of European scientists pose these questions (along with many highly technical ones). Dr. Guy Reeves and his colleagues suggest that the Insect Allies program “may be widely perceived as an effort to develop biological agents for hostile purposes and their means of delivery, which if true — would constitute a breach of the Biological Weapons Convention.” For details on the project, see the links below.

--*Insect Allies*. Defense Advanced Research Projects Agency. <https://www.darpa.mil/program/insect-allies>

--*DARPA Enlists Insects to Protect Agricultural Food Supply*. Defense Advanced Research Projects Agency. <https://www.darpa.mil/news-events/2016-10-19>
R. G. Reeves, S. Voeneky, D. Caetano-Anollés, F. Beck and C. Boëte.

--*Agricultural research, or a new bioweapon system?* *Science* Vol. 362, Issue 6410, pp. 35-37 DOI: 10.1126/science.aat7664

--*Background information on the article “Agricultural research, or a new bioweapon system?”* <http://web.evolbio.mpg.de/HEGAAs>

Cool goats eat seaweed

Global climate change is a common theme in many agricultural studies. Scientists around the world are investigating how to reduce the greenhouse gas emissions from agriculture, while others are researching the potential impact of global warming on farms. Feeding seaweed to ruminants fits into both these categories.



Researchers examined Saanen goats undergoing heat stress. Seaweed was added to their diet at either zero, four or 12 per cent (dry weight of total feed.) The goats that were fed the seaweed had lower body temperatures and slower breathing than the goats that didn’t consume it. This suggests that using seaweed as a dietary supplement can enable goats to better withstand heat stress.

Renata Nayharade Lima, João Batista Freirede Souza Jr, Nayane Valente Batista et al. *Mitigating heat stress in dairy goats with inclusion of seaweed *Gracilaria birdiae* in diet*. *Small Ruminant Research*. Available online November 8, 2018. Not in print at the time SFC went to press.



Poultry

AMY HOGUE

Best in show

Preserving Canada's poultry show tradition

No visit to an agricultural fair can be considered complete without a stroll through the poultry tent or hall, where children flock to gawk at birds of all kinds, and exhibitors display their prized stock in the hopes of an award. Here, farmers chat about their birds' lineage and compare their stock to their neighbours, for better or for worse.

Showing livestock is a big part of Canada's rural heritage and agricultural fairs have traditionally been the place where breeders go to show off their skills, garnering reputations as raising the best of the best. For poultry breeders, showing is about more than just tradition, it provides them with accreditation that their birds conform to the holy grail of poultry breeding, *The American Standard of Perfection*.

Created by the American Poultry Association (APA), the oldest livestock organization in North America, *The American Standard of Perfection* and the *Bantam Standard* are the criteria upon which all birds are judged.

Unfortunately for breeders, livestock shows appear to be on the decline, and preserving this agricultural tradition means more farmers will need to get involved. Christina Franc, Executive Director for the Canadian Association of Fairs and Exhibitions (CAFE) explained the decline is definitely a concern for the association.

"What we're seeing at some of the bigger shows is they're still doing well for numbers," Franc said, "Unfortunately, the smaller shows in general are really struggling to bring people in."

Franc noted CAFE has been looking at options to slow the decline, such as changing the amounts for prizes, changing show times or participating in the points system, in which points are required for participants to advance to larger shows.



These four-year-old grey saddleback Pomeranian geese were purchased by Seward from another breeder, and he used them to breed his own stock. Selective breeding is not foolproof; even champion breeding stock may not produce offspring that conform to the *Standard*.

Kevin Seward, an award-winning poultry breeder from Eastern Ontario, has been breeding heritage breeds of ducks and geese for most of his life. According to Seward, many agricultural fairs are moving to include revenue generating activities rather than shows, a move he finds disappointing. "If you don't do it, it dies," Seward said simply, "A lot of fairs were built around agricultural shows. The dairy cattle show, beef cattle show . . . it was a thing of pride."

Seward has been doing his part to keep the tradition alive, by breeding to the standard and competing in shows whenever feasible. Encouraging young people to get involved in breeding and showing is one way to maintain the tradition, and Seward said he has already inducted his two young daughters into the show world.

4-H Canada is known for their livestock projects that teach youth about successful breeding and how it contributes to ani-

continued on page 18

What to expect from your first show

So you've put the time into breeding poultry and think you have a winner to bring to a show? Your first poultry show will be an exciting event, but can also be intimidating; exhibitors treat poultry shows like the serious business it is, and forewarned is forearmed. Read on for information about what to expect from the experience.

- Be prepared for an almost deafening din — shows are notoriously noisy.
- Arrive early to find your section and have time to prepare your bird(s) for show. You'll find birds are usually placed in rows of raised cages and are grouped by section.
- Groom your birds prior to the show so they will be looking their best. Exhibitors will clean their birds' legs and feet well to remove any debris or manure, and will sometimes even groom their birds with toothbrushes or combs.
- Consider oiling the combs, wattles, legs and feet of your birds. Some breeders will also pluck off-colour feathers that deviate from the standard, while others consider this practice "cheating."
- Monitor feed carefully in preparation for a show. You want your birds bright and alert, not overfull and sleepy. Some breeders alter feeding habits to keep wastes more solid, and easier to clean up.
- Review in advance the different criteria on which your bird will be evaluated to ensure you are presenting your bird to the best advantage. Judges evaluate each bird's appearance for conformity to the standard, but also evaluate for overall condition, health, fitness and more.
- Birds can find the show room stressful; try to keep them calm and handle them gently. Judges will be hands-on with their inspection, and a calm bird is more valued.

Image: Jake MacDonald



These are the type of cages you would typically see at a poultry show. Imagine the amount of noise thousands of birds caged in the same building can make and you'll have a good approximation of what a poultry show is like.



Poultry



Kevin Seward holds a wheaten ko shamo bantam hen.



Seward's three-year-old daughter, Morgan, is already involved in the show world, and has shown one of her black Australian swans, shown here.

mal health and longevity, and can be one option for connecting young people with the agricultural world and furthering the showing tradition.

Although Seward noted there can be some frustrating elements to showing birds, overall the show world is dedicated to honouring the breeders who have put the time and effort into producing quality breeds. And those breeders should be recognized; successful breeding to the standard can be challenging, with no guarantee of the result.

"Sometimes if you have a pair of birds that have one grand champion grandparent, they may produce a bird that never places . . . genetics can be a funny thing; it can be very frustrating," Seward explained.

Getting started showing

If you're thinking of getting into the show world there's no time like the present. To get started, Seward recommends first picking up the *Standard of Perfection*, and reading it through to learn more about the different breeds and their characteristics. Don't ignore the first part of the *Standard*, which contains valuable information on breeding, and is an excellent reference for more than just breed specifics.

Next, pick a breed you are passionate about. In Seward's case, he has always had a profound love of all birds, but his true passion is wild waterfowl, including ducks, geese and swans from all over the world. Source the best breeding stock you can find and begin your own breeding regimen, documenting everything as you go.

Identify what characteristics you'd like to improve in your flock, and keep your end goal in mind at all times. Not every chick is going to conform to the standard; don't be afraid to cull any birds which don't promote the characteristics you are looking for. A good rule of thumb is that for every 100 chicks that are hatched, keep 10 for breeding. For your first show, start small at a local show before moving on to bigger venues.

Seward's final words of advice: Be patient. It can take years to produce a breed that's true to the *Standard*, and has a good chance of placing in a poultry show.

"Be patient. The guy who has a bird on Champion Row didn't put six months into it," Seward said.



Exotic species like these Egyptian geese can bring top dollars when they also boast award-winning lineage. According to Seward, a pair of good breeder geese can run between \$200 and \$500. Wild geese have sold for even higher amounts, ranging from \$1,500 and a pair of swans once sold for \$5,000 a pair.



For More Information:

www.canadian-fairs.ca/en/home/
www.poultryshowcentral.com
www.amerpoultryassn.com/



Kevin Seward owns more than 150 birds of different breeds, specializing in wild breeds. "If it's not a passion you shouldn't be in it," Seward said, "It should be because you enjoy raising birds."



Equipment

DAN KERR

All about . . . Three-point tractor hydraulics

Some things have no maintenance; you simply use it until it breaks or wears out and then fix it. Take for instance the three-point hydraulic cylinder in my B7200 Kubota. Last winter I noticed a hesitation to the three-point lift capability of my tractor with the snow blower, this season the hesitation turned into an almost refusal. It was time to replace the piston O-ring.

Components

Here are the components of a three-point hydraulic cylinder:

- cylinder head (covers the cylinder and has two rings, small and large in this case)
- cylinder (contains the piston)
- piston (has an O-ring and O-ring backer, which keeps the O-ring secure)
- push rod (fits inside the bottom of the piston and is connected to the lift arm cam)
- lift arm cam is connected to the external lift arms
- control valve is attached to the side of the cylinder casing and controls the direction and position of the lift arms with high pressure oil via an operator control handle

How it works:

When the control valve handle is lifted up by the operator, oil flows into the cylinder on top of the piston pushing it down. The piston pushes against a push rod linked to the lift arm cam. On both



When removing pieces, indexing them will ensure proper reassembly

ends of the lift arm cam are the external lift arms which lift the three-point hitch and load. When the control valve handle is pushed down it releases the oil back into the transmission, allowing the piston to rise and the arms to lower and float. This flow passes through the flow control rate valve which regulates the speed of the lowering motion. This system has no down pressure on the lift arms so pushing an implement such as a plow or auger into the ground is not possible.

Why it fails:

What has happened here is that the large piston O-ring, normally rounded,

like a straw, has gone flat. Eventually the neoprene O-ring wears and flattens on the cylinder contact point allowing the pressurized oil to ooze around it, causing the pressure to drop and the arms and load to lower.

Maintenance:

First up I remove the seat and seat rails. With these out of the way I clean the immediate work area, which is essential. No debris should get in the hydraulic assembly. Once the area is clean I ensure that the control valve arm is down so there is no pressure in the system, and then I remove two of the four head bolts



With the indexed bracket off, the head is exposed (clean the immediate area to reduce contaminants from entering cylinder before removing head)

and remove a bracket, then the remaining two bolts and the cylinder head exposing the piston.

As there is no wrist pin the piston floats, so by physically manipulating the lift arms up and down I was able to expose the piston enough that the O-ring was out of the cylinder. With the piston in this position I used a magnet to extract the piston out of the cylinder. I examined the piston and cylinder for signs of wear and scratches. None were evident, so I removed and installed a new O-ring by simply slipping it over the piston into its groove using a small pick and screwdriver, and being cautious not to scratch the piston. The piston is installed by coating it with transmission oil and compressing it with a piston ring compressor, then slipping it back into the cylinder.

A piston ring compressor is a winding of thin-walled, heat-treated steel wrapped with a ratchet tensioner resembling a hose clamp. The idea here is that you place the loose compressor around the piston and tighten it until the O-ring compresses enough that the piston, with ring, will simply slip back into the cylinder without any binding. I have replaced O-rings that were installed by someone else using screw drivers. The key here is that screwdrivers are used for *screws*; ring compressors are used for *rings*. Screw drivers are okay for removing the old ring but can puncture the new one, degrading it before use. My compressor is a 'KD' purchased 30 years ago from an automotive shop, at a reasonable price.

continued on page 22



The head removed exposing the piston



Extract piston with magnet



Removing the old O-ring from the piston

Equipment



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Once the piston was back in the cylinder I fitted the new cylinder head O-rings, installed the head and torqued the bolts to manufacturer's specs. With the seat rails and the seat reinstalled I'm now good to go.

Being unfamiliar with this procedure I contacted Tom Callaghan of Callaghan Kubota, Lindsay, Ontario, the dealer I purchased it from, for any "heads up" to what I was getting into as the shop manual was a little vague. It's nice to be able to contact your dealer after 14 years to bounce things off of, and it re-enforces my statement of getting to know your dealer. It took 28 years for this simple O-ring to finely fail with 1334 hours on the clock — I'd say it did a pretty good job.

Cost:

When it comes to repairs I use original OME parts when possible; they fit and work properly. When ordering parts such as O-rings, be specific such as how many you need. In some cases these are shipped from the depot in packages of more than one and you may be expected to purchase the entire bag.

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As for bulk packages from box stores, all O-rings are not the same. They may be the proper diameter but that doesn't mean they are the proper thickness which can cause serious issues with fit and leakage. If the dealer doesn't stock them or isn't available, any credible hydraulic shop can fit you with the proper O-rings.

Total time start to finish, 3 hours. Cost for the replacement O-rings from North Shore Kubota Sault Ste Marie, about \$8.00 taxes included. Sweet!

Note:

When conducting repairs such as these it is a good idea to use a parts container so that the pieces removed along with fasteners are placed away from the work area and not on any available horizontal surface. Once the piston is removed it leaves an access to the bowels of your tractor and anything that is dropped into that void now has to be located and removed. No explanation needed here!



The piston ring compressor, piston and head with new rings



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THE TRADITIONAL FARM HEDGEROW

YOUR UNDISCOVERED ALLY

BY JIM JONES



There may be places on your farm that you drive past every day and think nothing of, or perhaps you wonder if that unused strip of land could serve you better and you should be rid of it entirely. But wait, this woody, perhaps rock-strewn strip between your fields, known in North America as a fencerow, and in Europe as the hedgerow, is quietly working for you and with a little help it could do much more.

Defining a hedgerow

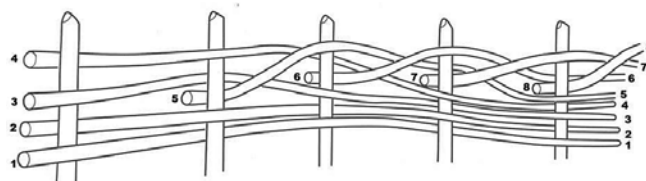
The terms fencerow and hedgerow are often confusing and loosely applied. The dictionary definition of a fencerow is ‘*an uncultivated strip of land on each side of and below a fence*’, but is commonly used to describe without a fence as ‘*a narrow linear strip of trees that defines a laneway or boundary between fields or properties*’ (this definition from Durham Municipal By-Law 31/2012). A hedgerow can describe a range of linear features, but in the United Kingdom it has the technical definition of ‘*any boundary line of trees or shrubs over 20m (67ft) long and less than 5m (16ft) wide at the base*’ (Hedgeline/DEFRA) (Picture 1). A major difference between fencerows and hedgerows is that the latter are usually managed and the former not, however the type and timing of management for both can vary enormously.

The origins of hedgerows

It’s thought that hedgerows or hedges were first used by early humans as ‘dead hedges,’ using thorny plants to corral livestock. Similar structures, such as the thorny acacia *enkang* used by the Masai peoples of East Africa to protect their villages, are still in use today. With the advent of agriculture, clearance of woodlands created fields with tree and shrub boundaries that were managed to create livestock-proof ‘living fences’. Hedgerows have been planted since the time of the Romans and reached their peak in Britain during the Enclosure Acts of the 1700s when an estimated 200,000 miles of mostly hawthorn (*Crataegus* species) hedgerows were planted.

Useful hedges

A hedgerow may take seven to 10 years to establish, depending on the species composition, and with good management is not only more robust than a fence but also brings additional benefits.



Chief amongst these for the arable farmer is protection of their fields’ soil from wind and water erosion. Dense and structurally strong hedgerows composed of species such as oak, hawthorn and hazel have been shown to be the most effective barriers. In areas where winds are strong hedgerows can reduce erosion by as much as 50 per cent. Hedgerows can also intercept water-borne sediment and reduce surface flow rates, capturing soil from fields above and reducing flow over fields below them.

Hedgerows also make water more available to crops through the retention of moisture in leaf litter and by facilitating the infiltration of surface water into the soil. As well, they can reduce water loss through evaporation and transpiration as a result of increased shading and wind shelter. Studies from Britain have shown that hedges can greatly increase infiltration of water into the soil, by a factor of 60 to 70 times compared to compacted upland pasture. The role of hedgerows in controlling water flows has led to their use in natural flood management.

Hedgerows enhance populations of natural enemies (predators and parasites) of crop pests by providing a wide range of



Sheilagh Crandall of Mount Wolfe Farm (centre) and Professor Stephen Quilley (left) of the University of Waterloo with attendees of the Open Farm Day in Fall of 2017 planting a new community hedgerow.

HEDGELAYING BY THE NUMBERS

The following pictures outline the South of England Style of hedgelaying. Pictures from a South of England Hedgelaying Society training day at Cissbury Ring, West Sussex, England except (1) and (4)



2 To allow access to the base of the hedge, sparingly remove lower branches with loppers. Don't go mad!



3 Using a sharp billhook or small axe cut down into the stem of the plant approximately 4/5 of the way through. Begin the cut up the stem at a height about 3-4 times the width of the stem. The cut stem- called a pleacher-is gently guided over to a 35 degree angle.



1 The hedge should ideally be at least 2.5m (8.2') tall for laying with regular and closely spaced (c. 30cm/1') plants.



4 Remove the 'heel' of the pleacher either with your billhook (with practice) or a small saw. This allows the next pleacher to be laid without hindrance.



5 Cut one pleacher at a time and build up the hedge with pleachers lying as parallel to each other as possible. In South of England style shown here, pleachers are crossed so that brush appears on both sides of the hedge.



6

Once all pleachers are layed, stakes (approx. 5-6' x 2") are driven through at intervals of approximately 1' 6" apart (closed fist to elbow is a good measure) down the centre line of the hedge, helping to support the structure. Then binders (approx. 10- 5' x 1.5") are woven alternately around the stakes (see Picture 8). Stakes and binders here are both hazel.



7

The finished hedge should be 4' high. The tops of stakes are sawn off and any excess brush above the binders is cut back, and the sides are trimmed to leave a neat finish.



8

South of England Style Binding (adapted from BTCV Hedging Handbook)

habitats across the shrub layer, trees, banks, base, margins, ditches and soil. The greater the structural and floristic diversity of hedges, the greater their insect diversity and, it's assumed, insect predators. Strong evidence exists, based largely upon bees (especially bumblebees) and hoverflies, that hedgerows are also important in agricultural landscapes for the existence of healthy and diverse pollinator populations.

Agriculture contributes 10-15 per cent of global carbon dioxide emissions so in the future, farms will need to play an important role in mitigating climate change. Hedgerows store more carbon than cropped land and so planting more hedgerows may mitigate climate change impacts.

Of course, hedgerows are essential for wildlife in agricultural landscapes. One survey in Devon, UK, showed a single hedge was home to over 2,000 species of plants and animals. Hedgerows offer nesting sites and food, but can also provide linkages between farm woodlots, scrubland and ponds for animals finding mates and new territory.

Hedgerows, and their absence, are a feature of landscape character, or what can be described as the 'feel' or 'sense' of a place. The French term *bocage* is used to describe a terrain of mixed woodland and pasture connected by hedgerows. In a small study comparing attitudes to hedgerows in Canada and England, hedgerows evoked childhood memories and provided colour and diverse views to an otherwise featureless agricultural landscape.

Planting and management

Like fencerows, hedgerows can arise naturally along fences and other linear features and they can also be planted with intention. They can be single species but are more useful with a diversity of plants. Volunteers at Mount Wolfe Farm in Caledon, Ontario, planted a hedge in 2017, which contains American hazelnut, gray dogwood, chokeberry, nannyberry, arrowwood, serviceberry, black chokeberry and fragrant sumac. To provide a dense hedge with opportunities for nesting and many stems for laying in the future, the planting was done in a double line, spaced 40cm (16in) apart, with plants in a staggered pattern at 30cm (12in) centres, giving five plants per metre.

Hedgerows are composed of living shrubs which will grow and will need to be managed so there is a balance to be found between allowing shrubs to grow and keeping the hedge from becoming a line of trees, developing gaps and eventually disappearing. Hedgerows can be cut to slow their growth but annual cutting can limit flower production and the development of fruits, berries and seeds. Annual cutting also stresses and eventually kills the plants. Evidence has shown cutting every two to three years and increasing the cut height by a few inches each time can maintain the health of the hedge. As a hedgerow grows, the shrubs will thicken and become gappy at the base, so at



A young volunteer shows off pleaching skills with a bilhook at a Surrey Wildlife Trust 'Hedgerow Heroes' hedgelaying event in the UK.



Hedgelaying experts Nigel Adams from the UK and Jef Gielen from the Netherlands demonstrate the principals of a hedgelaying as part of a series of workshops for the University of Waterloo's Hedgelaying in Ontario's Landscape project in Fall 2016.

some point it will be necessary to rejuvenate the hedge. The hedge could be coppiced (felled), however, with the shrubs removed it cannot function as a fence.

The practice of hedgelaying has evolved to rejuvenate a hedge while still maintaining a stock-proof structure. Hedgelaying is a catch-all term used to describe the rejuvenation of a hedge from the base by cutting and 'laying-over' of the shrub. There are many different styles of hedgelaying throughout the world, with at least 16 styles in the UK alone. In some styles wooden stakes are positioned at intervals along the hedge and long 'binders' are woven in across the top to give the hedge strength.

Hedgelaying in Ontario's landscape and beyond

In 2016 the University of Waterloo and partners in southern Ontario, funded by the Social Sciences and Humanities Research Council, began working together to examine landscape planning and management practices within the Greater Golden Horseshoe, using hedgerows and hedgelaying to connect to broader themes including place-making, collective stewardship, agroecology and social-ecological resilience. Two pilot plantings at Mount Wolfe Farm, Albion Hills Community Farm, were undertaken with a third at a private property in Inglewood.

In 2018 this author worked with the project, offering advice and delivering workshops on hedgerows, hedgelaying and other traditional rural skills such as scything, basket making and greenwoodworking through the Ontario Rural Skills Network. It's thought that hedgerows were once more widespread across Canada and so it is more than likely that traditional hedgerow management is being carried out somewhere still. I would love to hear from you if you can help find layed hedges or Canadian hedgelayers or if you would like to get involved in our pilot project in Ontario. Please contact jim.jones@uwaterloo.ca or call (647)-217-5530.

The midland style is one of the regional hedge-laying styles in England. It's a single-brush style, designed so that the woody brash extends only on one side of the hedge, keeping livestock away from the young regrowth, in areas where historically mixed farming was practiced, with livestock fields interspersed with arable.



References

Wolton, R. et al (2014) Regulatory services delivered by hedges: The evidence base, LM0106 Technical Report for Defra and Natural England

For more information

Hedgelinek: www.hedgelinek.org.uk

-A good source of information on hedgerows in England and beyond

National Hedgelaying Society:

www.hedgelaying.org.uk

Ontario Rural Skills Network:

www.ontarioruralskillsnetwork.com

Hedge shrubs once cut and layed over are known as pleachers. Here can be clearly seen the living hinge- the 'bark plus a bit more' that allows nutrients and sap to remain flowing in the stem. Jagged 'heels' from the stump are almost always removed.



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Monsanto vs. Schmeiser

20 years later

Farmer and biotech firm reflect on their landmark court case

BY MATT JONES

On August 6, 1998, Monsanto Canada first filed suit against Saskatchewan canola farmer, Percy Schmeiser. By May of 2004, the Supreme Court ruled 5-4 in favour of Monsanto, but the victory came at a public relations cost for the biotechnology company.

Regardless, the case became a regular talking point in discussions regarding big business and genetically modified organisms (GMO) and defined producer/corporate relations for a decade. *Small Farm Canada* spoke with both Schmeiser and a representative for Monsanto, to get their reflections on the case, 20 years after it was first filed.

The central issue of the case concerned whether Schmeiser's production of genetically modified plants constituted an infringement of Monsanto's patent on a glyphosate-resistant canola gene, which they sold in seed form as Roundup Ready Canola. Schmeiser found Roundup-resistant plants on his property in 1997, and claimed that the field has been accidentally contaminated with Monsanto's seed, either through spillage from a truck or airborne pollen.

Schmeiser, now 87, still lives on the same farm in Bruno, Saskatchewan. Retired from farming himself, he rents the land to another farmer who continues to grow wheat and canola on those roughly 1,000 acres.

"The seed that Monsanto had scheduled was raised in the ditch along our land," says Schmeiser. "We didn't even know where it came from. And then it was proven that one of my neighbours had GMO seed hauled past her land, in a wind storm. That's how the seeds got into her land. So they knew then how the seed got into our land."

This would be the basis for a popular narrative surrounding the case, that Schmeiser was being sued by the company over use of seeds that had accidentally landed on his property. In fact, any claims regarding Schmeiser's 1997 crop were dropped prior to trial and the case centered on Schmeiser's 1998 crop, which had been seeded from the Roundup resistant plants in his 1997 crop and had a high concentration of commercial-quality Roundup Ready Canola.

Schmeiser says that before the case was filed, he didn't even know what a GMO was. He soon received a crash course.

"It was something we didn't even know about, and they said anybody that didn't have a license from them, they would take to court," says Schmeiser. "But, we didn't even know about it, that there was such a thing in existence. They said we should have contacted them. How can you contact somebody when you didn't even know it existed?"

Schmeiser argued in court that he had "farmer's rights," meaning that he could do anything he wanted with plants on his own property, including plants that had grown on his property by accident. The court did not agree that "farmer's rights" existed in Canadian law, or with his explanations for how the seeds arrived on his property. Regardless, Schmeiser has spent the last 20 years as a figurehead and talking point for anti-GMO and anti-corporate movements.

"[My life] has changed a lot," says Schmeiser. "We have been contacted by people from around the world, people that have been also charged by a corporation, for using your own seeds, and stuff like that. We stood up for farmer's rights — not only here, but for farmers around the world."



Schmeiser believes that the case was part of a larger effort by Monsanto to obtain control over the world's seed supply. Regardless of the court's decision, he remains firm in his convictions and maintains that the case was actually a victory for him.

"Monsanto didn't get what they charged us for, we never had to pay Monsanto one red cent," says Schmeiser. "We brought to the world the attention of how a corporation can get control of a farmer's seed supply by wind or blowing in the snow, and he could be charged for it."

While still obviously passionate about the issue, Schmeiser says that he doesn't enjoy being a figurehead for it. He says it has been a burden to bear for his family for years and cost them much of their privacy and he would be happy to put it behind him.



"Opponents of either Monsanto as a company or opponents of genetic modification or modern agricultural tools got a hold of Mr. Schmeiser and wanted to support him and wanted to turn this into something that it was not." – *Trish Jordan, Monsanto Public and Industry Affairs Director*

"There were a lot of predictable story themes that are good for any story, of course," says Jordan. "Big versus small, technology versus not. Certainly, we did our due diligence going into this particular situation and this case did not involve a small farmer by any means. He had a large scale commercial farming operation and he was growing technology without obtaining the license or permission to do so."

Jordan says that the impetus for the case actually started with other farmers in the area.

"We never have been in the business of suing our customers and we never will be," says Jordan. "In this case, our customers were telling us that, 'Hey, we pay for this technology, we understand there's rules for using this technology. If we're gonna play by the rules and pay for this technology, we expect everybody else to as well.'"

For Monsanto, the court case was clearly a mixed-blessing. They defended their intellectual property rights and were vindicated in the court, but they became a target for anti-corporate or anti-GMO movements. Monsanto Public and Industry Affairs Director Trish Jordan says that it became the story of an individual versus a large, global, multinational company even if they didn't feel that reflected reality.

The court's decision in the case was not unanimous. Justice Louise Arbour, writing the minority dissenting opinion, argued that the gene and the process could be patented, but that the patent could not be extended to a living thing like a plant.

"Of course, we don't have a patent on a life form," says Jordan. "And that was never really what it was about for us, but it raised a bunch of other questions for people."

Jordan says that their product, and others like it were key to the growth of the canola industry in the past 20 years. And with a mind to a growing population, water scarcity and less land available to farm, she says that the company will continue to help farmers grow as much as possible on smaller plots of land. But the spectre of the case against Schmeiser still looms.

"I don't think it was Percy Schmeiser that was solely responsible for some of the questions and some of the public relations issues that we constantly have to deal with," says Jordan. "I've always said, I don't give Mr. Schmeiser credit for very much, but he is a fantastic storyteller and he had many people helping him. People are interested in stories about people, and emotions, and good versus bad, which are again very simplistic themes, but they're themes in stories that have been around forever. I think if anything, this was a good example of where if you follow that theme of good triumphing over evil, this was a good fit."



Percy Schmeiser says that before the case was filed, he didn't even know what a GMO was. He soon received a crash course.

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SLOW TRIUMPH

ONE FARMER'S INCREDIBLE EFFORTS TO DEAL WITH LEAFY SPURGE

BY EDNA MANNING

When Barry Ukraineec purchased his 80-acre farm southwest of Saskatoon 20 years ago, there were only a few small patches of leafy spurge on his property. Within a couple of years, however, the weed had begun to spread rapidly. The rural municipality's local weed inspector was monitoring the invasive species and landowners were given three options to control the problem: mowing, spraying or using sheep. Biological control with beetles was also being implemented in some areas of western Canada and the northern US.

"For about 15 years I took the route of paying to have it mowed. However, they didn't always mow it at the right time, so I knew that wasn't a long-term solution," Ukraineec says.

A herbicide called Tordon 22-K was used to control the weed along the ditches and roadsides, but this wasn't an option for Ukraineec. "I'd done some research into the sprays and realized that Tordon doesn't break down easily in sandy soils, and can therefore get into the water table."

The use of beetles is one of the more cost-effective ways to control spurge in terms of time and money. Three species of beetles are currently being utilized — the brown dot spurge beetle (*Aphthona cyparissiae*), the black dot spurge beetle (*Aphthona nigricutis*), and the black spurge beetle (*Aphthona lacertosa*). The adult beetles feed on the tops of the plants, while the larva feed on the roots. Once established, the beetles are self-sustaining. But, Ukraineec says, it also takes time for the beetles to multiply and for landowners to see long-term results.

Ukraineec felt his only alternative was to purchase sheep to control the weed. He already had a small herd of Black Angus cattle, but cattle will generally not eat leafy spurge because it causes scours and mouth blisters. Sheep however, can eat it without harmful effects. In fact sheep and goats prefer spurge to grass if they have access to the young plants.

"I'd never had sheep, didn't know anything about them other than they could be a nuisance and make great coyote

candy," he says. With a full time career as Food and Beverage Service Manager with the Travelodge Hotel in Saskatoon, Ukraineec knew he'd be in for a great deal of additional work. Not to mention the learning experience.

In the spring of 2009 Ukraineec purchased five Dorper ewes with very good bloodlines from a reputable breeder. Buying purebred animals gave him the added benefit of selling breeding stock as well as butcher animals. He chose the Dorper breed for a number of reasons, including the fact they don't need shearing; their hair/wool sheds spontaneously. They are non-selective feeders, excellent browsers and thrive in varying climates and conditions. The animals are slightly smaller than some breeds and are docile, hardy and prolific. They are also very good mothers.

The downside to the Dorsers is that there aren't very many bloodlines currently in Canada. "It's a very small association and there are only about nine or 10 reputable breeders that are working to improve the breed here in Canada," Ukraineec says.

A significant commitment in terms of time, labour and expense was involved in putting up adequate fencing, installing efficient gates and erecting shelters for the animals. But Ukraineec knew this would have to be a long-term project for it to be successful.

"Leafy spurge seeds stays viable for over eight years, so you'd have to do it for many years before you get it off your land. And if it's growing on adjacent land, deer can be bringing in new seed every year. So you really never get rid of it completely — but you can manage it."

ENTER WILY COYOTE

Dealing with predators, primarily coyotes, has been another interesting and valuable experience. Ukraineec purchased a female llama at the same time he acquired his first ewes. Females, he learned in hindsight, aren't as good as males who instinctively guard their territory better than a female.



Saskatchewan farmer Barry Ukrainec and his flock of spurge busters

Coyotes became a real issue about two years ago when a pair set up a den on the adjoining property. “It was a mated pair of parents that had retained their previous year’s pups and were looking after their current batch of pups as well. The female was training her last year’s pups to hunt. It’s a very dominant female that can have that kind of control. The predation specialist told me that likely it was the female who was the killer and it was important to get her because she is the pack leader. Once the mother is gone, the pups from last year have no boss to teach them and the pack will disperse. The male doesn’t take over very efficiently.

“I lost 13 sheep out of a flock of about 50 through the course of the summer when I was away at work. The coyotes came up and over a 48” page wire fence with barbwire over top of that. I’ve heard since that they can climb an 8-foot elk fence—they get right beside the fence and use it like a ladder to travel back and forth. I knew, by this time, I had to get some dogs because the llama wasn’t working,” he says.

Ukrainec purchased two six-month-old Ackbash pups that had been trained to guard sheep. Ackbash are large white dogs (averaging between 75 to 140 pounds), native to western Turkey. They are known to be intelligent, courageous and natural guardians with a strong maternal nature towards any animal under its charge. “They have to be bonded from birth with

WHAT IS LEAFY SPURGE?

Leafy Spurge (*Euphorbia* spp.) is an aggressive, deep-rooted perennial that is native to central and southern Europe. It was transported to North America in the early 1800s and spread across Canada and the northern U.S. Severe infestations can be found in the southern Prairie Provinces and southern Ontario. There are isolated pockets of the weed in the southern interior of B.C. An estimated two million hectares in North America are infested.

The plant grows to a height of 40-90 cm. (15 to 36”), is very adaptable and thrives under a variety of soil and growing conditions. It spreads by seeds as well as from an extensive root system that displaces native vegetation. Public and private land, abandoned farmland, roadsides and other uncultivated land are often affected. The roots, which can reach a depth of up to 8 meters (26 feet) and spread horizontally up to 4.5 metres (14.8 feet) a year, release a toxin that prevents other plant growth nearby. The ripe seedpods explode and can throw the seeds up to five meters. Seeds remain viable for at least eight years.

Cattle will not eat spurge because the stems contain a milky sap that can cause mouth blisters and scours. In fact, cattle will avoid heavily infested sites, which can lead to overgrazing in non-infested areas increasing the likelihood of leafy spurge spreading to these areas as well.

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Barry Ukrainec's cattle are not effective at controlling leafy spurge.



Left untreated with herbicide, or unmowed or not grazed by sheep, leafy spurge can take over a field in no time.



sheep and shouldn't have very much interaction with people. They aren't trainable like a German shepherd, for instance. They function more on instinct. They will assess a situation, make a decision on their own and use as much force as they think they'll need. Barking will sometimes keep predators away, but if a coyote comes in they would not hesitate to kill it. Coyotes will still come into the pasture, and I've watched the dogs function. As a pair, they both take after the coyote. One dog will continue the chase and the other has a tendency to run back to the sheep, round them up and make sure they're all safe."

Ukraineec says he's seen the dogs go into a forested area first to make sure it's safe, at which point the sheep will follow. "The sheep have now cleaned the spurge out of that area, as well as the underbrush, which improves the pasture."

PARASITES

While Dorper sheep are generally not as susceptible to parasites as some breeds, the wet summer of 2014 proved to be a bad year for internal parasites for Ukraineec's flock. He lost about 30 lambs to barber pole worms. These parasites usually affect the younger stock. Symptoms such as diarrhea, anemia and weight loss precede death. "I lost these lambs when they were in the two to three-month stage. I had never dealt with this before, and had to deworm them every two weeks three consecutive times before I got it under control."

Barber pole worms have a three-week cycle: the sheep excretes the eggs in its feces, the eggs hatch and in their final stage, crawl up on the stems of grass. The sheep eating the grass become re-infected. One of the best ways to control them is to rotate your pasture. Ukraineec's list of future projects includes fencing the rest of his land and creating more rotational pastures. This would allow him to move the sheep off parasite-infested land more often. He's also thinking about purchasing another dog to guard the sheep in their separate pastures.

"The sheep have done a wonderful job on the spurge. In our area, the spurge begins to grow about the first week of April. When I let the sheep out in the spring they will walk the entire pasture to pick out the young spurge plants. It's amazing. I took the weed control specialist on a tour of the pasture last summer, and we couldn't find a single spurge plant anywhere in areas where the sheep had access to it."



Dorper sheep, watched over by an Akbash guardian dog, on Barry's property; the sheep were most effective in ridding the property of leafy spurge.

CONTROLLING WEEDS THROUGH TARGETED GRAZING

Using livestock to manage weeds in a specific location for a limited time is known as targeted or prescribed grazing. Short-term, high-intensity grazing stresses weeds and reduces seed production. The benefits include improved pasture quality, and an increase in biodiversity. The practice is also environmentally friendly.

Livestock, particularly goats and sheep, will access hilly, rocky and wooded areas where other weed-control options are less practical. Many weeds provide a good source of nutrients and are palatable to livestock.

Typically goats and sheep are used for prescribed grazing but cattle can also be used, depending on the targeted weed. Sheep, and goats in particular, are designed to handle thorny and woody vegetation. Goats have a relatively large liver mass which allows them to process the chemicals in some weeds that cattle cannot tolerate.

One of the keys to successful prescription grazing is that the livestock used should be in the specified location for only a short period of time so as not to cause irreparable damage to surrounding vegetation. Grazing should be done when the weed is most vulnerable.

Other factors to consider:

- cost of, and locating animals
- fencing, water and hauling costs
- predatory animals
- compatibility with other wildlife

Many eggs, many baskets

What is being learned from the Crop Climate Project

BY VANESSA FARNSWORTH

With climate change impacting everything from bird migration patterns to wildfire severity, it's not surprising that Canadian researchers are taking a hard look at the challenges farmers are going to encounter growing crops in the face of increasing climatic instability.

"Thinking about how rapidly things are changing, we are setting ourselves up for failure because we have a very narrow crop base and a narrow way of doing things," says Richard Hebda, retired curator of botany and earth history at the Royal BC Museum. "We cannot depend on Chile or Argentina or Australia or anywhere else. We have to depend on our own food."

Hebda notes that average global temperatures have increased by roughly a degree over the past century with the greatest increases occurring in the north. Over the coming decades, rising temperatures will translate into the northern regions of Canada becoming increasingly hospitable to agricultural crops while much of the south, where we have traditionally grown our food, threatens to become less so. Climate instability is also predicted to cause a tenfold increase in extreme weather events such as heat waves, droughts and flooding.

"All of these things create a risk to the food supply that will (increase)...because food exists on climate and climate is becoming less stable," says Hebda, who grew up on a small family farm in southern Ontario. "The conditions for growing things in general are changing as is the occurrence of extremes, which means that some years you'll be okay and some years you won't and that some places will be okay and other places won't."



Project participant Gail Elder planting a row of trial potatoes complete with markers for each variety. Potato variety in foreground is the Ozette-Nootka.

Photo by Valerie Huff.





Ozette-Nootka potato harvest with ruler to show the size of the tubers
 Photo by Richard Hebda



Ozette-Nootka potato buds on the verge of flowering
 Photo by Valerie Huff

But it's not all gloom and doom. His concern over the risk climate change poses to Canada's food supply drove Hebda to help found the Crop-Climate Project, a ground breaking research program that sees organic farmers from diverse regions across Canada growing heritage potatoes in concert with in-field monitoring equipment that records critical weather measurements such as temperature and relative humidity.

"It's a fairly intense little monitoring program for farmers," says Valerie Huff, a restoration ecologist who coordinates the Crop-Climate Project. "They're doing on-farm research that requires them to monitor every three or four days."

It's the correlation of concise weather data with potato growth characteristics that makes this project valuable and not just to the researchers who are concerned that conventional potato varieties may not fare well in destabilized climatic conditions. It's also valuable to participating farmers who appreciate the insights that

scientific measurements have brought to their operations.

"Farming is about millions of variables and the only ones you have control over are when you put something in the ground and when you take it back out. Everything else is a crapshoot," says Chris Wooding of Ironwood Organics who operates a 170-acre organic farm in eastern Ontario and has participated in the project from its beginning. "All my farming experience was observational and trying crazy things and seeing if they worked. I had no measuring stick to start removing some of the variables so this project was my first introduction to that and I was absolutely hooked. I continue today to take daily weather station readings and it's a big part of the farm."

During the three years of field trials from 2014 to 2016, participating farmers were located in such varied climates as Vancouver Island, the Prairies, the Maritimes, southeastern Ontario and even the Yukon. In addition to those farmers

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involved in the core research program, the Crop-Climate Project also distributed potatoes to anyone who expressed an interest in participating and was willing to record their observations on a less formal basis, a strategy that resulted in anecdotal reports being submitted from across Canada.

“We put potatoes into the hands of the growers, gardeners, anybody, just to get them into the community and to get people interested in experimentation and in understanding that they can save the seed, produce the crop and settle on a potato that is best for their tastes, cooking practices and climatic conditions,” Hebda says. “By so doing, they develop the idea that they can do their own adaptations and develop their own regional or local variety and establish their own food security.”

Hebda believes that growing diverse potato varieties in a variety of locations and in different ways, something he calls the “many eggs, many baskets” approach, will help guard against the crop failures and high food prices that could very well be our collective future if the current generation of farmers fails to adapt agricultural practices to increasing climate instability. And he’s not alone.

“We’ve got to get on with it because the world is not in a good place and it’s getting worse by the year,” says Wooding, who has embraced the “many eggs” principle on his own farm. “From a strategic sense, it’s better for us to grow 30 different varieties. Every year, we have three miserable failures and every year we have 10 that are okay and eight that are absolutely stellar, but it’s never the same two varieties back to back year after year after year.”

Of all the crops the Crop-Climate Project could have selected for its field trials, potatoes came up the winner because anyone can grow them, they’re easy to process and they form part of the staple diet in this country. And when it comes to food security, a crop anyone can grow anywhere without specialized knowledge is key. Of the 12 potato varieties selected for the trials the majority were heirloom, in large part because of their diverse genetic characteristics which can one day be used to engineer

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Potato leaves breaking the soil surface

Photo by Richard Hebda



Potato plant included in trials

Photo by Richard Hebda



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potato varieties that have been optimized for Canada’s disparate growing regions. The selected varieties included Banana, Chieftain, Congo, Corne de Mouton, Likely, Mrs. Moehrle’s Yellow Fleshed, Ozette-Nootka, Pugh’s Purple, Russian Blue, Siberian, Sieglinde and Slovenian Crescent. However, with literally thousands of heritage potato varieties in the world, growers were also encouraged to submit data on any other type of potato they were growing during the trial period.

Not surprisingly, results varied across regions, years and varieties. Corne de Mouton, for instance, performed well in locations and during years when droughts dominated, while Likely proved to be a cold-climate adapted variety suitable for growing in northern regions, or possibly for overwintering, although its consistently low yields limit its commercial potential. But that may be beside the point.

“Heritage varieties are a source of diversity that absolutely needs to be conserved and preserved for the future,” says Huff. “It may be that Likely isn’t useful in and of itself but it can be used for crosses with more productive varieties in the future.”

Of the potato varieties that were trialed, one stood head and shoulders above the rest.

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“The one that we keep talking about is Ozette-Nootka,” Hebda says.

Ozette-Nootka is a heritage potato that was brought to Vancouver Island in the late 1700s by Spanish settlers and is thought to be Canada’s first potato variety. In field trials, this late maturing, yellow-fleshed fingerling produced high yields and showed little susceptibility to insects or disease. More importantly, it grew well across a wide range of climatic conditions.

“The Ozette-Nootka performed well even in the Yukon, which is surprising. It’s a very long season potato. If I plant it here (in Nelson, BC), I can plant it in April and it will grow until frost in October,” says Huff who, like her colleagues, didn’t know what to expect when they distributed this potato variety to growers across Canada. “It had never been grown anywhere except on the West Coast so we had no idea if it would perform well elsewhere. It certainly did.”

The Crop-Climate Project may have completed its field trial phase but that’s not the end of the project. It will continue for at least a few more years during which time it will expand to involve more small farmers, gardeners and other like-minded growers. Each participant will be asked to grow 10 to 15

potatoes of three different varieties and submit their observations to the project coordinator.

Anyone interested in participating in the Crop-Climate Project can go to its website (heritagepotato.ca) where they can request heritage seed potatoes, download observation forms and review the results for each potato variety included in the field trials. Hebda is particularly interested in encouraging participation by small farmers. He strongly believes they play a crucial role in contributing to our shared knowledge of which crops grow best and where.

“The small farm is extremely important for the future because that’s where adaptation and experimentation happens. That’s how we got the food varieties that we have and how we learned to grow everything,” Hebda says. “Farmers are really the first plant ecologists because they are basically testing the ecology of everything they’re harvesting and growing every year.”

Farmers who participate in the project will have the opportunity to grow potato varieties that were a part of the field trials or they can elect to grow varieties they’ve been cultivating for many years. Hebda is especially interested in learning about any heritage varieties that farmers are maintaining.

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Neatly marked rows of trial potatoes with weather monitoring equipment in the foreground

Photo by Valerie Huff



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“We may discover — and I can practically guarantee that we will discover — other Canadian heritage varieties that are very well suited to their regions. And if they’re well suited in place X then they may be well suited in place Y which has similar conditions,” Hebda says, adding, “We want to see diversification. We want to see people experimenting as widely as possible across Canada. It doesn’t take much — just a tiny corner of your field. But you’re contributing to data that will be available to everybody. So you’re not only doing it for yourself and your community, you’re helping everybody, not only in Canada but in the world.”



Weather monitoring equipment used during trials, potato varieties separated by markers

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Recipes

HELEN LAMMERS-HELPS

Soup has flavours of lasagna but with less work

January is National Soup Month which seems quite appropriate; nothing warms you up quicker on a cold winter's day than a bowl of piping hot soup.

I love making home-made soups of all kinds — lentil, carrot, corn chowder, minestrone and so many more. They're so simple to make and there's lots of room for experimentation. I don't really think you can go wrong when making soup.

Lasagna is one of my favourite meals but it occurred to me one day that I would make it more often if it didn't take so much time. What if I could make a soup version of lasagna, I wondered. It could have all the rich flavours of lasagna but without the laborious task of layering noodles and sauce.

I began experimenting and after some trial and error, this One-Pot Lasagna Soup recipe is what I came up with. (A big thank-you to my husband who ate countless bowls of this soup while I tweaked the recipe).

Served with a side of warm Italian bread, this soup makes a hearty but simple meal fast enough for a week night supper.



One-Pot Lasagna Soup

- 2 cups lean Italian turkey sausage (casings removed) or lean ground beef
- 1 Tbsp. vegetable oil
- ½ onion, chopped
- 2 cloves garlic, minced
- ½ green or red pepper, chopped
- ½ cup zucchini, chopped fine
- ½ cup mushrooms, chopped fine
- 1 28 oz (796 mL) can crushed tomatoes
- 4 cups vegetable broth
- 2 cups water
- 1 tsp dried oregano
- 1 tsp dried basil
- ¼ tsp red pepper flakes
- 6 lasagna noodles (broken into pieces approximately 1" square. This is a good place to use up those broken noodles in the bottom of the box. Just remember lasagna noodles expand a lot when cooked.)
- 1 cup loosely packed baby spinach, chopped
- Salt and pepper, to taste
- ½ cup milk
- Shredded mozzarella and/or parmesan cheese

In a large, heavy bottomed soup pot, heat the oil and cook the meat on medium-high. When the meat has been browned, add the onion, garlic, peppers, zucchini and mushrooms and cook until vegetables are tender. Add the broth, crushed tomatoes, water, and seasonings; bring to a boil. Add broken lasagna noodles and reduce heat to simmer for 20 minutes or until noodles are tender, stirring occasionally. Add spinach and simmer for a few more minutes until spinach is cooked. Gently stir in the milk. Add salt and pepper, to taste. Ladle soup into individual bowls and top with a sprinkle of shredded mozzarella and/or parmesan cheese and serve.

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Notes from the Larkspur Supper Club

DAN NEEDLES

Where do good ideas come from?

I once knew a man who immigrated to Canada after WWII from Latvia and went to work in a machine shop in southwestern Ontario. He soon saved enough money to buy a small plot and start a market garden. At first he had to borrow most of his equipment and his neighbour across the road was kind enough to lend him a set of disk plows.

But dragging the discs across the road left quite a mark on the highway and my friend was embarrassed by the damage he had done to a public road. So he rigged up an axle and a hydraulic cylinder and invented what many of his neighbours claim was the first hydraulic lift disk plow on the continent. The machine shop promptly sold the idea to one of the large farm implement companies and within five years it had spread across North America. My Latvian friend never got a dime.

Max Planck, the famous quantum physicist, once said that the best new ideas never originate from a committee but rather “from the head of an individually inspired researcher who struggles with his problems in lonely thought and unites all his thought on one single point which is his whole world for the moment.”

That idea has always resonated with this lonely researcher, labouring as I do in solitude and without a four wheel drive loader tractor. Loading pigs by yourself has a way of uniting your thoughts on a single point. Pigs sense treachery the moment the door of the house opens. When a pig comes up the ramp and sees the guy with the glasses it identifies a weak spot and, for an awful moment, this becomes our whole world.

Thirty years ago I invented a system for loading pigs that incorporated the principles of the lever, the pulley and the inclined plane. Family and neighbours would gather to witness this wonder of modern agriculture and marvel that it had been created by a soft-handed economist and a scribbler. One of the ancients on the sideroad even pronounced it “the slickest way of moving pigs I ever saw.” But it never gained traction in the industry.

Jethro Tull’s invention of the seed drill in England in 1740 is widely regarded as the beginning of modern agriculture.

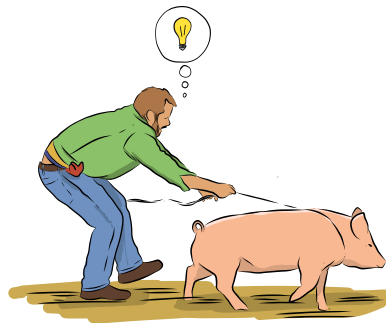
Actual farm practices did not change drastically until a century later when pioneers in the New World entered the bottomlands of the Ohio River and tried to turn the heavy clay soils with iron plows. Suddenly, a host of new patents were granted for the chilled steel plow and all of the mechanical processes of cultivating, reaping, baling and threshing that we recognize today. (It is no coincidence that Pittsburgh became the centre of the U.S. steel industry in the process.) Technical advances moved so rapidly that by 1880 the Amish and Mennonites called a halt to protect their families and communities from disruption. The rest of us have been trying to catch our breath ever since.

I was thinking about all of this while following the instructions from a computer expert from Albuquerque on how to install the latest version of the software package I use to write this column. Nothing worked. He was just as puzzled as I was but not nearly as irritated. At one point I practically shouted into the phone, “If you put in bread and it comes out toast, you have a toaster. If it doesn’t you have a boat anchor!”

This is where writing and farming are so closely linked. I have been pounding a keyboard for fifty years now and I find I don’t type a whit faster on this PC than I did with an Underwood in 1978. There has been no giant tech leap forward for me. This business of shaping a sentence in the English language resists mechanizing the way certain crops like mushrooms and ginseng refuse to be mass-produced, the way a pig refuses to be loaded.

People forget it was the lonely writer who forged the gap between hardware and software in the computer industry. Computers could do a lot of things but they were at a dead loss when it came to handling the subtleties of the English language. The blinking lights and whirring tapes needed a special ‘soft’ program to supervise the works, and that program in turn needed supervision by a human operator. It still needed husbandry, the vigilance of the shepherd and the attentiveness of the gardener.

And that gives me hope that there is still a place for us.





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