

AgTech - Leveraging Technology for Enhanced Ranch Profitability

Coordinators: Mr. Egleu Mendes
Dr. Jacquelyn Prestegaard



Vytelle



RANCHBOT
MONITORING SOLUTIONS




TEXAS A&M
AGRILIFE
EXTENSION



AgTech - Leveraging Technology for Enhanced Ranch Profitability



 8:00 to 9:30

VENCE® - Virtual Fencing for Livestock Management

- Donnell ("Donald") Brown from R.A. Brown Ranch
- McCalley Cunningham - VENCE®

<https://www.merck-animal-health-usa.com/species/cattle/vence>

Vence is a virtual fencing livestock management system for cattle. Our tool controls cattle movement, manage grazing, create virtual fences to dictate grazing behavior, and monitor animal location and movement.

 9:30 to 10:30

406 Bovine - Facial Recognition for Livestock

- Bryan Elliott - CEO 406 Bovine

www.406bovine.com

406 Bovine is an agricultural technology company providing facial recognition software for livestock.

 10:30 to 11:30

Ranchbot - Monitoring Water and Pumps Remotely

- Andrew Coppin - Founder & CEO Ranchbot

ranch-bot.com

Join Founder and CEO of Ranchbot with a live demonstration of their remote monitoring platform. Learn how over 7000 Ranchers are cutting costs, slashing gas bills, saving water and getting more done in their week.

 11:30 to 12:30

C-Lock - Measure & Control Feed Intake & Emissions

- Meredith Harrison, PhD - C-Lock Lead Scientific Advisor

www.c-lockinc.com

When measuring an on-farm carbon footprint and estimating individual animal sustainability, it is critical to look beyond absolute animal methane production. Emission footprints should be viewed holistically, accounting for animal growth and gain, feed intake, morbidity, and days on feed. This presentation will outline methodologies for comprehensive sustainability evaluation to inform decisions on genetic selection and benchmarking on-farm emissions using C-Lock Inc. GreenFeed, SmartFeed, and SmartScale technologies.

Getting Serious About Sustainability with metabolic gas measurement

Texas A&M Beef Cattle Short Course| Aug 6, 2024

Dr. Meredith Harrison
Chief Scientific Officer, C-LOCK Inc.

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Cows, carbon, and climate

Quitting Cows Could Have Big Environmental Impacts, but It's Harder Than It Sounds

Eating less beef, cheese and ice cream would slash emissions, but removing cattle from our agricultural system isn't easy

"US Cattle Industry Commits to Climate Neutrality by 2040"

Climate Change Due To Cows
The Effect Of Methane Gas — Farming Animals Leads To Much Greater Carbon Dioxide And Other Green House Gas Emissions. Learn Why The Livestock Sector Is Responsible For 20% Of All Human-Caused GHG Emissions! Climate-Friendly Methods, Plant-Based Solutions. International Relief.

How are cow burps contributing to climate change?
Complete information on the Australian Museum website. View now! View More Information on This & Other Topics on the Australian Museum Website. Stunning...

Cows contribution to global warming - Scientifically proven...
Learn to reduce the carbon footprint of a dairy farm without increasing production costs. A LCA of IntellIBond shows that it can reduce carbon footprint while reducing the cost.

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The truth about methane emissions...

14.5% of greenhouse gas emissions come from the livestock sector (FAO, 2018)

~39% methane from anaerobic fermentation

95% Methane in the cow's stomachs, breaks down cattle feed into products (energy, digesta) and produces methane

5% Horn, 2019

ARE ALL GHG EMISSIONS CREATED EQUAL?

Carbon Dioxide vs. Methane

Carbon Dioxide	300-1,000 yrs
Methane	-12 yrs

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Why measure metabolic gases emitted by cattle?

- Methane (CH₄) is produced as a result of microbes digesting feed in the rumen. The amount of methane produced per animal is related to feed intake, metabolic efficiency, diet, and animal health.
- Carbon dioxide (CO₂) is a by-product of metabolic processes (respiration and rumen metabolism). CO₂ can indicate animal health, diet, intake, and feed efficiency.
 - *estimate DMI using gas emissions as a proxy*
- Select for low emitting animals—GreenFeed is being implemented in bull performance tests
- Use methane data to leverage carbon credits and marketing/label claims
- Monitor whole farm/supply chain carbon footprint

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Carbon dioxide production as a proxy for DMI

- Correlations between gas emissions and performance traits are high ($r > 0.50$)
- Residual CO₂ has a potential for ranking individual animals based on feed efficiency
- Feed intake measurement method matters!

Traits	r
CO ₂ and DMI	0.93
CO ₂ and CH ₄	0.87
CH ₄ and DMI	0.84

Residual CO₂ and Residual Feed Intake

$y = 0.884 + 0.039x + 0.0140.15$
Adj. RMSE = 0.42

Predictive ability of CO₂ data

$y = 1.804 + 0.022x - 0.004 + 0.129$
Adj. RMSE = 0.23

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C-LOCK is a *science driven* company with experience in gas measurements, engineering, manufacturing, programming and data science

Made in U.S.A.

Diverse team with over 70 employees

Founded in 2005 in Rapid City, SD and is family owned

Former Director of Institute for Atmospheric Sciences

40+ years experience making trace gas measurements with >15,000 citations

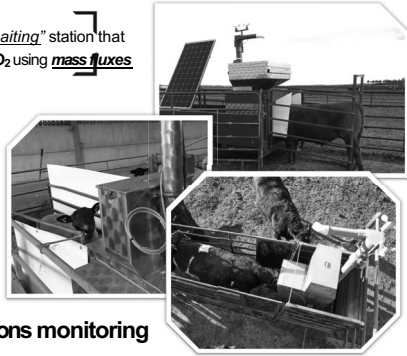
Our unique technologies provide defensible data to improve animal management, advance genetic selection, and improve efficiency.

Dr. Pat Zimmerman
Founder and CEO

© C-LOCK Inc. 2024

GreenFeed is a portable "baiting" station that measures real-time CO_2 , CH_4 , H_2 , and O_2 using mass fluxes (g/d) from a herd/flock of animals

- Automated, free access head chamber system measures ruminant breath and eructation anywhere
- Animals use the machine at will
- Accurately measures individual animal gas emission rates



Global standard for emissions monitoring

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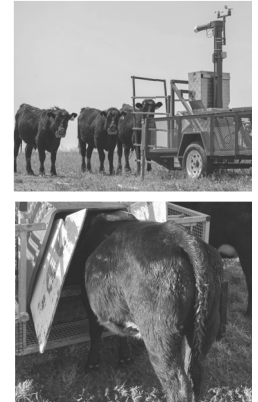
7

GreenFeed: The Global Standard

- Standardized machines, methodologies, and data processing
- Globally benchmarked and certified calibration gases
- Automated gas recovery and calibration
- Real-time monitoring and Expert data review
- Directly comparable results worldwide
- Sample in any environment

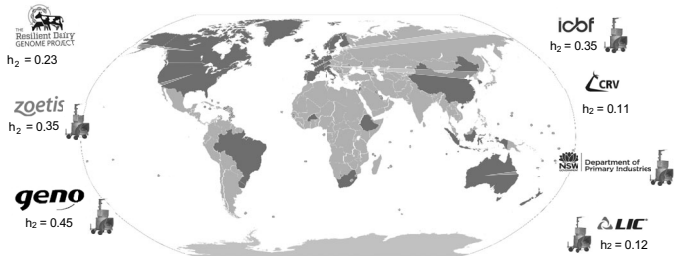
Application: Emissions monitoring, Phenotyping, Energetics and Efficiency, Evaluate pasture/diet/feed additives, Modeling, Carbon Markets, Genetics evaluation

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The Global Race in selection for low emissions

A recent meta-analysis reported $h_2 = 0.21$ for methane production (Kamalanathan et al., 2023)



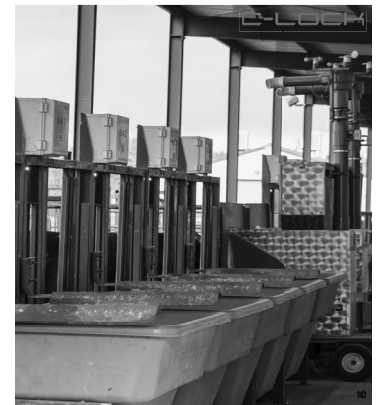
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9

GreenFeed Use

- Industry**
 - Genetics Companies (CRV, LIC)
 - Animal Ag Pharmaceutical companies (DSM, Zoetis)
 - Small Start-Ups (Symbrosia)
- Government Agencies** (USDA, Teagasc, AgResearchNZ)
- Commercial feedlots** (Hy-Plains, Stockyard Feeders, Five Rivers)
- Producers** (Leachman's, Nichols Farms, Byregos Angus)
- Researchers world-wide**

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How do we define animal methane emissions?

Methane production:
Amount of methane produced (g/d)

Methane intensity: Methane production standardized for gain (g/kg of ADG)

Methane yield: Methane production standardized for feed intake (g/kg of DMI)

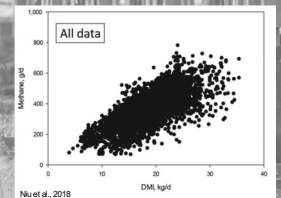
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11

Influence of DMI on CH_4 Emissions

- Dry matter intake has been well established as the main driver of methane emissions (Hristov et al., 2018; Niu et al., 2018)
- ~30% of daily CH_4 emissions are a result of yesterday's DMI
- Intake fluctuations can account for >5% variation in daily emissions patterns (Moate et al., 2012)

- In two datasets including both dairy and beef cattle data, correlations between DMI and methane production and 0.62 to 0.82 (Chamley et al., 2016; Jonker et al., 2018)
- Curve linear relationship in high forage diets



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Tradeoffs between production and emissions

100% Global total greenhouse gas emissions

14.52 Emissions from all livestock
9.62 Emissions from cattle only
-1.62 Maximum potential emissions off-set from grass-fed beef
any offsetting other methane, renewable, and any possible to largely specific agricultural combinations.

THERE MAY BE MANY BENEFITS TO GRASS-FED BEEF, BUT SOLVING CLIMATE CHANGE IS NOT ONE OF THEM.

#ClimateOutlet
Based on Food Climate Research Network, "Feed and CarbonFoot" report, 04, 2017

Achieving progress toward reducing methane emissions from beef cattle production needs to focus on a balanced selection approach considering intake and gain, rather than just reducing absolute methane production.

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How long to measure?

Phenotypic CH₄ repeatability based on length of GreenFeed Averaging Period

Methane (g/d) repeatability ranges from 0.45 to 0.90

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- Comparing daily emissions patterns is not recommended due to high variation in day-to-day emissions
- A sufficient number of measurements can be achieved using a 7 to 14 d period (Coppa et al. 2021; Ryan et al. 2022)
- GreenFeed can easily be implemented in performance evaluation

MORE UNCERTAINTY = MORE SAMPLES

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SustainaBULL Selection

Measuring methane directly is critical. Selection for low emissions animals using RFI can be misleading.

ADG Rank	FCR Rank	RFI Rank	CH ₄ Rank
10	10	6	6
9	9	8	10
6	3	2	9
8	4	3	2
3	1	4	8
4	7	10	5
7	8	7	3
1	2	1	4
5	5	5	1
2	6	9	7

Bull 1 Index = \$50 Bull 2 Index = \$25

Difference in Net Profit Between Progeny of Bull 1 and 2

= 1/2x difference in Selection Index Value
= 1/2x (\$50 - \$25)
= \$12.50 per cow mated

Figure adapted from BREEDPLAN Guide to Animal Selection (2022).

\$ SUSTAINABILITY ???

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Industry thoughts...

- Need stakeholder driven solutions
 - Rapid, Rigid, and Reliable
- Benchmarking/monitoring of carbon footprint
 - More than just emissions...
 - Incentives—producers want paid!
 - Who is the reporting/governing agency?
- Low carbon beef being marketed and sold in AUS
- Uniform accounting methodologies and standards
- Need multi-use and benefit technologies

Mike Thoren, CEO Five Rivers

"Why carbon accounting for food products needs an overhaul" –WWF

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CONCLUSIONS

- Beef cattle methane emission phenotyping is occurring globally at scale
- We have spent decades trying to predict DMI (with limited success); **metabolic gas production is a strong proxy for feed intake**
 - Big opportunities for grazing systems
- At the corporate level, there is considerable interest in reducing Scope 3 emissions to meet carbon climate neutrality commitments
 - Global perspectives—Carrot vs. the stick
- Early adopters are capitalizing on the economic value of methane measurement

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THANK YOU!

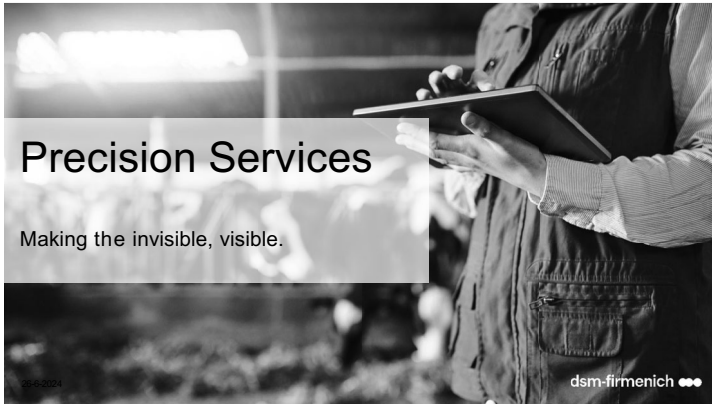
C-Lock Inc. is the global leader in measuring ruminant gas emissions. www.c-lockinc.com

Visit our booth to see our equipment and learn more!

Texas A&M Beef Cattle Short Course

Meredith Harrison
mharison@c-lockinc.com

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DSM-Firmenich at a glance
Highlights



- Operations in almost **60 countries**, revenues of more than **€12 billion** and **€1.7 billion EBITDA**
- Nearly **30,000 employees**
- **6% of R&D expenditures** as % of net sales

dsm-firmenich

ANH at a glance

Highlights

€3,227 million
In sales

6,000
Employees



Essential Products
We provide vital nutrients with a positive impact on animal health and development at farms and fisheries.



Performance Solutions
We offer advanced performance, health, and nutrition solutions to improve the sustainability and profitability of animal farming.



Precision Services
We power data-driven insights for more sustainable and efficient food production.

A few innovations:

- **Sustell™**, the world's first intelligent sustainability service, designed to improve the environmental footprint and profitability of animal protein production
- **Bovase®**, our cattle feed additive that reduces enteric methane emissions by 30%, helping to cut global warming
- **Veramaris®**, our algae-based omega 3 oil, which helps reduce reliance on marine resources and supports the sustainable growth of aquaculture
- **Precision Services**, our

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Precision Services

Making the invisible, visible.

MISSION

Leading the creation of an **eco-system for digital solutions** to enable our customers to **predict and optimize** health, nutrition and environmental value creation for precision animal farming.

VISION

Every farmer is able to predict and optimize animal health and performance, nutrition and environmental value creation with the support of precision animal farming tools.

We help to make **animal proteins affordable** to everyone, maintain the **income for farmers**, and strongly reduce the **environmental impact** of animal farming.

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Pioneering through data

Precision at the Forefront

Sustell

Sustainability

Sustainability addressed through **SUSTELL**—intelligence applied to quantify the environmental footprint of feed and animal protein production.

Verax

Health Prediction

Verax is able to identify health issues through biomarkers, days before clinical symptoms appear. This method articulates the impact efficiently, significantly improving health outcome.

FarmTell

Farm Management

On farm data collection allowing precise data analytics with FarmTell—elevating farm management and precision nutrition to unprecedented levels.

LORE

Artificial Intelligence

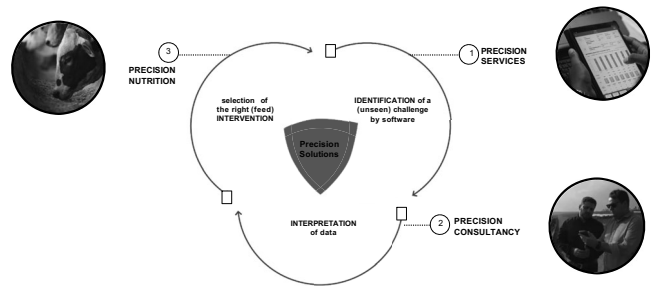
The first artificial intelligence developed for the livestock management, **LORE** enables the monitoring of productive and financial results in a simple, interactive, and human way.



dsm-firmenich

The Precision Triad

An interplay of Precision Services, Consultancy and Nutrition



dsm-firmenich

Precision Solutions
 Solving the future with the unbeatable triad of nutrition, digital, and consulting.

Unbeatable Success Triad

Precision Solutions combine nutrition, digital and consulting to transform client businesses and generate sustainable financial results.

Robust Consulting Tools

Tools like FarmTell and Lore, along with business knowledge and performance solutions, enable consultants to deliver unique value propositions.

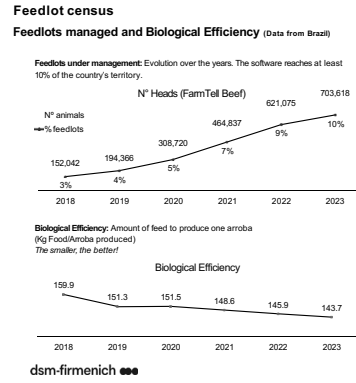
Continuous Support and Partnership

dsm-firmenich partners through the entire process, from analysis to implementation and results, ensuring viable solutions and continuous improvement.

Sustainable and Profitable Results

Transforming farms and feed mills into more profitable and sustainable businesses.

dsm-firmenich



Technology allowed us to digitalize our farms

- + Digital Products
- + IoT Devices

But how do we turn all the data we generate into action?

- + Data
- + Faster Decisions
- Analytical Workforce

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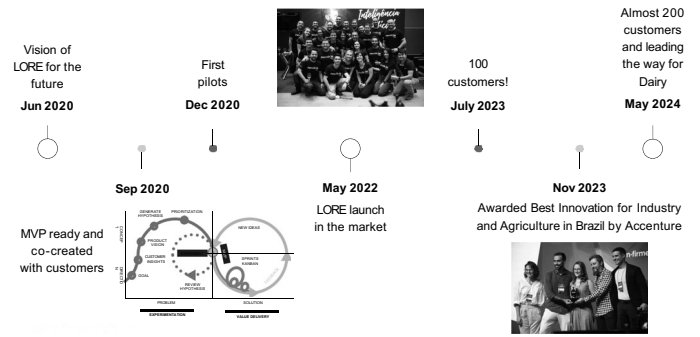


With LORE you are able to monitor productive and financial results in a simple, interactive, and human way.

Our goal is to deliver more value to our customers through historical and predictive analysis by integrating livestock data all over the globe.

- 194 customers managing 371 farms
- 157 internal consultants supporting more than 430 farms
- +97 thousand human interactions
- +5.5 million animals analyzed in production
- +600 thousand animals analyzed in feedlot

A story about LORE



Lore

Artificial Intelligence

WARNINGS

Receive automatic warnings, insights, and analysis on your phone with LORE notifications.

Receive important warnings!

EXPAND YOUR MANAGEMENT CAPACITY

Receive insights, warnings, and analysis to clear your doubts anytime and anywhere.

LORE Success Case



Vânia and Ricardo do Espírito Santo
Owners of Bom Sucesso and Luana Farm

"With LORE, we have information at all times, and this gives us security and peace of mind to manage the farms. By having this information to check, we noticed that farm productivity increases substantially. LORE has become the main management tool and allows us to identify problems before they happen. We now have precise and fast information."

Lore

Artificial Intelligence

WARNINGS

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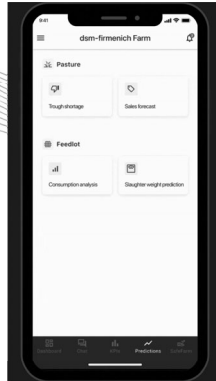
WEIGHT GAIN PREDICTIONS

For a simple and fast overview of your feedlot status. Check the weight gain predictions for your animals and the total slaughtered animals' results.

Check your animals slaughter weight prediction

WEIGHT GAIN PREDICTION

For a simple and fast overview of your feedlot status.



Weight gain prediction

How it works

- The algorithm makes a prediction for each batch on a daily basis
- Compares with the client's base result (average features of previous years)
- Shows how the batch is doing

Taking into account characteristics of the animal and the feedlot plant routine indicators, animal routine indicators, animal consumption and time of year

LORE uses this and other information to help the producer, showing which routine and consumption indicators are having the most impact on the forecast. In this way, the producer can direct efforts to the batches with lower performance, already knowing a possible cause for this deviation.

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LORE Success Case

Conforto Farm
+ 12,000 hectares
+ 200,000 head feedlot capacity
Partnership with d-f since 2006



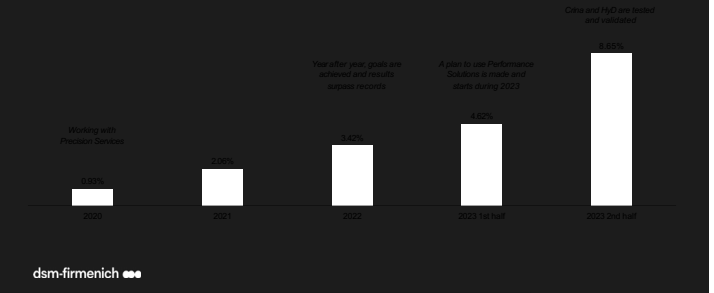
"I receive a daily message from LORE informing me about the progress of the business. LORE gives us a direction; it is a north star for us to act and pursue our vision."

Leonardo Guissoni
Farm supervisor



LORE Success Case

Conforto Farm – Results History
Carcass gain over the years



Lore Artificial Intelligence

WARNINGS

Receive automatic warnings, insights, and analysis on your phone with LORE notifications.

WEIGHT GAIN PREDICTIONS

For a simple and fast overview of your feedlot status. Check the weight gain predictions for your animals and the total slaughtered animals' results.

THE FUTURE

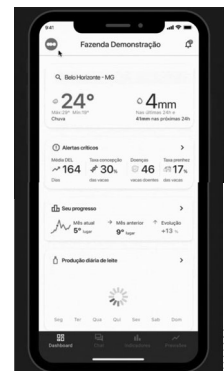
With LORE, you can do things that you could only imagine.

LOREmilk

We are ready to help dairy farmers to take their operations to the next level!

Unlocking new insights and identifying opportunities to improve operations and profitability.

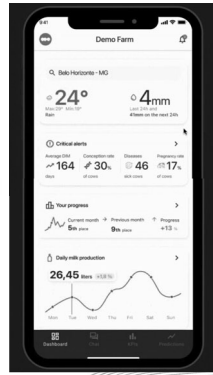
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LORE Milk

We are ready to help dairy farmers to take their operations to the next level!

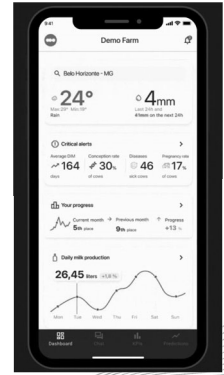
Unlocking new insights and identifying opportunities to improve operations and profitability.



LORE Milk

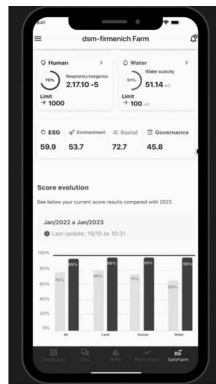
We are ready to help dairy farmers to take their operations to the next level!

Unlocking new insights and identifying opportunities to improve operations and profitability.



With artificial intelligence, we create a revolution in sustainability:

transforming insights into positive environmental impact with cutting-edge technology.



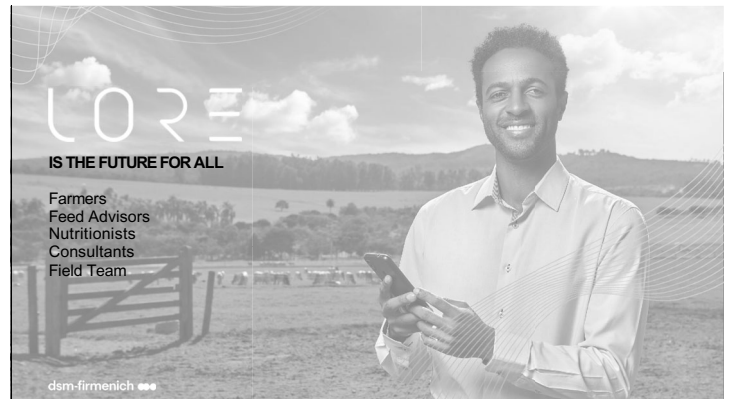
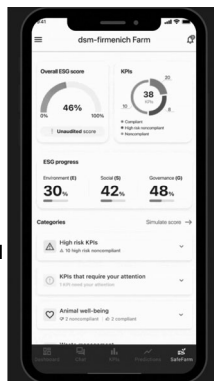
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Thank you!



Leonardo Sa
Head of Global Precision Services Hub



LinkedIn

Optimizing Feeding with Artificial Intelligence



BEEF CATTLE SHORT COURSE

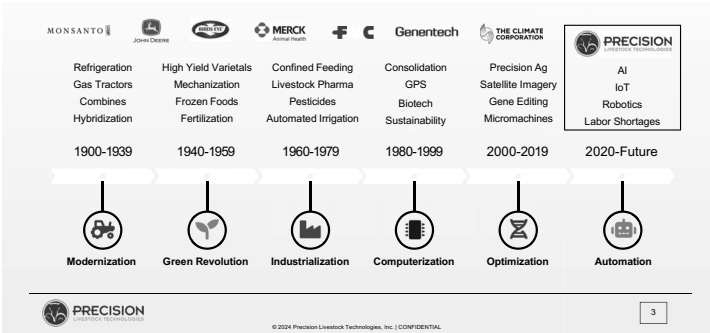
PRECISION LIVESTOCK TECHNOLOGIES
August 6, 2024

Bunk Status
Feeding: 0
Apprehension: 0
Flock: 0
Bunking: 0

Actionable intelligence to optimize livestock operations

Feeding Performance Health

Automation – the Next Wave of AgTech Innovation



Practical Solutions for Pressing Issues

- Automated Insights and Recommendations**
 - 24-hour bunk reading
 - Metrics on feeding behavior
 - AI-powered feeding recommendations
- Limitations of Current Methods**
 - Scarce skilled labor, difficult to train and retain
 - Observations vs. objective data
 - Limited ability to reduce volatility and drive higher intakes

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A Powerful, Integrated Machine Vision Platform



The PLT Data Acquisition System

- No upfront, flat monthly fee
- Fast, simple installation
- Solar-powered
- Weatherproof
- IR nighttime illumination
- Still images, reasonable bandwidth
- Remote diagnostics

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The PLT Bunk Management System

Problems

- Subjective data
- Big cuts, slow recoveries
- Staffing and training
- No behavioral insights

Solution

- Automated feed calling
- Continuous monitoring
- Reliable data
- Analytics and alerts

ROI

- Fewer problem pens
- Intake gains
- Adherence to protocols
- Labor savings

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The Path to Increased Performance

Phase 1 – Feeding Program Adherence

- Key program metrics, outlier identification
- Automated alerts

Phase 2 – Increased Gain

- Enhance protocols and reduce volatility with new data

Automated Intake Predictions

- Leverage AI to decrease errors and take advantage of every piece of data

Feed Callers

- Early Morning – Dashboard/Alerts, Drive View, Action Report, Integration
- Late Morning – Review key metrics

Managers

- Daily – Dashboard on key metrics

Nutritionists

- Weekly – Summary reports on program adherence

Customer Success

- Feed Caller – Weekly calls with PLT expert
- Managers – Bi-weekly alignment calls
- Nutritionist – Always welcome

8

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Phase 1: Driving Consistency

- Configurable homepage dashboard
- Customizable alerts for night slick, bunk level, aggression
- Filters to compare like-for-like cattle
- Shortcuts for one-click access to reports
- Integration with major feeding systems (Micro, AHI, PLA, etc.)

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Phase 2: Enhancing Protocols

- Ease of recognizing outliers
 - Knowing where to spend time
- Reliable metrics on feeding behavior
 - 40-minute window around feed events
 - 3-day trend strongly correlated with intake
- Verifiable data on night slicks
 - Many yards have no night reads or inaccurate night reads

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Phase 3: AI-Powered Intake Predictions

- Limitations of Current Methods
 - Long training period
 - Incomplete, periodic, subjective data
 - Reactive calls = big cuts and slow recoveries
- Advantages of Artificial Intelligence
 - Multiple algorithms use hundreds of variables over five days
 - Tuned to match feeding program
 - Objective and proactive calls
 - Updated monthly

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Recommendations and Insights

Detailed Prediction History

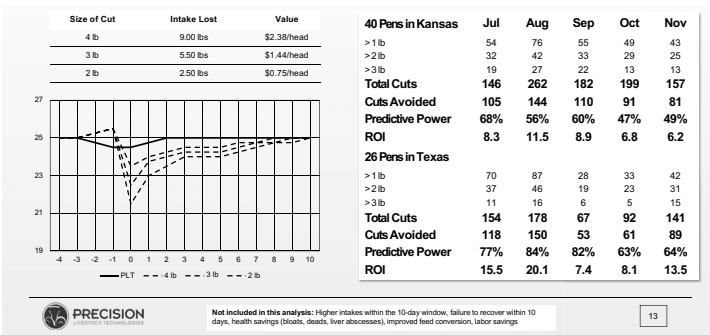
Daily Recommendations

Pen	Ration Strip	Per Head (lb)	Per Head (kg)	Intake	Night Slick	Feed 1	Behavior	Temperature	Pressure
0901	Steer Finisher	2.2	1.0						
0902	Steer Finisher	0.2	0.1						
0903	Steer Finisher	0.4	0.2						
0904	Steer Finisher	0.3	0.1						
0905	Steer Finisher	0.1	0.0						
0906	Steer Finisher	0.1	0.0						
0907	Steer Finisher	-0.5	-0.2						
0908	Steer Finisher	0.0	0.0						

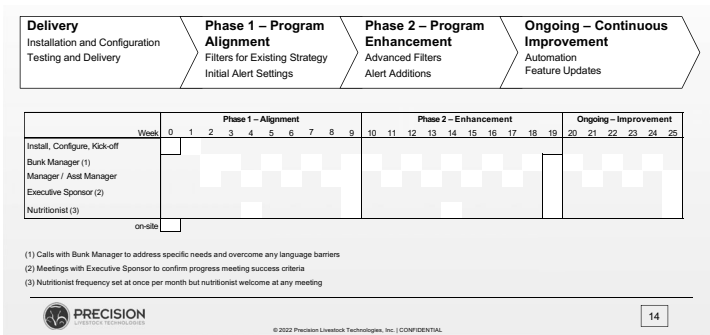
Shows factors behind predictions for training and validation

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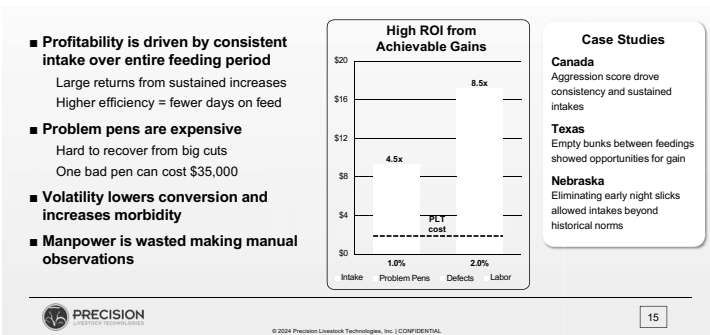
Examples – Summer and Fall 2023



Continuous Engagement to Ensure Maximum Benefits

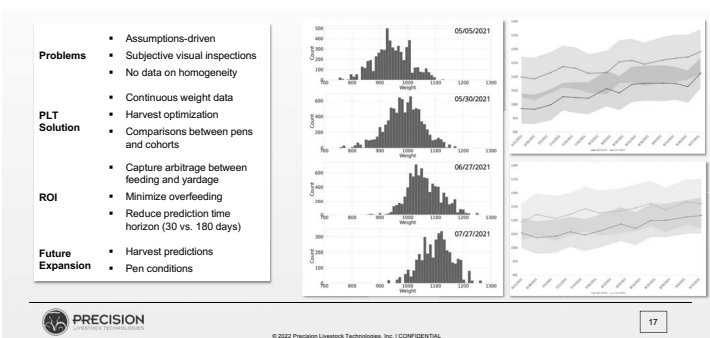


Calculating Return on Investment

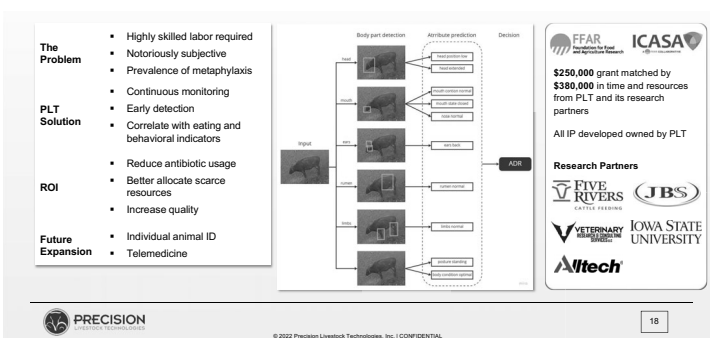


Performance and Health

Performance Measurement (in development)



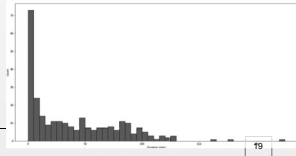
Health Management (experimental)



Health Management – Algorithm Capabilities



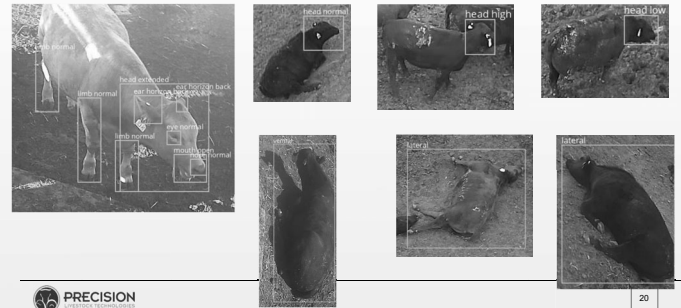
- **Animal Detection**
Detect animal and isolate within image
- **Location**
Understand relative to fixed points in image
- **Body Position**
Distinguish between standing and lying and determine postures
- **Duration**
Compare image sequences and calculate frequency and durations (eating, drinking, sitting, standing, etc.)
- **Body Part Detection**
Recognize body parts (head, limbs, eyes, ears, nose, mouth, rumen)
- **Body Part Classification**
Classify and the state of body parts (head position/extension, limb condition, rumen appearance, ear posture, eye condition, mouth condition, nose condition, hair loss and cleanliness/diarrhea)
- **Health Prediction**
Classify animal as IDR/ADR (Is/Ain't Doin' Right) based on above



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19

Health Management – Algorithm Examples



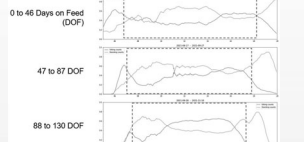
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20

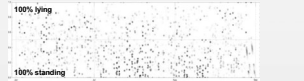
Behavior: Lying/Standing: Pen Level Aggregates



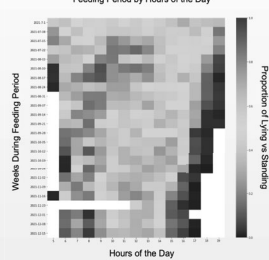
Change Lying/Stading over feeding period



More standing on hotter days (redder dots skewed to bottom of graph)

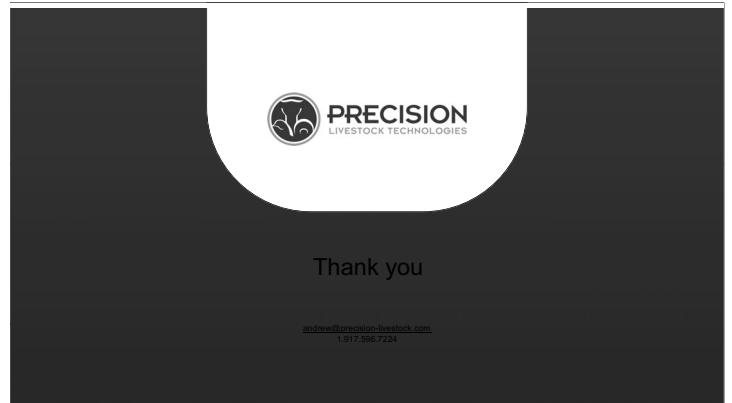


Weekly Average Lying Proportion Across Feeding Period by Hours of the Day



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21



Presented By:
Stuart MacLennan

peacocktechnology.com
@peacock_tech



Peacock
TECHNOLOGY

AgTech Session - Beef Cattle Short
Course 2024

Collaboration Programme

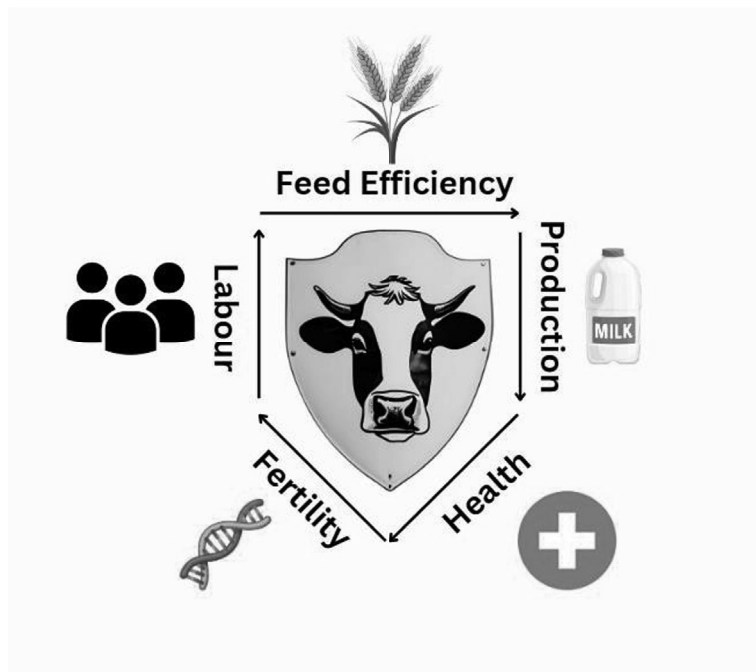


Partnership	Partnership with Farmers to Make the Most of their Data			
	Dairy // Beef // Swine			
Programs	Robots	Vision	Wearables	Data Intelligence
Support Platform	Tech Services	Farm team	R&D	
Focus	Labour Savings	Feed Efficiency	Increased Production	Health & Welfare
	Improved Fertility			
Revenue €/\$/£ Cow	Software	Hardware	Technical Services	
ROI	Proprietary partnerships to support farmers and their supply chain			

Customer Needs Matrix:
Feedback from Incubator Farms

Peacock Technology - Customer Needs Matrix - US Industrial Dairy Farmer			
Group	List	Status	Notes
Vision Core	ID	Active	Active and Commercial
	Body Condition Assessment	Active	Active and Commercial
	Fertility	R&D	In Pipeline
	Locomotion & Lameness	R&D	In Pipeline
Vision Environmental	Barn Management and Behaviours	Pipeline	Contract Pending for this
	Disruptive People	Pipeline	Contract Pending for this
	Biosecurity	Pipeline	Contract Pending for this
	Security	Pipeline	Contract Pending for this
Vision Health	Environmental	Pipeline	Contract Pending for this
	Udder and Feet Scores	R&D	Partner work
	Mastitis Detection	R&D	Partner work
	Auto Vaccination	Not Started	Requested
	Hoof Care/Treatment	R&D	Partner work
Vision Nutrition	Metritis Detection	Not Started	Not Yet
	Respiratory Infection	R&D	In Pipeline
	Feed Bunk Management	R&D	Progressing
	Feed and Drink Behaviour	R&D	Progressing
	Stool Recognition	Not Started	Priority being moved
Vision Dry Stock	TMR - Consistency & Chop Length	Not Started	Priority being moved
	Calf Behaviours	R&D	Live programme in UK
	Growth Rates	R&D	Requested
	Body Condition Assessment	R&D	Requested
	Health Assessments	R&D	Requested
	Bedding	R&D	Requested

The Data Programme



Technology Progress

Robot Progress



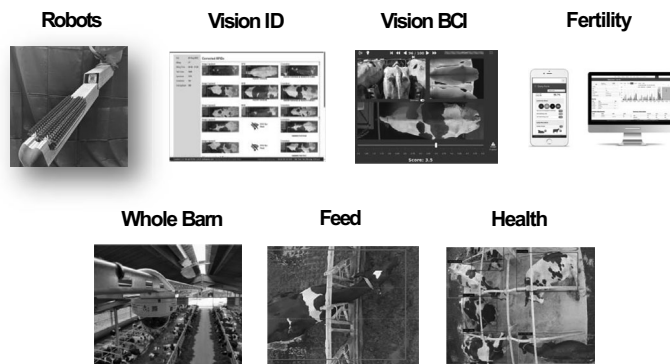
- Pre-Brush robot commercially launched Jan 2024.
- Brush robot now installed and running on commercial farms across global markets.

Vision Progress



- ID Verify demonstrated to increase identification accuracy to >99%
- Body Condition Index (BCI) in place to support precision agriculture.
- Delivering a vision lead management toolkit to extract the insights required.

Technology & Commercial Runway

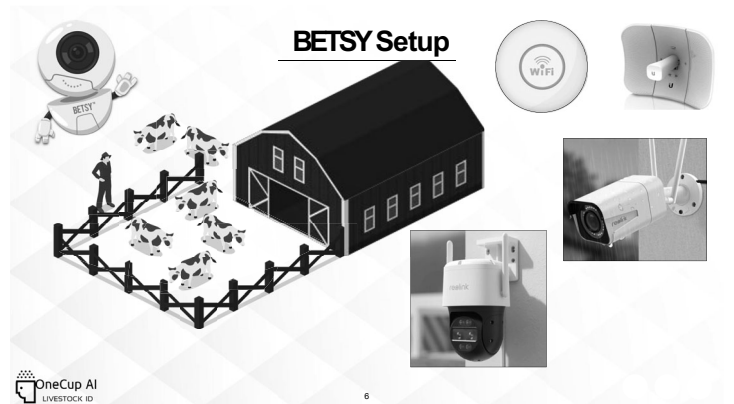
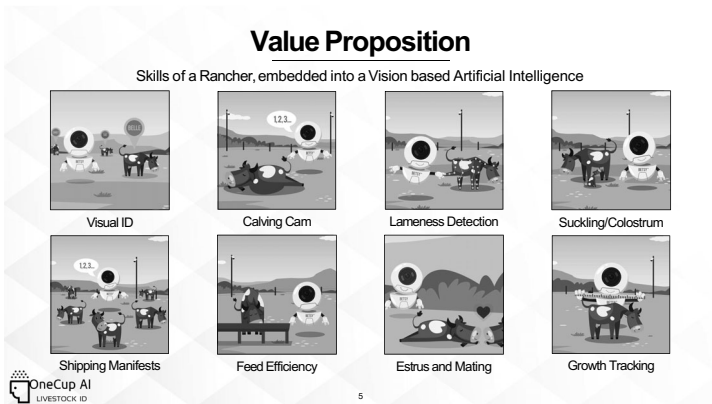
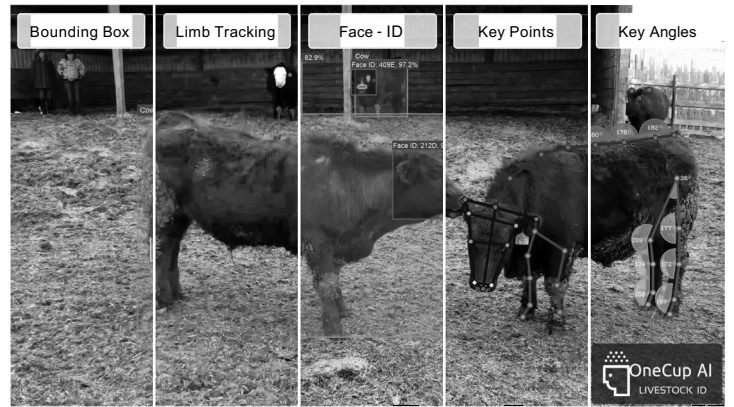
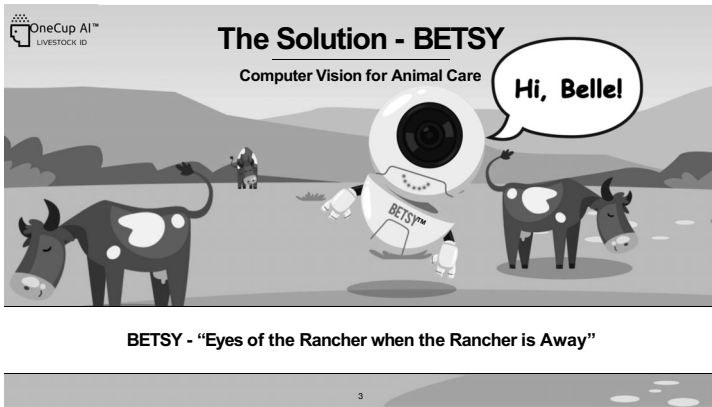


Serviced on a \$/cow basis over 5-year programmes

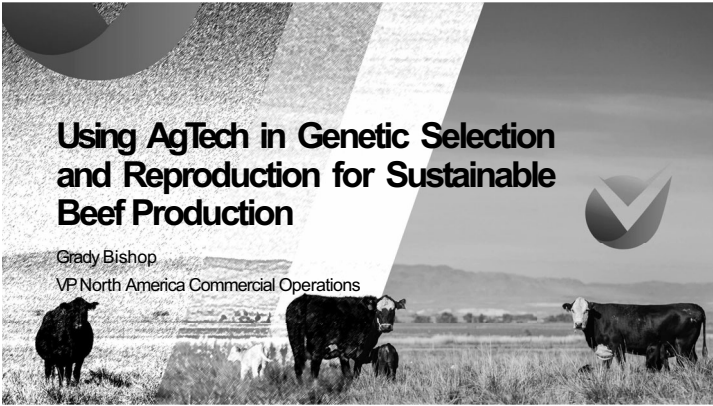
Operating as technology partner to our clients and their supply chain

Delivering insights to meet the need of your business

Proprietary reporting delivered through technical services team and using the power of machine learning







Using AgTech in Genetic Selection and Reproduction for Sustainable Beef Production

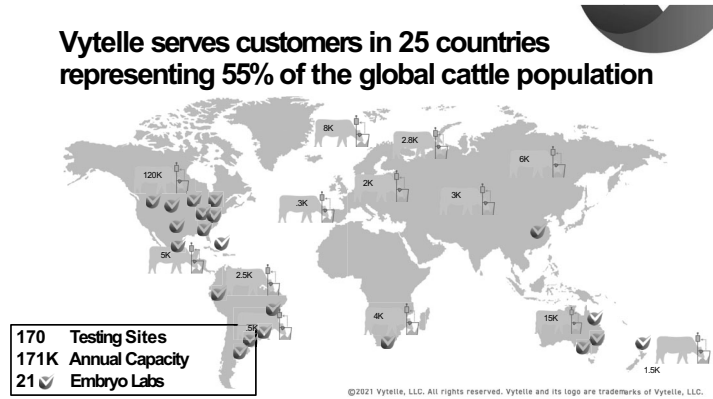
Grady Bishop
VP North America Commercial Operations



Vytelle Mission and Purpose

To ensure meat and milk are **viable** and **competitive** food choices for future generations.

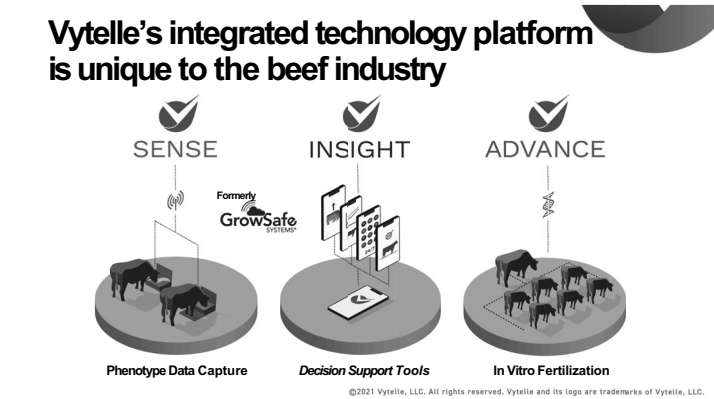
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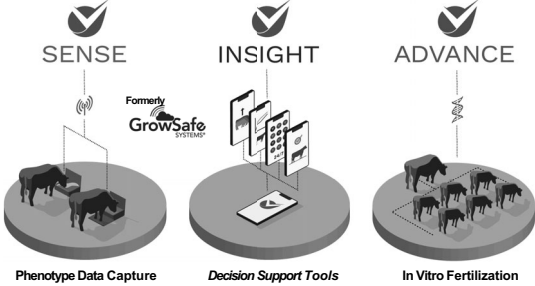
Vytelle serves customers in 25 countries representing 55% of the global cattle population

170 Testing Sites
171K Annual Capacity
21 Embryo Labs

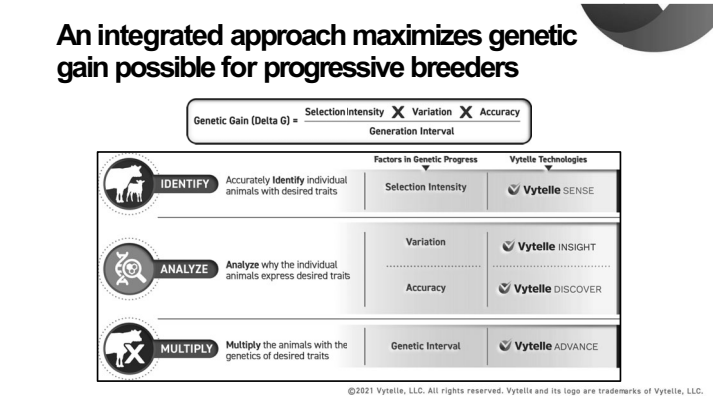
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Vytelle's integrated technology platform is unique to the beef industry



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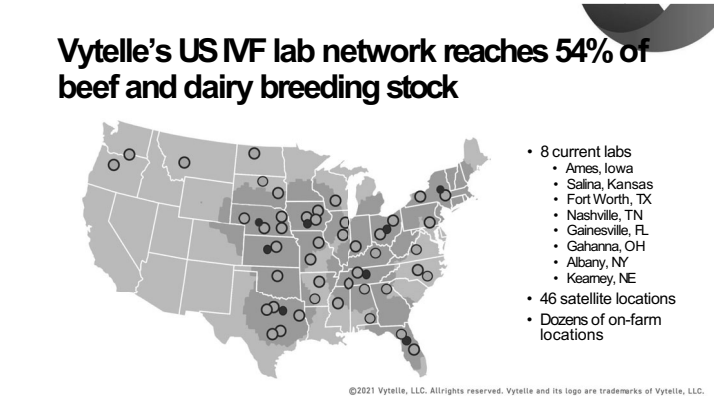


An integrated approach maximizes genetic gain possible for progressive breeders

$$\text{Genetic Gain (Delta G)} = \frac{\text{Selection Intensity} \times \text{Variation} \times \text{Accuracy}}{\text{Generation Interval}}$$

	Factors in Genetic Progress	Vytelle Technologies
IDENTIFY Accurately identify individual animals with desired traits	Selection Intensity	Vytelle SENSE
ANALYZE Analyze why the individual animals express desired traits	Variation	Vytelle INSIGHT
	Accuracy	Vytelle DISCOVER
MULTIPLY Multiply the animals with the genetics of desired traits	Genetic Interval	Vytelle ADVANCE

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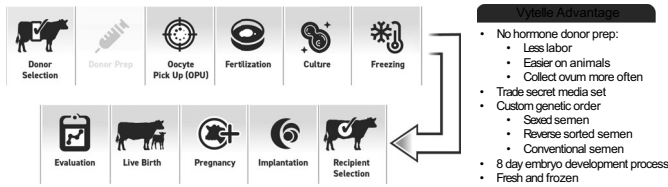


Vytelle's US IVF lab network reaches 54% of beef and dairy breeding stock

- 8 current labs
 - Ames, Iowa
 - Salina, Kansas
 - Fort Worth, TX
 - Nashville, TN
 - Gainesville, FL
 - Gahanna, OH
 - Albany, NY
 - Keamey, NE
- 46 satellite locations
- Dozens of on-farm locations

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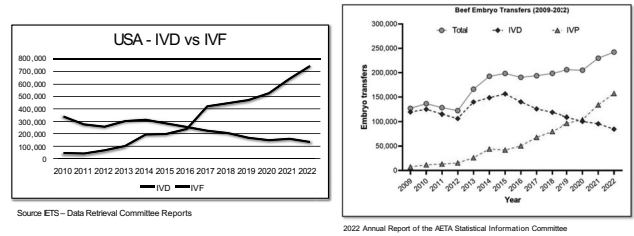
High performance modern reproduction technology, *In Vitro* Fertilization



Reproduction Method

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IVF embryos are 85% of US transfers – and growing



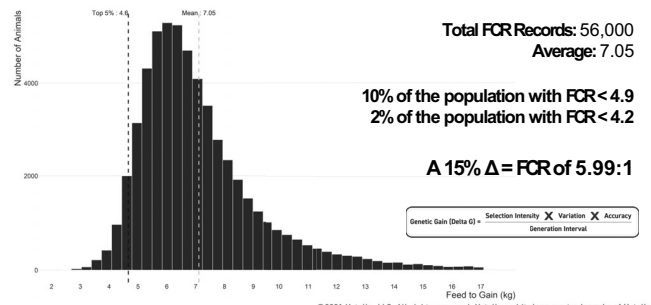
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Comparison of advanced reproduction methods

	MOET	IVF	Benefits of IVF
Time between Collections (days)	35	14	• Shortens generation interval
Length of season (days)	120	120	
Collections / season	3.0	8.0	• Leverages genetics of both sire and dam
Embryos / collection	6.0	5.0	
Embryos / season	18	40	• Maximizes the use of rare or valuable semen
Pregnancy rate	55%	50%	
Embryo calves / season	10	20	• Capture genetic gains from younger and pregnant animals

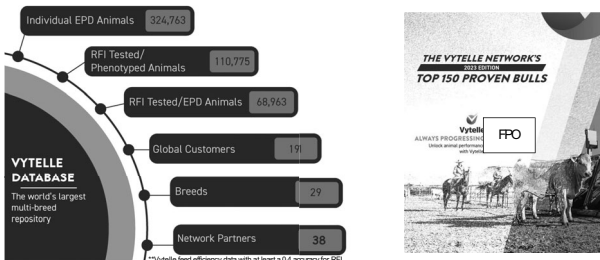
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Leveraging IVF maximized selection intensity to drive genetic gains from outliers



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Vytelle's Network Database is the Largest Beef Efficiency Database Globally



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We take individual feed intake measurements at 170+ global locations

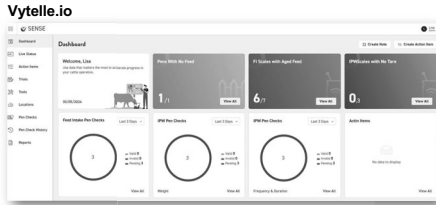


No one has more experience collecting feed intake phenotypes

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We're launching major upgrades to the SENSE software platform

- Completely new user interface
- Cloud-based
- Mobile-accessible
- Self-service

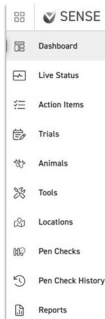


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- Customizable one-view dashboards
- Real-time alerts and trial status
- Messaging with Technical Service Representatives
- On-demand reports



- Detailed pen-level diagnostics
- Messaging support with Technical Service Representatives

Live Status

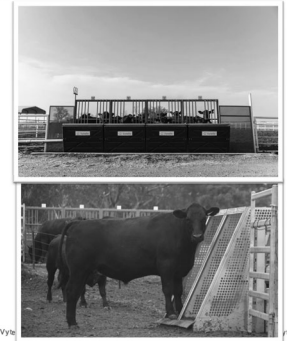
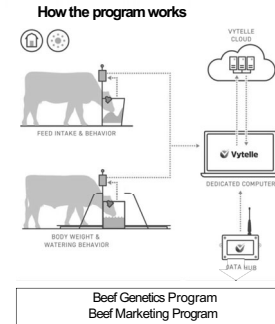
Feed Intake (kg) | IPW (lb)

Hardware Faults: 0 | Out of Feed: 1 | Low Feed: 0 | Aged Feed: 15 | On Trial: 4

Scale	Thal	Pen	Last IBF	Hardware Fault	Feed Status	Aged Feed	Panel	Location
1	No	Pen 1	162000445001055	0	15 kg	1	Efficient Cattle Co.	
2	No	Pen 1	162000445001186	0	18 kg	1	Efficient Cattle Co.	
3	No	Pen 1	162000445001183	0	29 kg	1	Efficient Cattle Co.	
4	No	Pen 1	162000445001122	0	24 kg	1	Efficient Cattle Co.	
5	No	Pen 2	162000445001084	0	16 kg	1	Efficient Cattle Co.	
6	No	Pen 2	162000445001215	0	17 kg	1	Efficient Cattle Co.	
7	No	Pen 2	162000445001086	0	41 kg	1	Efficient Cattle Co.	
8	No	Pen 2	162000445001175	0	29 kg	1	Efficient Cattle Co.	
9	Yes	Pen 3	162000445001027	0	0 kg	2	Efficient Cattle Co.	
10	Yes	Pen 3	162000445001021	0	19 kg	2	Efficient Cattle Co.	

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Vytelle SENSE Vytelle INSIGHT



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Vytelle's technology platforms enables sustainable beef production



- Genetic improvement is the permanent and compounding path to sustainable beef production
- Selecting for feed efficiency puts dollars in your pocket today and builds future resilience in your herd
- Leveraging the power of IVF is the fastest way to make genetic gains available today

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7,000 Ranchers Can't Be Wrong

It's more than water monitoring — it's preserving the legacy of ranching.

Andrew Coppin
CEO & Co-Founder of Ranchbot

August 6, 2024
2024 TAMU Beef Short Course
Rudder/MSU Complex

Overcoming Challenges

The United States is a **global leader** in beef production, but it's not without its challenges.

Economic	Regulation	Climate	Social
<ul style="list-style-type: none"> • Volatile markets • Land Leases 	<ul style="list-style-type: none"> • Gov't mandates • Labor laws 	<ul style="list-style-type: none"> • Drought • Natural Disasters 	<ul style="list-style-type: none"> • Environmental groups • Public opinion

If challenges are here to stay, how do we stay ahead of them?

Embracing Technology

Using ranch tech, you can drive profitability despite various challenges.

MyRanchbot Platform



Ranchbot lite



Pump Control



Pressure Monitor



Ranchbot Monitor



Rain Gauge



Trough Monitor



Flow Meter Sensor



Get Back To What Matters

Check water over a cup of coffee & know where to spend your time before you even leave the house.

Save Time

We spend 95% of our time checking water that doesn't need checking.

Lower Operation Costs

ROI within 12-18 months & avg. savings reported in the tens of thousands.



Near-Real Time Alerts

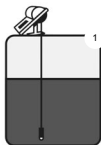
Know you have a problem, when you have a problem.

Ensure Livestock Health

Water is essential. Prevent heat stress, weight loss, & more.

How Does Remote Monitoring Work?

- 1 Install Ranchbot in just 15 minutes
- 2 Using **GPS & Satellite** technology, Ranchbot transmits data
- 3 Get near real-time alerts direct to your device on water leaks, levels, & more





Thank you!

Andrew Coppin
CEO & Co-Founder of Ranchbot
andrew@ranch-bot.com



Our Leaders

**Bryan Elliott –
 Chief Executive Officer**



**Forrest Roberts –
 Executive Board Chairman**



Our Vision

To put the best technology possible in the hands of every livestock producer



The Problem

Automated Individual Identification

- EID ear tags are the only form of automated individual identification available when managing livestock on software platforms.
- EID tags fall out of the ear at a rate up to 20% per year.
- EID tags require expensive, cumbersome equipment to read the tags and must be held within 2 inches of the tag reader.



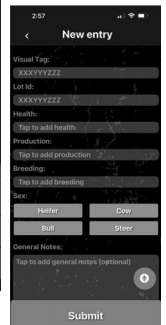
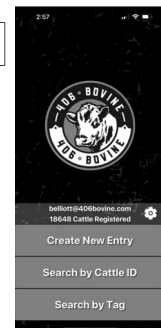
Our Solution

- Facial Recognition is the most reliable and scalable solution offered for automated individual identification.
- Our facial recognition software operates through a smart phone using proprietary technology and can identify an animal from up to 50 feet away.



How It Works

- Create New Entry
- Search by Cattle ID
- Search by Tag





Benefits to You

- Automated identification not just at the chute
- Rapidly identify animals outside of the flight zone
- Manage your herd from anywhere using only your phone
- Secondary identification when tags are lost
- Low input cost – no additional hardware (tags or reading devices) required



Scan QR Code

- Enter your information and we'll send you a link to 406 Bovine app
- Try it for yourself today!

