

Artificial intelligence helped Nature Fresh Farms dramatically improve greenhouse-based farming operations and increase produce yield

# Using AI to Turn Data into Farming's Greatest Natural Resource

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## Introduction

Nature Fresh Farms, based in Leamington, Ontario, Canada, is one of North America's leading independent greenhouse-based produce growers, selling bell peppers, cucumbers, and tomatoes to some of the largest retail chains in the United States and Canada. Since its founding in 2000, with a single 16-acre greenhouse, the company has been an innovator in integrating digital technology into one of the world's most hands-on endeavors, farming. The company now grows under nearly 200 acres of glass in Canada, Ohio, and Mexico.

As with any farming operation, Nature Fresh Farms faces constant challenges, including climate change, fluctuating product demands, resource management, and staffing issues. All these challenges affect produce yield – the company's lifeblood. Since its founding, the business has used sensors linked to computers to track every possible aspect of farming. With its growth, the volume of data and the effort needed to analyze and then act on that information has increased exponentially. But while the IT staff could process the data, it often took several days for that information to become usable for the growers in the greenhouses. A traditional farm, with one or two crops a year, might be successful with that turnaround. Delays in a highly automated indoor facility with daily harvesting, however, can dramatically affect yield, and therefore put the business at risk.

In addition, Nature Fresh Farms is highly committed to providing non-genetically modified produce in a pesticide-free environment and to conserving resources as much as possible. The company, therefore, had to find a way to combine the speed and analytical capabilities of digitization with the hands-on field expertise of its growers. As Nature Fresh Farms expanded, it used artificial intelligence (AI) solutions running on Dell Technologies' PowerScale storage and VxRail hyperconverged appliances to seamlessly bring farming into the future.

## SOLUTION SNAPSHOT

### ORGANIZATION:

Nature Fresh Farms

### ORGANIZATIONAL CHALLENGE:

Manage greenhouse farming operations through automation during a period of rapid business expansion.

### SOLUTION:

The AI applications are based on Dell Technologies' PowerScale and VxRail running in multiple large greenhouses linked by an SD-WAN.

### BENEFIT:

Automated analysis and control of virtually all aspects of greenhouse farming, resulting in more efficient and environmentally friendly operations while increasing produce yield.

## Implementation

Initially, Nature Fresh Farms used a small AI engine to develop a preemptive maintenance tool to track and control multiple aspects of running a greenhouse. "We realized very quickly that it was going to be a lot of work to monitor everything," said Keith Bradley, Nature Fresh Farms' vice president of IT. "Our first iteration of AI looked at data logs and predicted potential breakdowns so we could send a technician out to replace something before it broke. But now we are using AI to control virtually all aspects of greenhouse climate and plant growth."

To enable this control, Bradley's team had to get rid of the data silos by connecting input from each location into a single database that could be used to monitor plant growth. To IT staff, the data was just numbers to be compared with statistical norms; to growers, the information was just a set of figures without real-world meaning. To improve the yield, Bradley had to integrate the two. "We could automatically open and close vents, for example, based on temperature and even water the plants based on that information," he said. "But then the growers would have to go out and actually look at the plants so see if they were wilting."

The solution was to get the growers involved in the creation of the AI systems. At first, the growers were hesitant. But eventually, they realized that by adding their knowledge to the AI applications, they could spend less time looking at numbers and more time doing what they loved – working to improve yield with better quality produce. On the other hand, the IT staff, using PowerScale and VxRail, could create highly flexible, containerized work environments for the AI applications that could grow with the farming operations and easily be linked with traditional applications, such as ERP.

All of Nature Fresh Farms' acreage is under glass, so the company can control the complete environment using 11 different AI applications. "We have sensors everywhere; we measure the nutrient levels going in and out, how much light a plant is getting, the humidity, the water use, everything," said Bradley. "We can then determine any weight changes in a plant to determine how well it's growing."

The AI applications are the heart of Nature Fresh Farms' state-of-the-art greenhouse climate control system called PRIVA. Using PRIVA, the organization can carefully monitor resource use and optimize the growing environment. For example, carbon dioxide (CO<sub>2</sub>) produced by heating systems can be cooled and "fed" to the plants for photosynthesis. The operations use less water, because it is so tightly controlled, and anything not taken up by the plants is recycled. Because plant growth is so closely monitored, growers are alerted immediately if there is an issue, and if pests are present, they can take natural steps to eliminate damage without pesticides.

## Challenges

Bradley and his IT team did face challenges. First was getting people to buy into AI. To overcome this, Bradley started small, so he could quickly demonstrate the value of AI. This approach also enabled him to identify individuals who did not understand the technology and show them the benefits and explain that they still would have control over their information and tasks. Second was convincing the growers to spend time inputting their expertise into the AI applications. As soon as the growers realized that the applications would not only help them in their jobs but would give them a better work/life balance, they were "all in." A more recent challenge was something every business has faced recently – technology shortages caused by supply chain issues. Bradley's solution was to anticipate future needs and order well in advance, supplemented by the ability to easily add virtual capacity to the Dell Technologies solutions.

## Benefits

The amount of data generated by this sensor-based growing environment is significant, as much as 1TB/day, but managing growth has been easy for Bradley. "I can rapidly add more capacity using PowerScale and VxRail, link them to our SD-WAN, and we are up and running within minutes," commented Bradley. "The advantage is that this does not increase the time our growers spend in front of a computer. Because the AI performs the analysis and makes many basic decisions, our growers can be in the greenhouses, seeing what is happening with the plants."

AI has essentially turned farming from a predominantly reactive operation into a proactive endeavor. Decisions, such as adding more CO<sub>2</sub> to improve plant health can be made by analyzing measurement trends and then comparing them to the expertise of the grower. This is important because the pace of a greenhouse-based operation is much faster than a traditional farm. According to Bradley, "Our growers, the experts, now have an easier time making decisions and allocating labor if conditions change, taking minutes instead of hours."

Farming, by its nature, is labor intensive. Nature Fresh Farms has had to hire more people for the hands-on component of the business, but the AI applications have enabled the organization to increase its operations while only hiring a few more data analysts and farm managers. "Our senior growers can use the information provided by our technology to better manage larger field operations," said Bradley. "Our investments in resources, such as people, are more closely linked to our bottom line. AI has helped us improve capacity and product yield dramatically. Our belief is that if you are still in the R&D phase for AI implementation, you're already behind the times."

## Methodology

The project and company information contained in this document was obtained from multiple sources, including information supplied by Dell Technologies, questions posed by IDC directly to Nature Fresh Farms employees, and corporate documents provided by Nature Fresh Farms.

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## About the Analyst



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Penny Madsen is a senior research director for IDC's BuyerView research, focusing on Cloud Pulse, which provides quarterly insights into cloud adoption and investment trends. Her research covers software and infrastructure trends, offering insights that help leading vendors and infrastructure providers to develop strategy for future customer deployment scenarios.

### MESSAGE FROM THE SPONSOR

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