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Research Article

Effect of Prepartum Supplementation with an Energy-Supplementing Herbo-Nutritional Formulation on Energy Balance and Post-Calving Health in Dairy Cows

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Abstract

This study aimed to evaluate the effect of prepartum supplementation with an energysupplementing herbonutritional (ESHN) formulation on energy balance and the incidence of selected postcalving health conditions (metritis, retained fetal membranes/ ROP, mastitis, and milk fever) in dairy cows previously predisposed to these conditions. Twenty-four advanced-pregnant Holstein Friesian/Jersey crossbred cows with prior farm records of metritis (G1, n=6), ROP (G2, n=6), mastitis (G3, n=6), or milk fever (G4, n=6) were supplemented with ESHN at 100 mL/cow/day for 10 consecutive days. Clinical performance (rumen motility, appetite, activity) was recorded by scoring before supplementation (BS), during supplementation (DS), and after supplementation (AS). Post-calving milk yield (daily for 7 days) and milk quality (fat, SNF, CLR) were evaluated. Mean scores for rumen motility, appetite, and activity improved from BS to DS and were maintained at AS in all groups. Milk yield followed expected early-lactation trends; fat, SNF and CLR remained within normal ranges. No cases of metritis, mastitis or milk fever were recorded and 83.33% of previously predisposed cows were free from ROP. Pre-partum supplementation of ESN formulation at 100 mL/day for 10 days, functioned as an energy-support feed supplement was associated with favorable clinical scores and maintained milk production trends without adverse effects on milk quality in this field cohort.

Keywords: Transition Cow; Negative Energy Balance; ESHN Formulation; Milk Yield; ROP; Metritis; Mastitis; Milk Fever

Introduction

The transition period, spanning roughly three weeks before to three weeks after calving, is a pivotal physiological window in dairy cows during which profound changes in endocrine, metabolic and immune function converge. Increased glucose demand for colostrum and milk coincides with a transient reduction in dry-matter intake (DMI), predisposing cows to negative energy balance (NEB) and greater reliance on adipose mobilization. Elevated circulating non-esterified fatty acids (NEFA) and beta-hydroxybutyrate (BHBA) reflect this metabolic strain, and, when dysregulated, are associated with higher odds of subclinical or clinical ketosis and downstream health issues [1-6]. These disturbances intersect with postpartum infectious and metabolic conditions, including metritis, mastitis and periparturient hypocalcemia (milk fever), with implications for milk production, fertility and welfare [7-15]. Nutritional interventions that enhance hepatic gluconeogenesis- thereby closing the gap between energy supply and demand- are a practical lever during the periparturient phase. Gluconeogenic precursors and supportive micronutrients (e.g., niacinamide,

vitamin E) have been explored to stabilize energy status, sustain DMI, and support antioxidant-immune competence [16-21,36-45]. ESHN formulation is an animal feed supplement as an instant and sustained energy supplement with gluconeogenic precursors, niacinamide and vitamin E, intended to help maintain energy level in lactating animals; typical guidance for dairy cattle is 100-200 mL/day. The present field evaluation used a pre-partum regimen of 100 mL/day for 10 days and monitored clinical behavior, milk yield and quality, and the farm-level occurrence of selected postpartum conditions in previously predisposed cows.

Materials and Methods

ESHN formulation is HimShakthi™ (Himalaya Wellness Company, Bengaluru, India), a proprietary animal feed supplement comprising gluconeogenic precursors with niacinamide and vitamin E, positioned to provide instant and sustained energy support.

Ethical Approval

Use of animals was approved by Institutional Animal Ethics Committee (IAEC) of Himalaya Wellness Company, Protocol No.: AHP/LA/12/21.

Animals and study design

A total of 24 advanced-pregnant Holstein Friesian and Jersey crossbred cows (2-7 years) with prior farm records of metritis (G1, n = 6), retained fetal membranes/ROP (G2, n = 6), mastitis (G3, n = 6), or milk fever (G4, n = 6) were enrolled from Mysuru district, Karnataka. Cows lacking a gag reflex or with severe concurrent conditions (e.g., TB, prolapse) were excluded. Animals were supplemented with 100 mL of ESHN formulation orally once daily for 10 consecutive days before the expected date of calving (3 days expected prior calving and 7 days post calving). Concurrent herbal products were withheld. Standard management practices were followed by farmers with typical rations (~10 kg/day concentrate; ~30 kg/day roughage), and *ad libitum* fresh and clean water. The study followed a self-controlled experimental design, where each animal served as its own control. Baseline measurements of rumen motility, appetite and activity (before supplementation) were recorded and compared with during and postsupplementation.

Clinical and production assessments

Rumen motility, appetite and activity were scored before supplementation (BS), during supplementation (DS) and after supplementation (AS) using the predefined grading system (Table 1). Post-calving milk yield was recorded daily for seven days AS. Milk quality parameters- fat (%), solids-not-fat (SNF, %) and corrected lactometer reading (CLR)- were assessed AS. The occurrence of metritis, ROP, mastitis and milk fever was monitored during DS/AS.

Parameter	Description	Score
Rumen motility score	Normal - 2-5 contractions per 2 minutes	3
	Hypermotility - >5 contractions per 2 minutes	2
	Hypomotility - <2 contractions per 2 minutes	2
	Ruminal stasis - No motility	1
Appetite score	Normal - Takes full feed	4
	Mild anorexia - Takes 50% feed	3
	Moderate anorexia - Takes 25% feed	2
	Severe anorexia - Takes no feed	1
Activity level score	Excellent	4
	Good	3
	Fair	2
	Satisfactory	1

Table 1: Assessment criteria and grading system for evaluation.

Results

Across all groups, clinical scores improved during supplementation and remained favorable after calving. Group-wise means demonstrated a shift in rumen motility from 2.00 ± 0.00 (BS) to 3.00 ± 0.00 (DS/AS); appetite increased from 2.00 ± 0.00 (BS) to 3.00 ± 0.00 (DS) and 4.00 ± 0.00 (AS); activity paralleled this trajectory (2.00 → 3.00 → 4.00) (Table.2). Milk yield tracked the expected early-lactation curve without suppression, and milk quality (fat, SNF, CLR) (Table.3) remained within normal ranges. During the monitoring period, no cases of metritis, mastitis or milk fever were recorded; ROP occurred in 16.67% of previously predisposed animals (i.e., 83.33% free from ROP).

Assessment parameters	Before supplementation	During supplementation	After supplementation
G1 - Metritis group (n = 6)			
Rumen Motility Score	2.00 ± 0.00	3.00 ± 0.00	3.00 ± 0.00
Appetite Score	2.00 ± 0.00	3.00 ± 0.00	4.00 ± 0.00
Activity Level Score	2.00 ± 0.00	3.00 ± 0.00	4.00 ± 0.00
G2 - ROP group (n = 6)			
Rumen Motility Score	2.00 ± 0.00	3.00 ± 0.00	3.00 ± 0.00
Appetite Score	2.00 ± 0.00	3.00 ± 0.00	4.00 ± 0.00
Activity Level Score	2.00 ± 0.00	3.00 ± 0.00	4.00 ± 0.00
G3 - Mastitis group (n = 6)			
Rumen Motility Score	2.00 ± 0.00	3.00 ± 0.00	3.00 ± 0.00
Appetite Score	2.00 ± 0.00	3.00 ± 0.00	4.00 ± 0.00
Activity Level Score	2.00 ± 0.00	3.00 ± 0.00	4.00 ± 0.00
G4 - Milk fever group (n = 6)			
Rumen Motility Score	2.00 ± 0.00	3.00 ± 0.00	3.00 ± 0.00
Appetite Score	2.00 ± 0.00	3.00 ± 0.00	4.00 ± 0.00
Activity Level Score	2.00 ± 0.00	3.00 ± 0.00	4.00 ± 0.00

Table 2: Impact of ESHN formulation on assessment parameters in dairy cows (Mean ± SEM; n = 6 per group).

Values are expressed as Mean ± SEM; n = 6.

Assessment parameter	Milk yield (L)	Fat (%)	SNF (%)	CLR
G1- Metritis (n = 6)	9.20	4.10	8.82	29.50
G2- ROP (n = 6)	8.70	4.20	9.09	30.50
G3- Mastitis (n = 6)	7.50	4.20	8.89	29.70
G4- Milk Fever (n = 6)	12.30	4.20	9.47	32.00

Table 3: Impact of ESHN formulation on milk yield and milk quality parameters in dairy cows (AS; Mean; n = 6 per group).

Values are expressed as Mean; n = 6.

Discussion

This field investigation explored a pre-partum nutritional strategy aimed at supporting transition-period energy demands in cows with prior records of early-lactation disorders. Although modest in size, the cohort represents a population at heightened risk of periparturient complications, which often emerge from the interaction of metabolic load, immune status, and management. The consistent improvement in rumen motility, appetite and activity observed during supplementation and the preservation of normal milk yield and quality across the first week post-calving together suggest that the evaluated regimen adequately complemented farm rations during the period of greatest glucose requirement.

Energy partitioning around calving is driven by a steep rise in mammary glucose uptake coupled with a transient dip in DMI. In this context, hepatic gluconeogenesis from propionate and other glucogenic substrates underpins the cow's capacity to sustain lactation while limiting adipose mobilization. When this balance fails, excessive NEFA release and elevated BHBA typify NEB, which has been associated with impaired immune function, altered leukocyte dynamics, increased disease susceptibility and depressed milk yield in multiple studies [1-6]. Nutritional alternatives that increase gluconeogenic flux, reinforce antioxidant defenses, and help maintain feeding behavior are therefore biologically credible levers for improving transition outcomes [16-21].

The formulation under study is an instant and sustained energy supplement containing gluconeogenic precursors with niacinamide and vitamin E. Field and experimental data on glucogenic inputs such as propylene glycol describe rapid increases in plasma glucose and reductions in BHBA and NEFA, accompanied by improved clinical resolution of subclinical ketosis and, in some studies, greater early-lactation milk yield [16-21]. While the present evaluation did not include biochemical monitoring, the observed maintenance of milk yield trajectories and the concurrent improvement in appetite and activity are consistent with the biological expectations of enhanced energy supply. Similarly, the inclusion of vitamin E—recognized as an important antioxidant during the periparturient immune nadir- aligns with literature associating adequate vitamin E and selenium status with fewer new intramammary infections and lower odds of retained placenta and metritis in some settings [36-41].

The absence of metritis and mastitis cases and the low occurrence of ROP during the observation period are noteworthy given that these cows had previous records for the same disorders. Reports place ROP incidence typically in the 4-18% range, with metritis and mastitis varying widely based on herd, parity, and management [26-29]. The relationship between ROP and subsequent metritis is well documented: physical patency of the cervix, delayed uterine involution, impaired lochia clearance, and compromised neutrophil function contribute to increased uterine disease risk [30-35]. Against that background, the field observations here are directionally favorable. Nonetheless, results relied on farm-level surveillance over a short AS period.

Rumen motility, appetite and activity are integrative reflections of rumen health, energy status and comfort. Improvements across these indices during the pre-partum supplementation period and their maintenance post-calving indicate that cows experienced a smoother metabolic transition, which likely supported steady DMI and regular rumen kinetics. From a husbandry perspective, these simple measures are valuable because they are feasible at scale and correlate with risk of clinical disease identified in epidemiologic work [7-15].

The positioning of ESHN formulation as a feed supplement is central to interpreting outcomes. The objective is not to diagnose, treat or cure diseases but to help meet elevated nutrient demands and maintain energy levels at a time of high physiological stress. The current results are consistent with such a role. Importantly, milk quality parameters (fat, SNF, CLR) remained within normal ranges, indicating the regimen did not adversely affect compositional quality.

The sample size limits statistical inference, and the absence of randomization and blinding introduces potential bias. The reliance on short-term monitoring may under-estimate events that manifest later in early lactation (e.g., clinical mastitis at 2-6 weeks in milk). Future randomized controlled trials should incorporate: (i) longitudinal sampling of BHBA, NEFA, glucose, calcium and acute-phase proteins; (ii) feed intake and behavior telemetry; (iii) comprehensive udder health surveillance (somatic cell count, culture where feasible); and (iv) multivariable models accounting for parity, BCS dynamics, calving ease and ration. Given the multifactorial nature of transition disorders, factorial designs that integrate diet formulation (starch/neutral detergent fiber, physically effective fiber), controlled energy dry-period rations, and micronutrient status (vitamin E/selenium) with or without gluconeogenic supplementation would be informative [1-6,36-45].

For practitioners and producers, the practical take-away is that pre-partum nutritional support with an energy-focused feed supplement at labeled use levels can be integrated into standard transition protocols without compromising milk composition, while aligning with aims to support cow vigor around calving. Implementation should be accompanied by close observation of DMI, body condition trajectories from dry-off to 30 days in milk, and routine screening for subclinical ketosis as per herd health plans.

In summary, the present observations- improved clinical behavior, preserved milk yield, stable milk quality, and low recorded incidence of tracked postpartum conditions- are congruent with the concept that nutritional support aimed at gluconeogenesis and antioxidant balance can facilitate a smoother transition in at-risk animals. Larger, controlled studies are warranted to precisely estimate effect sizes and define optimal integration with ration and management strategies.

Conclusion

Healthy cows are important for saving costs, thus increasing profits and ensuring longer and more productive milking lifetimes. ESHN helps to optimize energy balance and thereby play a pivotal

role in reducing the incidences of post-parturient health conditions *viz.* metritis, ROP, mastitis and milk fever and. ESHN benefit helps to optimize, not only performance and milk quality, but also cow overall health and welfare.

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Conflicts of Interest

None to declare.

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