AGVANCE
Success. Together.

WEBINAR:

Setting the Cow up for Success:

Dry Cow Management

QUESTION 1: What are we trying to achieve over the dry period?

- Cow condition of 4.8 - 5.2 at calving.
- Cow spends the dry period rebuilding fat, protein, and mineral stores, along with rebuilding/turning over milk secretory cells and maybe liver hepatocytes.
- Another key function of the dry period is getting the cow “match-fit” - strong rumination muscles, good capacity, strong immune system, and excellent liver capacity.

QUESTION 2: How do we use the various techniques and technology available for condition scoring cows?

- It's important to condition score at late-lactation, pre dry-off and pre-calving, at least to help with management decisions.
- We can score our cows visually, using weighing technology, AI camera technology and scanning.
- Once we know cow condition, we can use this data for feed decisions, mob decisions, and supplementary decisions.

QUESTION 3: What are the key nutritional strategies that help us achieve our dry period goals?

- ME, CP + Key AAs, NDF and minerals are all key in helping to rebuild milk secretory cells, fat and protein reserves, rumen function and capacity, bone Ca & P and liver capacity.
- It's important to make constant adjustments to diet and feed allocation based on cow performance and weather conditions.
- Basic 'back of the envelope' calculations are generally all that is needed to do the job well, as long as extra allowance is given.

WHAT ARE WE TRYING TO ACHIEVE OVER THE DRY PERIOD?

1. Increased level of stored fat.

2. Increased protein stores in muscle.

3. Rumination muscle fitness and rumen volume.

4. Increased calcium and phosphorus stores if low.

5. Milk secretory cell and liver recovery/capacity.

<u>GOAL</u>
Set us the cow to recover quickly post-calving, peak-milk earlier, peak-milk higher, maximise immune function, cycle earlier, get back in-calf, and minimise condition loss post-calving.

IDEAL LENGTH OF DRY PERIOD

- Dry period length should be no less than 45 days.
  - This is an inadequate time for udder recovery.
- The ideal dry period length is 50 – 70 days.
- Potential effects of >80-day dry period
  - Reduced milk production
  - Reduced fertility
  - Increased risk of metabolic disease post-calving

USING THE DRY PERIOD TO GET THE COW 'MATCH-FIT'

- It's important to keep the cow working with adequate fibre – NDF >45%. Ad-lib fibre helps to ensure maximum rumen fill.
- By keeping the rumination activity high, the rumen muscles stay strong.
  - Helps cow recovery post-calving
- Keeping pressure down on the liver to maximise liver capacity
  - Minimise highly fermentable energy and maximise fibre, particularly important in the second half of the dry period. Keep a careful balance, however, as cow intake is limited.
  - Increasing liver capacity is going to impact the liver's ability to metabolise fatty acids and metabolise hormones and enzymes for reproduction and immune system function.

CONDITION SCORING SYSTEMS

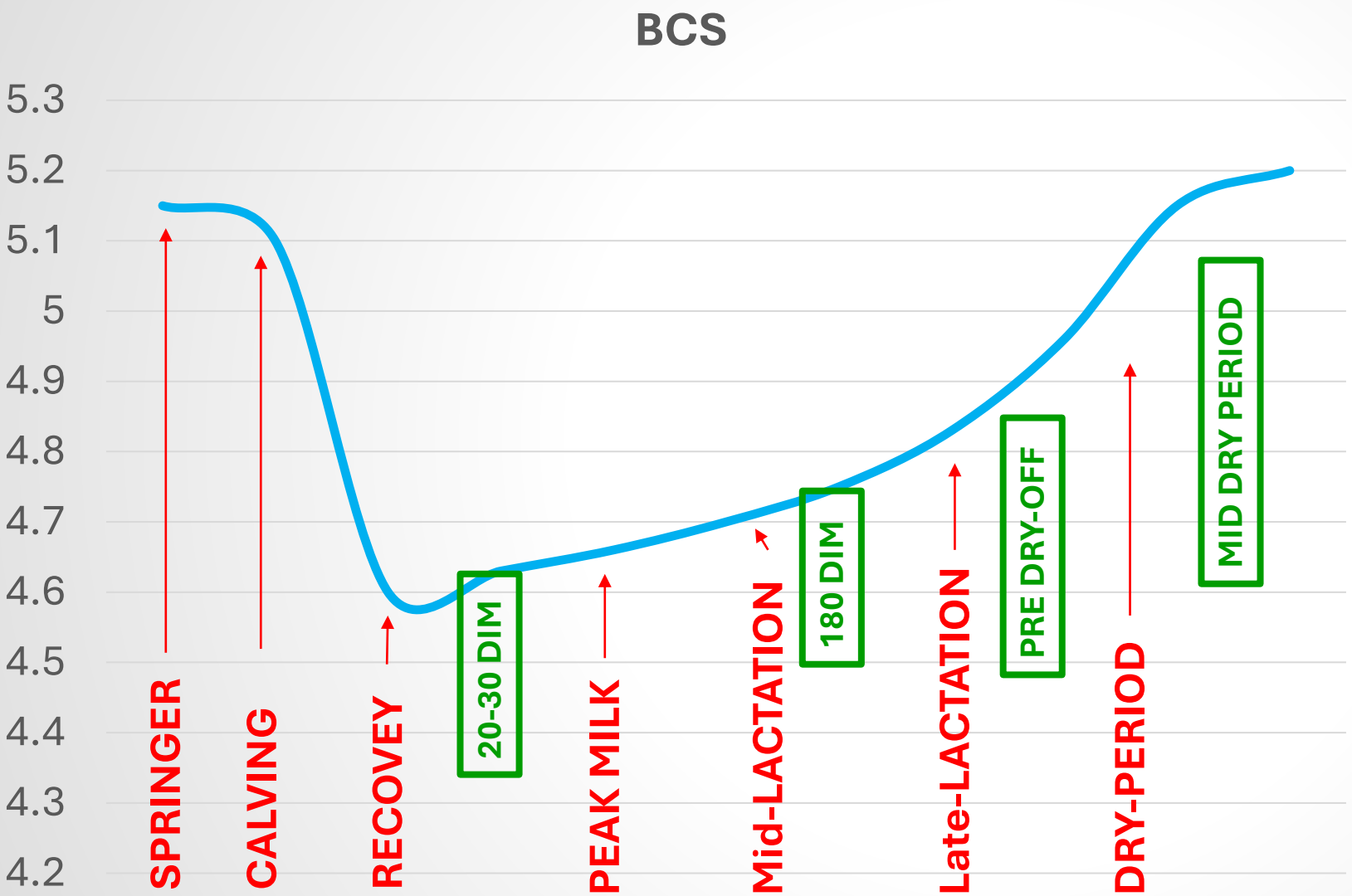
1. Visual scoring

2. Walk-over weighing

3. 2D/3D image & AI technology

4. Ultrasound scanning

USING TECHNIQUES & TECHNOLOGY FOR CONDITION SCORING



20-30 DIM

- How much condition was lost at calving?
- Adjustments needed to cow nutrition

180 DIM

- Access where the cows are
- Herd/OAD mob management

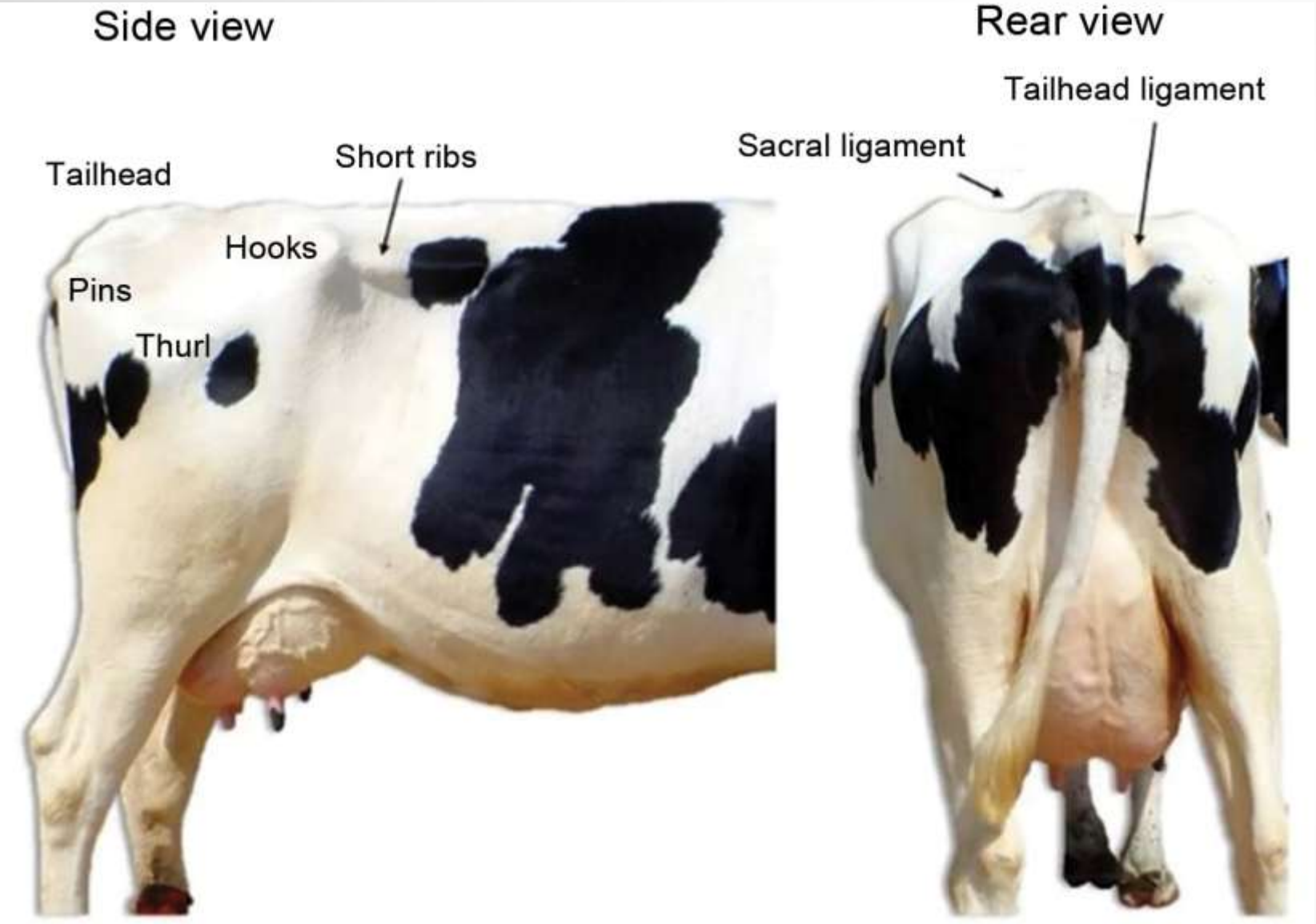
PRE DRY-OFF

- How much condition has been gained?
- Winter mob management

MID DRY PERIOD

- Have targets been achieved?
- Management decisions for springer nutrition?

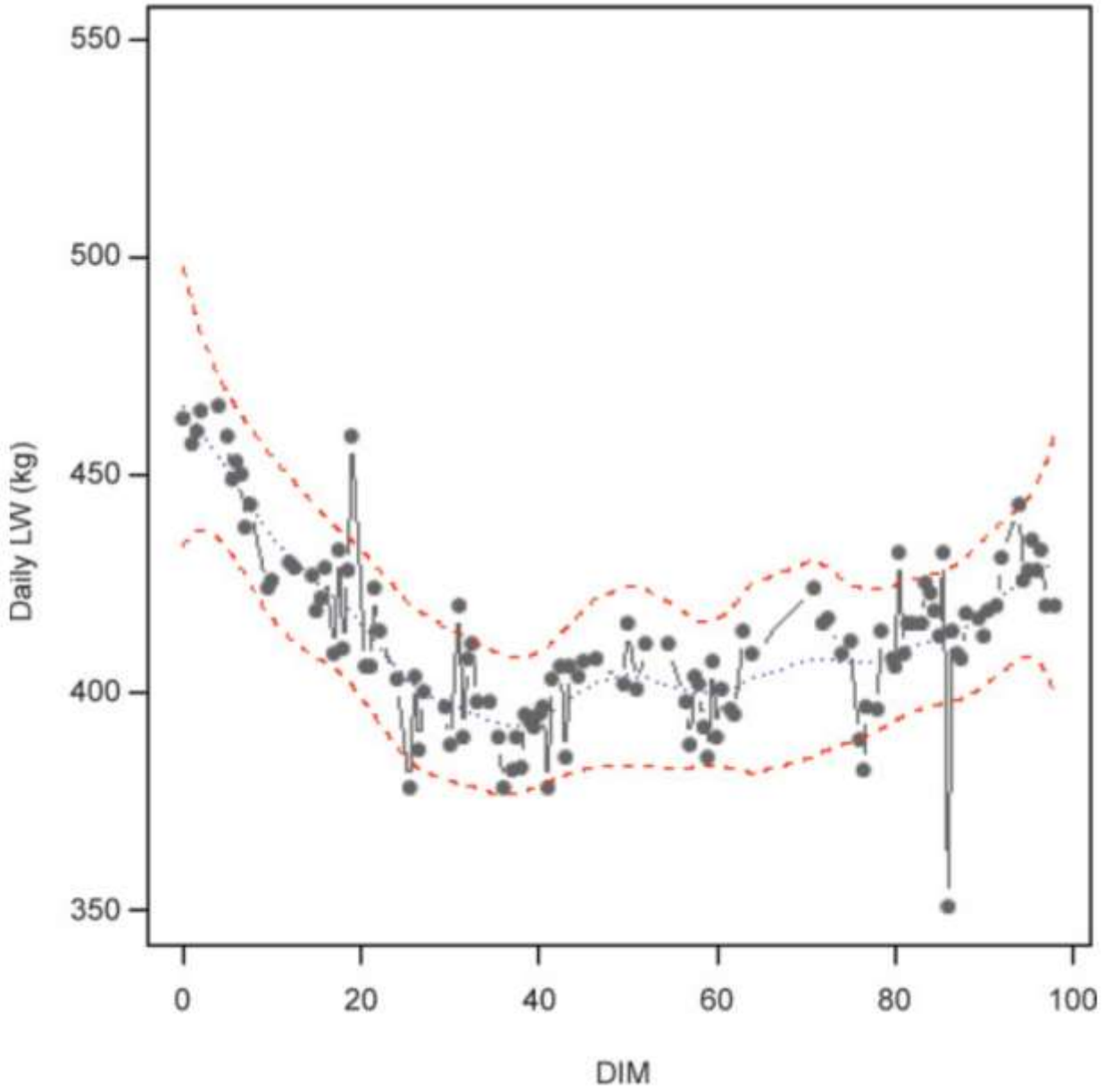
VISUAL CONDITION SCORING



Key points

- Calve the cows at 4.8-5.2 BCS.
- No more than 0.25-0.5 BCS gain over dry period.
- Minimum of four condition scores through the season is ideal.
- Develop an on-farm team that is tuned in to cow condition.
- Cow condition is like the fuel guage in a car.

WEIGHING THE COWS: CAN WE USE THIS TO CALCULATE CONDITION?



- Various researchers have showed weighing cows regularly has potential around monitoring changes in cow condition.
  Dickinson et al., 2013, Alawneh et al., 2011 & Roche et al., 2007a

- Consistent accuracy of +/- 10kg when comparing walk-over to static scales.

2D & 3D IMAGE SENSOR TECHNOLOGY

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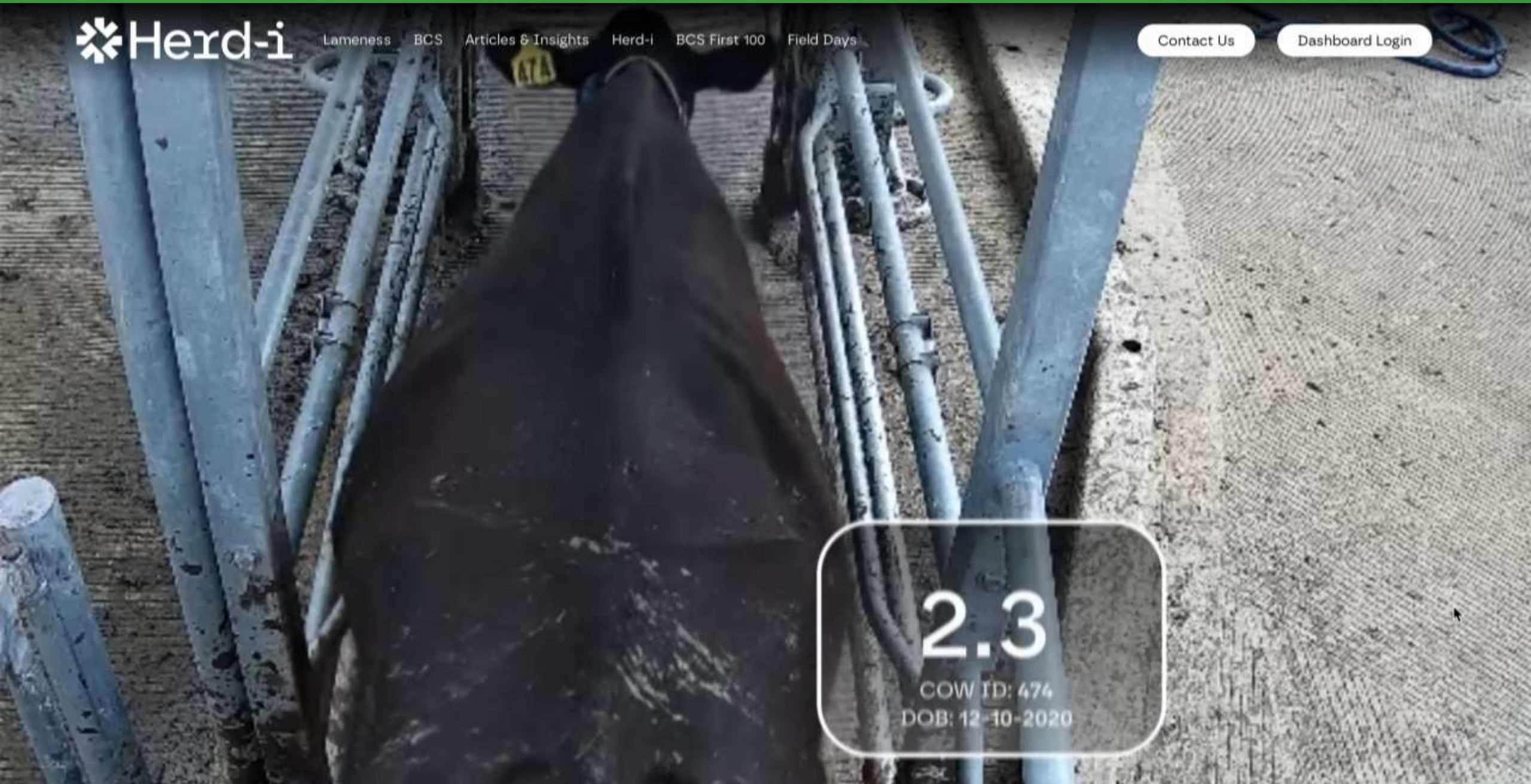


2D & 3D IMAGE SENSOR TECHNOLOGY

- Research and practical insights are indicating this technology, combining imaging and AI, has good application, particularly when combined with a lameness scoring system. The ROI is yet to be fully discovered.
- Likely provides best payback when used during first 100DIM to collect data around cow recovery post-calving.
- Also useful in late lactation and pre dry-off.

- Camera placement and exit-race setup are critical to accuracy.

- AI programing is also a big contributor to accuracy.

2D & 3D IMAGE SENSOR TECHNOLOGY

Table 2: Main research work of cattle body condition score estimation.

Work	Sensor	Dataset Size (images)	Automation level	Results
2D Sensors				
Bewley et al. (2008)	2D	834	low	92.79% within 0.25 deviation, 100% within 0.5 deviation
Battiato et al. (2010)	2D	286	low	Mean BCS error is 0.31
Azzaro et al. (2011)	2D	286	low	BCS error is 0.31
Halachmi et al. (2013)	2D (Thermal)	172	high	R=0.94
Bercovich et al. (2013)	2D	151	medium	50% within 0.25 deviation, 100% within 0.75 deviation
Li et al. (2019)	2D	2231	low	64.55% within 0 deviation, 94.5% within 0.5 deviation
Huang et al. (2019)	2D	8972	medium	98.46% BCS accuracy
3D Sensors				
Krukowski (2009)	3D (ToF)	471	medium	79% within 0.25 deviation, 100% within 0.5 deviation
Salau et al. (2014)	3D (ToF)	540	high	$R^2 = 0.7$
Hansen et al. (2015)	3D (RGB+depth)	95	high	93.33% BCS accuracy
Anglart (2014)	3D (ToF)	1329	high	R=0.84
Fischer et al. (2015)	3D (RGB+depth)	82	low	Test Set 1: R=0.89, RMSE=0.31 Test Set 2: R=0.96, RMSE=0.32
Shelley (2016)	3D (RGB+depth)	18,517	high	71.35% within 0.25, 93.91% within 0.5 deviation
Spoliansky et al. (2016)	3D Kinect	20	high	91% within 0.5 deviation
Kuzuhara et al. (2015)	3D	27	medium	$R^2 = 0.74$
Alvarez et al. (2018)	3D (RGB+depth)	1661	high	78% within 0.25 deviation, 94% within 0.5 deviation
Song et al. (2019)	3D	44	medium	0.72 BCS classification sensitivity
Yukun et al. (2019)	3D	3430	medium	77% within 0.25 deviation, 98% within 0.5 deviation
Rodríguez Alvarez et al. (2019)	3D	1661	medium	82% within 0.25 deviation, 97% within 0.5 deviation
Martins et al. (2020)	3D	53	medium	$R^2 = 0.63$
Liu et al. (2020)	3D Kinect	38	medium	76% within 0.25 deviation; 94% within 0.5 deviation
Zin et al. (2020)	3D (ToF)	52	medium	3.9% mean absolute percentage error

* R is correlation coefficient; R^2 is coefficient of determination;

RMSE (Root Mean Square Error) is the standard deviation of prediction errors.

Source: Qaio et al., 2021

- Albornoz et al., 2022
- Swartz et al., 2025
- O'Connor 2008

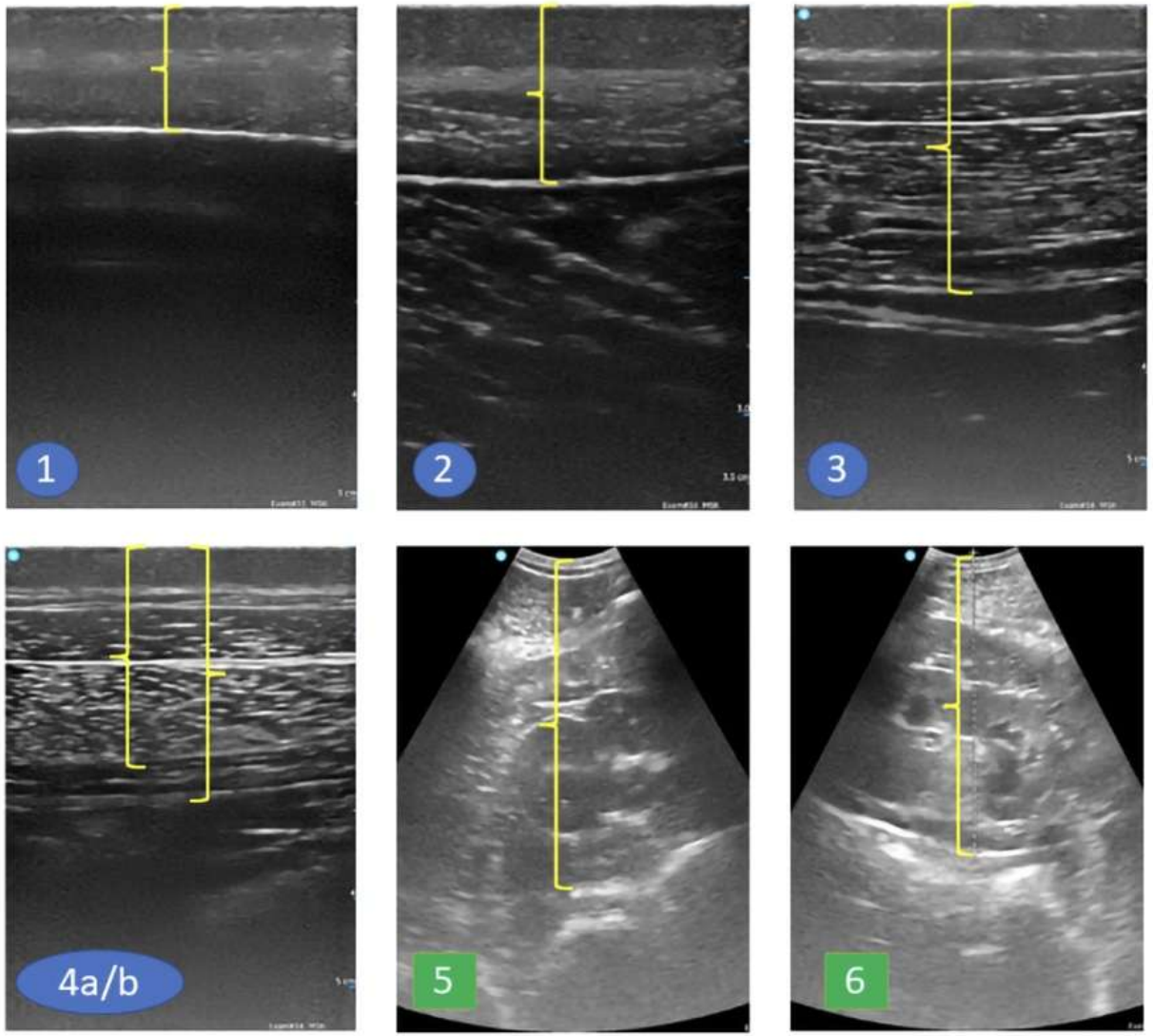
NZ Automated BCS Providers:

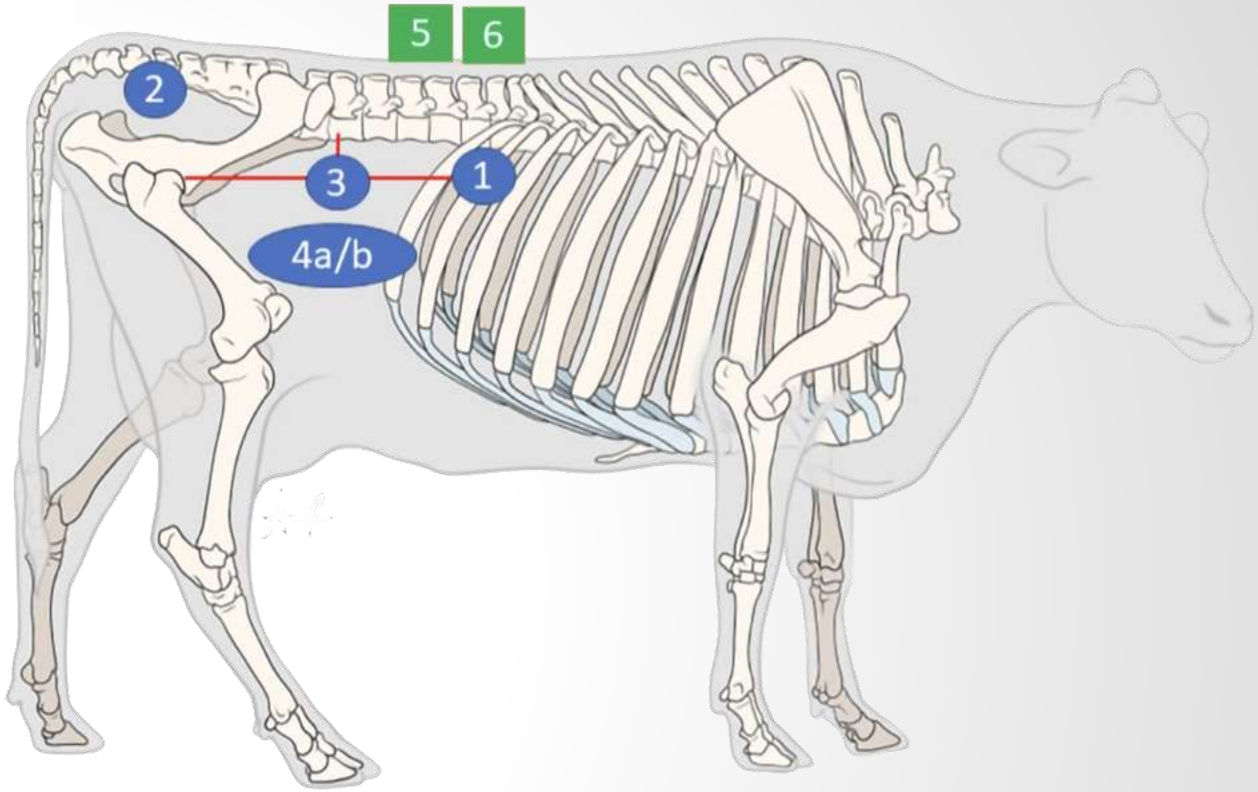
- Herd-I
- DeLaval

SCANNING THE COWS

- Ultrasound scanning is useful for determining the amount of fat and muscle in the cow.
- Useful for potentially diagnosing a high visceral fat vs subcutaneous fat proportion.
- Likely only useful/economic if metabolic issues have been a problem and answers are needed.

SCANNING THE COWS





Linear probe; musculoskeletal setting; 5 cm depth; 100% gain

Abdominal probe; abdominal setting; 24 cm depth; 100% gain

WHAT ARE WE TRYING TO ACHIEVE OVER THE DRY PERIOD?

1. Increased level of stored fat

METABOLISABLE ENERGY

2. Increased protein stores in muscle

CRUDE PROTEIN & AMINO ACIDS

3. Rumination muscle fitness and rumen volume

NDF/FIBRE & FEED VOLUME

4. Increased calcium and phosphorus stores if low

MINERAL NUTRITION & FEED ANALYSIS

5. Milk secretory cell and liver recovery/capacity

TIME, FEED NUTRITION & MINERAL NUTRITION

GOAL

Set up the cow to recover quickly post-calving, peak milk earlier, peak milk higher, maximise immune function, cycle earlier, get back in-calf and minimise condition loss post-calving.

ENERGY OFFERED - ENERGY QUALITY - ENERGY AVAILABILITY

Key to know

1. Energy content of feed
2. Energy availability of feed
3. Utilisation of that feed
4. Cow access/consistency to the feed

	MJ ME (% LWT)	480kg LWT, +0.5BCS 50 days, 10.5ME TD
Maintenance	8%	3.7kg DM
BCS gain	15%	6.9kg DM
Walking	2-4%	0.9-1.8kg DM
Wastage	+10-50%	1.2-5.8kg DM
TOTAL		**12.7-18.2**kg DM

FERMENTATION RATE OF ENERGY INFLUENCES TYPE OF FAT

- Once you have your energy calculations roughly sorted, it's important to assess the dynamics of the energy you are offering the cows.

- When the cow is fed a high fermentation rate dry period feed, this increases the visceral (SOFT - internal) fat proportion in the cow and decreases the subcutaneous (HARD - under the skin) fat proportion.

Higher levels of visceral fat have been associated with more condition loss post-calving and higher rates of ketosis/fatty liver. These effects flow on to peak milk and poor reproductive performance.

PROTEIN OFFERED...PROTEIN QUALITY...PROTEIN AVAILABILITY

- 12-14% CP is the minimum required over the dry period. However, just as important is the quality of protein.

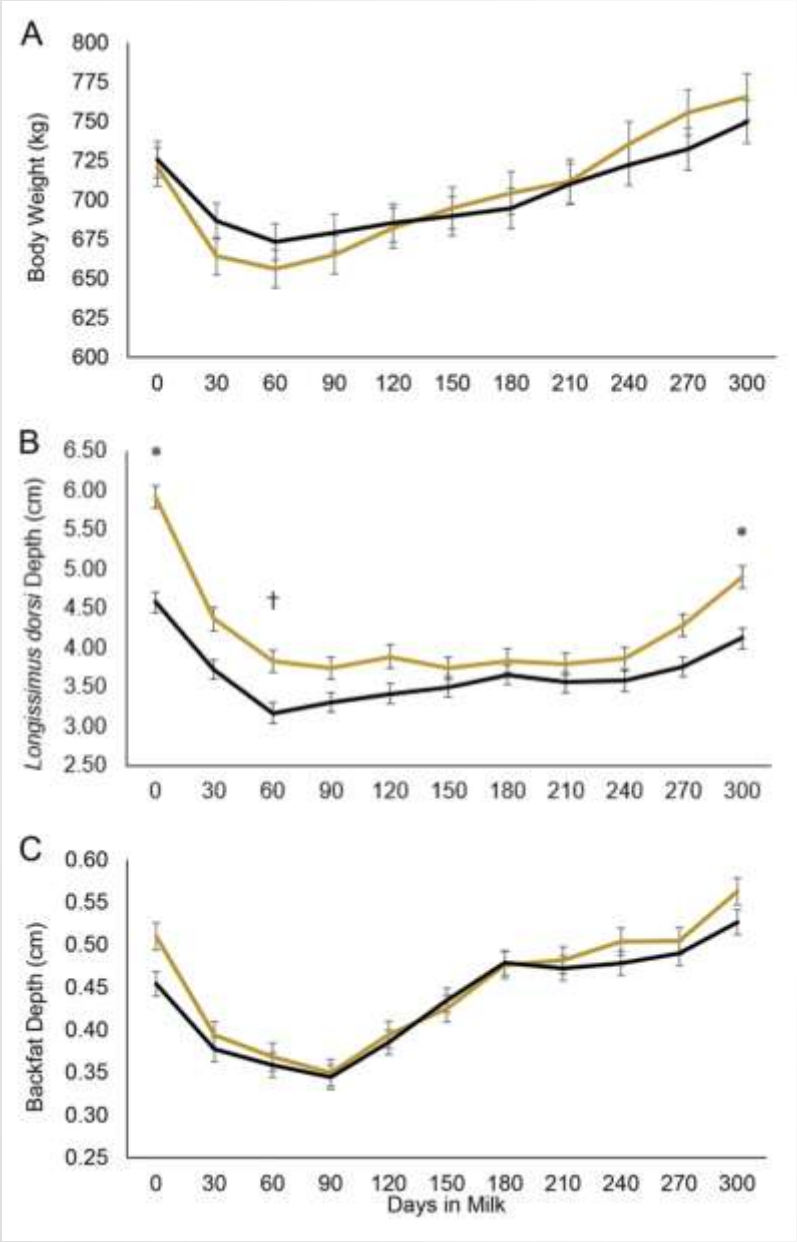
- Ensuring the cow is getting enough essential amino acids can make or break protein storage, milk secretory cell turnover, and liver recovery.

- There are some general rules around feed types etc.,
  but the best way to measure this is via herbage testing.

PARAMETERS FOR PROTEIN

- **Total protein**
- **Non-protein nitrogen**
- **Soluble protein**
- **RDP & UDP**
- **Fast, intermediate, and unavailable %**
- **Lysine, methionine, and histidine?**

NUTRITIONAL STRATEGIES FOR INCREASED PROTEIN STORAGE



- 2% increased milk production
- Potentially higher FCE
- More weight loss but less fat loss
- Less fat mobilisation required
- Superior metabolic performance

J. Dairy Sci. 108:1092–1102
https://doi.org/10.3168/jds.2024-25197

Assessment of skeletal muscle dynamics and milk production across a 300-day lactation in multiparous dairy cattle

Samantha L. Hanno, Theresa M. Casey, Hinayah Rojas de Oliveira, and Jacquelyn P. Boerman*
Department of Animal Sciences, Purdue University, West Lafayette, IN 47907

NDF OFFERED - NDF QUALITY - NDF AVAILABILITY

- It's important to keep the cow working with adequate fibre – NDF >45%. Ad-lib fiber helps to ensure maximum rumen fill.
- >80% of this fiber should be from forage sources. Forage fibre should have high palatability to improve herd distribution.
- **Total** rumination/eating mins (approx. 120% of level at peak milk), along with **deviation** of rumination/eating mins within a herd, are key metrics.
- If total rumination/eating mins are lower than ideal, analyse the diet and adjust.
- If deviation within the herd is high, check palatability, feed face dynamics, feed-out timing, herd sizes etc.

ANALYSIS - FILL THE GAPS

Like fat and protein, calcium and phosphorus are also important stored nutritional elements critical for cow function, particularly through transition, calving, peak milk, and repro...

There are two key factors: 1. Stored status & 2. Mineral nutrition

1. Stored status

Estimate Ca/P storage based on lactation. This will help determine the level of dry period supplementation needed.

2. Mineral nutrition

Analysis/Herbage tests will allow basic calculations.
>0.75%Ca & >0.32%P needed for storage.

TIME - FEED NUTRITION - MINERAL NUTRITION

Time and nutrition

Udder needs a minimum of 40 days for secretory cell regeneration.

- I have many questions around this - udder health, feed, mineral & vitamin nutrition?

The liver hepatocytes are also constantly regenerating:

- Liver repair: Choline, betaine, niacin, vit E, selenium & zinc
- Liver capacity: Hepatic capacity...amino acids, biotin, vit A/D/E & niacin
- Liver capacity: Oxidative capacity - copper, zinc, manganese & selenium

Barry Bradford and a few other researchers have touched on the topic, but the research is still developing.

10-point overview

1. No more than 0.25 – 0.5BCS gained over dry period

2. Subcutaneous vs visceral fat dynamic

3. Great potential in automated BCS systems

4. Don’t just focus on ME & DM when managing dry period diet

5. Fat & protein are mobilised at calving - metabolics behind this have particular importance!

6. Where can we improve as an industry?

THANK YOU FOR ATTENDING

For more information and previous webinars:

- Visit our website: www.agvance.co.nz
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