

ISSUE TWO | WORLD AG EXPO 2022

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NUTRITION TECHNOLOGY

IT'S TIME TO Elevate

Welcome to Elevate at World Ag Expo 2022 – our second live event bringing together industry leaders for open, honest and productive conversations in the dairy industry. And why do we do this? For the good of the whole. It is our belief that, as an industry, we are stronger together as we face challenges related to production, quality, sustainability and consumer engagement.

Most importantly – we hope you enjoy tonight's dinner and speakers. We encourage you to speak up, speak out, and share your ideas with the group. You can even email me (below) with ideas on topics you'd like to see in the future. Speaking of which: The party doesn't end here. Scan the QR code on the back page of the magazine and join in for our next virtual event in April!

We have the momentum. We're excited for you to be a part of it.

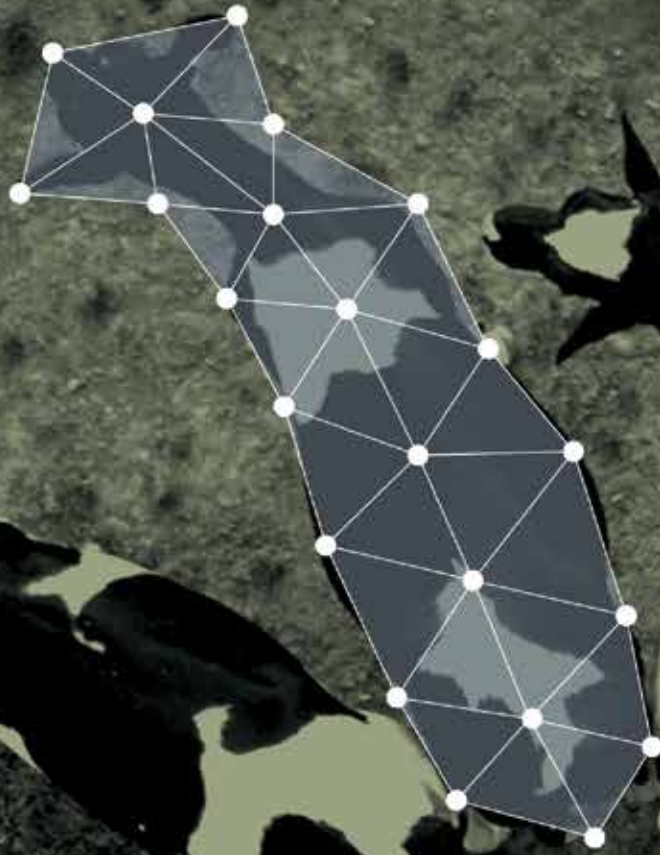
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Mountainside Engineering & Innovation



KEEP YOUR EYES ON YOUR COWS 24/7
**AUTONOMOUS VIDEO
MONITORING**



CATTLE
EYE

INCREASING FARM PERFORMANCE

with Fewer Emissions and Less Water

To save our planet and ourselves, we must use our existing agricultural resources more efficiently. Farmers around the world want nutritious livestock feed for their animals and better farm performance. Innovative indoor growing solutions address problems like emissions, waste, water shortages, and land scarcity issues, providing options that help protect future generations.

HydroGreen Inc., a division of CubicFarm Systems Corp., was founded by farmers. HydroGreen's Automated Vertical Pastures™ technology enables farmers to grow nutritious fresh livestock superfeed

at commercial scale in any climate, year-round. This technology was designed for farmers and ranchers operating in areas with low precipitation where water scarcity and extreme drought significantly impacted their ability to feed their herds. It was a solution to a problem, and while ag-tech may have been a nice-to-have, it's quickly become a necessity.

Automated Vertical Pastures™ are comprised of eight vertically stacked growing surfaces with a seed cleaner, water delivery, automated conveyors, feed sizers for harvesting, and the indoor controlled environment

systems that control temperature and humidity, maintaining an optimal environment for the plants. This efficient, fully automated system increases yield exponentially with daily harvesting compared to outdoor methods yielding only two harvests per year.

One person can produce an entire crop of on-farm fresh fodder, usually wheat or barley, from seed to superfeed in six days. For farmers, the automated system can go from seeding to harvesting in just minutes, giving them control over the nutrition of their animals daily, all year long, 365 days a year.





Approximately 70% of all agricultural land is being used for some aspect of livestock production. Beef and dairy farming represent approximately 14.5% of all human-induced greenhouse gas (GHG) emissions. Feed production and animal waste represent the two largest sources of these GHG emissions, representing 45% and 39% respectively.

Hydroponic fodder and greenhouse gas emissions: a potential avenue for climate mitigation strategy and policy development was published by Canadian Science Publishing in FACETS, the official journal of the Royal Society of Canada's Academy of Science. This scientific research was developed through a collaboration of academic researchers and industry experts. It warns of the imminent pressures on our food systems through demand for consumption of animal products, which are becoming more apparent as our global population increases, with estimates suggesting a global population of almost 10 billion by 2050.

The journal article explores the potential for hydroponic fodder

production for contributing to climate mitigation in fodder agriculture. Case studies compare GHG emissions and the carbon sequestration potential of hydroponically grown sprouted barley fodder to conventional barley grain fodder. The case study analyzed fresh livestock feed grown in a controlled environment using a HydroGreen system when compared to traditional farming methods.

Results of this published case study indicate that incorporating hydroponic systems into barley production has the potential to reduce GHG emissions. Further results indicate that hydroponic fodder farming could contribute to climate mitigation objectives if complemented with effective energy and land-use policies. Results also show that hydroponic farming can provide greater carbon sequestration opportunities than simply shifting to no-tillage farming.

"Finding solutions like the HydroGreen hydroponic growing system that can lower overall GHG emissions caused by livestock will be critical to solving the world's GHG emission problems

and reduce the overall effects of global warming," commented Dr. Newman, a co-author of the study. "This latest research estimated that the HydroGreen demonstration farm produced 7.4% fewer GHG emissions (per nutrient mass) than were found with conventional barley grain fodder farming, and greater reductions can be achieved with improved seed-to-fodder output, indicating that transitioning to such systems can result in GHG reductions and (ultimately) climate mitigation benefits. These are exciting findings and a bright light in the otherwise gloomy world of climate change."

As more farmers transition toward sustainable agriculture, immediate solutions are needed for reducing the impact of livestock industries by improving farm performance and reducing waste. Using less water began as a key measurement for the HydroGreen technology because it was originally designed for farmers and ranchers operating in areas with extreme drought conditions. "Growing indoors in our system uses 95 percent less water than traditional central



pivot irrigation systems that farmers typically use,” said HydroGreen President Dan Schmidt, cautioning that this figure depends on the location of the farm and the kinds of climate conditions where the farm operates.

The larger Automated Vertical Pastures™ commercial scale system saves 500 million gallons of water per year. Growing up to 25 million pounds of fresh feed annually, this technology uses less than 1/10th of the water used for feed grown in irrigated fields. That’s enough water to give one glass to every single person on the planet.

“Water availability is an increasing concern in our industry and this technology is part of the solution,”

said Jay Burnett, co-founder of Burnett Land & Livestock in Carpenter, Wyoming. Burnett’s operations include over 17,000 cattle on 35,000 acres across the Midwestern and Western United States. Construction is well underway on a dozen Automated Vertical Pastures™ modules at Burnett’s and will be the largest automated indoor fresh livestock feed system in the world.

In the initial stage at Burnett’s, the system will feed about 2,000 animals, producing 16,000 pounds daily of dry matter, or 25 million pounds as fed annually, which is enough to support 2,000 cows daily producing nearly 20,000 gallons of milk every day. As a scalable, modular system, Burnett’s

can accommodate a second Vertical Pastures™ expansion or more as needed and is a reliable solution to feeding thousands of cattle—without needing or using thousands of acres of land.

Even with better farm performance, fewer GHG emissions, and less waste, there remains the issue of limited land availability and increasing land prices. Each year, 12 million hectares are lost at an unprecedented rate of 33,000 hectares per day. Between 1982 and 2001, approximately 34 million acres of open space were lost to development, at a rate of 6,000 acres per day. For farmland in the U.S., 31 million acres of farmland were lost between 1992 and 2012, primarily caused by the expansion of cities and suburbs, followed by development in rural areas. The larger Automated Vertical Pastures™ commercial scale system maximizes land efficiencies, replacing 500 acres of farmland—equivalent to 378 football fields. For farmers who cannot expand their farmland or want to get better performance from what they have, hydroponic vertical farming provides a sustainable and profitable solution when there’s nowhere else to go but up. **E**

Visit www.hydrogreenglobal.com to learn more about Automated Vertical Pastures™.



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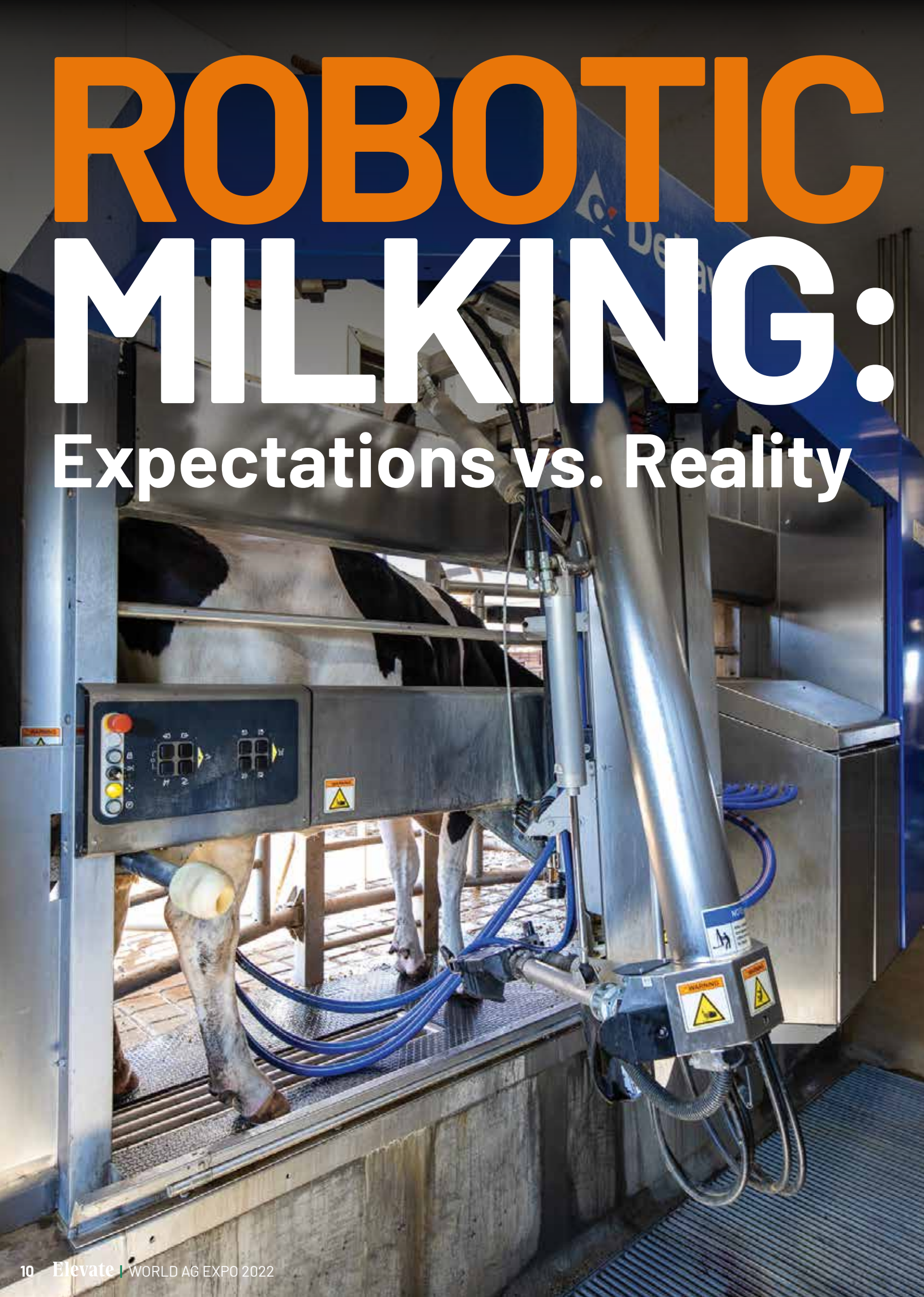
Where dairy comes together



Ascend is a product of Vyla, a dairy technology company founded to inspire collaboration and create impact through technology.

Learn more at www.vyla.com

ROBOTIC MILKING: Expectations vs. Reality



**By Ryan Calistro,
TDS CCO & Partner**

The “dairy of the future” is quickly becoming “the dairy of today.” More than 35,000 robots are milking cows around the world. While several benefits of robotic milking have long been proven, true success comes from individual, realistic goals and expectations, followed by aligned execution.

Dairy managers can expect a lot from robots – both positive and negative. Some expectations are myths, while others can quickly become reality depending on management practices.

EXPECTATION:
I can get rid of a lot of labor.

REALITY: You can shift your labor needs. Studies have shown a labor savings of anywhere from zero to 29%. This wide range is a product of variance in management and barn design. A University of Minnesota study of 53 robot farms showed that even when total labor is similar, time saved from milking is used for activities, such as improving animal health, analyzing records, improving reproduction, and more timely forage harvest.

EXPECTATION:
I won't be able to justify the cost of robots.

REALITY: The speed of return on investment for robots depends first on capital investment – whether robots are part of a retrofit, or they're added to an entirely new barn. Second, management of cow flow through the robot and maintenance will largely impact the profitability of the system. In a retrofit, if you're able to increase production by two pounds per cow, and the system lasts



longer than ten years, it will be more profitable than the previous setup. In a new barn, it will take ten additional pounds per cow and a savings in labor to be consistently more profitable than the old system. Whether it's a retrofit or new barn, don't forget to consider the less tangible factors, including cow comfort and the ability to identify and focus on herd management issues around the barn.

EXPECTATION:
Milk quality will go down.

REALITY: Robotic milking removes the potential for human error that we sometimes see in the parlor. If the milking system is well maintained, with regular flushing and adherence to the recommended cleaning schedule, you'll likely be able to maintain the same level of SCC you had in your previous setup. Also, keep the rest of the cow's environment in mind: the cleanliness of the rest of the barn has a big impact on exposure to bacteria.

EXPECTATION:
I can have some freedom from the farm.

REALITY: With the right management systems in place and the ability to see what's going on

straight from your phone, you may in fact be able to leave the farm more often than you used to. Your management responsibilities do not end after robots are installed. Instead, they shift. In order to be comfortable leaving the farm, managers must have a good understanding of their mobile access to the system, the data that's coming from it, and knowledge of the alarms they may receive – along with a plan in case something does come up.

EXPECTATION:
I can put 70 cows in one robot.

REALITY: With the right management, this is possible. But do not expect to successfully flow 70 cows through one robot on the first day it's installed – even for the first several weeks. Only the best-managed barns are effectively moving 70 cows through each robot, and it takes a full-farm, team-based approach to make it happen. Dairies that are able to reach this level of efficiency have their feeding programs dialed in, a thorough transition cow plan, minimal disruptions in the pen, and a well-designed barn. **E**

References:
<https://dairy-cattle.extension.org/dairy-robotic-milking-systems-what-are-the-economics/>

CONNECT WITH CONSU



ING MERS



There are many new realities being hurled at dairy farmers that have never been encountered before – record inflation, impossible workforce challenges, increasing regulations to name a few. One reality that cannot be denied is that the consumer is behind many of the radical changes the industry is undergoing.



Demands for increased transparency around food sourcing, production and delivery methods are not a trend, it is now a part of doing business.

Vyla, an industry-backed technology company founded in 2020 views the consumer/producer relationship as central to creating a reality in which the farmer thrives and consumers become loyal customers to the brands that have a story to tell.

Vyla CEO Tim Taylor says there are three key focus points for the industry as it tries to reimagine the consumer relationship, which at times has felt adversarial. He says the dairy industry should create opportunities for collaboration, seek to integrate tools and processes, and lastly empower the farmer.

“Connected technology is needed to solve today’s problems and accelerate our growing connection to consumers,” says Taylor. “But it won’t happen unless we embrace these three principles.”

PRINCIPLE 1: COLLABORATION

There are many disparate tools and products addressing the issues facing the dairy industry. Unfortunately, many of these innovative tools are operating in a vacuum leading to data silos in addition to creating what equates to a Denny’s menu of options when trying to solve a problem.

“We are stronger when we work

together for the industry,” says Vyla Chairman Yoav Levsky, who as a founder of Vyla, as well as serving in various roles in some of the industry’s leading companies, has a unique perspective. “We must look to the long term with conviction to drive progress not through a singular effort but through working together for farmers and the industry as a whole.”

PRINCIPLE 2 INTEGRATION

A byproduct of having many tools that don’t speak to one another is wasted effort. Most farms require a sort of brute force approach and double entry to create the data views needed or desired to operate. What could a farm manager do with more time and rapid access to the information he or she needs?

“We see farms connecting disparate applications in Excel and it hurts,” says Levsky. “In so many ways we are missing out on the rapidly improved efficiencies and decision making that is possible. We honestly believe that a secure integration between platforms and applications will enable a transformed dairy industry.”

PRINCIPLE 3: FARMER EMPOWERMENT

It’s safe to say a lot of what has slowed adoption and chilled collaboration

is apprehension on behalf of the farmer when it comes to sharing their data. Understandably, farmer’s make judgments based on past experiences where the rapid proliferation of technology in the space created a lot of try-and-fail situations.

“Look, farmers are doing great work and our world needs their products,” says Levsky. “They don’t get to control a lot of their business outside of the walls of their farm. To them, data is one more thing that leaves the farm and they have little control over what happens next. That shouldn’t be the case. Our collective effort is a commitment to supplier transparency on the issue of data ownership at the farm level.”

Vyla’s interest and understanding of data and its potential impact on the industry comes from its founding leaders which have worked at industry-leading companies and have dedicated their careers to dairy and technology.

“Our purpose today is to engage in a non-commercial discussion of “What’s Needed and What’s Possible” in the dairy space,” says Taylor. “We want to bring new technology to the farmer in a collaborative and open approach.” **E**



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In Eliyahu M. Goldratt's influential management book **"The Goal: A Process of Ongoing Improvement"** he illustrates how to identify bottlenecks within a manufacturing process and when to incorporate technology.



THE PROOF IS IN THE PROCESS

**Harnessing Automation, AI and Deep Learning
to Unlock Optimal Cow Well-Being**

Dr. Nial O'Boyle
Director of Product Development
at CattleEye

The advent of automation within manufacture in the 1980s led to confused systems where industries knew technology was vital in competitive manufacturing but were utilizing it ineffectively. The book is recognized as one of the influential business management books, and the lessons are still valid today.

Artificial intelligence, deep learning and neural networks are no different. They are impacting all industries, but their potential will be maximized with a prudent approach. One clear advantage of these technologies is their ability to carry out highly repetitive and predictable tasks.

Within the dairy industry, as herd size has grown, the ability to recognize

subtle changes over time has become more challenging. It is not feasible to have a skilled labor unit watching cows and noting observations every day. Deep learning can achieve this and provide actionable insights to enable prompt intervention. Locomotion scoring and body condition scoring are two examples of tasks that are easily done by humans but virtually impossible to carry out with the frequency, objectivity and accuracy to provide actionable data. Placing this technology where it can augment these tasks has tremendous potential to prevent issues progressing too far where it impacts welfare and profitability. Lameness

is one such example, with a cost per case of between \$90-\$300 and a prevalence on most herds of between 20 and 30 percent, it is a large economic and welfare drain. This is despite dairy farmers working hard to ensure their cows are looked after to the last possible detail. Freestalls, flooring, footbaths, preventative trimming, nutrition and genetics, all contribute to foot health. Despite best efforts to provide the optimum cow comfort and handling, dairy cows are still going lame at an undesirable level.

Lameness draws parallels with dental disease, you cannot afford to go to the dentist every day for a check-up,



but when you experience pain, you want to get there straight away, to alleviate discomfort and get the lesion attended to before any irreversible changes occur. As a dairy cow is a prey animal, it is suspected that masking pain is part of its demeanor, so the initial stages of lameness are difficult to observe. Ideally, we would intervene early and prevent further damage and discomfort. However, up until now we have relied upon people to observe cows while they walk back from the parlor. The task of observing hundreds of cows and recording an objective, consistent score is extremely challenging, even for the well-trained expert, and often it is left to untrained employees. This barrier to optimal hoof health could be removed by video monitoring technology-enhanced by Deep Learning.

Any on-farm technology must enable dairy farmers to produce actionable insights, be simple to operate and affordable while not generating extra labor tasks. A monitoring camera placed to capture an individual cows' mobility could accomplish this. Recent work by the University of Liverpool, in a 1,400-cow trial, found that video monitoring synergized with deep learning technology is as good as an expertly trained veterinarian at identifying various degrees of lameness. What's more, is that this technology can be present 24/7. The prospect of being able to reliably, consistently capture this actionable data may offer a new paradigm in lameness control.

Processing images requires large amounts of computing power, which only recently has become commercially available. Today, video monitoring technology is easy to deploy, easy to manage, and constantly improves. Images can be captured via an overhead, off-the-shelf security camera, avoiding any sophisticated hardware making the

adoption easy and accessible.

Enrolment of cows into the system can be made as painless as possible by matching up images with an RFID read, then the system stores the image on the cloud and can deliver the insights. This avoids the need of using any additional wearable on the cows, drastically reducing the need for on-farm labor with no batteries or hardware to renew or maintain, allowing skilled labor to focus on current demands rather than additional ones.

As the consumers of dairy products get further removed from connections to agriculture, they rely more on metrics to trust and verify that their purchases are sourced in a sustainable manner. While dairy farmers care deeply about these practices and are already working tirelessly to ensure the best for their cows, it has up until now largely relied upon subjective observations by third party auditors. Today's available video monitoring technology allows an objective, comparative assessment to be made of mobility, and other future insights, so dairy farmers can demonstrate their success. The progress and actionable data can be conveniently collated in an app, as well as integrated with herd management software. Cows needing attention can be sent directly to the management program for easy sorting. Historic performance, many sortable lists, as well as individual searchable video clips of the camera footage will be at the reach of your fingerprints. The metrics available will also advance the understanding of mobility management and early intervention, offering statistics akin to the development of individual cell count to improve milk quality. The synergy of individual data and genomic information will allow new phenotypes to be established, further compounding the improvement.

Video Monitoring with Deep Learning is evolving to other critical cow management areas. Compared to other livestock farming, dairy has much more biological variation. Forages are unpredictable, compared to high grain feeding, the rumen is not fully understood in comparison to the simple stomached animal and humans interact many times per day with milking, breeding, scraping and other tasks. Deep learning can smooth this variation, augmenting human capabilities of observing changes in dairy cow behavior to produce actionable data. Understanding this variation at an earlier timepoint will allow prompt intervention and thwart many debilitating diseases.

Body condition monitoring has long been known to be extremely valuable in feed efficiency, fertility and metabolic health management. Around 25% of cows leave the herd in their first 65 days of lactation, and most of this is due to metabolic disease. Body condition management is crucial in preventing metabolic disorders and for the first time it can be captured frequently, consistently and objectively. With the potential of individual and cohort data availability, nutritionists could tweak rations to ensure body condition is optimized. Excess weight movement could be appreciated before the keenest of observers can detect it, which would reduce metabolic disorders. With feed costs being a large proportion of the cost of production this insight would be extremely valuable to feed efficiency and reducing the carbon footprint of dairy.

Like automation did in previous decades; A.I. and Deep Learning will transform industries. Similarly, it can initially lead to costly mistakes if put in the wrong place. Augmenting tasks such as locomotion and body condition scoring will enable us to solve old problems in a new way. **E**

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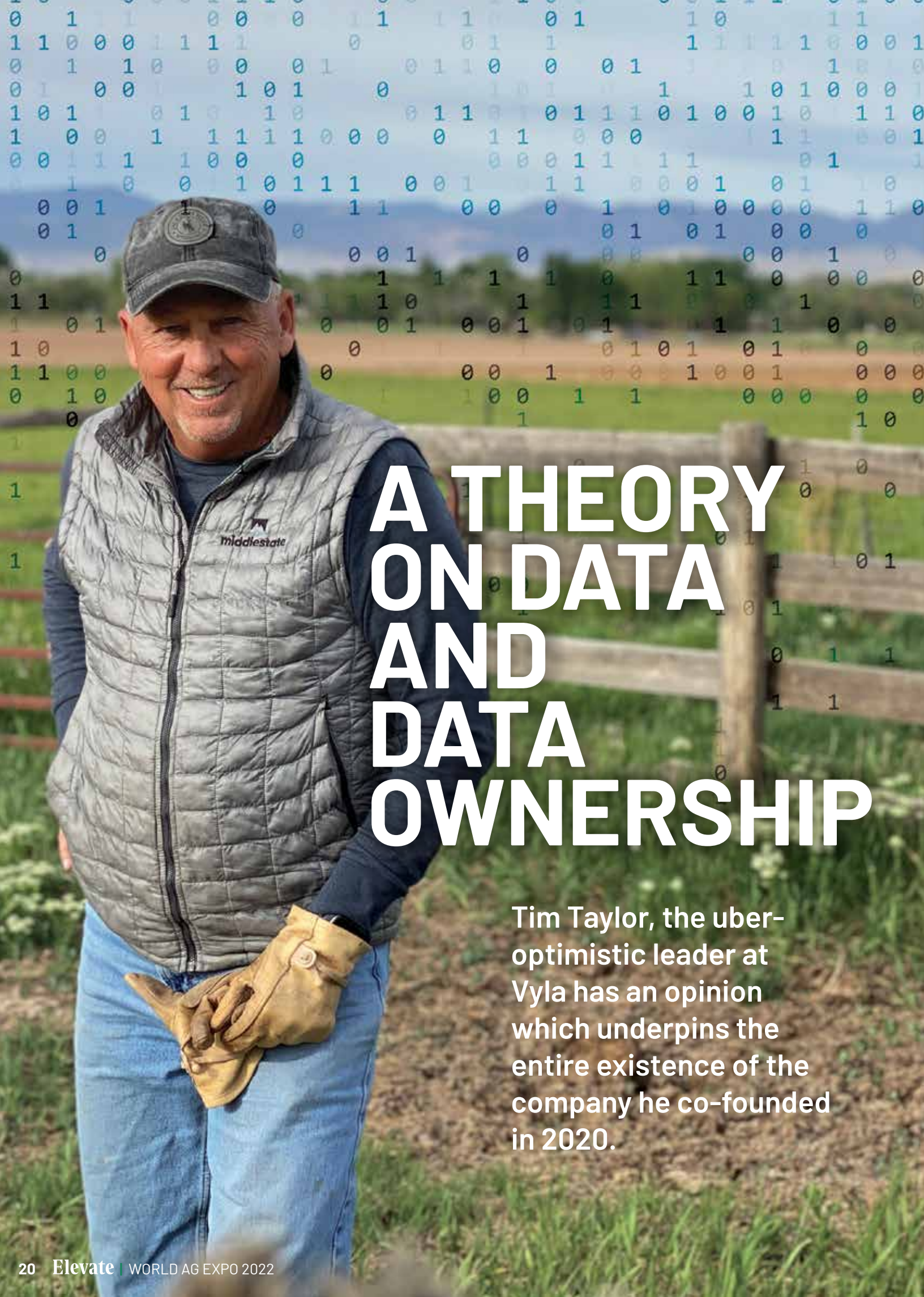
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A THEORY ON DATA AND DATA OWNERSHIP

Tim Taylor, the uber-optimistic leader at Vyla has an opinion which underpins the entire existence of the company he co-founded in 2020.

He believes, when it comes to data and sharing, the farmer should control the conversation. Empower the farmer to share their digital commodity when they want, to whom they want, and it will unlock the invisible barriers that have blocked collaboration, sharing and adoption of technology for years.

"It's not a radical notion," says Taylor. "Farmers do an amazing job and we all benefit from their amazing products. And yet they feel threatened by the issue of lack of control of their data. Let's let them lead."

Vyla's on-farm application Ascend, which launched in 2021, provides dairies with a customizable view of their operation by aggregating performance metrics from across the farm. The app is free and available for iOS or Android download and already has 70,000 cows represented.

That aggregated data will be transformative for farmers, processors and consumers through a more visible and transparent supply chain – dairy farmers know it, supply chain partners know it, and Vyla knows it.

"In our opinion, the farmer holds the key," says product manager Maite Muse. "We want to put the controls in their hand to share the KPIs they want, see who has access, and control who has access at all times."

In January, Ascend launched a new data sharing control center. In the app, farmers can establish data sharing connections to processors and service providers downstream and choose which KPIs each have access to.

The feature release is a direct answer to a request by many Ascend users and would-be users. "I just want to know who I'm sharing with and for how long I've been sharing with them," says Frank Cardoza, a dairy consultant at Dairy Works.

"I just want to know who I'm sharing with and for how long I've been sharing with them" – Frank Cardoza

Having the opportunity to truly own your data and manage your engagements with partners does more than offer security, it alters the dynamics of relationships in many important ways.

Vyla's theory of data ownership suggests that a farmer with access to a complete picture of their on-farm data and the ability to share it at their discretion creates a unique set of circumstances.

It means any engagement with downstream partners originates from a place of trust.

It aligns incentives for all of those who benefit from the data to try and create an equal exchange of value.

It builds confidence in emerging technology and fosters an environment that welcomes technology as part of their operational strategy.

At this moment in time when food producers across the globe are facing incredible challenges, Vyla's position on data ownership claims that an empowered farmer, armed with critical data and a collaborative mindset may be the key to answering the demands for transparency, animal care and sustainability metrics.



"We've always said it starts on the farm and it's never been more true," says Taylor. "The dairy industry has a great story to tell and we believe the most powerful chapter begins now with farmers, processors, retailers and all industry stakeholders committing to work together for the purpose of elevating us all." **E**

GREEN REVO- LUTION

How to Grow 25 Million Pounds of Livestock Feed Indoors

Currently, half of the United States is experiencing moderate to extreme drought conditions, significantly impacting the ability of farmers to feed their herds. Herd size is limited by the available land, natural resources, and the ability to feed their animals nutritious, healthy livestock feed.

Too many farmers have been forced to make extremely difficult decisions like selling off some or all their herd, or risk losing the family farm. We need technology to help provide a solution that works for farmers and allows them to keep growing profitably, reliably, and consistently.

As a technology company founded by farmers, HydroGreen Inc. (a division of CubicFarm Systems Corp.) is leading the delivery of fresh on-farm livestock feed solutions.

HydroGreen technology was developed by farmers to feed the herd in areas with limited precipitation. HydroGreen's Automated Vertical Pastures™ system helps farmers keep growing nutritious fresh livestock feed at commercial scale in any climate, year-round, sustainably.

Automated Vertical Pastures™ are simple by design. They are modular and scalable for small and large herd size operations. Farms and ranchers are operating these systems across the U.S. in Utah, Wyoming, South Dakota, and North Dakota, as well as in Canada, Italy, and Japan.

Construction is well underway on what will be the largest automated indoor fresh livestock feed system in the world in Carpenter, Wyoming. Burnett Land & Livestock, a beef cattle ranch and dairy farm, is installing a dozen modules. This system will be able to feed about 2,000 animals in the initial stage, producing 16,000 pounds daily of dry matter, or 25 million pounds as fed annually, which is enough to support 2,000 cows daily producing nearly 20,000 gallons of milk every day. As a scalable, modular system, Burnett's can accommodate a second Vertical Pastures™ expansion, or more as needed.

The larger Automated Vertical Pastures™ commercial scale system saves 500 million gallons of water per year and replaces 500 acres of farmland, equivalent to 378 football fields. Growing up to 25 million pounds of fresh feed annually, this technology uses less than 1/10th of the water used for feed grown in irrigated fields. For context, that's enough water to give one glass to every person on the planet.



The collaboration between Burnett and HydroGreen was initiated by Total Dairy Solutions U.S.A. ("TDS"), a global leader in dairy farm solutions and HydroGreen Certified Dealer, when they evaluated the need for sustainable, commercial scale solutions for livestock feed.

"The HydroGreen Certified Dealer Network was created to meet increasing distribution demand for the company's HydroGreen technology to help get this technology into the hands of the farmers who need it now," said Dan Schmidt, President, HydroGreen. "Our dealers bring decades of direct experience working with farmers in the dairy and beef industries and we're thrilled to offer new farmer partners support to get up and running quickly." Total sales commitments from members of the HydroGreen Certified Dealer Network include more than 100 modules in 2022, with dealers operating across the U.S. and in western Canada.

Automated Vertical Pastures™ is more than just the growing machine—it's an entire feed solution, according to Schmidt. Using a patented livestock feed solution, farmers can automate essential on-farm growing of fresh livestock feed locally, using significantly less land, 95% less water, less energy, and less physical labor than traditional growing.

Each system is comprised of eight vertically stacked growing surfaces with a seed cleaner, water delivery, automated conveyors, feed sizers for harvesting, and the indoor controlled environment systems that control temperature and humidity, maintaining an optimal environment for the plants. This efficient, fully automated system increases yield exponentially with daily harvesting compared to outdoor methods yielding only two harvests per year.

"...we're thrilled to collaborate with innovative, forward-thinking dairy farmers and ranchers," – Dan Schmidt

One person can produce an entire crop of on-farm fresh fodder, usually wheat or barley, from seed to superfeed in six days. For farmers, the automated system can go from seeding to harvesting in just minutes, giving them control over the nutrition of their animals daily, all year long, 365 days a year.

As a local chain ag-tech solution that brings feed closer to home, farmers can consistently grow nutritious livestock feed with significant environmental benefits to the farm without the typical investments in fertilizer, chemicals, fuel, field equipment, and transportation miles.

Schmidt says that, while consistency is the number one concern for farm business owners, a close second is dealing with the challenges of nature, including pests, weeds, disease, hail, and snowstorms. As a result of it being a modular, indoor technology that's located right on the farm, the Automated Vertical Pastures™ system takes care of both.

Since fresh feed is produced on demand and harvested daily, there are reduced antinutritional factors from storage. The Automated Vertical Pastures™ itself has zero waste, which is significant to traditional outdoor farming because it's common to lose 15% of the corn silage harvest to shrinkage before it can be fed to their cows.


"As a technology company founded by farmers, we're thrilled to collaborate with innovative, forward-thinking dairy farmers and ranchers," said Schmidt. "We've seen significant impacts on the animal performance, health, fertility, and efficiency. HydroGreen's unique nutrient properties include high glucose

level, simple sugars, and reduced carbohydrates. Multiple feed trials have shown dramatic animal health benefits."

By including the high-performing HydroGreen livestock feed as part of the daily ration, feeding trial results are showing positive feeding behavior, increases in dry matter feed intake, improved ration consistency, and greatly reduced anion gap. HydroGreen delivers high density energy with increases in milk fat yield and increases in conception rates and fertility.

Hydroponic sprouting of wheat and barley seed leverages properties of germination and early plant growth to capture nutrient enhancements and the best digestibility of any feed on the farm. HydroGreen helps cows to increase fiber digestion by 10% from typical performance levels, resulting in less waste, as every gram fed is utilized more efficiently. HydroGreen is a great ration conditioner as well, which helps maintain diet consistency and reduce dust in the diet.

Delivering technology that grows 25 million pounds of fresh livestock feed indoors is getting noticed on a global scale. Business Intelligence Group recently named HydroGreen as "Sustainability Product of the Year" in the 2021 Sustainability Awards program honoring those who have made sustainability an integral part of their business practice and overall mission. With a simple, efficient, and scalable design, herds of all sizes can benefit from this technology.

Visit www.hydrogreenglobal.com to learn more about the technology or connect with a HydroGreen Certified Dealer. 

RAIN MAN:

By Dr. Nial O'Boyle
Director of Product Development
at CattleEye

**PREDICTING THE FUTURE
OF THE DAIRY INDUSTRY**

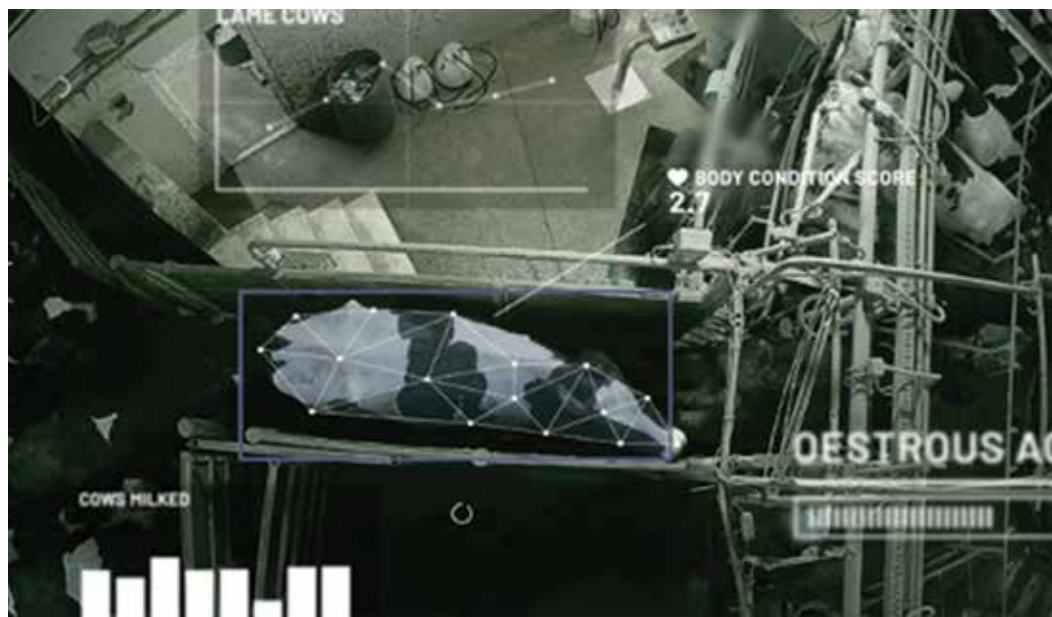
Whilst touring a local Special Academy for our son's future placement, I had a chance meeting with a young student, around 15 years old, who politely asked myself and my wife for our birth dates, he then got distracted and ran on.

The Principal explained he had a party trick where he could tell us the day of the week we were born, etc. The encounter reminded me of the award-winning 1988 film *Rain Man*: a moving story starring Dustin Hoffman and Tom Cruise. The character "Ray" played by Dustin Hoffman was influenced by Kim Peek. Kim Peek had savant syndrome, which among other attributes enabled him to have a remarkable memory, without the need for mnemonics or other aids. He could memorize books within hours, and apparently could recall the contents of over 12,000 books.

Although people with savant syndrome can often have other challenges, their gifts can be astounding and hard for us to grasp. The movie illustrates this on several occasions, including success at Las Vegas casinos. Ray has unbelievable success at the blackjack table, as his brother Charlie (Tom Cruise) leverages his gift to make a lot of money. Ray counts, analyses, and predicts which card may come next. The suspicious casino security looked for the classic deception techniques, and upon finding none exclaimed "You know there's no one in the world who can count a six-deck shoe." Yet, Ray could; all the data was there but with his gift he was able to unlock the answers and extract the value.

In the dairy industry, the potential value in routine monitoring of body condition and mobility score has been known for decades. The ability to

detect early changes enables prompt intervention, leading to positive results for welfare, production and GHG efficiency. However, up until now this value has mainly been demonstrated in university studies with dedicated, trained staff. The ability to provide the frequency, objectivity, consistency, and time needed to get these scores is



unfeasible in a commercial setting. Moreover, finding skilled labor willing to dedicate time to a repetitive task is difficult.

The technology is fast approaching where the same wonder of a human predicting Blackjack cards can be applied to the dairy industry. Machine learning tools applied to simple security cameras have already enabled CattleEye to validate their equivalence to a veterinary expert in mobility scoring. The team are working diligently with data and

predictive algorithms to augment prompt detection and deliver early-intervention alerts. The body condition scoring application is undergoing beta testing and should be ready for an exciting launch in 2022; the potential to reduce metabolic disease and feed precisely, will be of tremendous benefit to the cow, farmer and environment.

With the drive for methane reduction in the next 30 years being a top priority, there are lots of high-rolling bets on feed supplements and alternative methods. CattleEye is creating the Rain Man for the dairy industry, capturing, analyzing and predicting the data, in order to unlock the value and provide a sure bet to reduce GHGs.

The CattleEye mobility scoring application has already made a positive impact on many dairy farms, with many others following suit, and the body condition scoring creating another ace-in-the-hole. The cost of entry to the technology is low, with off-the-shelf security cameras and panel reader. So, the investment will be returned in spades.

CattleEye enables dairy farmers to "count a six-deck shoe" and produce remarkable actionable data to stack the cards in their favor. **E**

Mountainside Engineering & Innovation:

IT'S ALL ABOUT SOLUTIONS

Based in Phoenix, AZ, Mountainside Engineering and Innovation (MEI) was founded in fall of 2021 with dairy farms in mind. MEI consists of several experienced agricultural engineers on a well-rounded team that manages engineering projects from conception through completion. MEI's core team of engineers has roots in the dairy industry. Their projects include Programmable Logic Controller (PLC) programming, user interface design, schematics, panel buildout, installation and integration into herd management systems.

So why do dairy farms need PLC programming integrated into their herd management systems? Many

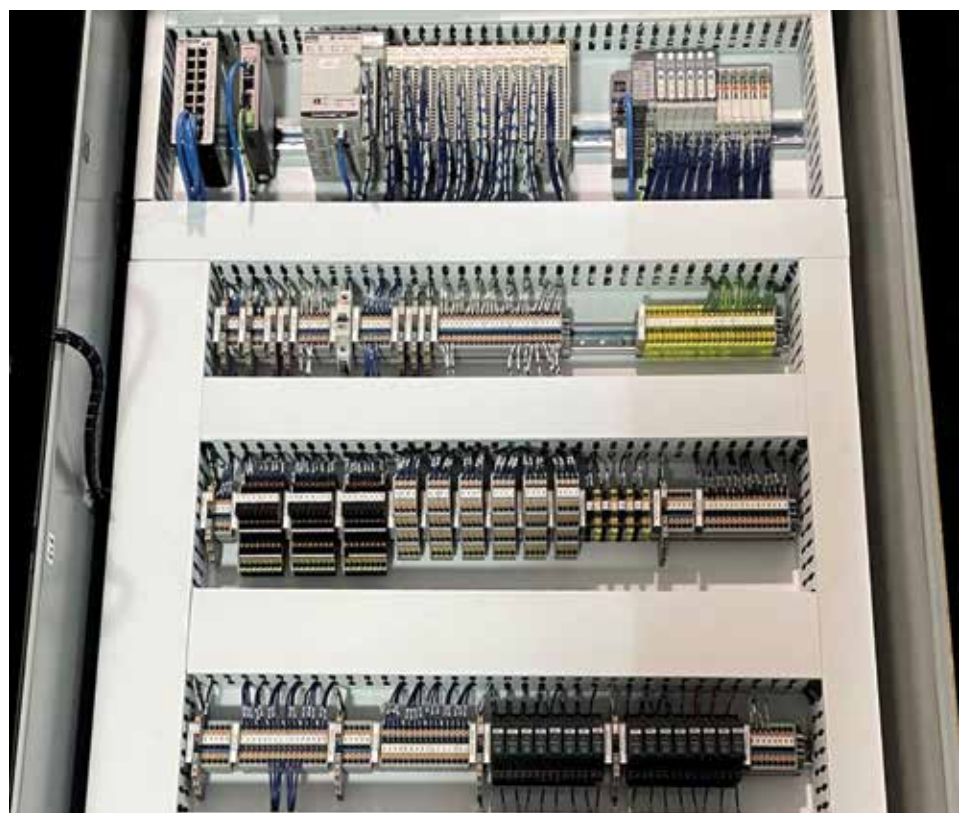
dairies have their back of barn systems dialed in. They know where and how to control robots, fans, feeding systems, milk temperature, room temperature and more. MEI uses PLC to put everything into one place, and it's all accessible from a single, mobile device. Even better, technicians can log into the system, troubleshoot and make many repairs remotely – saving time and money for the dairy.

PLC does not replace the systems that control robots or milk temperature, but it helps everything on the farm talk to each other and work together in an if-this-then-that format. Customers with PLC from

MEI love the proactive management that the system enables. They can see what's going on all over the farm, using cameras and data, instead of relying on employees to relay any issues.

PLC also has many applications outside of dairy, and MEI offers their expertise in other industries, too. The steel, auto, chemical and energy industries all benefit from this kind of streamlining.

MEI is based out of a large workshop and warehouse space, so that development, engineering, storage and production can all happen in one place. **B**



Elevate

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