Concentrate supplementation during the four weeks prepartum: dairy cow production and immune function

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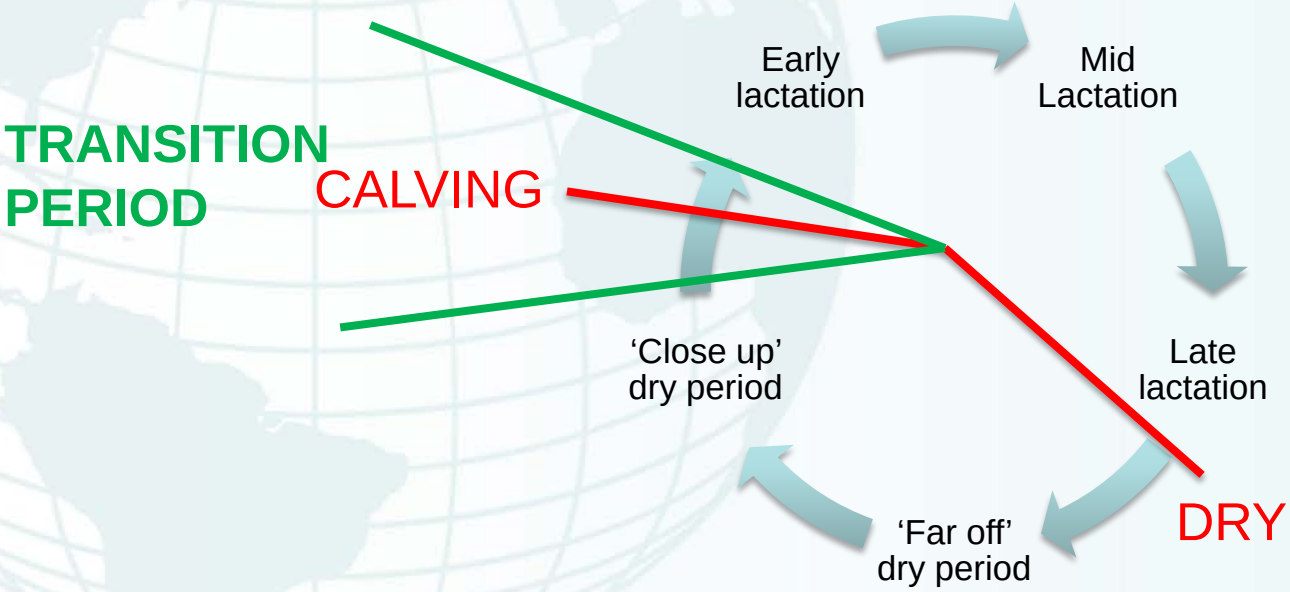
Background (i)

- The Transition Period – 3 weeks before and 3 weeks after calving is the most traumatic period in the dairy cow production cycle



Background (i)

- The Transition Period – 3 weeks before and 3 weeks after calving is the most traumatic period in the dairy cow production cycle
- Many changes/challenges during this time
  - Social, routine and hormonal changes
  - Dietary quality changes
  - Metabolic challenge - negative energy balance
  - Immune dysfunction - normal occurrence
    contributory metabolic effects
  - Increased risk of infectious and metabolic diseases

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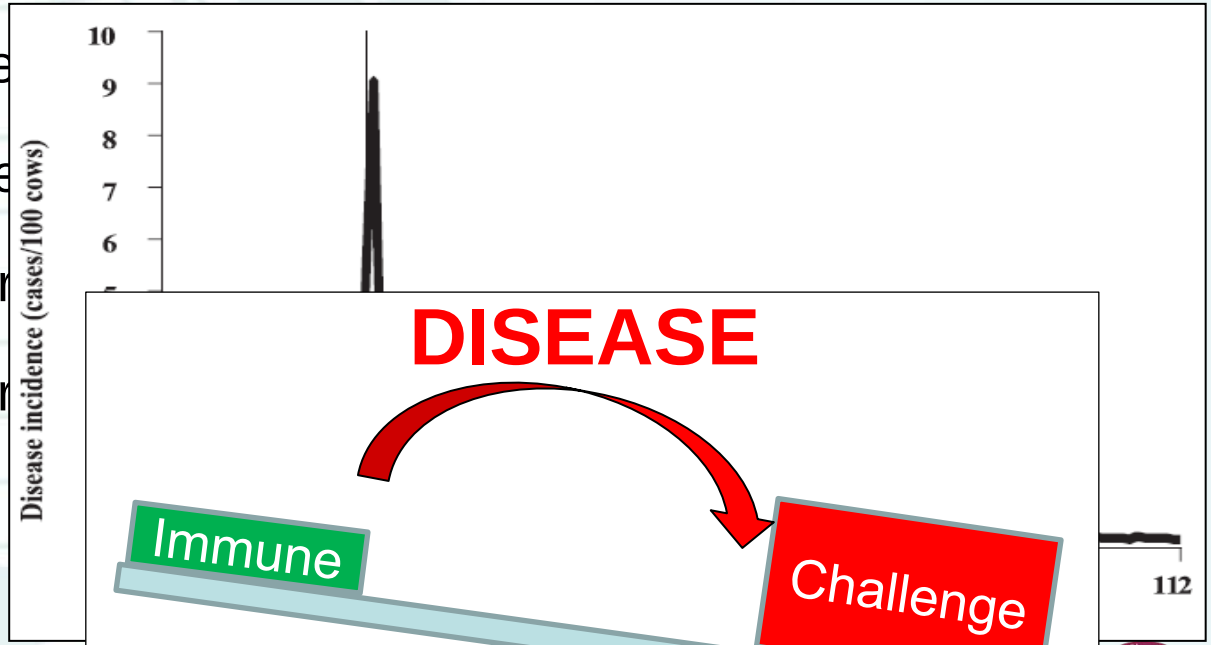
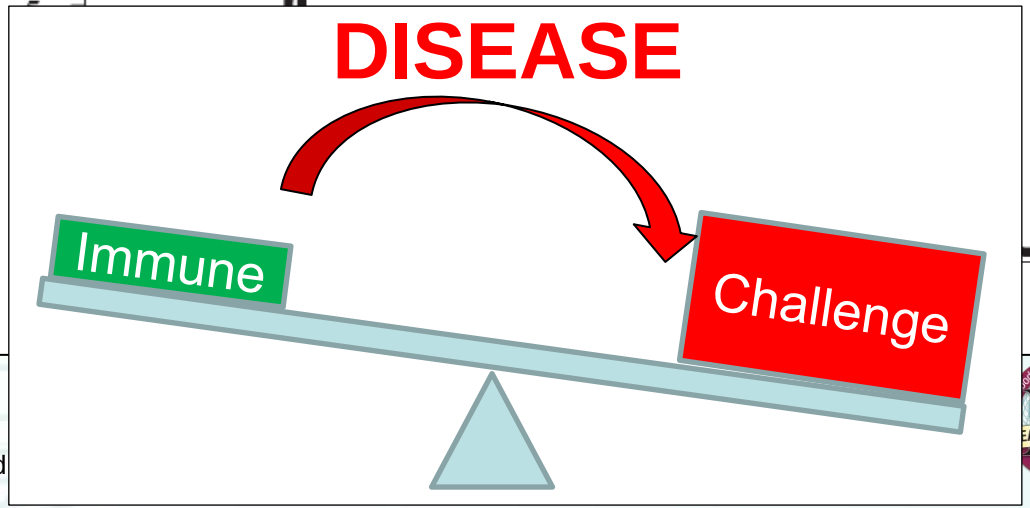
Background (ii)

- The Transition Period is associated with a peak disease incidence
- Negative
  - Incre
  - Decr
  - Decr





Ingvartsen, K. L. 2006. Anim. Feed

Background (iii)

- Need to identify nutritional strategies to help cows ‘transition better’
- Reduce negative energy balance and it’s immunosuppressive effects
- Work from the USA and New Zealand suggest restricting energy intake before calving
- However :
  - AFBI work has shown that 88% of cows in Northern Ireland had a BCS d 2.5 at dry-off (target 2.75)
  - Thin cows (BCS d 2.25 at dry off) offered concentrates during the dry period had lower culling rates in early lactation

Background (iii)

- Previous AFBI research has shown that supplementing additional concentrates throughout the dry period improved immune function during the week after calving[1]
- However, concentrates are expensive
- Can this beneficial effect on immune function be achieved by supplementing concentrates for a shorter period?

[1] Little, M. W., N. E. O'Connell, M. D. Welsh, J. Barley, K. G. Meade, and C. P. Ferris. 2016. Prepartum concentrate supplementation of a medium quality grass silage based diet: effects on performance, health, fertility, metabolic function and immune function of low body condition score cows. J. Dairy Sci. 99(9):7102-7122.

Methodology

- 28 multiparous and 22 primiparous Holstein-Friesian dairy cows
- 2 treatments imposed during the 4 weeks before calving
- Silage : Grass silage only
- Silage plus concentrates : Grass silage + concentrates (60:40 DM ratio) in a complete diet 4.5 kg DM concentrates/cow/day
- All cows offered a common diet for 70 days post calving
  - Grass silage + concentrates in a complete diet (40:60 DM basis) and concentrates in parlour

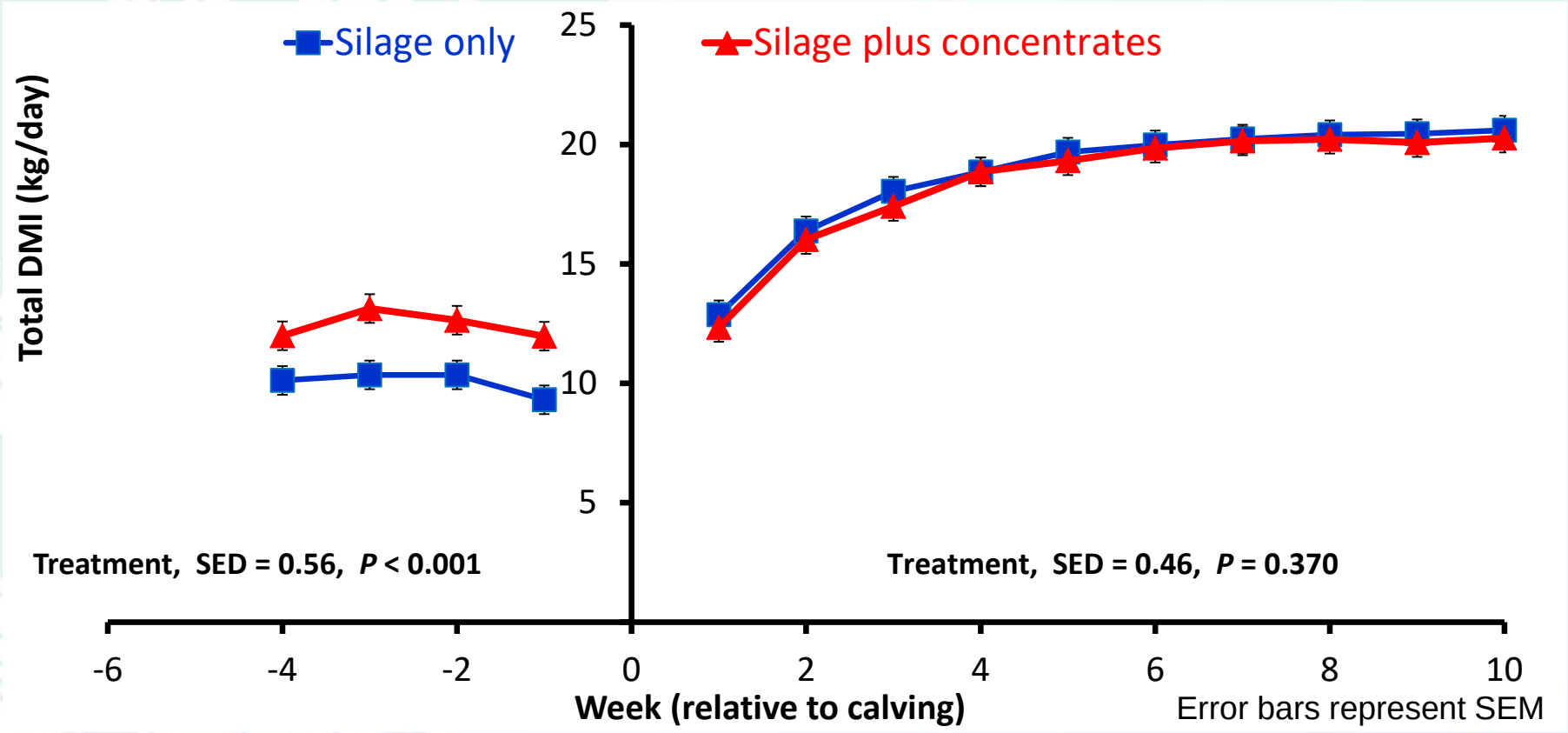
Statistical Analysis

- Data were analysed using Genstat Version 16.2 (VSN International, Oxford, UK).
- Continuous data (e.g. dry matter intake, milk yield, milk composition, liveweight, BCS, postpartum serum NEFA and BHBA) were analyzed using REML repeated measures analysis.
- Mean weekly data for neutrophil activity, prepartum serum NEFA and BHBA were analysed by ANOVA.

Results

1. Cow performance
2. Body tissue changes
3. Immune measures

Effects of offering additional concentrates for 4 weeks prepartum on total DMI



Effects of offering additional concentrates for 4 weeks prepartum on milk production

	Silage	Silage plus concentrates	SED	P-value
Milk yield (kg/d)	33.2	33.5	1.00	0.785
Milk fat (g/kg)	44.6	44.2	1.30	0.696
Milk protein (g/kg)	32.8	33.1	0.51	0.541
Milk fat + protein yield (kg/day)	2.54	2.57	0.085	0.729

Results

1. Cow performance
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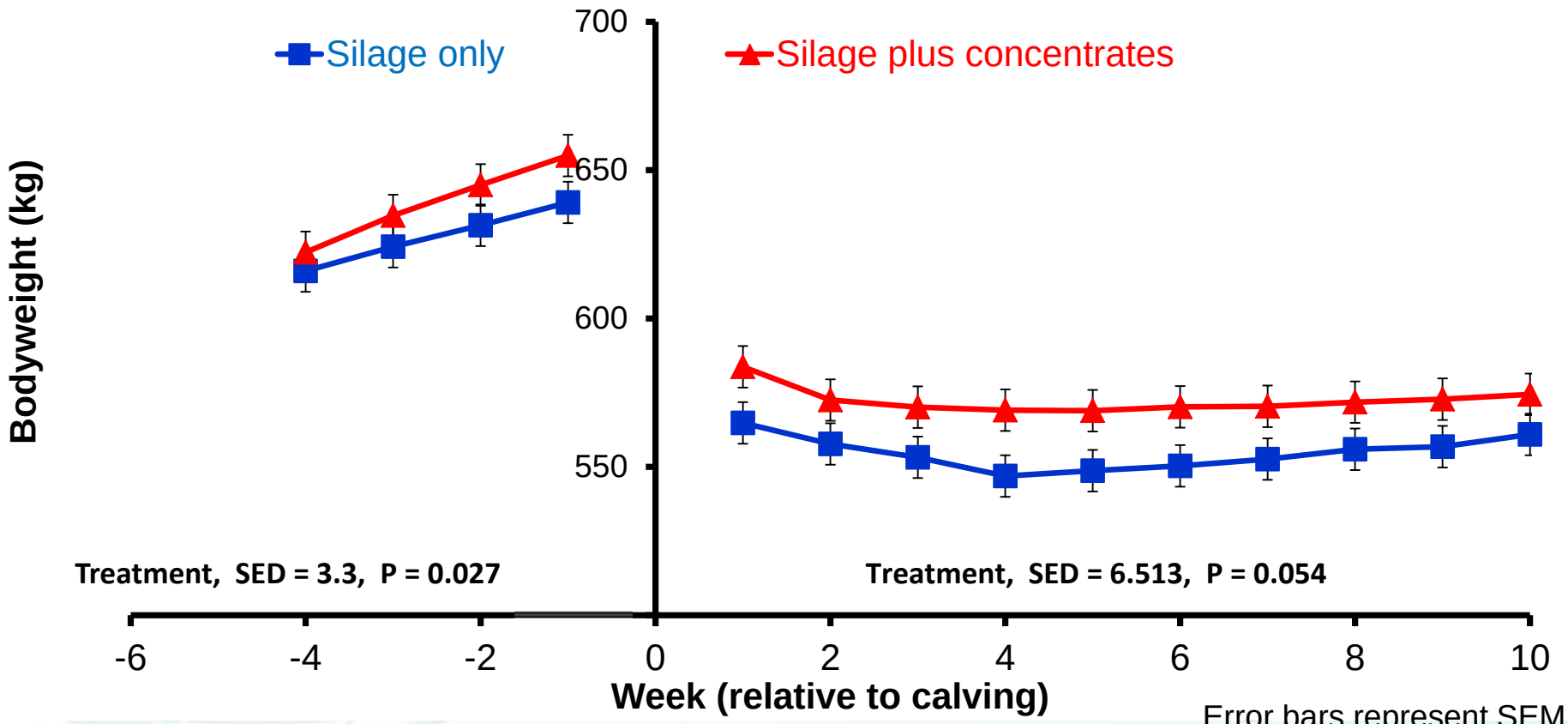
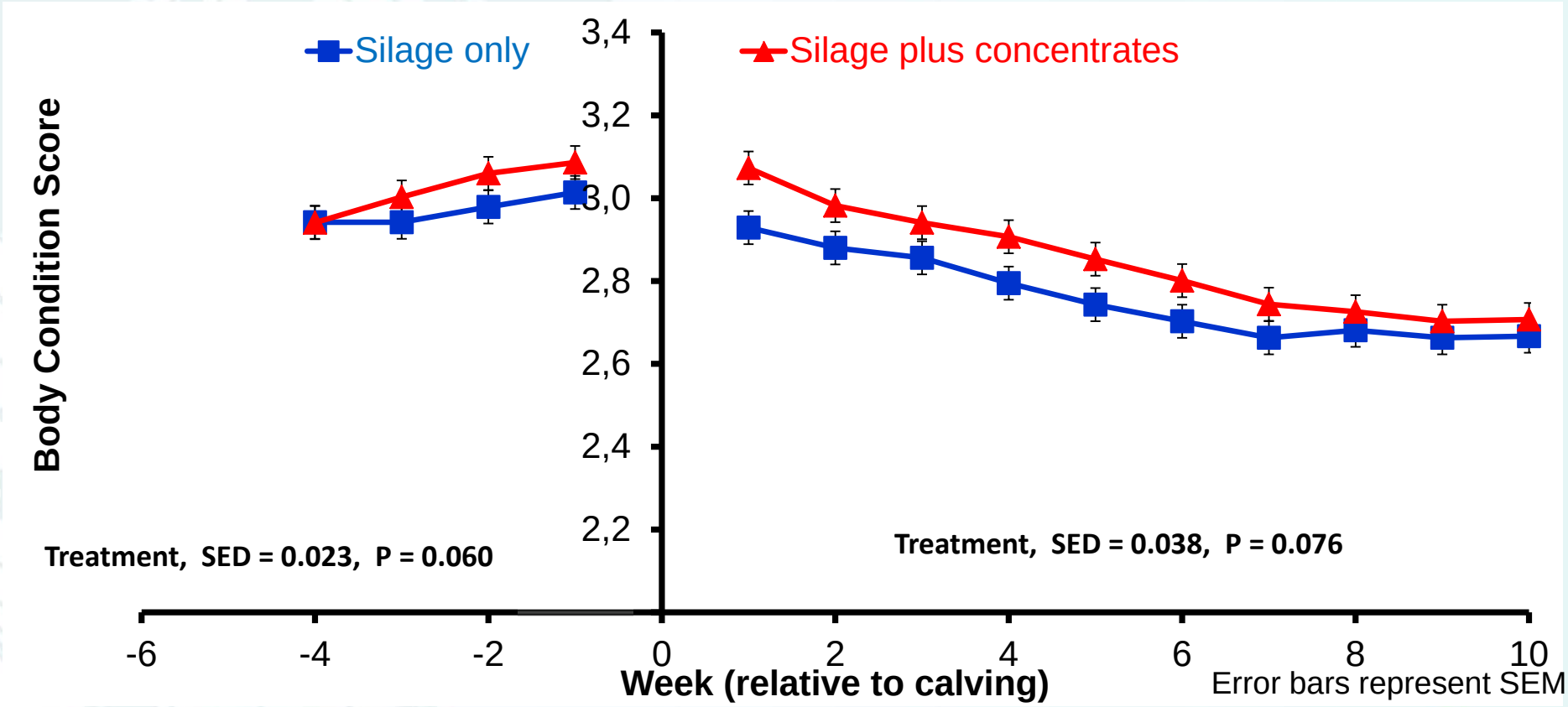
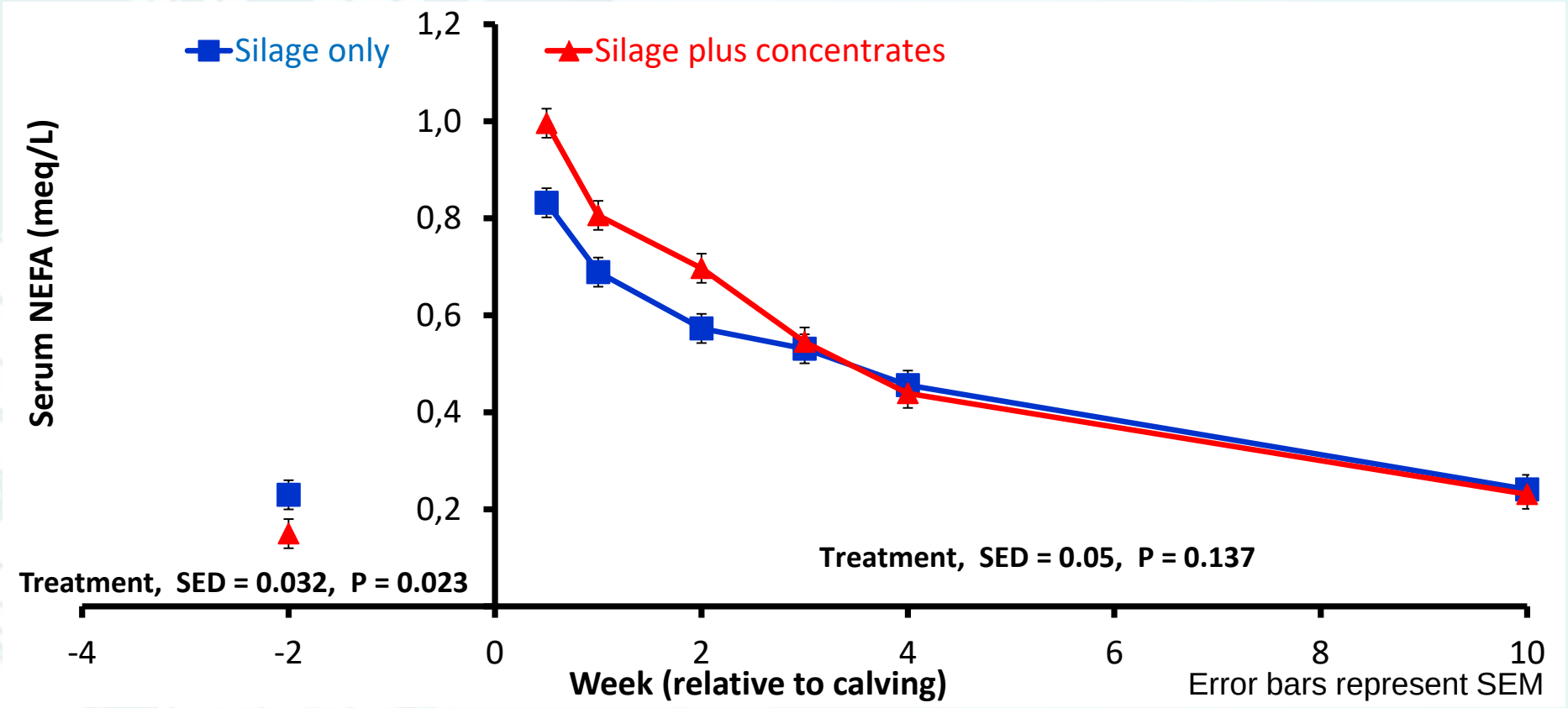
Effects of offering additional concentrates for 4 weeks prepartum on bodyweight



Effects of offering additional concentrates for 4 weeks prepartum on body condition score



Effects of offering additional concentrates for 4 weeks prepartum on serum NEFA concentration



Results

1. Cow performance
2. Body tissue changes
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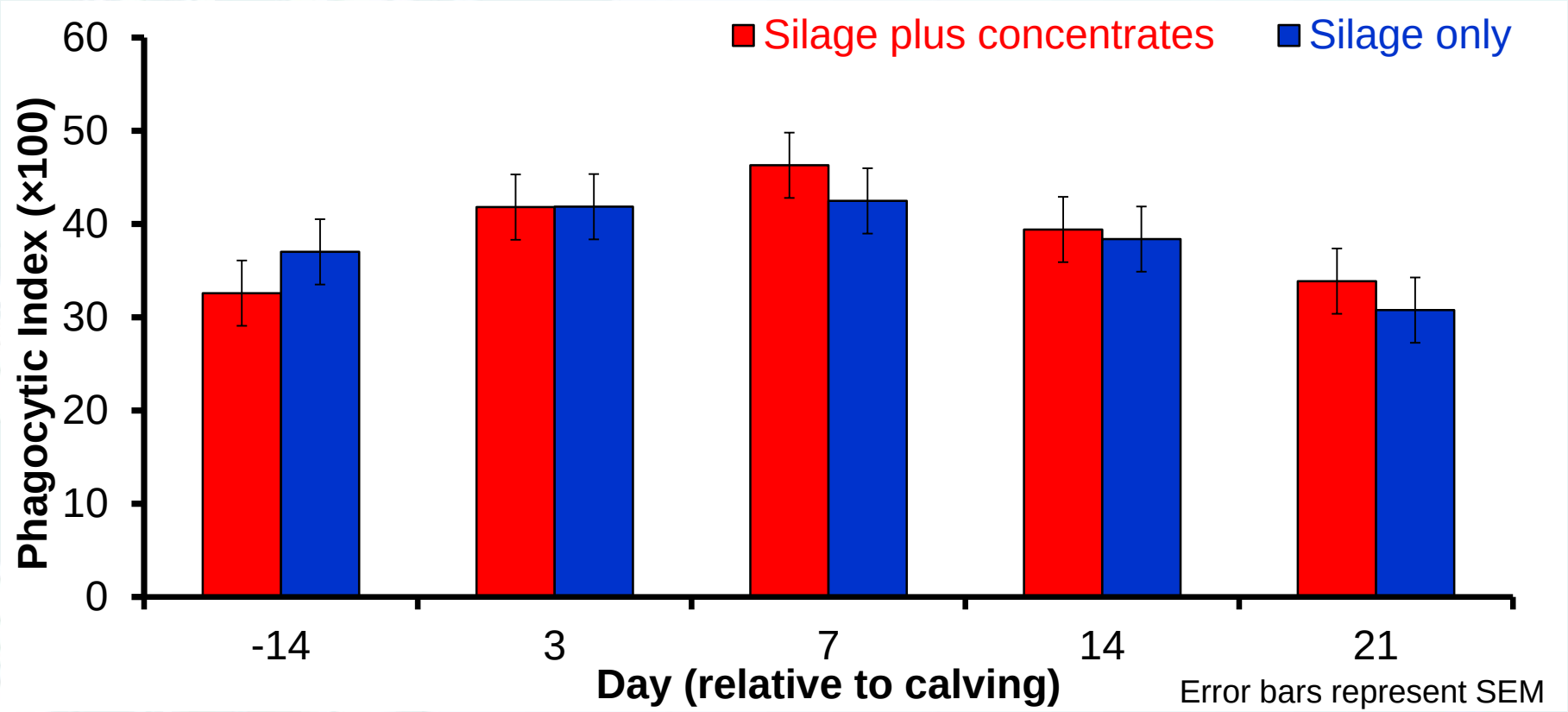
Effects of offering additional concentrates for 4 weeks prepartum on Neutrophil activity



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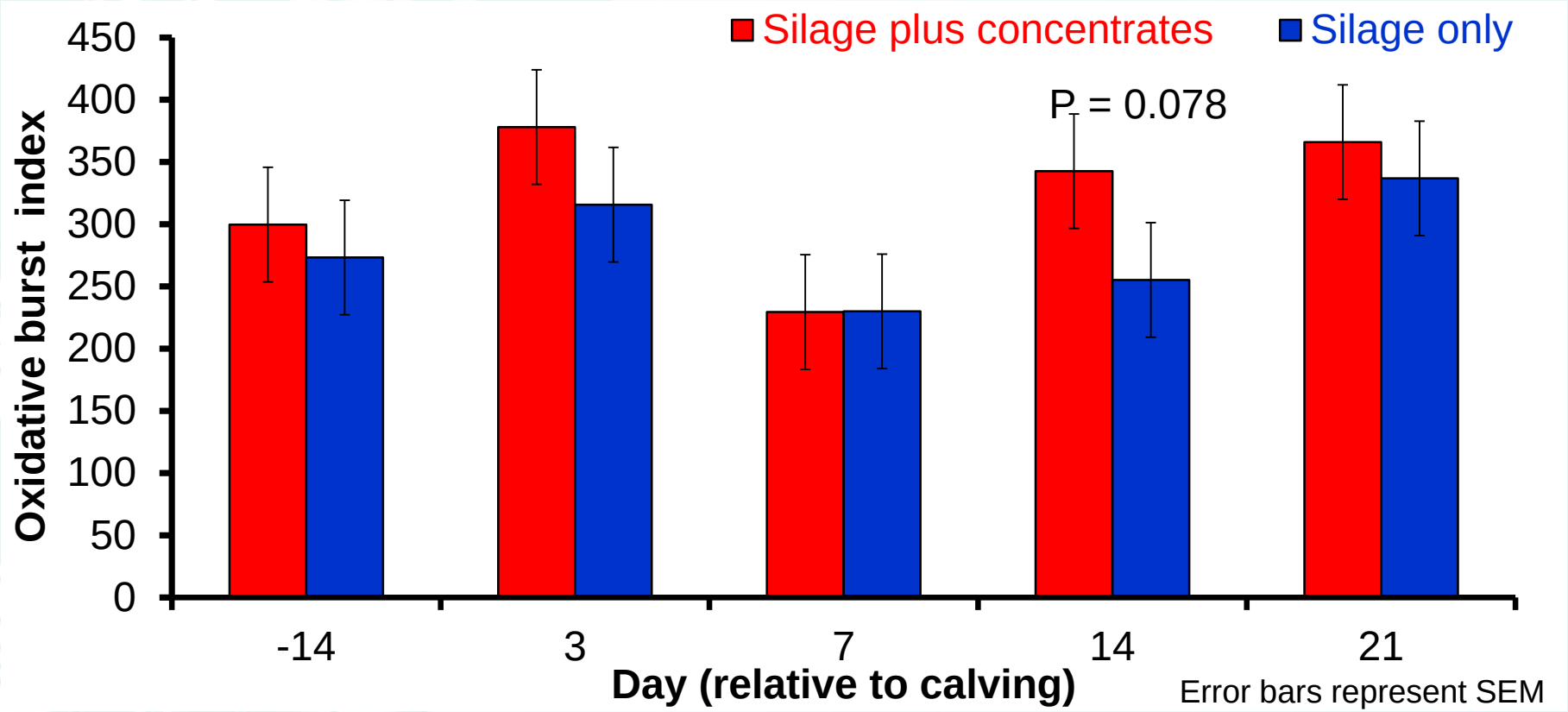

Conclusions

- Supplementing a grass silage diet with additional concentrates for 4 weeks before calving resulted in:-
  - Larger bodyweight and BCS gain prepartum but no effect in bodyweight and BCS loss postpartum
  - No effect on postpartum dry matter intake, milk yield or milk composition
  - No significant effect on measures of neutrophil activity

Implications

- Unlike supplementing a grass silage diet with additional concentrates for the entire dry period, supplementing for the close-up period only did not have any beneficial effects on immune function

- Further studies are needed to examine the effects of body condition on immune measures

Acknowledgements

AFBI Dairy Unit Staff

AgriSearch NI
Driving Excellence & Innovation

Department of
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and Rural Affairs

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