

Original Article

Impact of Herbo-Mineral Supplementation on Productivity and Health of Lactating Dairy Cows Under Field Conditions

Rajesh M¹, Vishalakshi Koli², Bhagwat V. G³, Varun Kumar K⁴

¹Veterinary Dispensary, Tindlu, Devanahalli, Bengaluru, Karnataka, India.

²Veterinary Dispensary, Doora, Mysore, Karnataka, India.

⁴Himalaya Wellness Company, Makali, Bengaluru, Karnataka, India.

³Vishwanath Gopal Bhagwat Himalaya Wellness Company, Makali, Bengaluru, Karnataka, India.

³Corresponding Author : dr.bhagwat@himalayawellness.com

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Abstract - Optimal nutrition is essential for maintaining productivity and health in lactating dairy cows. The present field study evaluated the effect of a Herbo-Mineral Powder (HMP), consisting of multivitamins, trace minerals, and herbal ingredients, on productivity and selected health parameters in milking cows under field conditions. A 45-day self-control trial was conducted in 33 multiparous lactating cows administered HMP orally at 50 g/day/animal in addition to routine feeding practices. Parameters evaluated included feed intake, dung consistency, rumen motility, activity level, milk yield, milk fat percentage, product performance, and safety observations. Significant improvements were observed in feed intake ($P < 0.001$), dung consistency ($P < 0.01$), rumen motility ($P < 0.001$), activity level ($P < 0.001$), milk yield ($P < 0.001$), and milk fat percentage ($P < 0.001$) following supplementation compared with baseline observations. No adverse effects were recorded during the study period, and users reported high satisfaction with product performance. The observed improvements may be associated with enhanced nutrient utilization, rumen function, and metabolic support provided by the combined herbo-mineral formulation. However, the absence of a parallel untreated control group and the limited sample size remain important study limitations. The findings suggest that HMP supplementation may support productivity and general health in lactating dairy cows under practical field conditions.

Keywords - HMP, Dairy cows, Feed supplement, Milk yield, Fat, Health.

1. Introduction

The dairy sector has evolved into a highly efficient area of livestock farming, with milk production serving as a major source of income and economic growth worldwide. According to the United Nations' Food and Agriculture Organization, both global milk output and the dairy product price index have shown consistent annual growth (Liu N et al., 2023). The dairy sector has evolved into one of the most efficient and economically important branches of livestock farming, with milk production contributing substantially to food security, rural livelihoods, and economic growth worldwide. According to the United Nations Food and Agriculture Organization, global milk production and dairy product prices have demonstrated a consistent upward trend in recent years, reflecting the growing demand for dairy products and the increasing importance of this sector in the global economy (Liu N et al., 2023).

In India, agriculture and allied sectors remain the backbone of rural development, providing employment and

income opportunities for a large proportion of the population. Among these sectors, dairy farming occupies a prominent position due to its close integration with smallholder farming systems. Unlike seasonal crop production, dairying offers a regular source of income throughout the year, thereby enhancing household economic stability. The growth of cooperative institutions such as the Karnataka Milk Federation has further strengthened milk procurement, processing, and marketing systems, improving market access and income realization for dairy farmers (Patil MV and Honnalli SH, 2025).

Sustained productivity in dairy cattle is highly dependent on optimum nutrition, particularly during periods of elevated physiological demand such as lactation and the transition period. Trace minerals are indispensable nutrients that participate in a wide range of biological functions and are essential for maintaining animal health, productivity, and reproductive efficiency (Fresco-Rey, Laura et al., 2026). Minerals such as cobalt (Co), chromium (Cr), copper (Cu),



iron (Fe), iodine (I), manganese (Mn), molybdenum (Mo), selenium (Se), and zinc (Zn) are involved in antioxidant defense mechanisms, immune responses, enzyme activity, and metabolic regulation (Palomares Roberto A, 2022 and Suttle Neville F, 2022). These functions become particularly critical during the transition phase, when reduced feed intake and increased metabolic demands predispose dairy cows to oxidative stress, metabolic disturbances, and infectious diseases (Mion Bruna et al., 2023; Pérez-Báez J et al., 2019).

Despite the recognized importance of trace minerals, ensuring adequate mineral nutrition under practical farming conditions remains a significant challenge. Mineral intake in dairy cattle is influenced by factors such as soil mineral composition, forage quality, water quality, feeding practices, palatability, mineral source, and accessibility. Furthermore, free-choice mineral supplementation often results in considerable variation in voluntary intake among animals. Such inconsistencies can compromise the mineral status of both cows and their offspring, potentially affecting growth, immune competence, and overall productivity (Van Emon Megan et al., 2020). Consequently, strategic supplementation of trace minerals has become an essential component of modern dairy nutrition programs aimed at enhancing productivity and physiological efficiency (Mussayeva Gulzhan K et al., 2023 and Wang Xiaofang et al., 2025).

In addition to conventional mineral supplementation, increasing attention has been directed toward the use of herbal feed additives and phytochemical compounds as natural approaches to improve animal performance. Several herbal bioactive compounds have been reported to enhance feed intake, rumen fermentation, nutrient digestibility, and overall productivity without leaving harmful residues in animal products (Chaudhary Sandeep Kumar et al., 2023). Similarly, combinations of herbal ingredients and mineral supplements have shown potential to improve feed efficiency, milk yield, milk quality, and nutrient utilization through positive modulation of rumen microbial activity (Orzuna-Orzuna José Felipe et al., 2024; Terré Marta et al., 2024). Improved nutritional status associated with such supplements has also been linked to better reproductive performance and general health, although the magnitude of these responses may vary depending on physiological status, management conditions, and duration of supplementation (Chaudhary Sandeep Kumar et al., 2023; Orzuna-Orzuna José Felipe et al., 2024).

Although the beneficial effects of trace minerals and herbal feed additives have been reported in controlled studies, there remains limited field-based evidence regarding the performance of integrated herbal-mineral formulations under practical dairy farming conditions. Most available reports evaluate either mineral supplementation or phytochemical additives independently, while information on the combined effects of herbal and mineral interventions on milk production and animal health in lactating cows under field conditions is

scarce. Moreover, the variability associated with on-farm management, feeding practices, and environmental conditions underscores the need for scientifically validated field evaluations before broad recommendations can be made.

A Herbo Mineral Powder (HMP) formulation developed by M/s. Himalaya Wellness Company, Bengaluru, Karnataka, India, has been formulated with multivitamins, multiminerals, and selected herbal ingredients to support digestive efficiency, metabolic function, and productivity in livestock. However, despite its intended benefits, scientific evidence demonstrating its effectiveness on milk production and the health status of milking cows under field conditions is currently limited. Therefore, the present investigation was undertaken to evaluate the efficacy of HMP supplementation in enhancing milk production and maintaining the health of milking cows under field conditions.

2. Materials and Methods

2.1. Ethical Approval

The study protocol was approved by the Committee for the Control and Supervision of Experiments on Animals (CCSEA) (Approval No. AHP/LA/22E/25E; 10 February 2026), and all procedures were conducted accordingly.

2.2. Study Design

The study was conducted using a self-control experimental design for a period of 45 days at Mysore district and Bengaluru rural district, Karnataka, India. A total of 33 multiparous, client-owned lactating dairy cows were selected. Animals received the baseline ration supplemented with HMP at 50g/day/cow.

2.3. Animal Selection and Identification

Thirty-three milking cows of *Holstein Friesian* cross and Jersey cross breeds were selected. The selected animals were between 2 and 10 years of age and were in their 1st to 6th lactation. All animals were individually identified and monitored throughout the study period.

2.4. Inclusion and Exclusion Criteria

Only healthy lactating dairy cows at a similar stage of lactation with a history of consistent milk production were included in the study. Animals suffering from severe disease conditions such as tuberculosis, metritis, prolapse, fatty liver syndrome, ascites, foot-and-mouth disease, fever, or absence of gag reflex were excluded from the study.

2.5. Limitations

The absence of a parallel untreated control group is a limitation of the present field study.

2.6. Animal Management and Housing

All animals were managed by clients and housed under standard dairy farming conditions. The regular feeding schedule and routine ration consisting of concentrate feed and

green fodder, as followed by the client, were maintained consistently throughout the study period.

2.7. Investigational Veterinary Product

HimPoshan™ Powder, a Herbo-Mineral Powder (HMP), was used as the investigational veterinary product in the study. The HMP was supplied with batch details, manufacturing and expiry dates, and was stored in a cool and dry place as per the manufacturer's recommendations.

A 50g packet of HMP was cut-opened and mixed with a concentrate feed and water quantity sufficient for one day just before administration. The mixture was thoroughly stirred for 2–3 minutes to ensure uniform distribution of the supplement.

The freshly prepared mixture of HMP, concentrate feed, and water was fed orally to the dairy cows. The supplementation schedule and duration were followed as per

the study design. No supplemental trace mineral products were allowed alongside the experimental treatment during the study period.

2.8. Assessment Parameters

Feed consumption was assessed daily using a standard grading system (Table 1) and recorded by the veterinarian, client, or co-investigator. Dung consistency was evaluated daily as an indicator of digestive efficiency according to the standard grading system (Table 1). Milk yield was recorded daily in liters. Milk quality was assessed by estimating milk fat percentage weekly during the supplementation period and once before and after supplementation. Rumen motility was evaluated to assess rumen function and digestive efficiency, with observations recorded once before supplementation, weekly during supplementation, and once after supplementation using the standard grading system (Table 1).

Table 1. Assessment parameters grading system

Parameter	Description	Score	Recording frequency
A. Feed Intake	Normal – Consumes total quantity of feed	3	Daily
	Mild Anorexia – Consumes 50%-25% feed	2	
	Severe Anorexia – Not consumes feed	1	
B. Dung Consistency	Normal – Semi-solid, porridge-like with well-formed stools	3	Daily
	Subnormal – Loose stools	2	
	Poor – Watery stools (diarrhea) / Very solid and hard	1	
C. Activity Level	Normal - Active and alert	3	Daily
	Dull and depressed	2	
	Sluggish and Lethargy	1	
D. Rumen Motility Score	Normal – 2-5 ruminal movements per 2 minutes	3	Before supplementation – Once During Supplementation - Weekly once After supplementation – Once
	Hypermotility – >5 ruminal movements per 2 minutes	2	
	Hypomotility – <2 ruminal movements per 2 minutes	1	
E. Fat (%)	Recordings		Before supplementation – Once During Supplementation – Weekly once
I. Milk Yield (Ltrs)	Recordings		Daily
J. Product Performance / Satisfaction Score	Highly Satisfied	3	Daily
	Moderately Satisfied	2	
	Not Satisfied (No relief)	1	
K. Product Safety	No adverse effects	2	Daily
	Adverse effects observed	1	

Animal health and activity were evaluated based on activity levels and general behavior 7 days before supplementation, throughout the supplementation period (30

days), and 8 days after supplementation in accordance with the standard grading system (Table 1).

Product safety was assessed by daily monitoring of animals for any adverse effects during the study period, and product performance and satisfaction were evaluated by the veterinarian using the standard grading system (Table 1).

2.9. Statistical Analysis

Data were expressed as mean $\pm$ standard deviation (SD). Statistical analysis was performed using repeated measures one-way ANOVA followed by Dunnett's multiple comparison post-hoc test to compare values during and after supplementation with baseline values.

Differences were considered statistically significant at $p \leq 0.05$. Statistical significance was considered at $P < 0.05$. Results were expressed as mean $\pm$ Standard Deviation (SD).

3. Results

3.1. Health Parameters

The results on effectiveness of HMP on health parameters, viz., feed intake, dung consistency, rumen motility, and activity level were represented in Table 2. Results depicted that following supplementation of HMP, feed intake significantly increased, and dung consistency was returned to normalcy in all the animals, which was evident through improvement in feed intake score and dung consistency score during the supplementation period and after the supplementation period of HMP. The feed intake score was significantly improved during the supplementation period of HMP (2.24 ± 0.61 ; $p < 0.001$) and after the supplementation

period of HMP (2.95 ± 0.18 ; $p < 0.001$) as compared to the baseline feed intake score (1.85 ± 0.74). The dung consistency score was non-significantly ($p > 0.05$) improved.

During the supplementation period of HMP (2.61 ± 0.57) and significantly improved after the supplementation period of HMP (2.82 ± 0.50 ; $p < 0.001$) as compared to baseline dung consistency score (2.52 ± 0.61). Furthermore, the rumen motility score was significantly ($p < 0.001$) improved in the after-supplementation period of HMP (2.91 ± 0.29) compared with during supplementation period (2.17 ± 0.40) and baseline rumen motility score (2.12 ± 0.33). Consequently, the activity level score was significantly improved in the after-supplementation period of HMP (2.96 ± 0.17 ; $p < 0.001$) and during the supplementation period of HMP (2.20 ± 0.51 ; $p > 0.05$) as compared to the baseline score (2.15 ± 0.50). These findings inferred that activity level scores in all the animals improved during the supplementation period and after the supplementation period of HMP.

3.2. Reproduction Parameters

The baseline and during supplementation period estrus signs score (0.02 ± 0.09 and 0.01 ± 0.03 , respectively) implied that estrus signs were absent in the dairy cows enrolled into the study and during supplementation period. However, the estrus signs score was improved significantly in the after-supplementation period of TMP (0.14 ± 0.29 ; $p < 0.05$) (Table 3). These findings depicted that TMP play a crucial role in improvement of reproductive performances of dairy cows after prolonged supplementation of TMP viz., 30 days.

Table 2. Effect of HMP on health parameters in dairy cows

Parameters	Baseline	During Supplementation	After Supplementation
Feed intake score	1.85 ± 0.74	*** 2.24 ± 0.61	*** 2.95 ± 0.18
Dung consistency score	2.52 ± 0.61	2.61 ± 0.57	*** 2.82 ± 0.50
Rumen motility score	2.12 ± 0.33	2.17 ± 0.40	*** 2.91 ± 0.29
Activity level score	2.15 ± 0.50	2.20 ± 0.51	*** 2.96 ± 0.17

Values were expressed as Mean $\pm$ SD; $n = 33$

*** $p < 0.001$ as compared to baseline based on Repeated Measures One-way ANOVA followed by Dunnett's multiple comparison *post-hoc* test

Table 3. Effect of TMP on reproductive parameters in dairy cows

Parameters	Baseline	During Supplementation	After Supplementation
Estrus signs score	0.02 ± 0.09	0.01 ± 0.03	* 0.14 ± 0.29

Values were expressed as Mean $\pm$ SD; $n = 33$

* $p < 0.05$ as compared to baseline based on Repeated Measures One-way ANOVA followed by Dunnett's multiple comparison *post-hoc* test.

3.3. Milk Parameters

The results on the effect of HMP on milk parameters, viz. milk yield (L) and milk fat (%) in dairy cows, were represented in Table 4. Results portray that milk yield (L) was significantly increased during the supplementation of HMP (11.17 ± 5.94 ; $p < 0.05$) and after supplementation period of

HMP (14.15 ± 4.34 ; $p < 0.001$) as compared to baseline milk yield (10.25 ± 5.96). These findings indicated that supplementation of HMP caused to augment milk yield by 5.85% and 11.63% during supplementation and after supplementation periods of HMP, respectively.

The milk fat (%) was increased during the supplementation of HMP (3.80 ± 0.30 ; $p > 0.05$) and after the supplementation period of HMP (4.26 ± 0.40 ; $p < 0.001$) as compared to baseline milk fat (3.76 ± 0.33).

These finding implied that supplementation of HMP caused to improve milk fat (%) by 3.3% and 10.1% during the supplementation period and after the supplementation period of HMP, respectively.

3.4. Safety and Performance of HMP

The product safety and product performance scores recommended by clients or veterinarians who used HMP for supplementation to their dairy cows were found to be 2.00 ± 0.00 and 2.85 ± 0.50 , respectively (Figure 1). These findings inferred that clients or veterinarians who used HMP were found that the product HMP was safe and highly satisfied with the performance of HMP in terms of improvement of overall health status, augmentation of milk yield and milk quality enhancement effects.

Table 4. Effect of HMP on milk parameters in dairy cows

Parameters	Baseline	During Supplementation	After Supplementation
Milk Yield (L)	10.25 ± 5.96	$*11.17 \pm 5.94$	$***14.15 \pm 4.34$
Milk Fat (%)	3.76 ± 0.33	3.80 ± 0.30	$***4.26 \pm 0.40$

Values were expressed as Mean $\pm$ SD

* $p < 0.05$ and *** $p < 0.001$ as compared to baseline based on Repeated Measures One-way ANOVA followed by Dunnett's multiple comparison *post-hoc* test

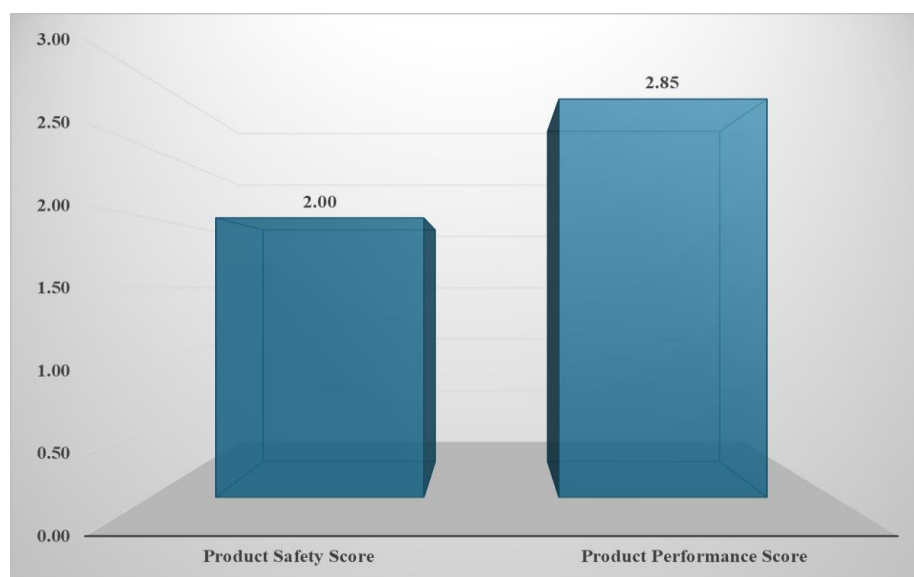


Fig. 1 Effect of HMP on safety and product performance

4. Discussion

Feed intake is a key determinant of productivity and overall health in dairy cattle, as it directly influences the availability of nutrients required for maintenance, reproduction, and lactation. In the present study, HMP supplementation led to a significant increase in feed intake during as well as after the supplementation phase. This improvement may be attributed to enhanced palatability, better digestive efficiency, or improved metabolic well-being in supplemented animals. Similar increases in feed consumption following the use of multivitamin-multimineral and herbal supplements have been reported by earlier studies (Ricci Sara et al., 2021), where the effect was linked to improved rumen conditions and stimulation of appetite. Previous literature also indicates that herbal bioactive compounds can promote

salivary secretion and optimize ruminal fermentation, thereby encouraging voluntary feed intake (Hassan Faizul et al., 2021). The sustained effect observed even after discontinuation of HMP suggests a carry-over influence on rumen adaptation and metabolic processes, consistent with recent reports published in the literature (Liu Siyuan et al., 2024).

Dung consistency serves as a practical, indirect indicator of digestive efficiency and nutrient utilization in ruminants. The marked improvement in dung consistency observed following HMP supplementation indicates enhanced ruminal fermentation and improved synchronization between fiber digestion and passage rate. Comparable findings have been reported in studies evaluating mineral- and herbal-based feed

additives, where better fecal consistency was associated with stabilization of ruminal pH and microbial balance (Teobaldo Ronyatta Weich et al., 2023 & Oberson J-L et al., 2019). The combined action of herbal constituents and essential nutrients in HMP may have improved intestinal motility and nutrient absorption, thereby reducing the incidence of loose or poorly formed feces. Improved dung characteristics also suggest more efficient energy utilization, which is particularly critical during early and peak stages of lactation (Hassan Faizul et al., 2021).

Rumen motility plays a vital role in digestion, microbial protein synthesis, and the prevention of metabolic disorders. In the present investigation, HMP-supplemented cows exhibited a significant increase in rumen motility scores. These observations align with earlier reports indicating that supplementation with calcium, magnesium, trace minerals, and herbal additives enhances ruminal contractions and improves rumination efficiency (Lobo Richard R et al., 2023 & Nutrient Requirements of Dairy Cattle, 2021). Improved rumen motility facilitates better mixing of digesta and promotes the absorption of volatile fatty acids, which may partly explain the concurrent increases in feed intake and milk production. The persistence of this improvement beyond the supplementation period suggests that HMP contributes to sustained rumen health rather than producing only a transient effect.

Activity level is an important indicator of animal welfare, reflecting energy balance, comfort, and general physiological status. In this study, HMP supplementation resulted in a significant increase in activity levels, suggesting improved metabolic condition and reduced subclinical stress. Similar findings have been reported in earlier studies, where balanced supplementation with vitamins, minerals, and herbal adaptogens improved alertness and reduced fatigue in dairy animals (Zhang Hongxing et al., 2024 & Ahmad Masood et al., 2022). The observed improvement in activity may also be linked to enhanced feed intake and rumen function. The sustained increase in activity beyond the supplementation period further indicates that HMP positively influences the overall physiological resilience of dairy cows under production stress.

Milk yield remains the most critical economic parameter in dairy farming, and its enhancement through nutritional strategies is well established. In the present study, HMP supplementation led to a highly significant increase in milk production during and after the treatment period. These findings are consistent with reports by Mussayeva et al. and Ahmad et al., who observed improved milk yield in cows receiving multivitamin-multimineral and herbal supplements (Wang Xiaofang, et al., 2025 & Urrutia Natalie L et al., 2025). The improvement in milk production may be attributed to increased feed intake, enhanced rumen fermentation, and more efficient nutrient partitioning toward lactation. The

continued elevation in milk yield after supplementation suggests improved metabolic efficiency and enhanced responsiveness of the mammary gland, as also reported in animals receiving balanced nutritional support (Zhang Hongxing et al., 2024).

Milk fat percentage is a critical quality parameter influenced by rumen fermentation patterns and fiber digestion. In the present study, HMP supplementation resulted in an increase in milk fat percentage. Similar improvements have been reported by Urrutia et al., who emphasized the role of acetate production and fiber digestibility in enhancing milk fat synthesis (Urrutia Natalie L, and Kevin J Harvatine, 2017 & Horan Louise et al., 2025). The mineral and herbal components of HMP may have promoted beneficial rumen microbial populations and improved the acetate-to-propionate ratio, thereby supporting higher milk fat content. The persistence of this effect beyond the supplementation phase indicates a sustained positive influence on ruminal metabolism.

Safety evaluation is a critical aspect of any field supplementation study. In the current investigation, all animals receiving HMP maintained consistent safety scores with no observed adverse effects, indicating good tolerability. Similar conclusions regarding the safety of mineral and herbal feed additives in dairy cattle have been documented in previous studies (Saleh Ahmed Ali et al., 2023). The favorable product performance scores observed in this study reflected improvements in production, health, and body condition. Additionally, the high level of acceptance among farmers and veterinarians highlights the practical applicability of HMP under field conditions. Overall, the combined evidence of efficacy and safety suggests that HMP can serve as an effective feed supplement for enhancing productivity, digestive efficiency, and overall performance in dairy cows. The present investigation was conducted as a self-control field trial without a parallel untreated control group, which may limit the ability to attribute all observed improvements solely to the supplementation. In addition, the relatively small sample size and inclusion of multiple breeds under varying field conditions may have influenced the variability of responses. Larger randomized controlled multicentric studies are recommended to further validate the findings.

4.1. Novelty of the Study

This study provides novel field-based evidence on the effectiveness of herbo-mineral supplementation in lactating dairy cows by evaluating its impact on both productive performance and health under routine farm management conditions. Unlike studies conducted under controlled experimental settings, the present investigation assesses the practical benefits of integrating herbal bioactives with essential minerals in commercial dairy systems. The findings contribute to the growing evidence on natural nutraceutical interventions as sustainable strategies for enhancing milk

production, supporting animal health, and improving overall dairy farm productivity.

5. Conclusion

Herbo-mineral supplementation was associated with improvements in productivity-related and general health parameters in lactating dairy cows under field conditions. Improvements in feed intake, rumen motility, milk yield, and milk fat percentage suggest potential benefits on nutrient utilization and metabolic efficiency. The supplement was well-tolerated during the study period without observable adverse effects. Further randomized controlled studies with larger sample sizes are warranted to confirm these findings and better understand the underlying biological mechanisms.

Recommendations

The results of this study suggest that herbo-mineral supplementation can be effectively incorporated into dairy herd nutrition programs to improve productivity and support health in lactating cows under field conditions. Adoption of such natural nutraceutical interventions, alongside good management practices, may contribute to sustainable dairy production. Further multi-location and long-term studies are warranted to confirm these findings and optimize supplementation strategies.

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Conflicts of Interest

Bhagwat VG and Varun Kumar K are employees of Himalaya Wellness Company. The authors declare that this affiliation did not influence the study design, data collection, data analysis, interpretation of results, or the decision to publish the manuscript.

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Ethics Approval

The study was conducted in accordance with the protocol approved by the Committee for the Control and Supervision of Experiments on Animals (CCSEA), approval number AHP/LA/22E/25E, dated 10-02-2026.

Authorship Contribution

RM and VK: Carried out field trials, and BVG and VKK: Conceptualization, Methodology, Investigation, Writing of the Original Draft, Review & Editing. All authors read and approved the final manuscript.

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