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Effect of anionic Mishran feed supplementation during the transition period on calving performance, postpartum health and milk production in Pluriparous dairy cows

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Abstract

The transition period is a critical phase in dairy cows, characterized by substantial changes in nutrient intake, mineral metabolism and endocrine function, with increased calcium demand at calving predisposing animals to hypocalcaemia and associated postpartum disorders. This study evaluated the effects of Anionic Mishran supplementation during the prepartum transition period on placental expulsion, calf performance, postpartum health, milk fever incidence and milk yield in Pluriparous dairy cows. Twelve cows were randomly allocated to treatment and control groups (n=6 each). The treatment group received Anionic Mishran during the prepartum period, while controls received the basal diet. Placental expulsion time, calf birth and weaning weights, metritis/pyometra, downer cow/milk fever incidence and daily milk yield were recorded. Anionic Mishran supplementation significantly reduced placental expulsion time from 6.93 ± 0.22 to 4.63 ± 0.33 h ($P < 0.001$) and increased daily milk yield from 8.64 ± 0.11 to 9.64 ± 0.16 L/day ($P < 0.001$). Calf birth and weaning weights did not differ significantly between groups. Metritis/pyometra and downer cow/milk fever incidence were numerically lower in the supplemented group, although differences were not statistically significant. Overall, prepartum Anionic Mishran supplementation showed beneficial effects on placental expulsion and early lactation yield, indicating its potential as a nutritional strategy for improving transition-period management in Pluriparous dairy cows. Larger studies are warranted to validate its effects on postpartum health and reproductive performance.

Keywords: Anionic Mishran, transition period, dietary cation-anion difference (DCAD), hypocalcaemia, placental expulsion, postpartum health, milk yield, Pluriparous dairy cows, milk fever, calf performance

Introduction

The transition period, extending from late gestation through the early postpartum period, is one of the most metabolically demanding phases of the dairy cow's production cycle. During this period, cows undergo marked changes in feed intake, energy balance, mineral metabolism and physiological adaptation to lactation. Among the minerals, calcium is particularly important at parturition because the initiation of colostrum and milk secretion results in a sudden increase in calcium requirement. Failure to maintain calcium homeostasis can result in clinical or subclinical hypocalcaemia. This condition can compromise muscular function and is associated with several postpartum health problems. Manipulation of prepartum dietary cation-anion difference has therefore become an important nutritional approach for transition-cow management. Lowering dietary DCAD produces a mild metabolic acidosis that enhances the physiological mechanisms involved in calcium homeostasis. A large meta-analysis involving 42 experiments and 1,803 cows reported that reducing prepartum DCAD improved blood calcium around calving and reduced the risk of milk fever, retained placenta and metritis. Importantly, the response in milk production was more favourable in parous cows, which directly supports the rationale for evaluating this strategy in pluriparous animals (Santos *et al.*, 2019).^[7]

More recent experimental evidence continues to support the physiological effect of negative-DCAD diets. Connelly *et al.* (2024)^[1] demonstrated in multiparous cows that prepartum DCAD manipulation altered calcium dynamics around parturition. Similarly, Frizzarini *et al.*

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(2024a) [3] reported that a negative-DCAD diet influenced periparturient mineral and hormonal responses, while Frizzarini *et al.* (2024b) [2] evaluated effects on feed intake, energy metabolism and milk performance. Recent work comparing anionic supplements also showed that negative-DCAD diets significantly lowered urinary pH, demonstrating their acidogenic effect, although effects on feed intake and production varied according to the formulation and dietary conditions (Rajaeerad *et al.*, 2023) [6]. Therefore, the present study was undertaken to evaluate the effect of Anionic Mishran, an anionic feed supplement, during the transition period on calving performance, calf growth, postpartum reproductive health, milk fever incidence and milk production in pluriparous dairy cows.

Objectives

Primary objective

To evaluate the effect of Anionic Mishran supplementation during the transition period on calving performance and early lactation yield in pluriparous dairy cows.

Secondary objectives

1. To assess the effect on placental expulsion time.
2. To assess calf birth weight.
3. To evaluate calf weaning weight.
4. To determine the incidence of metritis/pyometra.
5. To determine the incidence of downer cow/milk fever.
6. To assess daily lactation yield.
7. To evaluate the practical applicability of Anionic Mishran as a transition-cow nutritional intervention.

Experimental Design

Animals

12 Pluriparous dairy cows Groups

Group	No. of animals	Treatment
Treatment	6	Basal diet + Anionic Mishran
Control	6	Basal diet without Anionic Mishran

Study period

The intervention should be described precisely according to your actual protocol. Based on your previous study description, you can write:

Anionic Mishran supplementation was initiated during the prepartum transition period and continued according to the prescribed feeding schedule until calving.

Results Interpretation

Outcome	Treatment response	Interpretation
Placental expulsion	4.63 vs 6.93 hours	Significant improvement
Calf birth weight	24.48 vs 24.67 kg	No significant effect
Calf weaning weight	56.08 vs 56.82 kg	No significant effect
Milk yield	9.64 vs 8.64 L/day	Significant improvement
Metritis/pyometra	0 vs 33.3%	Numerical reduction, NS
Milk fever/downer	0 vs 33.3%	Numerical reduction, NS

Placental expulsion time

The most pronounced treatment response was observed in placental expulsion time.

- Treatment: 4.63±0.33 h
- Control: 6.93±0.22 h

- $P < 0.001$

Thus, Anionic Mishran supplementation reduced placental expulsion time by approximately 2.30 hours, equivalent to about a 33% reduction compared with the control group.

Anionic Mishran supplementation significantly reduced placental expulsion time compared with the control group (4.63±0.33 vs. 6.93±0.22 h; $P < 0.001$). The approximately 33% reduction in placental expulsion time suggests improved periparturient uterine function following anionic supplementation. This response may be associated with improved calcium homeostasis during the immediate periparturient period, because negative-DCAD diets are known to alter calcium metabolism and improve calcium availability around calving (Santos *et al.*, 2019; Connelly *et al.*, 2024) [7, 1]. However, the present study did not directly measure blood calcium or urinary pH, so this proposed mechanism should be regarded as biologically plausible rather than directly demonstrated.

Calf Birth Weight

Treatment: 24.48±0.32 kg

Control: 24.67±0.38 kg

$P = 0.705$

Interpretation

The similarity in calf birth weight indicates that Anionic Mishran supplementation under the conditions of this study did not adversely affect fetal growth. Calf birth weight did not differ significantly between treatment and control groups (24.48±0.32 vs. 24.67±0.38 kg; $P = 0.705$), indicating that prepartum Anionic Mishran supplementation did not adversely influence fetal growth.

Calf Weaning Weight

Treatment: 56.08±0.78 kg

Control: 56.82±0.58 kg

$P = 0.474$

Interpretation

The absence of a treatment effect suggests that the maternal nutritional intervention did not substantially influence subsequent calf growth under the conditions of this experiment. Similarly, calf weaning weight did not differ significantly between the treatment and control groups (56.08±0.78 vs. 56.82±0.58 kg; $P = 0.474$). This indicates that Anionic Mishran supplementation during the prepartum period did not produce a measurable effect on subsequent calf growth.

Lactation Yield

Treatment: 9.64±0.16 L/day

Control: 8.64±0.11 L/day $P < 0.001$

Difference: +1.00 L/day

Relative improvement: approximately 11.6%

Interpretation

This finding is particularly interesting because your animals were pluriparous cows.

Previous meta-analysis found that lowering prepartum DCAD improved milk yield in parous cows, whereas responses in nulliparous cows were less favourable.

Daily lactation yield was significantly higher in cows receiving Anionic Mishran than in control cows (9.64±0.16

vs. 8.64 ± 0.11 L/day; $P < 0.001$). The treatment resulted in an approximately 1.0 L/day or 11.6% increase in milk yield. This response is consistent with evidence that reduction of prepartum DCAD can improve subsequent milk production in multiparous cows (Santos *et al.*, 2019) [7]. More recent work in multiparous Holstein cows has continued to evaluate the relationship between prepartum DCAD strategy, calcium status and milk production (Graef *et al.*, 2025; Frizzarini *et al.*, 2024b) [4, 2]. Recent experimental work also demonstrates that the response to prepartum anionic diets can involve changes in mineral metabolism and physiological adaptation around the onset of lactation.

Metritis/Pyometra

Treatment: 0/6 = 0%

Control: 2/6 = 33.3%

Reported $P = 0.211$

Metritis/pyometra incidence was numerically lower in the treatment group (0%) than in the control group (33.3%), although the difference was not statistically significant ($P = 0.211$)

Downer Cow/Milk Fever

Treatment: 0/6 = 0%

Control: 2/6 = 33.3%

Reported $P = 0.211$

The incidence of downer cow/milk fever was numerically lower in the Anionic Mishran group (0%) compared with the control group (33.3%), but the difference was not statistically significant ($P = 0.211$).

Biological significance

Although statistically non-significant, the complete absence of observed cases in the treatment group is potentially interesting. The finding is directionally consistent with evidence that reducing prepartum DCAD improves calcium status and reduces milk-fever risk, particularly in parous cows (Santos *et al.*, 2019) [7]. Recent research also confirms that periparturient calcium dynamics are associated with postpartum health and inflammatory status in multiparous cows (Graef *et al.*, 2025b) [5].

Effect on placental expulsion

Anionic Mishran → altered DCAD → acid-base adaptation → improved Ca homeostasis → improved uterine contractility → faster placental expulsion

Your result should then be compared with studies reporting reduced retained placenta with lower prepartum DCAD. The meta-analysis by Santos *et al.* (2019) [7] reported a reduction in retained placenta and metritis with decreasing prepartum DCAD, supporting the biological plausibility of the present observation. Nevertheless, because the present study did not directly measure calcium status, uterine contractility or retained placenta incidence, the proposed mechanism should be discussed cautiously.

Effect on calf growth

Explain that the supplement was targeted primarily at the dam's mineral and acid-base adaptation, and the absence of differences in birth and weaning weights suggests no adverse effect on calf growth.

Effect on milk yield

9.64 vs 8.64 L/day can be discussed alongside the meta-

analysis showing improved milk production in parous cows receiving lower prepartum DCAD diets (Santos *et al.*, 2019) [7]. Recent experimental studies in multiparous cows also indicate that prepartum DCAD strategy can influence calcium status and milk production, although responses may depend on the degree of acidification and dietary calcium supply (Frizzarini *et al.*, 2024b; Graef *et al.*, 2025a) [2, 4]. Recent work also emphasizes that the effects of anionic diets are not simply attributable to one factor; changes in mineral metabolism, acid-base status, feed intake and metabolic adaptation may collectively influence postpartum performance (Frizzarini *et al.*, 2024a, 2024b; Graef *et al.*, 2025a) [3, 2, 4].

Effect on metritis/pyometra

Discuss the 0 vs 33.3% numerical difference cautiously. The literature supports a possible connection between improved calcium homeostasis and reduced postpartum disease risk, but your sample size prevents a strong statistical conclusion.

Effect on milk fever/downer cow

0% vs 33.3% but statistically non-significant. A larger study is needed.

Key Limitation

The major limitation of the present study was the small sample size ($n = 6$ per group), which may have limited the statistical power to detect differences in low-frequency postpartum disorders."

References

1. Connelly MK, Rodney Harris RM, Kuehn J. Influence of prepartum dietary cation-anion difference and the magnitude of calcium decline at the onset of lactation on mineral metabolism and physiological responses. *J Dairy Sci.* 2024;107(2):1228-1243. <https://doi.org/10.3168/jds.2023-23588>
2. Frizzarini WS, Campolina JP, Vang AL, Lewandowski LR, Teixeira NN, Connelly MK, *et al.* Mechanisms by which feeding synthetic zeolite A and dietary cation-anion difference diets affect feed intake, energy metabolism, and milk performance: Part II. *J Dairy Sci.* 2024;107(7):5222-5234. <https://doi.org/10.3168/jds.2024-24057>
3. Frizzarini WS, Monteiro PLJ, Campolina JP, Vang AL, Soudah O, Lewandowski LR, *et al.* Mechanisms by which feeding synthetic zeolite A and dietary cation-anion difference diets affect mineral metabolism in multiparous Holstein cows: Part I. *J Dairy Sci.* 2024;107(7):5204-5221. <https://doi.org/10.3168/jds.2024-24056>
4. Graef GM, Kerwin AL, Ferro LN, Ordaz-Puga S, Ryan CM, Westhoff TA, *et al.* Effect of prepartum dietary cation-anion difference strategy and level of dietary calcium on postpartum blood calcium status and milk production of multiparous Holstein cows. *J Dairy Sci.* 2025;108(8):8332-8349. <https://doi.org/10.3168/jds.2024-25783>
5. Graef GM, Sipka A, Tompkins S, Seely CR, McArt JAA, Overton TR. Associations between periparturient calcium dynamics of multiparous Holstein cows and inflammation markers during the transition period. *J Dairy Sci.* 2025;108(10):11389-11402. <https://doi.org/10.3168/jds.2024-25979>

6. Rajaeerad A, Ghorbani GR, Khorvash M, Sadeghi-Sefidmasgi A, Mahdavi AH, Boroumand Jazi M, *et al.* Comparison of two different anionic supplements and a low calcium diet fed to transition cows prepartum on DM intake, mineral homoeostasis and performance. *Animal*. 2023;17(10):100961. <https://doi.org/10.1016/j.animal.2023.100961>
7. Santos JEP, Lean IJ, Golder H, Block E. Meta-analysis of the effects of prepartum dietary cation-anion difference on performance and health of dairy cows. *J Dairy Sci*. 2019;102(3):2134-2154. <https://doi.org/10.3168/jds.2018-14628>