The Role of Technology in Animal Health

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WESTERN CANADA FEEDLOT MANAGEMENT SCHOOL

SCA SASKATCHEWAN CATTLEMEN'S ASSOCIATION

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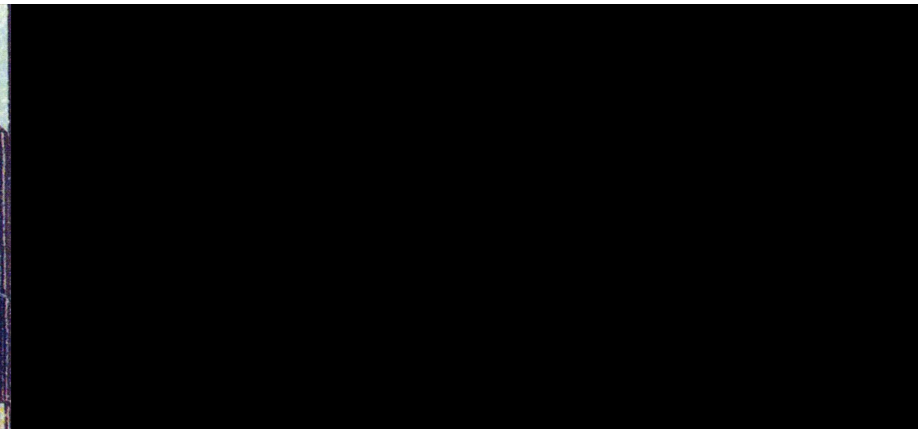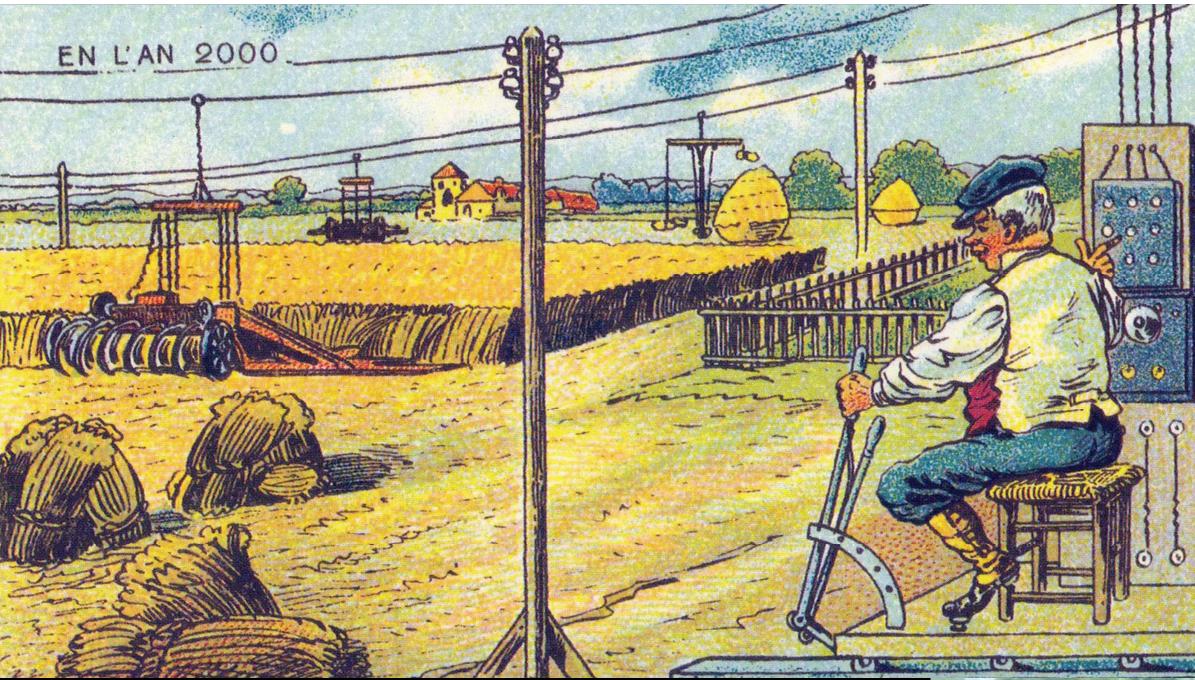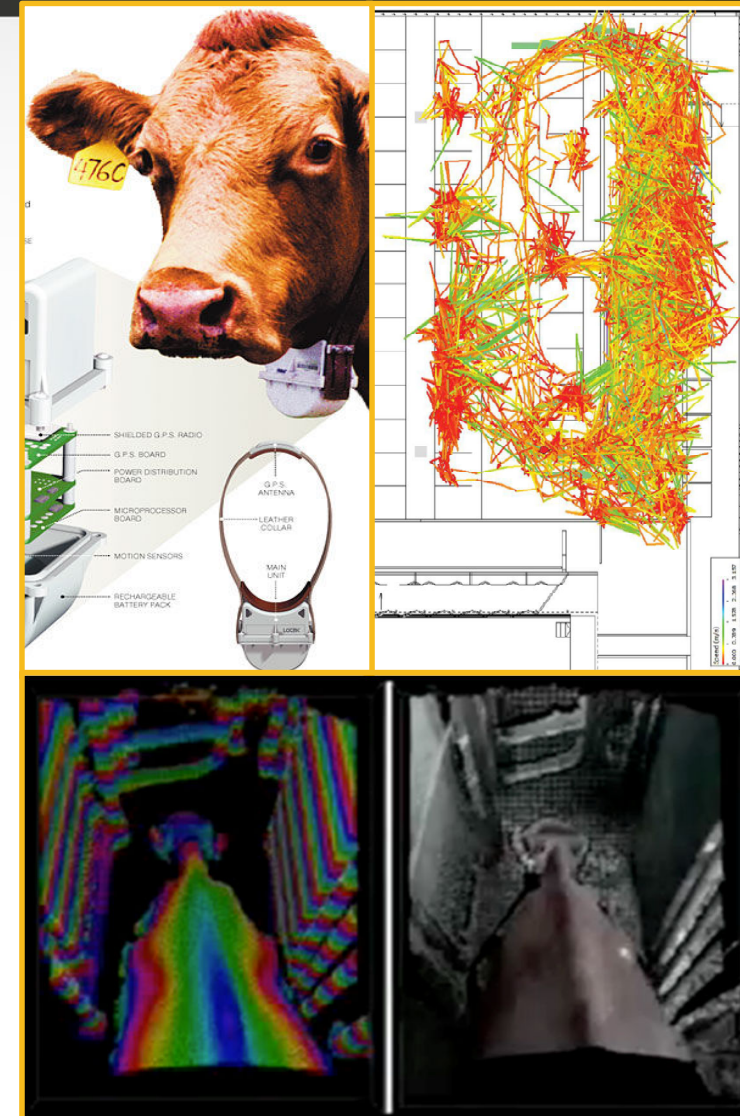Western College of Veterinary Medicine
USASK.CA/WCVM

Government of Saskatchewan

General overview of livestock farming technologies

Technologies applied to grazing animals

Technologies for feedlot cattle

Final considerations

Livestock farming technologies

- Equipment aimed at automatic, real-time monitoring of animal behaviour, health, productivity and/or environmental impact.

- Software/algorithm: Transforms and presents data for a human to make informed decisions:

  ➢ Reproductive, feeding management

  ➢ Husbandry practices

  ➢ Health interventions

Beef vs Dairy

Most commercial cattle farming technologies have been developed to support intensive dairy cow production.
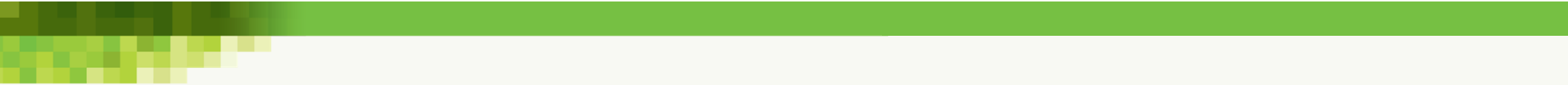
➢ Higher value of the lifetime milk production.

➢ Proportionately greater margin for technologies.

➢ Consider:

  ✓ Infrastructure

  ✓ Added efficiency to existing routines

  ✓ Return of investment

Wishlist for new technologies
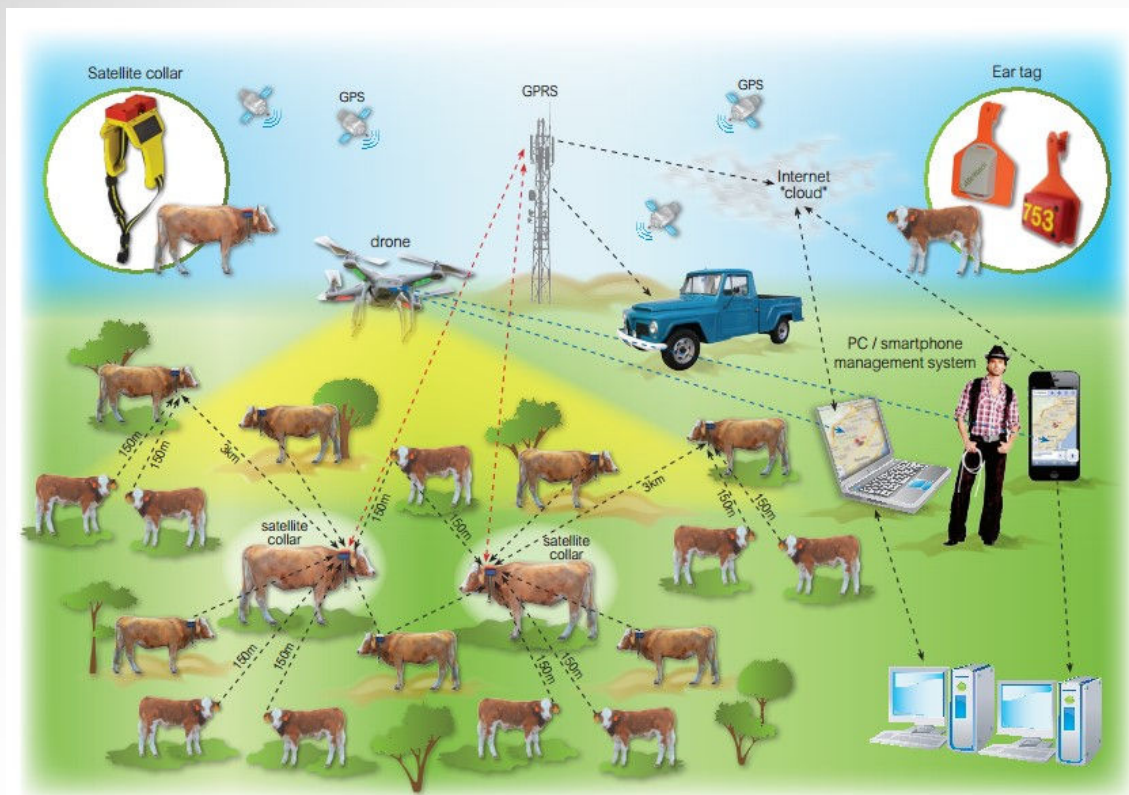
- Accurate and versatile

- Scalability

- Electric autonomy

- Cross-communication/Networking
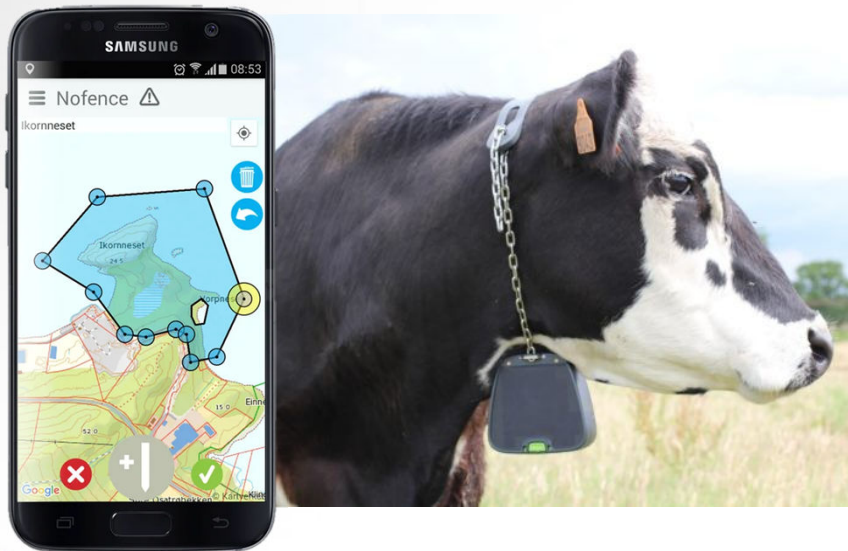
- Practical: it solves more problems than it causes

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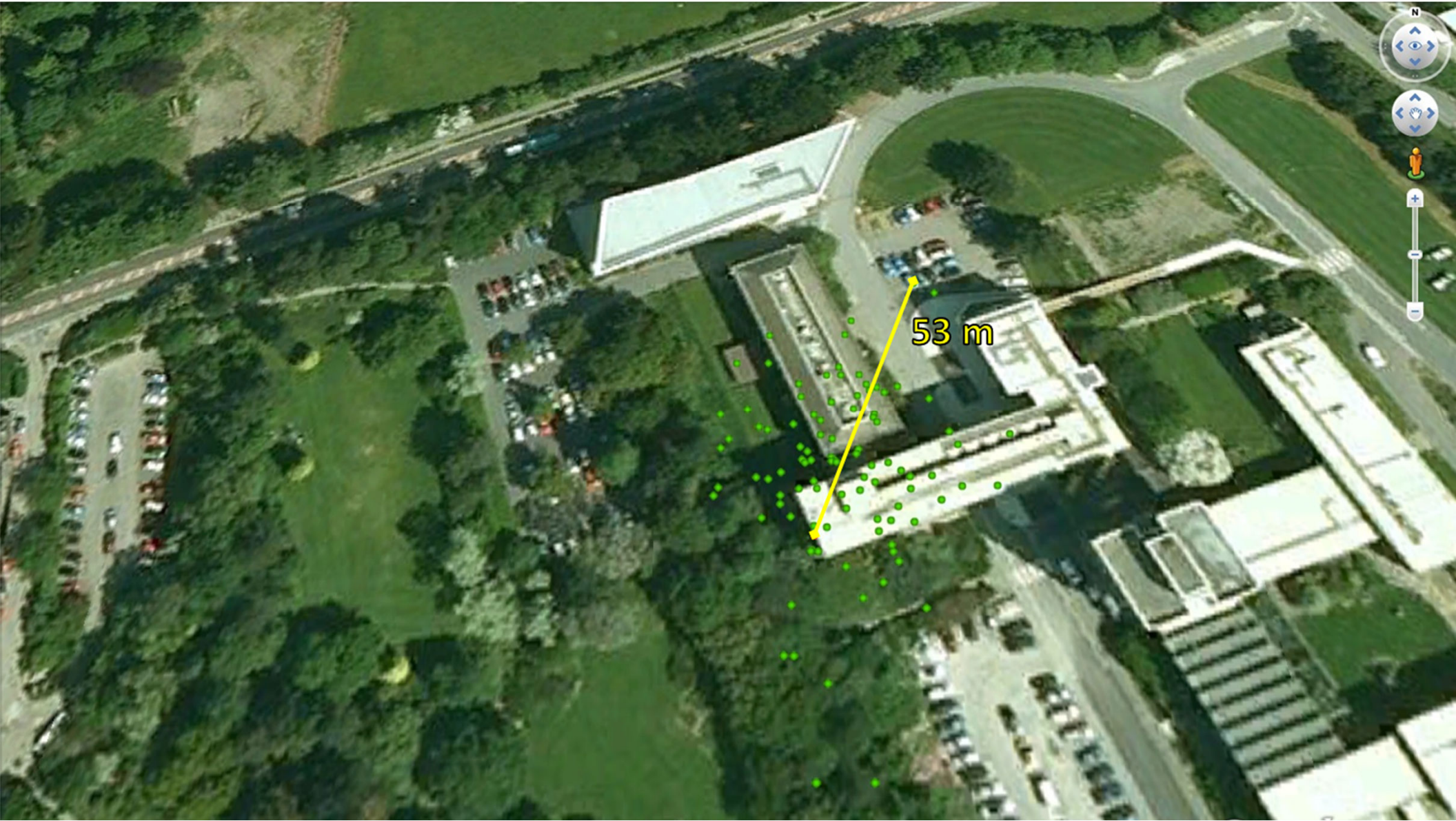
Technologies for feedlot cattle

Final considerations

Virtual fencing

NoFence Grazing Technology; eShepherd; SmartPaddock; Vence

- ➢ Movement range
- ➢ Use of pasture
- ➢ Access to water
- ➢ Health alerts (No activity, just location)

53 m

0.2 mi

Controlling grazing activity

Things to consider:

- Farm location and topography
- Accuracy
- Training period
- Cost/maintenance
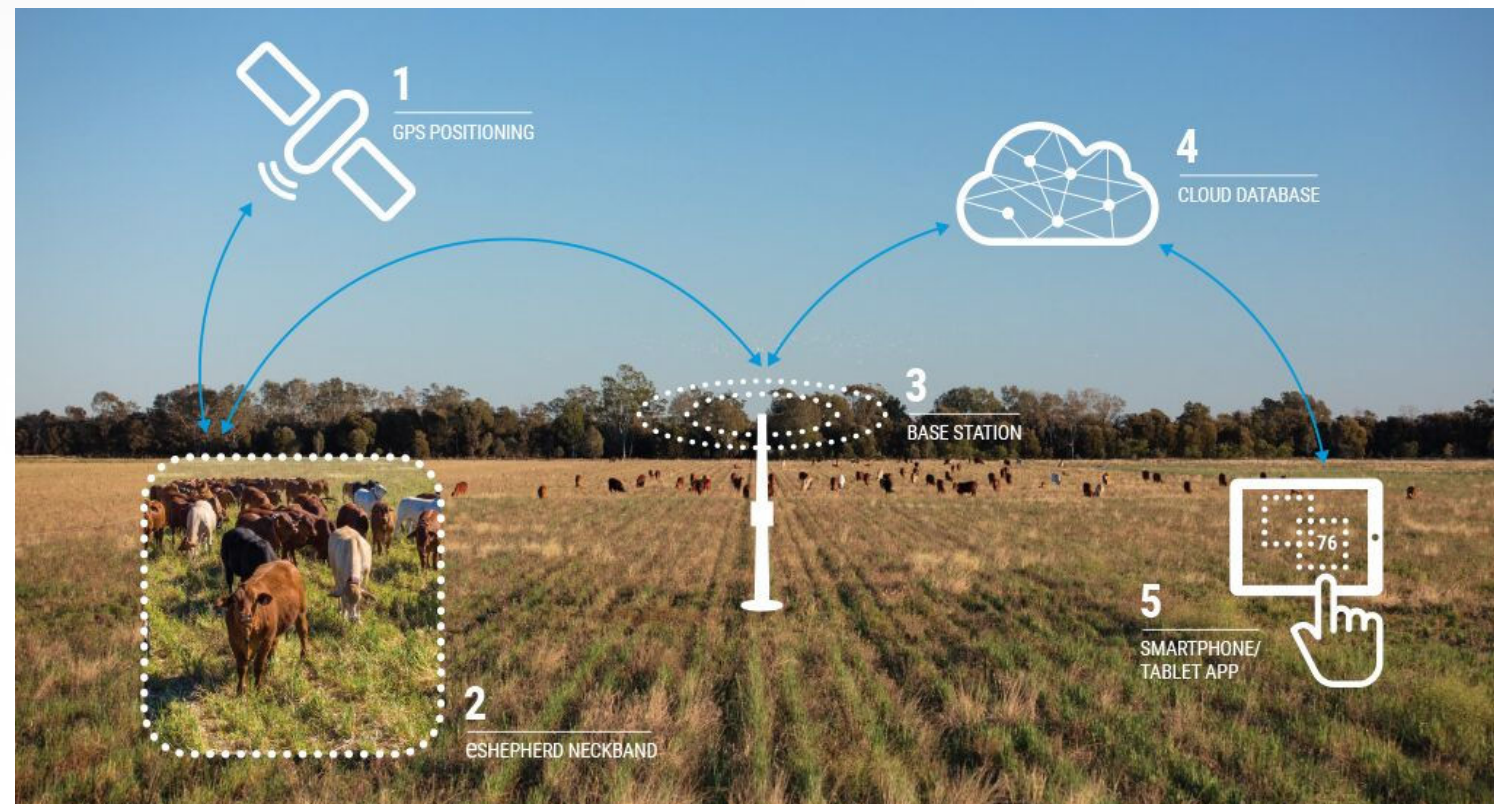
Drones

- Check on fences/facilities

- Calving/health check

- Pasture scoping

- Research purposes
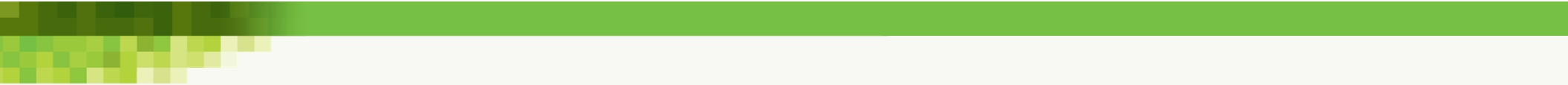
Calf mobility after castration

- Cow-calf distance
- Time from point A to B

Calving detection
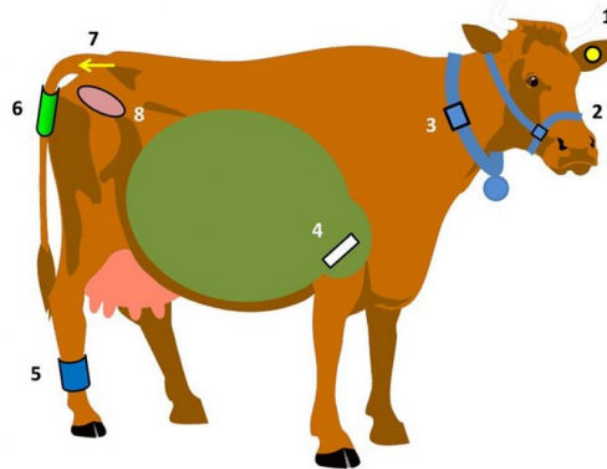
- ➢ Based on changes in activity, feeding/rumination or tail movement
- ➢ Network access, battery life,…

https://businesswales.gov.wales/farmingconnect/posts/precision-dairy-farming-review-current-available-technologies-0

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Accelerometers

- Changes in overall activity, number of steps, ear flicks, or standing/lying behaviour can be associated with estrus, calving, disease or injury.

CowAlert (Peacock Technology)   CowManager   SenseHub (Merck Animal Health)

➢ Ear temperature, eating, ruminating, activity
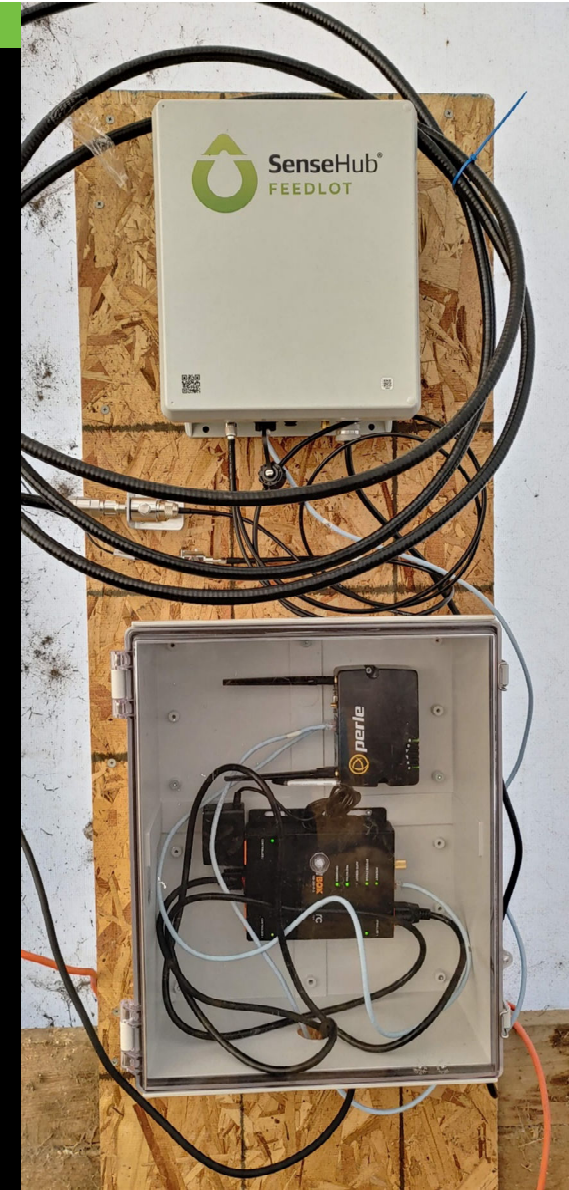
Rumen boluses

SmaXtec

Moonsyst

➢ Rumen pH

➢ Drinking

➢ Temperature

➢ Activity

Ultra-wideband sensors

NEDAP livestock management, TrackLab (Noldus), Pozyx System

- ➢ Location
- ➢ Position

Infrared thermography

Pre-castration   Post-castration

Coetzee, 2013 Vet Clin Food Anim
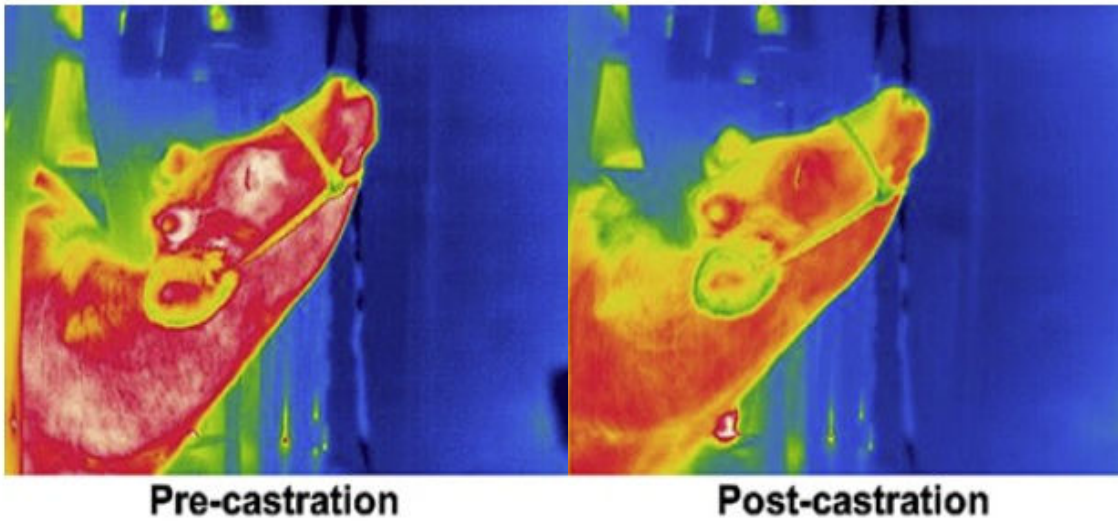
Tools to monitor feed intake

GrowSafe

CRFI (BioControl)

Grimace scale, emotions

Face Detection

Landmark Detection

Normalisation

Localized Histogram of oriented Gradients

SVM Classification AU1-AU9

Aggression
Fear
Pain
Happiness
Neutral State

Neethirajan et al., 2021
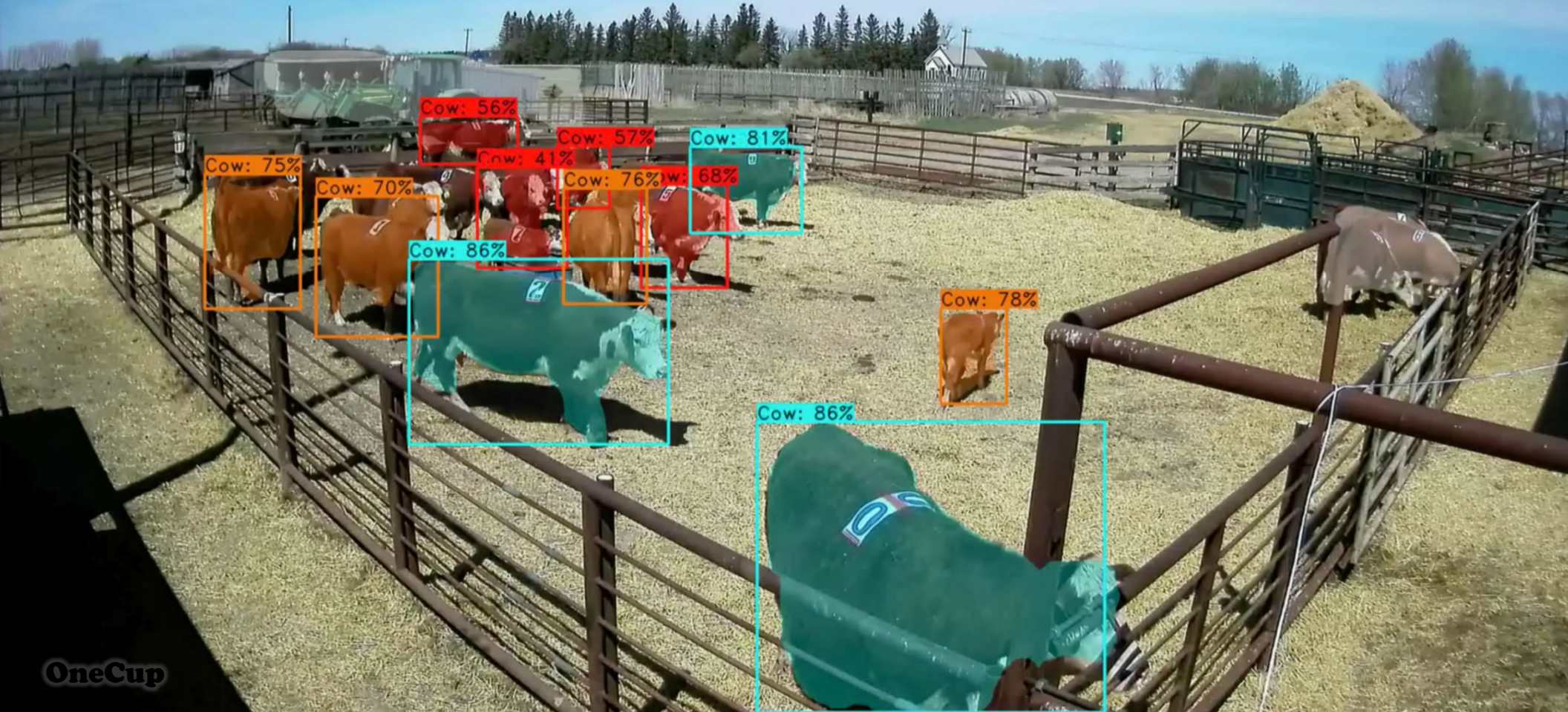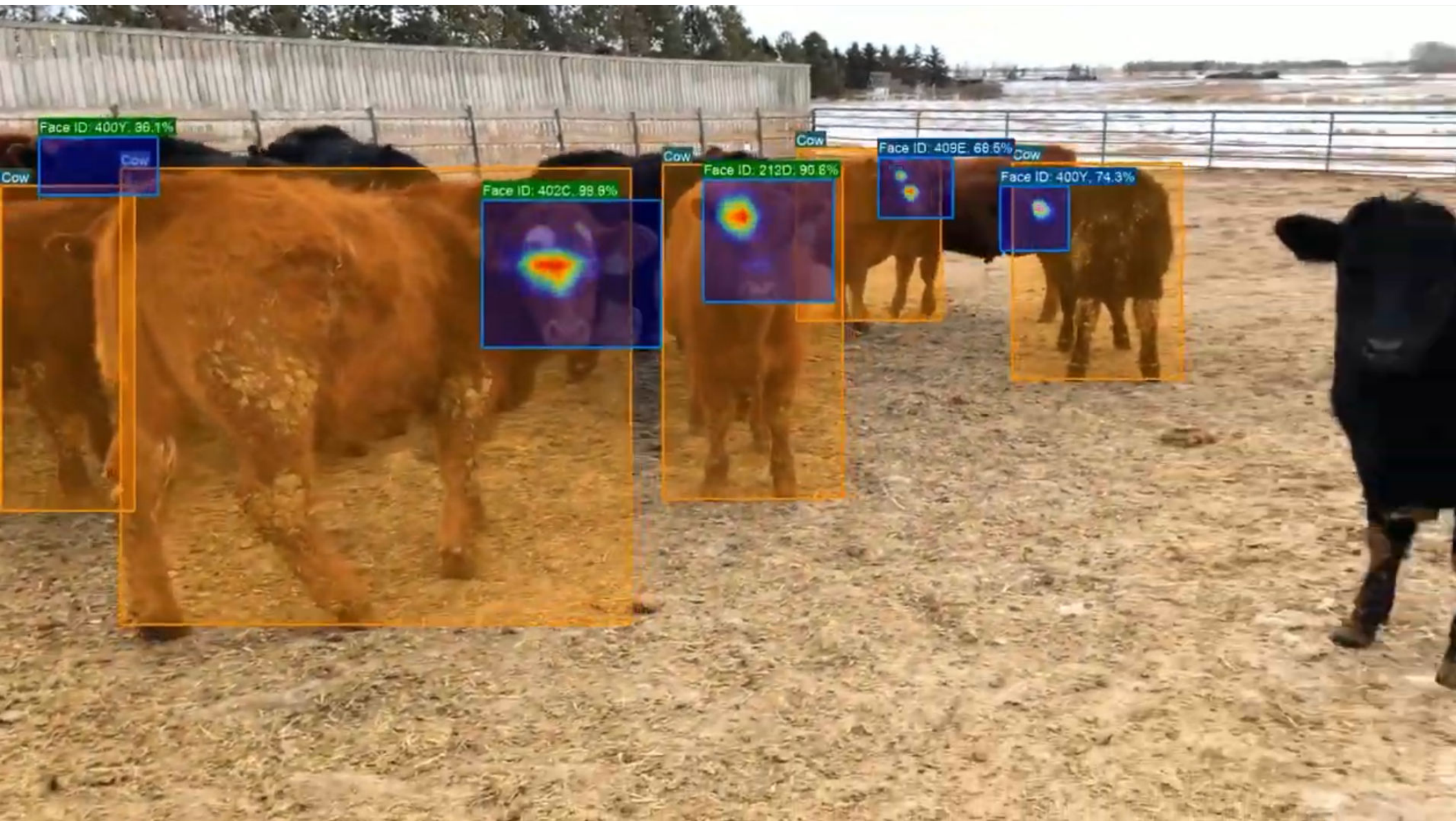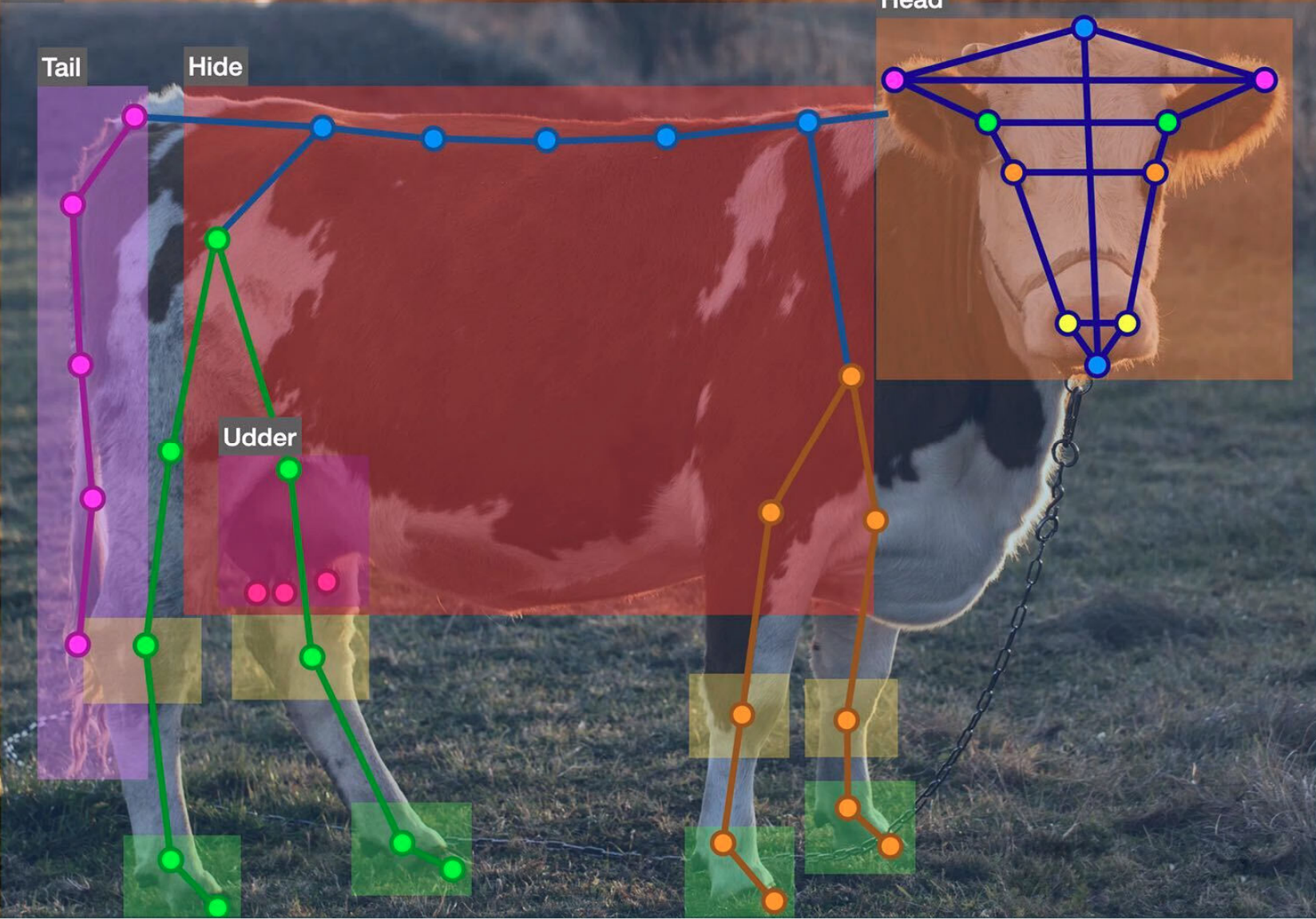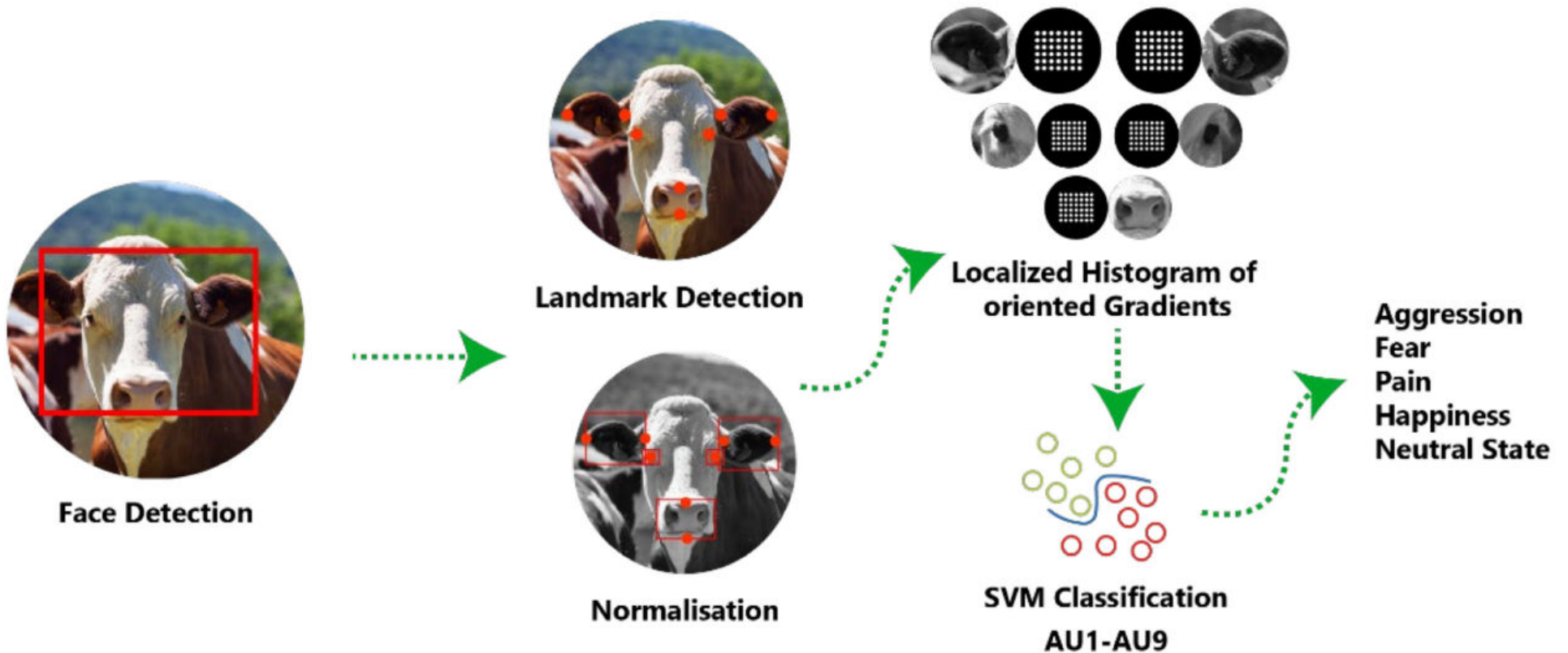
Computer-assisted lung auscultation

Whisper OnArrival (Merck Animal Health)

- ➢ Algorithm associates lung noises to health status
- ➢ Score from 1 to 5
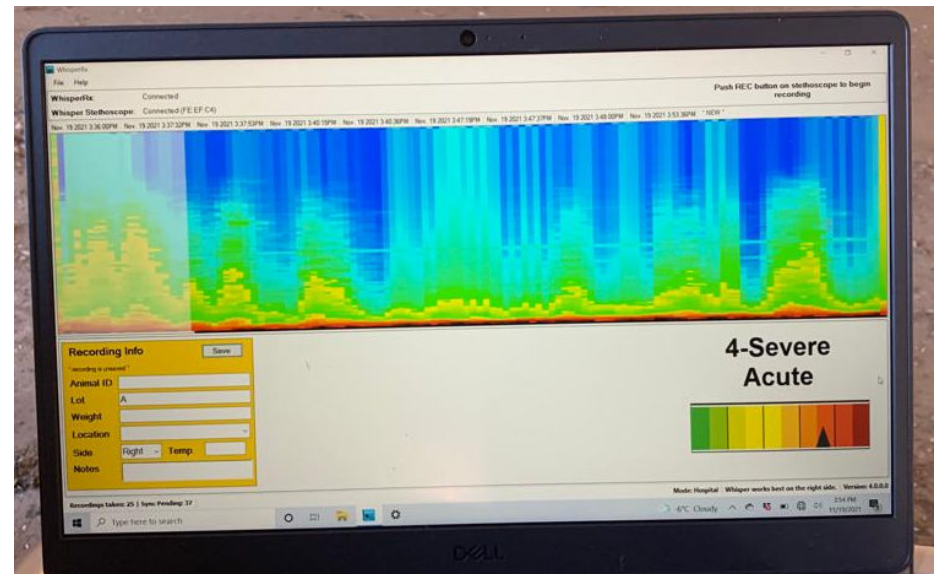
Computer assisted lung auscultation
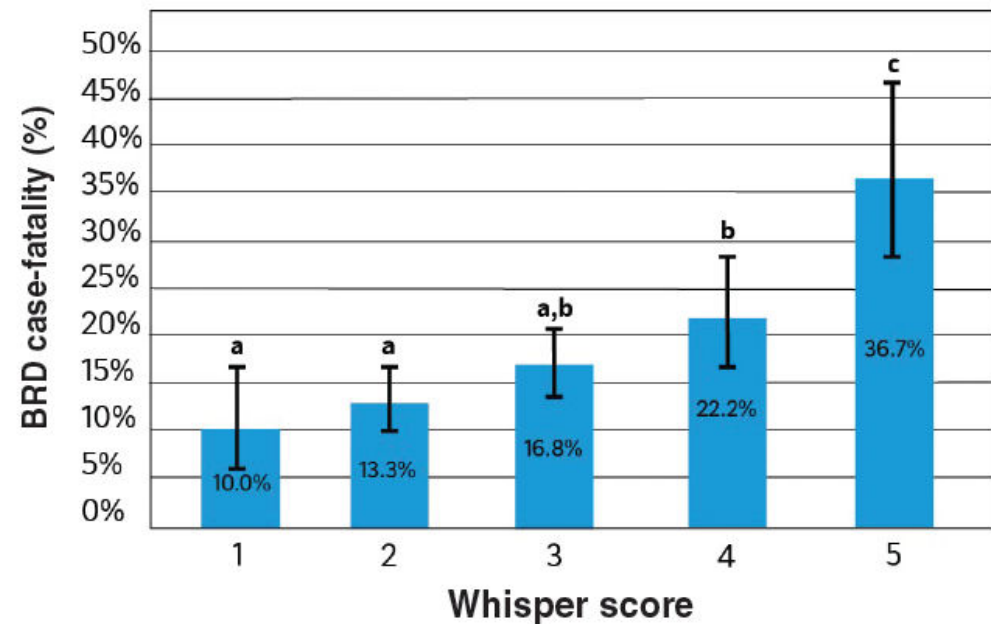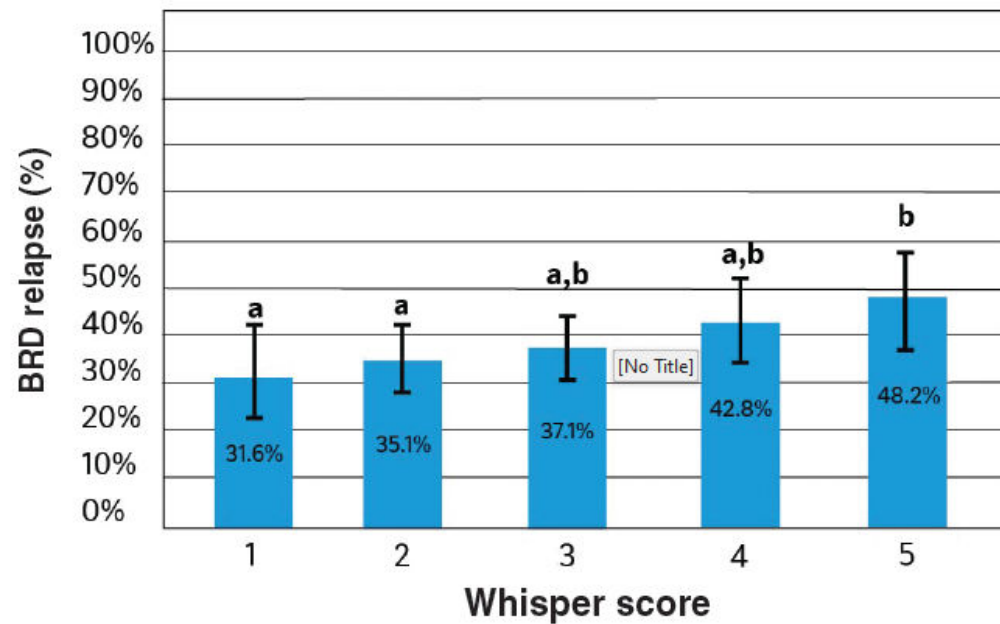
N = 2,726

Booker et al., 2021; Can Vet J

To characterize clinical signs associated with different case definitions of BRD and health outcomes of newly arrived feedlot calves

Katrina Garneau, John Campbell, Emily Snyder, Karen Schwartzkopf-Genswein, Michael Jelinski, And Diego Moya

Lactate Pro 2
5.7 mmol/L
12:08 PM

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Questionnaire for pen riders

Feedlot: Pen rider's name: Date:
Number of pens to assess today: Walking / Horse   Cattle per pen: DOF:
Recent history of outbreaks/Fatalities:

Overall (1-10)													
Others													
Behaviour	Coughing												
	Dragging toes												
	Slow moving												
	Abnormal gait												
	Head carriage												
	Isolated												
	Lack stretching												
Appetite	Away from bunk												
	Poor BCS												
	Empty flank												
Respiration	Thoracic												
	Abdominal												
	Altered rate												
	Laboured												
Facial signs	Ears position												
	Eyes expression												
	Nose secretions												
	Mouth secretions												
Calf ID													
Walked distance													
Pen													
Time													NOTES:

Level of agreement between case definitions

55.1%

Kappa = 0.0511

Level of agreement between case definitions

63.7%

Kappa = 0.2028

Level of agreement between case definitions

52.7%
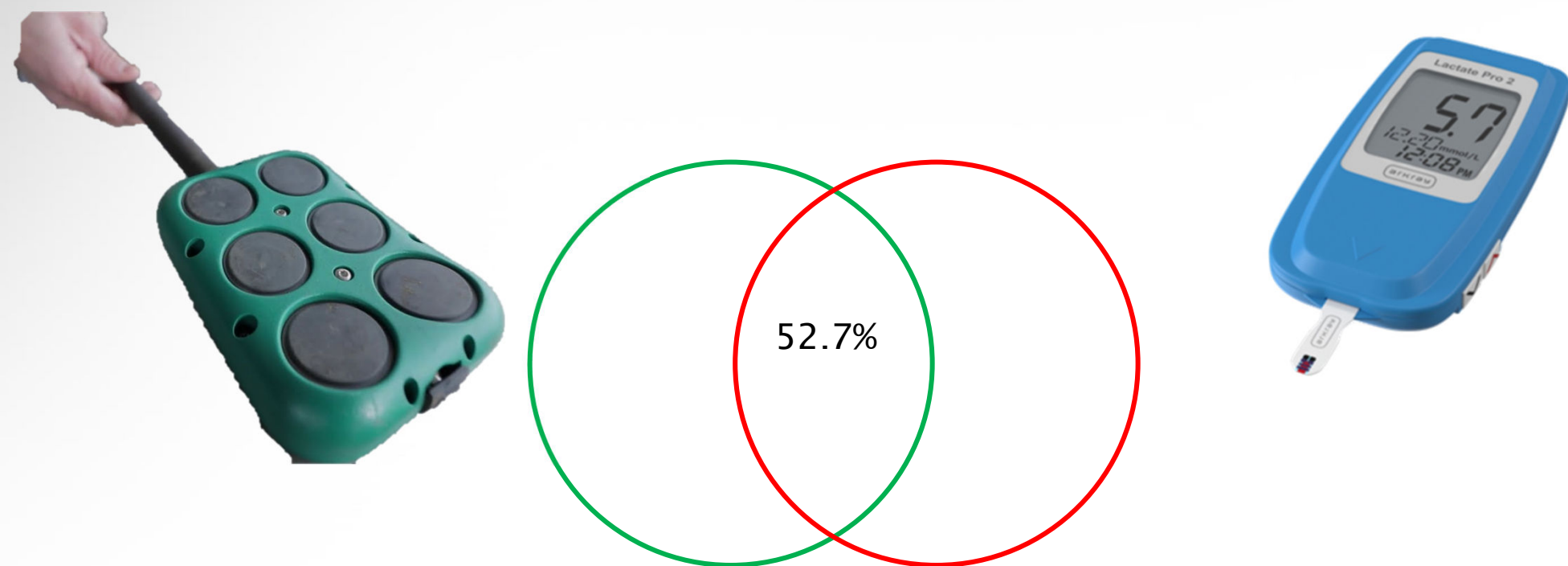
Kappa = 0.0608

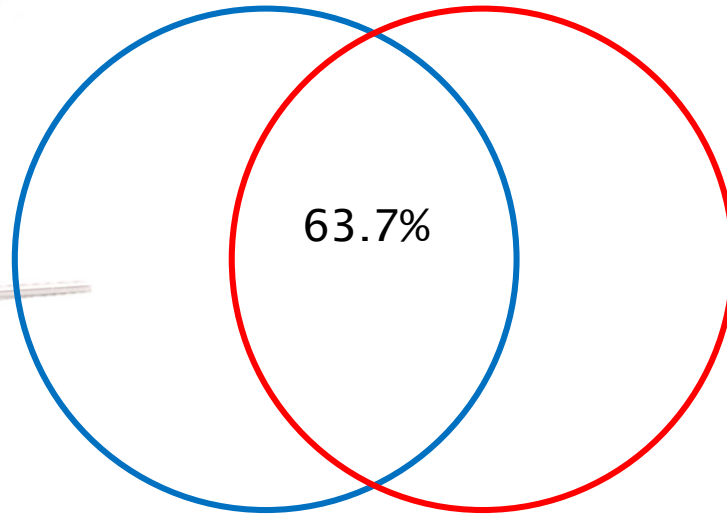# Association between diagnosis and clinical signs

	With fever	Without fever	Odds Ratio
Mouth secretions	25.4%	20.4%	1.33
Nose secretions	51.7%	30.6%	2.43*
Eye expression	28.1%	44.9%	0.48
Coughing	21.1%	30.6%	0.6
Flat tail	21.1%	16.3%	1.37
Abnormal Respiration	10.5%	8.2%	1.32
Lack of rumen fill	30.7%	30.6%	1
Isolation in Pen	9.7%	12.2%	0.77
Lethargy	30.7%	40.8%	0.64
Abnormal Head Carriage	47.4%	42.9%	1.2

Odds Ratio: >1 = 1 <1   * Means *P-value* <0.05

Association between diagnosis and clinical signs

	With fever AND High score	Rest of animals	Odds Ratio
Mouth secretions	22.2%	25.9%	0.82
Nose secretions	50.8%	25.9%	2.95*
Eye expression	30.2%	40.7%	0.63
Coughing	23.8%	25.9%	0.89
Flat tail	22.2%	18.5%	1.26
Abnormal Respiration	9.5%	7.4%	1.32
Lack of rumen fill	31.8%	37.0%	0.79
Isolation in Pen	11.1%	14.8%	0.72
Lethargy	31.8%	44.4%	0.58
Abnormal Head Carriage	47.6%	40.7%	1.32

Odds Ratio: >1 = 1 <1   * Means *P-value* <0.05

Association between diagnosis and clinical signs

	Fever AND Score AND Lactate	Rest of animals	Odds Ratio
Mouth secretions	19.05%	18.75%	1.02
Nose secretions	52.38%	12.50%	7.7*
Eye expression	33.33%	37.50%	0.83
Coughing	28.57%	31.25%	0.88
Flat tail	23.81%	25.00%	0.94
Abnormal Respiration	11.90%	6.25%	2.03
Lack of rumen fill	28.57%	25.00%	1.2
Isolation in Pen	4.76%	25.00%	0.15*
Lethargy	28.57%	31.25%	0.88
Abnormal Head Carriage	40.48%	43.75%	0.87

Odds Ratio: >1 = 1 <1   * Means *P-value* <0.05

Association between diagnosis and health outcome

	Treated within one month from initial pull			Re-treated within one month from previous treatment			Chronic (>3 treatments)		
	BRD +	Rest	Odds ratio	BRD +	Rest	Odds ratio	BRD +	Rest	Odds ratio
	24.8%	46.7%	0.38	9.9%	13.3%	0.71	4.0%	4.4%	0.89

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Product support

Products come and go, companies are absorbed by other companies based on patents and niche marketing. Hard to keep track of what technologies are readily available and which ones are on development stage.

Pushing New Boundaries in Livestock Farming

Introducing Virtual Fencing

eShepherd is a GPS enabled neckband with web applications that enable you to fence, move and monitor livestock. Draw your virtual fence anywhere on your property and your cattle are trained to remain within the virtual barrier.

Coming Soon!

Register your interest

Virtual fencing leader Agersens acquired by Gallagher

Leading developer of virtual fencing technology, Agersens, is now part of Gallagher Group under a strategic change of ownership that will allow us to further improve the solution and accelerate commercial expansion across Australian and international markets.

Read more

Limitations

Lyndsey Gilpin/TechRepublic

Most automatic procedures are based on human-made algorithms, and are often based on generalizations and assumptions that may or may not work on your conditions.

Competitive environment

Different technologies operate 'stand-alone' and will not communicate with each other.

towardsdatascience.com

van Erp-van der Kooij and Rutter, 2020

Reduced contact with animals

- Over-reliance on remote-sensing technologies may cause a reduced human-animal interaction that could lead to problems been overseen or detected too late.

van Erp-van der Kooij and Rutter, 2020

"IF YOU ASK ME TODAY'S FARMER IS GETTING TOO MODERN!"

- Good tools do not automatically guarantee good utilization.

- When technology malfunctions, delays in repairing them can lead to welfare risks for the animals.

van Erp-van der Kooij and Rutter, 2

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