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WEBINAR:

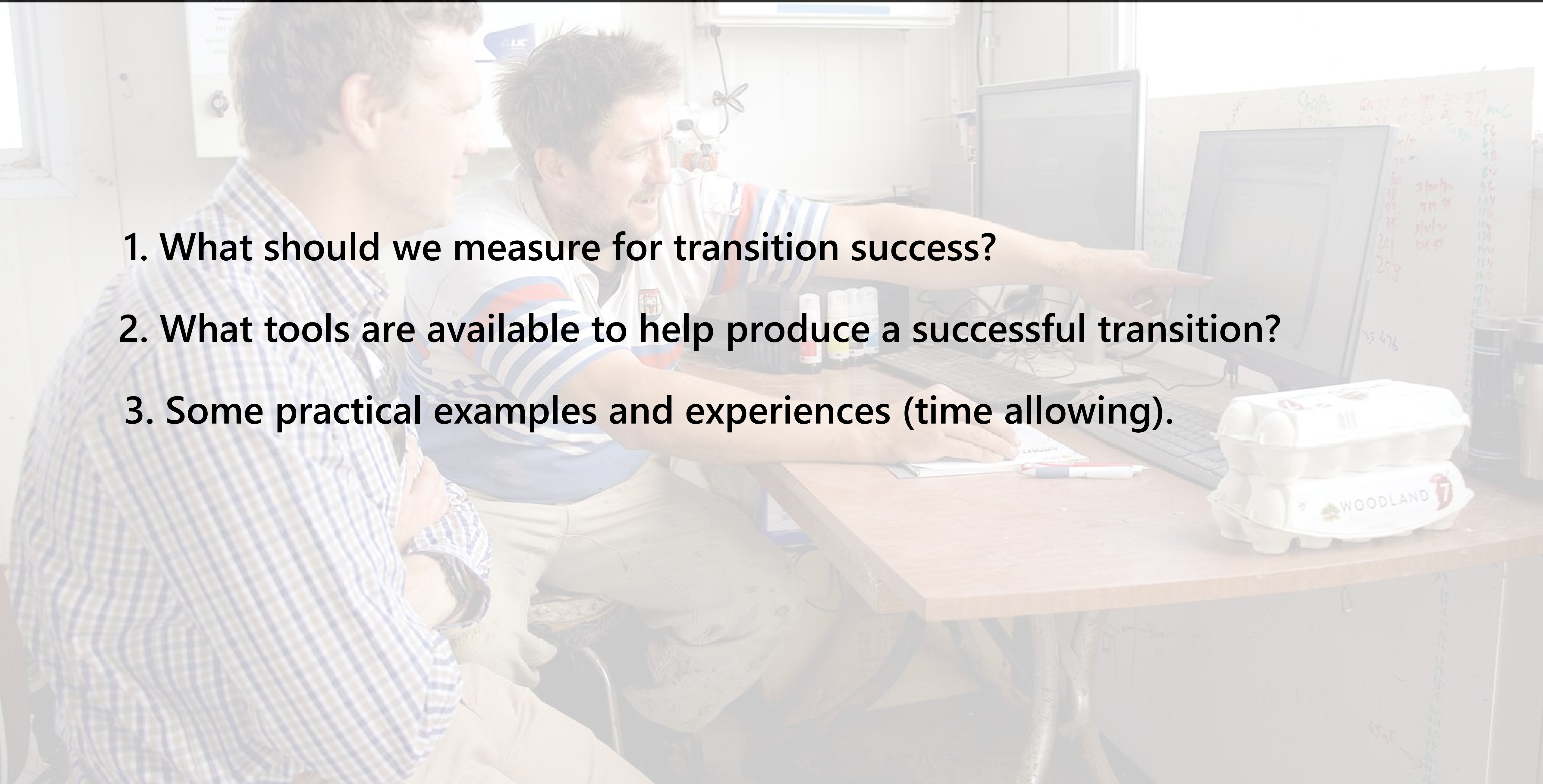
Setting the cow up for success:

Transition Cow Management

PART 2

Presented by SHAUN BALEMI

OVERVIEW



1. What should we measure for transition success?
2. What tools are available to help produce a successful transition?
3. Some practical examples and experiences (time allowing).

QUESTION 1: WHAT SHOULD WE MEASURE - GOOD/AVERAGE/POOR TRANSITION?

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- ✓ No condition loss pre-calving
- ✓ Liver tuned for lactation, ready to go!
- ✓ Optimum rumination mins
- ✓ Good energy levels at calving
- ✓ Consistent appetite close-up to calving
- ✓ Zero pre-calving metabolics/ketosis/low NEFA
- ✓ Less that 2% post-calving clinical metabolic disease or ketosis
- ✓ Recovery from inflammation
- ✓ Strong immune system
- ✓ Optimum cow recovery post-calving

1. NO CONDITION LOSS PRE-CALVING

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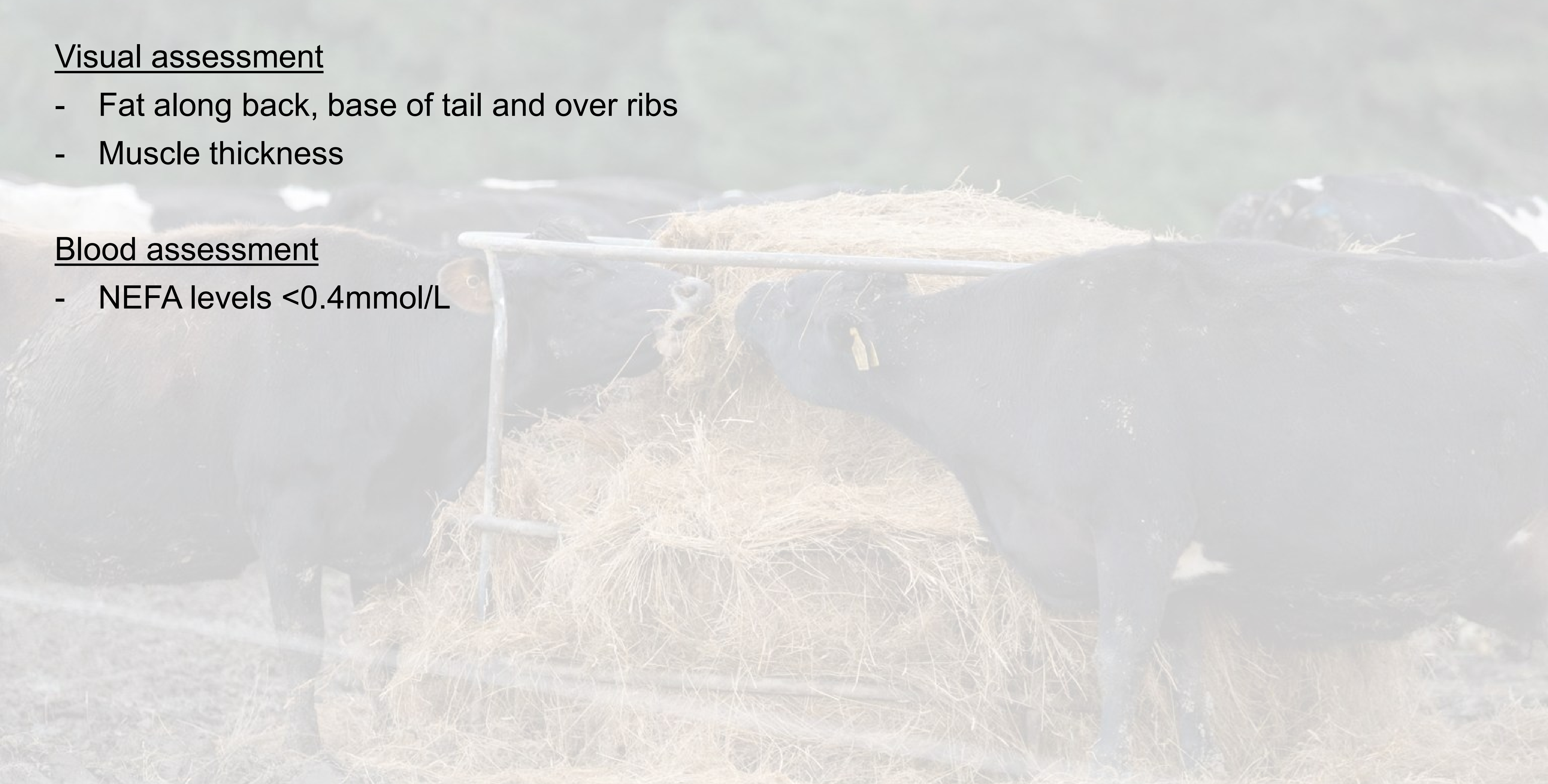
Visual assessment

- Fat along back, base of tail and over ribs
- Muscle thickness

Blood assessment

- NEFA levels <0.4mmol/L



2. LIVER IS TUNED FOR LACTATION, READY TO GO!

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The dry period and transition period is all about getting the cows in the right window ready for calving.

<u>Appetite & stress</u>

- Feed intake is a key indicator
- Cow behaviour, getting pushed off feed etc

<u>Blood assessment</u>

- Measure <1 week pre-calving
- NEFA levels <0.4mmol/L
- TP, COL, BILI, GGT & ALT?

3. OPTIMUM RUMINATION MINS

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Rumination minutes are one way to measure a stable/well-functioning rumen. However, you must incorporate blood liver and appetite factors for cow recovery measurement.

<u>Visual</u>

- Counting cow chews (70-80 chews/min
- Feed intake/appetite
- Cow should be either eating or ruminating/resting, never standing idle

<u>Cow measurement tech</u>

- Rumination: >70% of transition rumination
  i.e. >390mins rumination, with transition rumination of 560mins
- Activity/eating mins following rumination mins
- Water intake
- Rumen pH
- Temperature

4. GOOD ENERGY AT CALVING

This is really a visual-only assessment but important nonetheless.

It's important to assess the number of assisted calvings and overall cow energy levels at calving.

There are many elements that influence energy levels at calving, but it is a good tool for measuring an effective transition.

5. CONSISTENT APPETITE RIGHT UP TO CALVING

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Again, this is a visual, and potentially an activity, measurement.

We are looking for close-up cows, in particular, standing off the feed or getting pushed off the feed.

These cows are your high-risk cows for ketosis and metabolic disease. If the proportion of these cows is high, the cow is not in the optimum calving window.

6. ZERO PRE-CALVING METABOLICS/KETOSIS/LOW NEFA

Zero-treated metabolic cows is an easy measure.

Triggered by either low energy/liver instability OR calcium/potassium/phosphorus/magnesium imbalance.

<u>Blood assessment</u>

- Measure <1 week pre-calving
- NEFA levels <0.4mmol/L
- Cow-side ketone meters

7. LESS THAN 2% POST-CALVING METABOLIC DISEASE OR KETOSIS

Again, this is a visual measurement and relies heavily on record-keeping:

- It's important to record treated cows as downers, any cows showing clinical symptoms.

Cow-side ketone monitoring can be a cost-effective and useful tool.

<u>Blood assessment post-calving</u>

- Calcium: >2.2mmol/L
- Phosphorus: >1.8mmol/L
- Magnesium: 0.75-0.95mmol/L
- BOHB: <0.6mmol/L
- NEFA: <0.8mmol/L

8. RECOVERY FROM INFLAMMATION

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Part of the post-calving recovery process is recovering from the natural inflammation, with minimal to no bad inflammation developing.

The science is still developing, but we know that inflammation is linked with immune response and has a high energy cost.

There are multiple triggers/inducers of bad inflammation, liver stress/fatty liver, physical injury, lack of glucose, driving poor immune system response, leading to poor inflammation recovery.

<u>Potential blood assessment</u>

- Pro-inflammatory cytokines (PIC)
- Tumor necrosis factor (TNFa)
- Amyloid A, IL-1 & IL-6 are also used in oxidative stress models

9. STRONG IMMUNE SYSTEM

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This is most effectively measured by the level of animal health issues in early lactation.

<u>Helpful metrics:</u>

- RFMs
- Metritis/endometritis
- SCC
- Foot infections
- Other various diseases
- Immunoglobulin (IgG) in the blood
- Liver function blood indicators

10. OPTIMUM COW RECOVERY POST-CALVING

Each of these 10 factors culminates to make up a successful transition period, which results in fast cow recovery post-calving.

Helpful metrics:

- Rumination/activity mins
- Cow appetite & production
- Cow condition
- Blood glucose, BOHB/NEFA, calcium & bilirubin
- Cow temperature

QUESTION 2: WHAT ARE THE TOOLS AVAILABLE TO HELP WITH TRANSITION?

- ✓ Diet calculation tools
- ✓ Cow management
- ✓ DCAD and potassium management
- ✓ Calcium and phosphorus
- ✓ Rumen stabilisers: Buffers and yeasts
- ✓ B vitamins, vitamin E & vitamin D
- ✓ Methyl donors: Betaine
- ✓ Selenium, boron, chromium, copper, and zinc

DIET CALCULATION TOOLS

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DIET CALCULATORS

- Back-of-envelope
- Agvance calculator
- Diet check
- Rumen8
- Multiple spreadsheets

Using diet formulation tools, or the back of the envelope, is important to ensure the cow's nutrition requirements are being met, not exceeded, and that the rumen is working hard.

ENERGY - MJME

80 – 110% of maintenance, around 22-24% of LWT = 85 – 144ME (380 – 600kg cow).

PROTEIN - %CP

>14%, ideally 16-18%, amin acid supply/profile is critical.

FIBRE - %NDF

>45%, however, the situation and availability are more important. Therefore, ad-lib is my general recommendation.

DIET CALCULATION TOOLS

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Sample Name: **Lab Number:**

Sample Type: Mixed Pasture (P1)

Analysis		Level Found	Medium Range	Low	Medium	High
Nitrogen*	%	2.6	4.0 - 5.0			
Nitrogen*	%DM	2.8				
Phosphorus	%	0.29	0.38 - 0.45			
Potassium	%	1.8	2.5 - 3.0			
Sulphur	%	0.26	0.30 - 0.40			
Calcium	%	0.81	0.60 - 1.00			
Magnesium	%	0.25	0.20 - 0.30			
Sodium	%	0.321	0.150 - 0.300			
Iron	mg/kg	185	100 - 250			
Manganese	mg/kg	68	60 - 150			
Zinc	mg/kg	37	30 - 50			
Copper	mg/kg	7	10 - 12			
Boron	mg/kg	6				
Molybdenum	mg/kg	0.36	0.50 - 1.2			
Cobalt	mg/kg	0.14	0.10 - 0.20			
Selenium	mg/kg	0.11	0.08 - 0.15			
Chloride*	%	0.66	0.30 - 2.4			
Dry Matter*	%	19.8	12.0 - 30.0			
Crude Protein*	%DM	17.3	20.0 - 30.0			
Acid Detergent Fibre*	%DM	24.7	20.0 - 30.0			
Neutral Detergent Fibre*	%DM	45.2	30.0 - 45.0			
Ash*	%DM	9.0	7.0 - 14.0			
Organic Matter*	%DM	91.0				
Soluble Sugars*	%DM	10.7				
Starch*	%DM	< 0.5				
Crude Fat*	%DM	3.4				
Digestibility of Organic Matter in Dry Matter (DOMD)*	%	72.2	65.0 - 80.0			
Metabolisable Energy*	MJ/kgDM	11.5	9.0 - 12.0			

KEY ELEMENTS

DCAD = (Na + K) – (Cl + S)

Sodium %

Potassium %

Chloride %

Sulphur %

Calcium %

Phosphorus %

Magnesium %

Dry matter (DM)

Metabolisable energy (ME)

DIET CALCULATION TOOLS

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Edit Recommendation - Balemi, Agvance

Summary

P 47 Ca 126 Mg 38 K 353 Na 33 S 58 Cl 200
Cu 191 Zn 943 Co 12 I 1 Mn 807 Se 4.50 B 159 Vit A 70250 Vit D 0 Vit E 1355

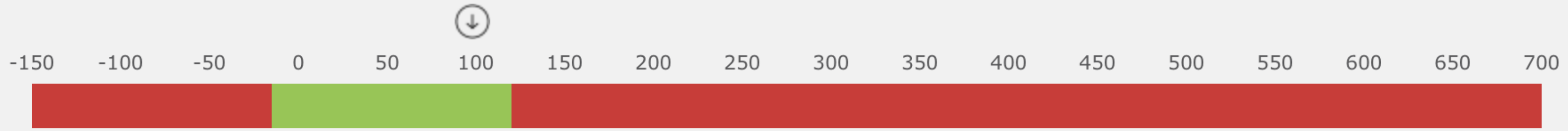
DCAD VALUE 95 GOOD

Number of Days	126	Client Group	1.5
Number of Cows	20	Price To Vet Client	**$1,197.29**
Number of Doses	2520	Vet Client Cost Per Dose	**47.51 cents**
Dose Rate	400.0 grams	Total Kg	1008 Kg ?
Animal Type	Cow	Add Rumasweet ☐ Add Aniseed ☐ $0.00	Add Canola Oil ☐ ?
Notes For Bag Label			

To edit the number of cows change the herds for this order

Products | **Herds** | **Feeds** | **Nutrient Calculations**

Type	Feed	Amount	
Feed	Pasture (Spring)	4.00 Kg DM	Delete
Feed	Pasture Silage (average)	6.00 Kg DM	Delete
Feed	Straw (Barley)	2.00 Kg DM	Delete
Feed	Barley	0.50 Kg DM	Delete



Add Feed... Amount Kg DM | Add Feed | Create Custom Feed | Edit Feeds List

Add Additive... Amount Gms/cow | Add Additive | Create Custom Additive

DIET CALCULATION TOOLS

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Edit Recommendation - Balemi, Agvance

Summary

P 47 Ca 126 Mg 38 K 353 Na 29 S 58 Cl 190
Cu 189 Zn 936 Co 11 I 1 Mn 807 Se 4.40 B 158 Vit A 70250 Vit D 0 Vit E 1355

DCAD VALUE 104 GOOD

Number of Days	14	Client Group	1.5
Number of Cows	1000	Price To Vet Client	**$6,752.43**
Number of Doses	14000	Vet Client Cost Per Dose	**48.23 cents**
Dose Rate	380.0 grams	Total Kg	5320 Kg ?
Animal Type	Cow	Add Rumasweet ☐ Add Aniseed ☐ $0.00	Add Canola Oil ☐ ?
Notes For Bag Label			

ⓘ To edit the number of cows change the herds for this order

Products | **Herds** | **Feeds** | **Nutrient Calculations**

Product Name	**Gr/Dose**	**Mg/U.I. Per Dose**	**Kg**	**Recommended Range**		
Springer Transition Cow Health	380.0000		5320.000			Delete

DIET CALCULATION TOOLS

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Edit Recommendation - Balemi, Agvance

Summary

P 47 Ca 126 Mg 38 K 353 Na 33 S 58 Cl 200
Cu 191 Zn 943 Co 12 I 1 Mn 807 Se 4.50 B 159 Vit A 70250 Vit D 0 Vit E 1355

DCAD VALUE 95 GOOD

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Animal Type	Cow	Add Rumasweet ☐ Add Aniseed ☐ $0.00	Add Canola Oil ☐ ?
Notes For Bag Label			

To edit the number of cows change the herds for this order

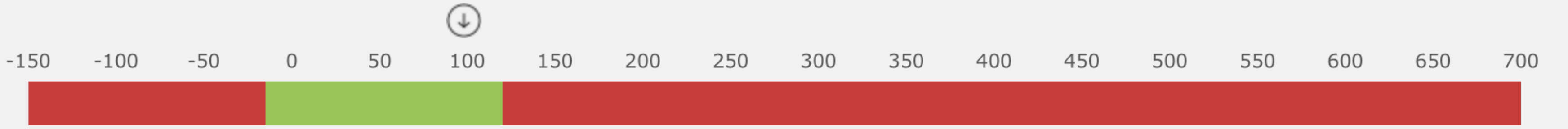
Products | **Herds** | **Feeds** | **Nutrient Calculations**

Transition | Cow - Friesian | Print Report

	P	Ca	Mg	K	Na	S	Cl
Total Diet	47	126	38	353	33	58	200
Requirement	**42.6**	**103.2**	**49.0**	**144.5**	**16.8**	**25.8**	**70.9**

	Cu	Zn	Co	I	Mn	Se	B	Vit A	Vit D	Vit E
Total Diet	191	943	12	1	807	4.50	159	70250		1355
Requirement	**200.00 ppm**	**750.00 ppm**	**1.80 ppm**	**14.00 ppm**	**270.00 ppm**	**6.00 ppm**	**150.00 ppm**	**75000.00 IU**	**0.00 IU**	**875.00 mg**

	Weight	Total Energy	Average Energy	Crude Protein	Eff Fiber	Fat
Total Diet	12.90 Kg DM	128 (MJ)	10 ME	2,100 (g)	4,460 (g)	362 (g)



COW MANAGEMENT

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Transition length

- 14+ days with minor dry transition diet change.
- 21+ days with a medium dry transition diet change.
- 28+ days with a major dry transition diet change.

Cow condition

- Av. <4.8 BCS, 22% LWT ME, >14% CP, ad-lib fibre.
- Av. 4.8 – 5.2 BCS, 22% LWT ME, >14% CP, ad-lib fibre.
- Av. >5.2 BCS, 24% LWT ME (sugar), >16% CP, ad-lib fibre, betaine.

Water, feed & supplement supply

- WATER: Quality and quantity.
- FEED: Correct balance and quality, along with consistent availability.
- SUPPLEMENT: Correct balance and palatability with even delivery.

Stress & group management

- Minimise weather stress with shelter.
- Don’t move cows between groups.
- Have a close-up group if transition groups are large.

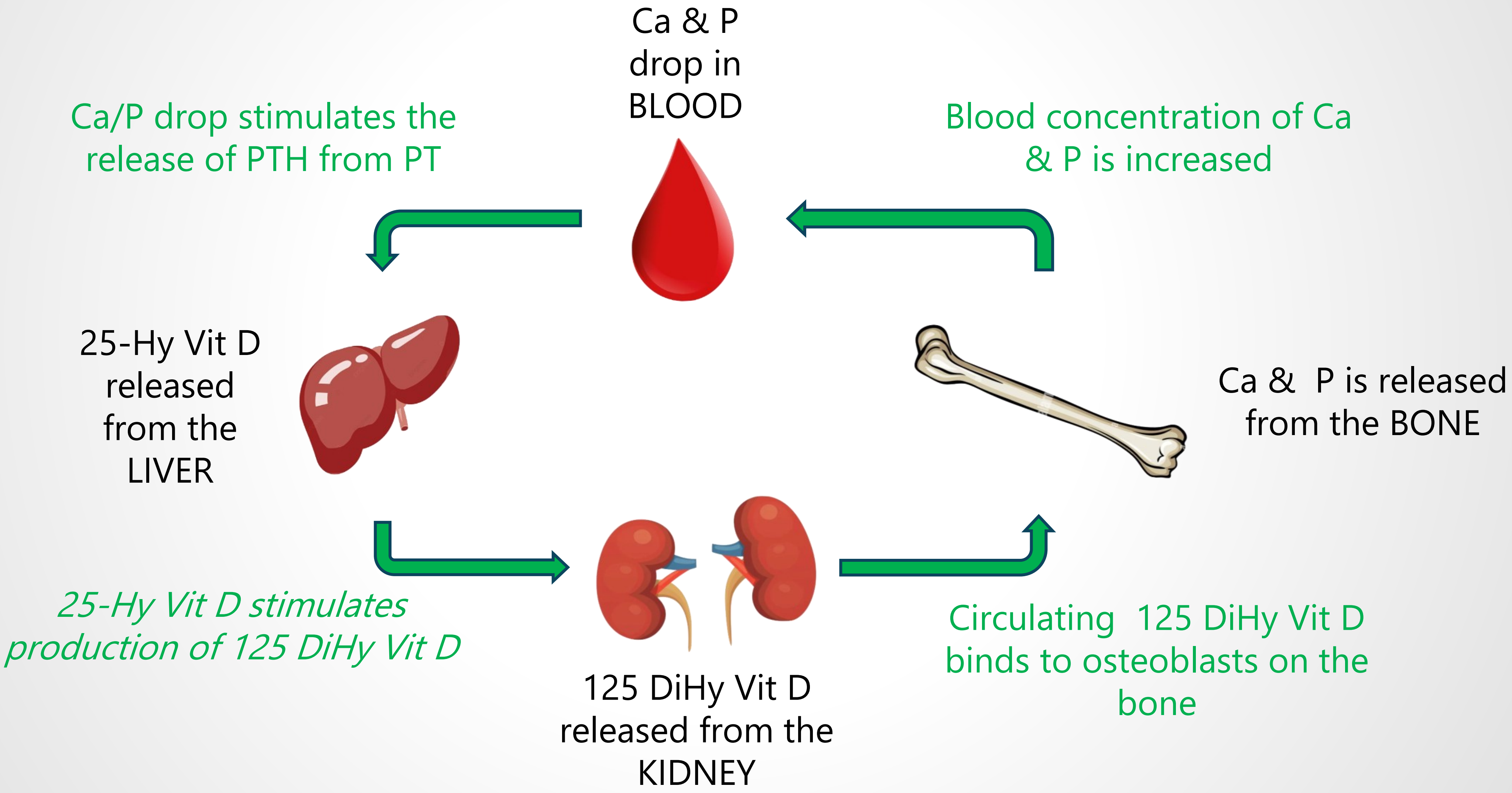
DCAD & POTASSIUM MANAGEMENT

- Dietary cation anion difference.
- We decrease the DCAD by increasing the anions in the diet.
- This causes the cations to decrease, thus lowering the amount of bicarbonate in the blood.
- As we lower bicarbonate levels in the blood, the cow's sensitivity to parathyroid hormone (PTH) increases.
- PTH is released when calcium levels in the blood drop.
- The release of PTH stimulates the production of 125-dihydroxy vitamin D in the kidney.
- 125-dihydroxy vitamin D does two things: 1. Stimulates the release of calcium from the bone, and 2. Increases calcium absorption from the diet.
- This process of PTH/vitamin D release/reabsorption happens very fast.

DCAD & POTASSIUM MANAGEMENT

- Aiming for a DCAD less than 100meq.
- Calculate using ALL sources of feed.
- Time is important to drive pH down in the blood, minimum 14 days, ideal 21 days.
- Liver stored vitamin D levels are important to Ca/P metabolism.
- Pre-loading with vitamin D over the dry period is a useful tool.
- Calcium and phosphorus supplementation are critical post-calving. It takes 24-48hr for blood pH to balance again after calving on a negative DCAD system. This also has an impact on bicarbonate buffering capacity.
- Colostrum blends/loose licks are particularly important to use alongside DCAD transition blends.

DCAD & POTASSIUM MANAGEMENT



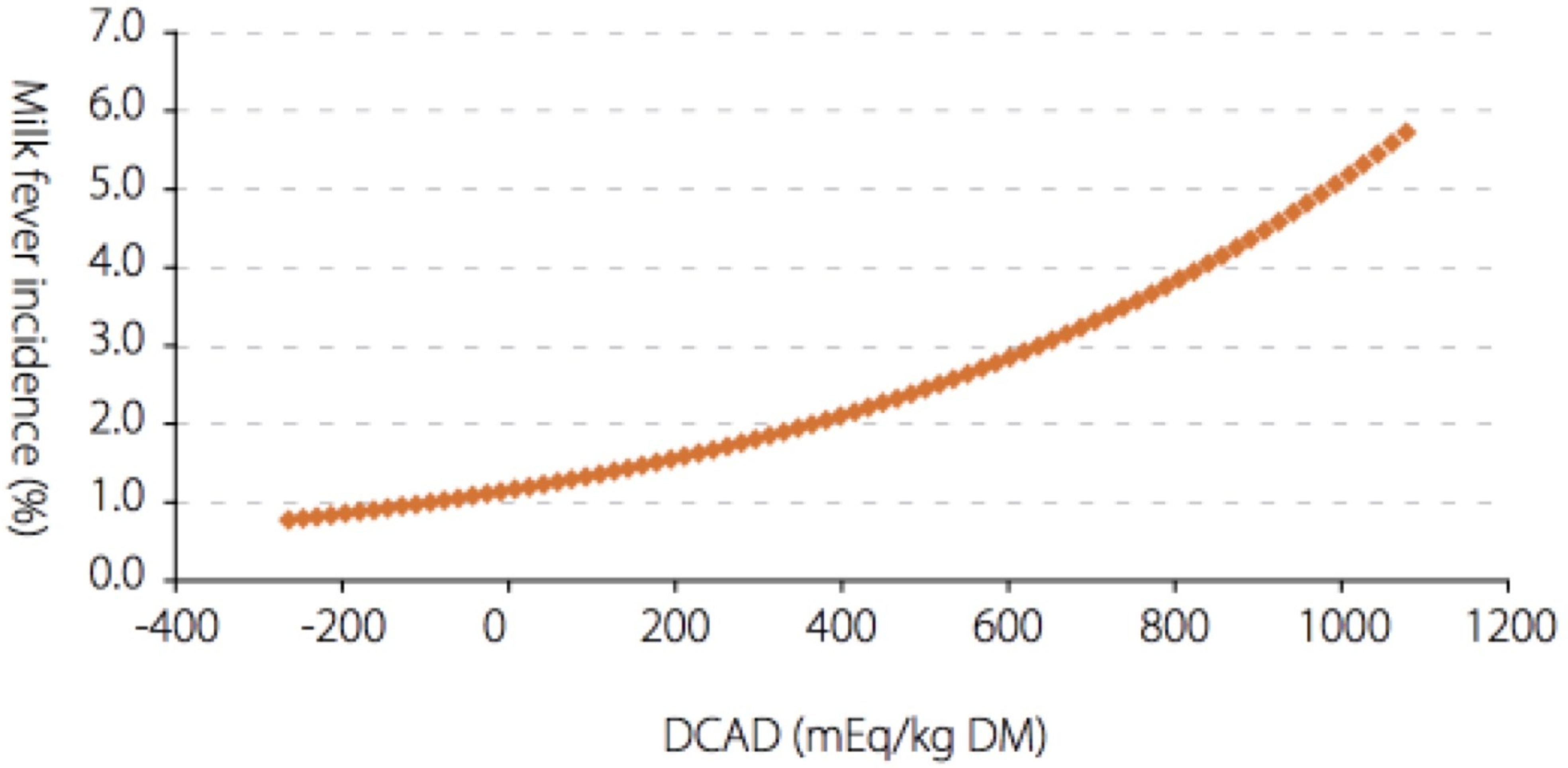


Figure 9: Relationship between DCAD and milk fever risk (Lean et al. 2006).

CALCIUM

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- Most springer diets are below the requirement for calcium. Feed concentrations should be 7.5 Ca/kg DM[11] or 0.75% of the total diet.

- It is important that the correct type of calcium is supplemented.

- Calcium must be fed in an acid salt form, such as calcium sulphate/calcium chloride, or a pH-neutral form, such as Calsea.

- Excess calcium levels will cause metabolic alkalosis, which shuts down the PTH, causing the kidneys to reabsorb bicarbonate, which boosts blood bicarbonate levels.

- Feeding anionic salts will help prevent metabolic alkalosis and increase the cow’s ability to mobilise and absorb calcium. However, it also increases her excretion of calcium via the urine.

- When feeding anionic salts, it is most important that calcium is supplemented at a minimum to meet requirements[11].

PHOSPHORUS & CALCIUM

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- Research indicates that phosphorus has both a positive and negative effect on calcium homeostasis in the transition cow (Goff, 2020).

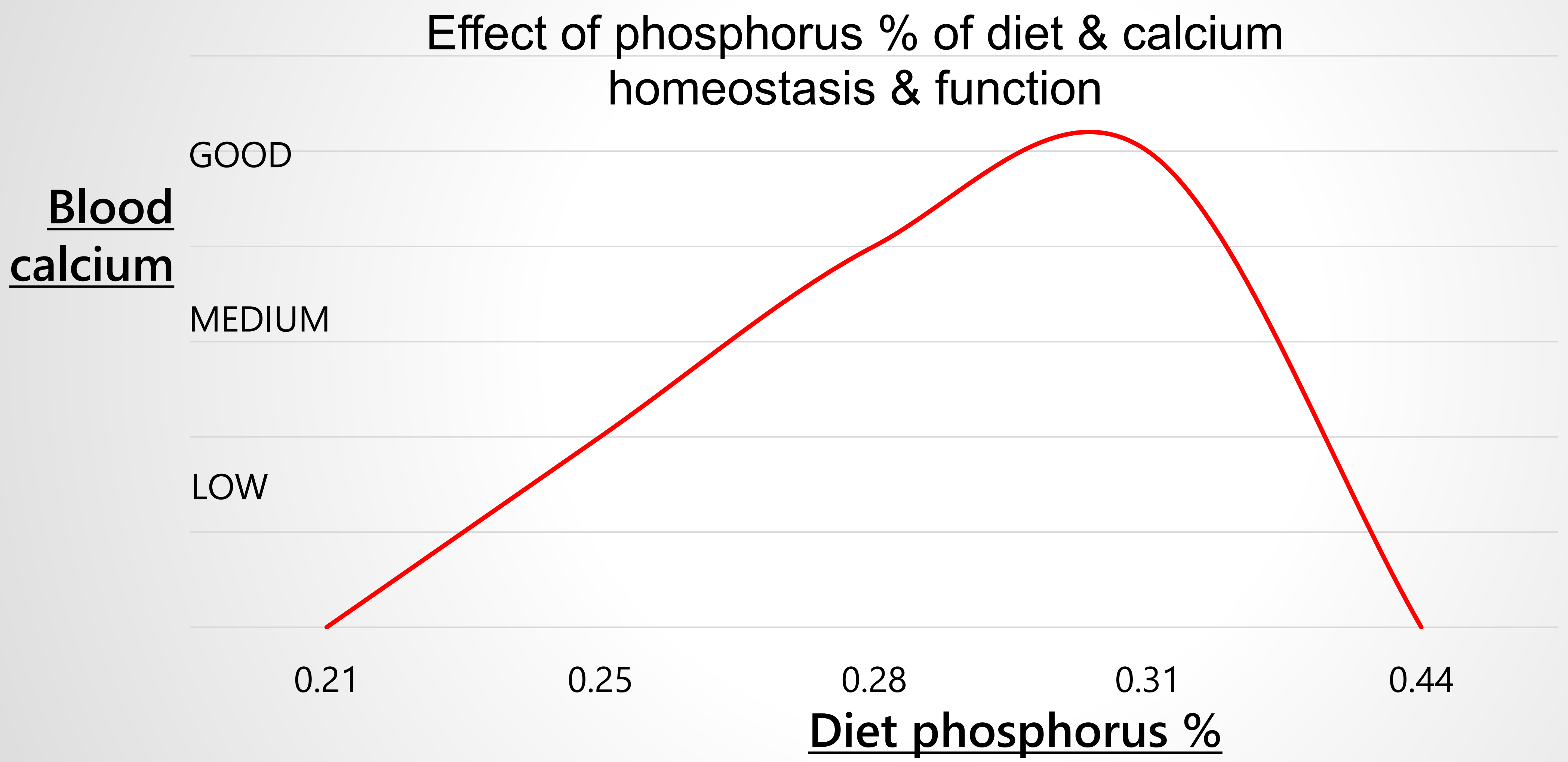
- Grunberg et al., 2019 showed that P intakes below 0.25% pre-calving resulted in reduced feed intakes and lower milk production after one-week post-calving. This data was also supported in work done by Valk & Sebek, 1999 (<0.28% P) and Puggaard et al., 2014 (<0.21% P).

- Having adequate P & Ca is important for the presence of osteocalcin, which is important for the mineralisation/storage of bone Ca & P. Puggaard et al., 2014 showed that in a diet containing P 0.21%, osteocalcin was significantly lower than a diet containing P at 0.31%.

- Oestocalcin is also important for energy metabolism in the cow (Puggaard et al., 2014).

- Increased P levels in the blood cause an increase in fibroblast growth factor, which stops the kidney synthesis of 125-dihydroxyvitamin D, which negatively interferes with both Ca and P absorption from the intestine and bone resorption (Goff, 2020).

PHOSPHORUS & CALCIUM



Graph extrapolated from: Goff, 2020, Puggaard et al., 2014, Peterson et al., 2005, Valk & Sebek, 1999 & Barton, 1987

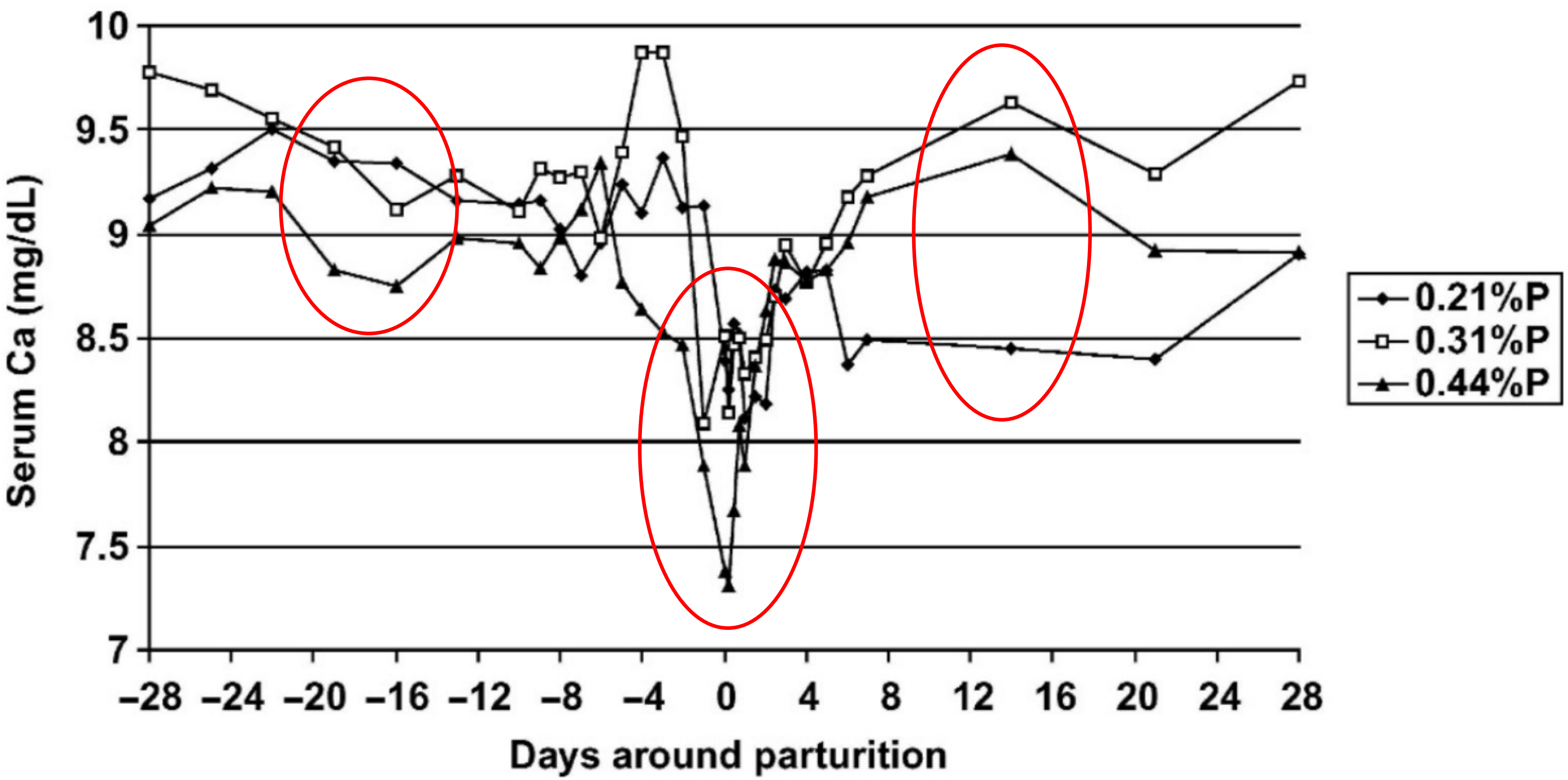


Figure 4. Effects of prepartum dietary P treatments (0.21, 0.31, or 0.44% dietary P, dry basis) on total serum Ca concentrations from 28 d prepartum through 28 d postpartum; d 0 is day of calving (SEM = 0.49; $P < 0.05$ for treatment by time interaction in prepartum period; $P < 0.03$ for treatment by time interaction for the periparturient period; $P < 0.04$ for treatment by time interaction for the postpartum period).

source: Peterson et al., 2005

PHOSPHORUS

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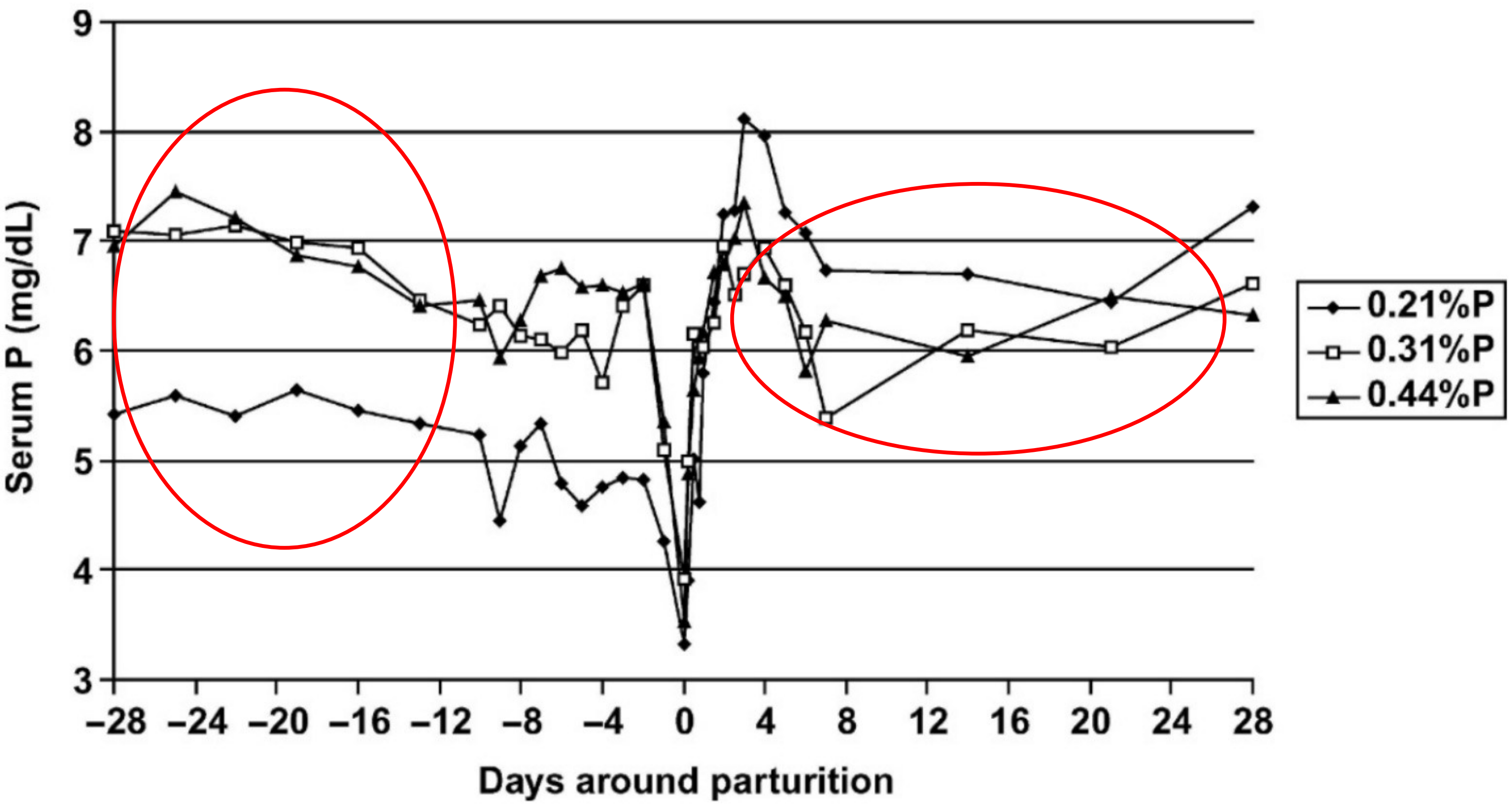

Figure 3. Effects of prepartum dietary P treatments (0.21, 0.31, or 0.44% dietary P, dry basis) on serum P concentrations from 28 d prepartum through 28 d postpartum; d 0 is day of calving (SEM = 0.38; $P < 0.01$ for treatment by time interaction in the periparturient and postpartum periods).

source: Peterson et al., 2005

PHOSPHORUS & DMI

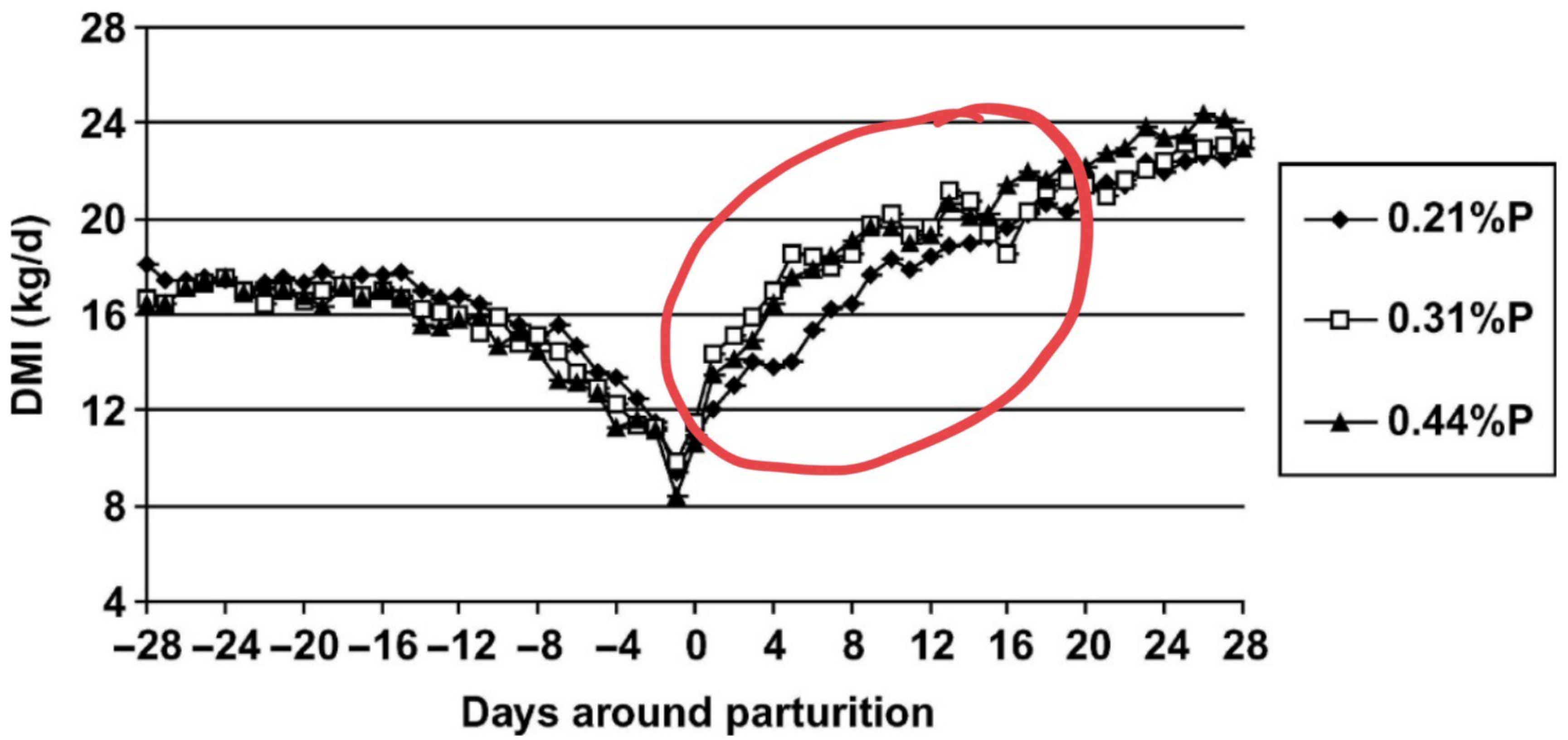

Figure 1. Dry matter intake as affected by prepartum dietary P treatments (0.21, 0.31, or 0.44% dietary P, dry basis) from 28 d prepartum through 28 d postpartum; d 0 is day of calving (SEM = 1.2).

Source: Peterson et al., 2005 ($P<0.10$)

PHOSPHORUS EFFECTS ON BCS & SCC

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Table 7. Least squares means and orthogonal contrasts for milk yield and composition variables during the postpartum period (from parturition through 28 d of lactation).

Milk variables	Treatments 0.21%P	0.31%P	0.44%P	SE	Contrasts 0.21%P vs. 0.31%P, 0.44%P	0.31%P vs. 0.44%P
					P <	
ECM yield,[1] kg/d	53.4	53.2	52.2	1.49	NS[2]	NS
Adjusted ECM,[3] kg/d	54.4	53.2	51.7	1.58	NS	NS
SCC, ×1000/mL	1447	592	354	285	0.01	0.04
P, mg/dL	76.9	70.6	65.5	2.25	0.01	0.06
Fat, %	5.44	5.32	5.04	0.23	NS	NS
Fat, kg/d	2.25	2.29	2.26	0.14	NS	NS
Protein, %	3.06	3.11	2.99	0.07	NS	NS
Protein, kg/d	1.23	1.29	1.30	0.05	NS	NS
Lactose, %	4.65	4.76	4.70	0.05	NS	0.09
Lactose, kg/d						
SNF, %						
SNF, kg/d						

[1]Energy-corre
yield (lb) (Dairy
[2]NS = Not sig
[3]Adjusted EC

Table 6. Least squares means and orthogonal contrasts for treatment and treatment by time interactions for DM intake and blood variables during the postpartum period (from parturition through 28 d postpartum).

Variables	Treatments 0.21%P	0.31%P	0.44%P	SE	Contrasts 0.21%P vs. 0.31%P, 0.44%P	Contrasts 0.31%P vs. 0.44%P	Contrasts by time[1] 0.21%P vs. 0.31%P, 0.44%P	Contrasts by time[1] 0.31%P vs. 0.44%P
					P <			
DMI, kg/d	18.9	19.7	19.9	0.92	NS[2]	NS	NS	NS
DMI, % BW	2.88	3.05	3.00	0.14	NS	NS	NS	NS
BCS	2.99	3.20	3.16	0.39	0.08	0.09	NS	NS
BCS change	–0.11	–0.09	–0.12	0.04	NS	NS	NS	NS
BW, kg	657	665	695	11.0	NS	NS	NS	NS
BCS change, kg	–64.0	–59.0	–47.0	12.4	NS	NS	NS	NS

Source: Peterson et al., 2005

METHYL DONORS: BETAINE

Betaine has been commonly used to combat heat stress through its effects on stabilising a stressed rumen and improving liver performance when under pressure.

Production results & dose rates vary a lot, however, 15-25g seems to be a sweet spot in early lactation for our cows to help with transition, calving & recovery, particularly in over-conditioned calving cows.

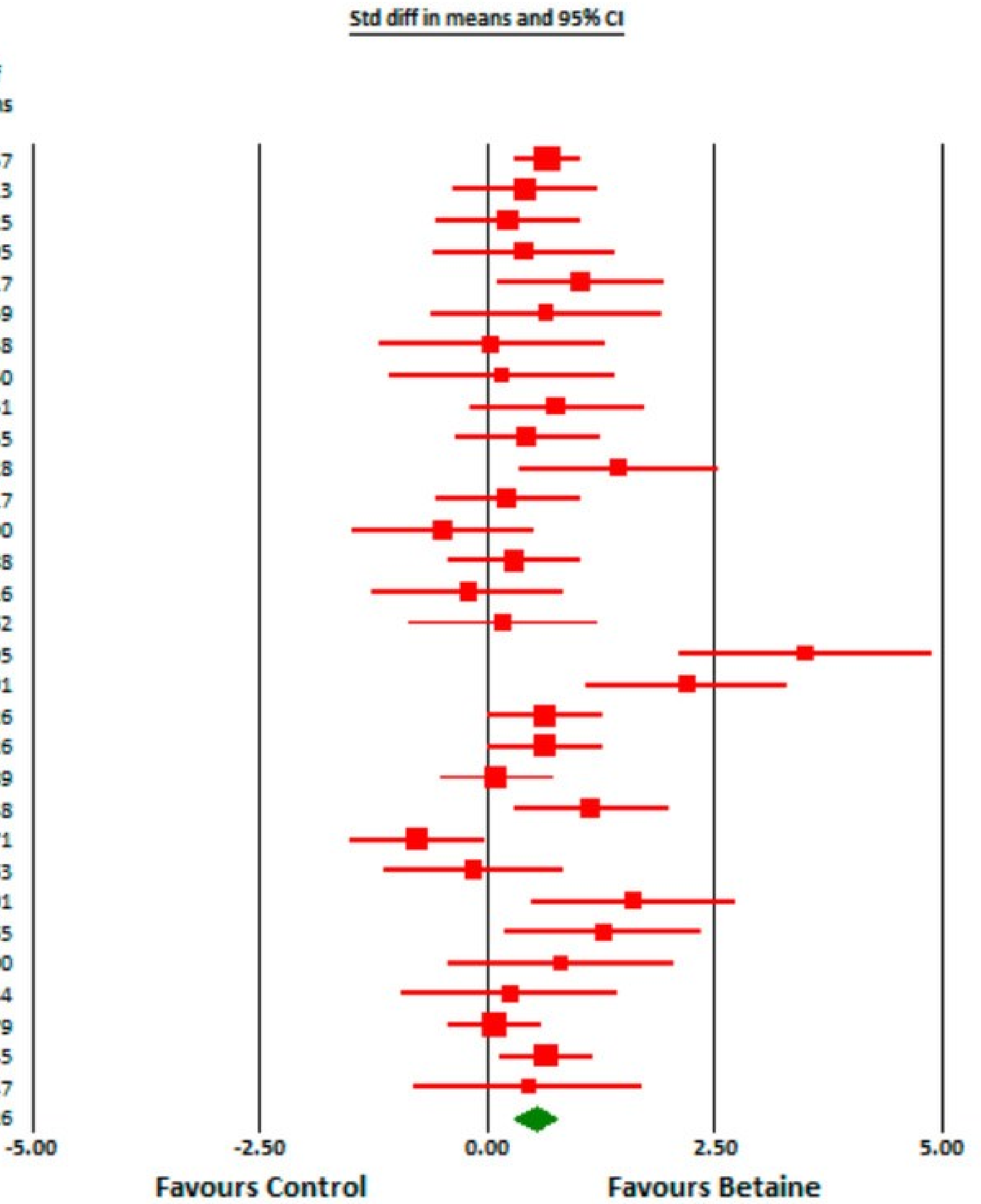
Research has shown that Betaine can:

1. Decrease the effects of ketosis.
2. Increase dry matter intakes.
3. Help to lower respiration rates under heat stress.
4. Help to improve anti-oxidant function.
5. Reduce GHG emissions from cow digestion – increased *De Novo* fatty acids in milk.
6. Improve rumen feed digestion efficiency.
7. Helped to reduce ovarian/follicular cysts.
8. Contributed to improved reproductive success.

METHYL DONORS: BETAINE

Abhijith et al., 2024

Study name	Subgroup	Std diff in means
Dunshea et al.(2019)	Large rum.	0.657
Hall et al.(2016)	Large rum.	0.413
Hall et al.(2016).	Large rum.	0.225
Monteiro et al.(2017)	Large rum.	0.395
Monteiro et al.(2017).	Large rum.	1.017
Peterson et al.(2012)	Large rum.	0.639
Peterson et al.(2012).	Large rum.	0.038
Peterson et al.(2012)..	Large rum.	0.150
Cheng et al.(2020)	Large rum.	0.751
Wang et al.(2019)	Large rum.	0.435
Shankhpal et al.(2019)	Large rum.	1.428
Davidson et al.(2008)	Large rum.	0.217
Davidson et al.(2008).	Large rum.	-0.490
Fedota et al. (2017)	Large rum.	0.288
Hung et al.(2018)	Large rum.	-0.216
Hung et al.(2018).	Large rum.	0.162
Shah et al.(2020)	Large rum.	3.495
Shah et al.(2020).	Large rum.	2.191
Wang et al.(2010)	Large rum.	0.626
Wang et al.(2010).	Large rum.	0.626
Wang et al.(2010)..	Large rum.	0.089
Wang et al.(2020a)	Large rum.	1.138
Zang et al.(2019)	Large rum.	-0.771
Zhang et al.(2014)	Large rum.	-0.163
Zhang et al.(2014).	Large rum.	1.601
Zhang et al.(2014)..	Large rum.	1.265
Dunshea (2016)	Large rum.	0.800
Dunshea (2016).	Large rum.	0.244
Fernandez et al.(2009)	Small rum.	0.079
Fernandez et al.(2004)	Small rum.	0.645
Saipin et al.(2013)	Small rum.	0.447
		0.526



VITAMIN D, B VITAMINS & VITAMIN E

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Vitamin D

- 21-hydroxy vitamin D is metabolised into 125-dihydroxy vitamin D in the kidney, 125-dihydroxy vitamin D stimulates the release of calcium & phosphorus from the bone.
- 25-hydroxy vitamin D is stored and released from the liver (stimulated by PTH). If liver levels are low, this will influence the cow's ability to stabilise calcium and phosphorus levels.

B vitamins – B2, B3, B5, B9, B12 & Biotin.

Key for liver's ability to:

- Remove toxins
- Methylation
- Preventing fattyliver

Vitamin E

Anti-oxidant and anti-inflammatory action pre- and post-calving.

Levels can be low when pasture levels are minimal, silage and crop feeding.

SELENIUM, BORON, CHROMIUM, COPPER, MANGANESE & ZINC

Chelated copper (100mg), zinc (800mg) & manganese (120mg)

- Important for anti-oxidant function (CuZnSOD).
- Protect/enhance liver, immune system & reproductive function.

Selenium – 8-12mg/cow/day

- Important for anti-oxidant protection (GPx).
- Enhance liver function.
- Works closely with Vit E, methionine, zinc, B12, and iodine.

Chromium – 7-9mg/cow/day

- Enhances insulin sensitivity, helps to partition more energy to cow condition.
- Helps to aid in cow recovery and energy metabolism post-calving.

Boron – 80-120mg/cow/day

- Key catalyst in the absorption of calcium, phosphorus, and magnesium.
- Helps to maximise levels when other hormonal controls are creating restrictions.

QUESTION 3: How does this translate practically?

- On-farm situations showing problems and solutions

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AGVANCE
Success. Together.

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