Text: Lynn Radford
Images: Vine Fresh Acres and Lebo Farms



Operations Manager Pete Neufeld. "It is impossible for me to adjust the settings to keep pace with the constant changes in the weather. It gives us confidence to know that the system is constantly monitoring the screen and responding to what it sees."

Pete Neufeld wants to maximise production:

'AI-powered decision-making plays a key part in our success'

The owners of Vine Fresh Acres and Lebo Farms in Ontario pride themselves on growing high-quality cucumbers and bell peppers all year round, providing a consistent and dependable supply to retailers across North America. Here, Operations Manager Pete Neufeld shares insights into how combining automation with artificial intelligence has helped the company boost cucumber production by over 30% in recent years. "And I know we're not even close to achieving our full potential," he says.

The story of Vine Fresh Acres and Lebo Farms in Leamington, Ontario, is a shining example of what can be achieved by adopting state-of-the-art technology as the basis for both efficient crop growth and efficient business growth. Lebo Farms started out in 2009 as a small cucumber growing venture on a 2 ha site as a spinoff from the Neufeld family's greenhouse building company, Roof and Greenhouse Construction. As this became more successful, the original farm was sold and the family purchased and developed two adjacent sites, expanding them both rapidly and later adding bell peppers to the portfolio too. Today, red, orange and yellow bell peppers are cultivated on 21 ha at Lebo Farms, while Vine Fresh Acres produces high-wire English cucumbers in three cycles per year and high-wire mini cukes in four cycles per year, on a total of 27.5 ha.

Minimising chemicals

The harvested products are collected multiple times a day by Nature Fresh Farms, whose distribution centre is just one minute away, and sold primarily to end customers throughout the USA. "The tariff situation has not affected the produce industry so far and we hope that this will remain the case, but you never know," says Pete Neufeld. "We hope that by focusing on running a tight ship, as efficiently and cost-effectively as possible, we will be resilient enough to survive for some time if the worst does happen."

The company typically grows two or three varieties of each type, but often switches at the start of a new cycle, sometimes due to the season and sometimes to take advan-

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tage of new resistances. “Our IPM Manager is amazingly knowledgeable and does a great job of minimising our use of chemicals at both farms. This is especially important because we are picking cukes every day, and we don’t want to be restricted by a pre-harvest interval.”

Green mottle mosaic virus

The green mottle mosaic virus is the biggest challenge in cucumbers, he says. “While good hygiene and biosecurity help, varieties with built-in resistance will make a real difference,” states Neufeld, who as Operations Manager now oversees the labour team, IPM team and growing team for both sites.

He explains that both farms are highly automated: “My elder brothers, Henry and Jake, are visionaries who are always looking at how we can use emerging technology to overcome various challenges and continuously improve our performance. Some examples include a labour monitoring system that stimulates employee productivity, and an induction line for the carts travelling from the greenhouse to the warehouse. Besides producing as much as possible while maintaining quality, we also have to achieve product uniformity, because this is important for our warehouse automation.”



Production of English cukes has recently increased by over 30%.

Addressing climate challenges

Another challenge is the increasingly extreme climate. “The summers here have been brutal lately, with some really hot spells making things difficult. We apply a ReduSol coating to the glass and we’ve also installed misting throughout our facility to provide both cooling and humidity,” he says. Thankfully, operations have not been directly affected by the Canadian wildfires, which have mainly been further north. “We just had a few extremely hazy days,” adds Neufeld.



The cucumbers are harvested every day for sale throughout North America.

In contrast, the winters can sometimes be cold and are always dark, with fewer hours of daylight from October until late January. “And even if it is mild in November and December, it gets really cloudy,” comments the Operations Manager. To compensate for the darkness, the company initially installed HPS lighting at Vine Fresh Acres in 2018, but has since completely switched to LEDs from Philips. “Their tech team helped us with the light level and encouraged us to use far red too, even though many people say it’s not necessary for cucumbers. We now provide 300 µmol of top lighting all year round, because it boosts production a little even in the summer.”

Interlighting trial

They are also conducting a trial with additional interlighting at 140 µmol. “LEDs have already hugely increased our production and we’re keen to see how much higher we can go. So we’re also doing some crazy things in the trial, such as lighting for 24 hours a day to see just how much light we can give before it becomes too much for the crop.” The company has recently started trialling LEDs in peppers too.

When the outdoor temperature drops, the water in the rail pipes is heated by the gas boilers, which also provide sufficient CO_2. All the blocks have blackout screens from Ridder, the supplier of the climate computer. “These are primarily to prevent nighttime light emissions but they also help to trap

some heat. And we're trialling a thermal energy screen in one block. We're also currently testing a vertical fan from Svensson in one block to see if it helps us to limit pipe usage. The local hydroelectric power is relatively cheap – especially because we dynamically manage our energy consumption to qualify for lower rates as a Class A customer – but we're always looking to further reduce energy costs."

AI-powered steering

One piece of technology that helps not only to reduce the company's energy consumption, but also to improve crop performance, is the algorithm Crop Controller. "We first came into contact with Blue Radix through Ridder. When it comes to new tech, nothing is hotter than artificial intelligence right now, and we were keen to explore what AI could do for us. We immediately felt a high level of confidence in the Blue Radix team. They're at the forefront of the advancements," he recalls. "More than five years ago we set up a trial in one of our blocks and spent around two years to further fine-tune the product before rolling it out to control all our acreage of both cucumbers and peppers."

Crop Controller monitors and autonomously steers the greenhouse climate 24/7 and makes the necessary adjustments every five minutes, according to him: "A grower can't possibly change the setpoints to keep pace with the constant changes in the weather. It gives us confidence to know that the system is always watching the screen and acting on what it sees. The system is so reliable that overrides are rarely necessary. The only limitation is that the algorithm will undergo a short learning period following major changes to greenhouse installations or growing strategies."

Over 30% yield increase

The use of Crop Controller has given Neufeld a number of new insights. "For example, we used to just crank open the vents all the way, but now we've learnt that it can sometimes be more effective to leave one side completely closed."



The harvested products are collected multiple times a day by distributor Nature Fresh Farms.



Besides yield and quality, product uniformity is very important for the company's warehouse automation.

Year after year, the company is breaking its own production records. In English cukes alone, yields have gone from around 270 pieces per square metre to the potential for around 360 based on extrapolated figures for the whole year – a more than 30% increase. "We've made so many changes, such as varieties and LEDs, that it's always hard to pinpoint a single reason, but I strongly believe that the algorithm plays a part in that success," he states.

Another factor that has an impact on production is the substrate. Lebo Farms recently switched from stone wool to coco in the hope of reducing pepper wilting issues, and Neufeld is now thinking of switching to coco at Vine Fresh Acres too. "Personally, I think that coco is better for root health due to being better aerated, and the biofungicides we use seem to multiply better in coco," he comments.

Water shortage

The substrate is also linked to water consumption, which is a growing challenge in Leamington, according to Neufeld: "There is no more water available, so we are having to take pond water to irrigate our crops. With these issues in mind, we are currently trialling the Blue Radix autonomous irrigation module. Growers are often particularly hesitant to relinquish control of their irrigation and steering because just half a day of the wrong strategy can cause severe crop damage. But we're keen to see how this module can reduce our water input and improve overall performance."

Looking ahead, the goal is to continue to grow both in terms of yield per square metre and in terms of the size of the production area. "For now, we intend to focus on increasing our pepper acreage, perhaps by purchasing new land if necessary – preferably within a one-hour radius of here," he states.

Future potential

"I'm not sure when we will say we're big enough, but I know we're not even close to achieving our full potential. We will retain our focus on adopting new tech and continuing to make changes that help us to produce more and grow as efficiently as possible, and then we'll see where the future takes us," he concludes.



The family produces high-wire English cucumbers and mini cukes on 27.5 ha.

Summary

In Leamington, Ontario, the Neufeld family owns two neighbouring farms: Vine Fresh Acres producing high-wire English cucumbers and mini cukes on 27.5 ha, and Lebo Farms cultivating red, orange and yellow bell peppers on 21 ha. The company makes use of AI-based autonomous crop control in combination with various other greenhouse automation to maximise production while upholding high standards of quality and uniformity.