International Journal of Veterinary Sciences and Animal Husbandry

ISSN: 2456-2912
NAAS Rating (2025): 4.61
VET 2025; SP-10(7): 106-109

www.veterinarypaper.com
Received: 24-06-2025
Accepted: 22-07-2025

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Field evaluation of TANUVAS-GRAND: A nutritional intervention to enhance dairy cattle productivity in Sivagangai district, Tamil Nadu

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DOI: https://www.doi.org/10.22271/veterinary.2025.v10.i7Sb.2428

Abstract
A field demonstration was carried out at Battam village in Sivagangai district, Tamil Nadu to assess the efficacy of TANUVAS-GRAND as a feed supplement in dairy cattle. Fifteen crossbred dairy cows traditionally fed with unbalanced gruel-based diets were selected. TANUVAS-GRAND was supplemented for 45 days and parameters including milk yield, dung quality, fertility, respiratory signs, and coat health were assessed. Significant improvements were recorded in milk yield (0.55 L/day to 1.27 L/day), dung consistency, skin texture, and estrus return. The study recommends TANUVAS-GRAND for enhancing rural dairy productivity.

Keywords: Dairy cattle, feed supplement, TANUVAS-GRAND, rumen health, milk yield, smallholder farming

1. Introduction
Dairying remains an essential livelihood activity in rural Tamil Nadu, especially for small and marginal farmers who maintain one or two crossbred dairy animals under semi-intensive conditions. These farmers heavily depend on conventional and locally available feed resources such as rice gruel (kanji), kitchen waste, and leftover cooked food to nourish their animals. While these resources are readily accessible and cost-effective, they lack the essential nutritional balance required for optimal milk production, reproductive efficiency, and animal health. The absence of formulated feed or balanced supplementation often results in deficiencies of energy, protein, fiber, and critical micronutrients such as calcium, phosphorus, copper, cobalt, zinc, and selenium (Patel *et al*., 2020; Sahoo *et al*., 2017) [4, 7].

Prolonged feeding of high-starch, low-fiber, and unbalanced diets leads to metabolic disturbances in dairy cows. One of the most commonly encountered issues under such feeding regimes is Subacute Ruminal Acidosis (SARA). This condition arises due to the excessive accumulation of organic acids in the rumen, particularly volatile fatty acids and lactic acid, which subsequently reduces the rumen pH. When the rumen pH falls below 5.6 for more than three hours a day, microbial activity gets disrupted, negatively impacting fiber digestion, feed intake, and nutrient absorption (Plaizier *et al*., 2008) [5]. Clinical manifestations of SARA include reduced milk yield, poor dung quality, bloat, decreased appetite, compromised immunity, infertility, and in chronic cases, laminitis and liver abscesses (Stone, 2004) [9]. Unfortunately, due to its subclinical nature, SARA often goes unnoticed at the farm level, leading to long-term productivity losses.

Addressing the challenges of unbalanced feeding and ruminal acidosis requires the use of scientifically formulated nutritional supplements. In this context, the Tamil Nadu Veterinary and Animal Sciences University (TANUVAS) has developed TANUVAS-GRAND (Improved version), a comprehensive feed supplement enriched with essential vitamins, chelated minerals, probiotics, and rumen buffers (TANUVAS, 2024) [10]. The formulation is specifically designed to support rumen health, enhance nutrient digestibility, improve reproductive performance, and increase milk yield.

By incorporating probiotics and bypass proteins, the supplement aims to stabilize the rumen ecosystem and ensure adequate energy and amino acid supply, especially during the early lactation period (Mota *et al*., 2018) [2].

To evaluate the practical utility and field efficacy of TANUVAS-GRAND, a demonstration trial was conducted in Battam village, Sivagangai district, where traditional feeding practices prevail. The objective of the study was to assess the impact of TANUVAS-GRAND supplementation on key performance indicators such as milk production, dung consistency, coat condition, respiratory health, and fertility in crossbred dairy cattle under rural management conditions. This field-based evaluation aims to promote evidence-based adoption of scientific feed supplementation among smallholder dairy farmers for improved animal productivity and livelihood sustainability.

2. Materials and Methods

2.1 Study location and animal selection

The field demonstration was conducted in Battam village, located in Tirupuvanam Block of Sivagangai District, Tamil Nadu. This region is characterized by smallholder dairy farming, where most households rely on traditional feeding practices involving rice gruel and kitchen waste. A total of 15 crossbred dairy cows (Holstein Friesian or Jersey crosses), maintained by individual households, and were selected for the demonstration. These animals were managed under a semi-intensive system and were in mid- to late-lactation stages. Selection criteria included uniform body condition, absence of major clinical illness, and willingness of farmers to participate. None of the selected animals had been supplemented with any commercial mineral or probiotic reparation for at least two months prior to the study.

2.2 Supplementation details and feeding protocol

The nutritional supplement used in this demonstration was TANUVAS-GRAND, developed by the Tamil Nadu Veterinary and Animal Sciences University. Each cow received a total of 20 ml of TANUVAS-GRAND per day, administered in two divided doses: 10 ml in the morning and 10 ml in the evening. The supplement was diluted with a rice gruel and offered to the animal. This ensured full voluntary intake and better absorption. The supplementation was continued for a period of 45 days without interruption. Farmers were instructed to maintain their usual basal feed and fodder routine, and no other nutritional additives or medicines were introduced during the study period.

2.3 Parameters Assessed

The impact of TANUVAS-GRAND was assessed by comparing animal performance before and after 45 days of supplementation. The following parameters were recorded:

- Milk yield, measured in litres/day using standard calibrated vessels.
- Dung consistency, scored by farmers using a visual 1-5 scale, where 1 represented watery dung and 5 represented firm, well-formed dung.
- Skin and coat condition, assessed visually by the research team for glossiness, dryness, and roughness.
- Estrus return, noted by farmer-reported behavioral signs of heat.
- Respiratory distress, assessed clinically by the presence or absence of nasal discharge, coughing, or abnormal breathing.

Table 1: Performance of dairy cattle before and after TANUVAS-GRAND Supplementation (N=15)

S. No	Parameter Assessed	Unit of Measurement	Baseline (Day 0)	Post-Supplement (Day 45)
1	Milk Yield	Litres/day	0.55±0.18	1.27±0.32
2	Dung Consistency	Farmer scoring (1-5 scale)	2.1	4.5
3	Skin & Coat Quality	Visual observation	Rough and dull	Smooth and shiny
4	Estrus Return	No. of cows in heat (out of 15)	2/15	8/15
5	Respiratory Distress Signs	Clinical observation	Present in 6 cows	Absent in all cows

No adverse effects or feed refusal were reported during the study period. The overall acceptability of the supplement was high among farmers, and the compliance with twice-daily supplementation was 100%.

3. Results and Discussion

The field demonstration of TANUVAS-GRAND supplementation in crossbred dairy cows at Battam village yielded significant improvements across all key performance indicators. The observed changes suggest the beneficial impact of a scientifically formulated nutritional supplement in improving animal health and productivity under smallholder rural farming conditions.

3.1 Milk Yield Improvement

A notable improvement in average milk yield was recorded over the 45-day supplementation period. The baseline milk yield, which was 0.55±0.18 litres/day, increased significantly to 1.27±0.32 litres/day by Day 45. The increase in milk yield may be attributed to enhanced rumen function and nutrient absorption due to the action of chelated minerals, bypass protein, and probiotics present in TANUVAS-GRAND. Chelated minerals, being more bioavailable, improve metabolic processes, while probiotics stabilize rumen microflora, leading to better feed conversion efficiency (Yadav *et al*., 2020) [12].

These findings are consistent with the results reported by Mota *et al*. (2018) [2], who found that supplementation with a mineral-probiotic-vitamin complex significantly improved milk production in dairy cows under tropical conditions. Similarly, Stone (2004) [9] emphasized that dairy cows supplemented with rumen buffers and nutrient-dense additives exhibited increased dry matter intake and milk yield.

3.2 Dung Quality and Rumen Health

The consistency and form of dung improved considerably, shifting from a watery, semi-formed state to well-formed, firm feces. The farmer scoring improved from 2.1 to 4.5 on a 5-point scale, reflecting enhanced digestion and reduced signs of ruminal upset. Watery dung with undigested particles is often a sign of poor rumen microbial activity and SARA (*Subacute Ruminal* Acidosis), a condition frequently seen when cattle are fed carbohydrate-rich, fiber-deficient diets such as rice gruel (Plaizier *et al*., 2008) [5].

Rumen pH stabilization is crucial for cellulolytic bacterial activity, which directly influences the quality of digestion and nutrient assimilation (Nocek, 1997) [3]. The improved fecal characteristics also facilitated easier manure handling for the

farmers, which is a practical benefit in day-to-day cattle management.

3.3 Coat Condition and Skin Health

A visual assessment of the animals revealed marked improvement in skin and coat condition, with cows previously displaying rough, dull, and dry skin developing smoother and shinier coats. These changes are likely due to improved trace mineral and fat-soluble vitamin status particularly zinc, copper, and vitamin E, all of which are known to support epithelial integrity and skin health (Radostits *et al*., 2007) [6]. Improved skin texture also indicates enhanced metabolic performance and detoxification, which are essential for overall animal welfare.

3.4 Return to Estrus and Fertility Response

Before supplementation, only 2 out of 15 cows showed signs of estrus. By Day 45, 8 out of 15 cows (53%) returned to estrus. This substantial improvement can be linked to the correction of nutritional deficiencies, especially involving energy, protein, selenium, and reproductive vitamins such as vitamin A and E. These nutrients play vital roles in follicular development, estrus expression, and hormonal regulation (Kumar *et al*., 2020) [1]. The supplementation with TANUVAS-GRAND likely restored ovarian activity in cows previously experiencing silent estrus or anestrus.

These results are comparable with findings from Upadhyay *et al*. (2015) [11], who reported that strategic mineral and vitamin supplementation in anestrus cows resulted in a 60-70% estrus return rate within two months of feeding. Hence, TANUVAS-GRAND could serve as a cost-effective reproductive booster under village conditions.

3.5 Respiratory health and general vitality

Before the intervention, 6 cows showed mild respiratory distress, including nasal discharge and labored breathing, a common sign of weakened immunity or subclinical metabolic stress**.** By the end of the trial**,** all affected cows recovered, and no further respiratory issues were reported in any of the animals. This improvement may be attributed to the action of vitamin E, selenium, and probiotics, which enhance the immune response, modulate inflammation, and restore mucosal integrity (Spears & Weiss, 2008) [8]. Improved immunity also has indirect effects on milk yield, reproductive efficiency, and longevity.

Table 2: Summary of TANUVAS-GRAND Supplementation Outcomes

Parameter	Before Supplementation	After 45 Days Supplementation
Milk Yield (L/day)	0.55±0.18	1.27±0.32
Dung Consistency (1-5)	2.1	4.5
Estrus Return (No of cows)	2/15	8/15
Coat Appearance	Rough & dull	Smooth & shiny
Respiratory Signs	6 cows affected	0 cows affected

3.6 Farmer feedback and practical significance

Farmers reported a high degree of satisfaction with the use of TANUVAS-GRAND. The supplement was easy to administer, well-accepted by the cows, and showed visible improvements within 2-3 weeks. Improved dung consistency and milk yield were considered the most valuable outcomes, followed by reproductive recovery and reduced health issues. Farmers expressed interest in continuing the supplementation at least at the maintenance dose (10 ml twice daily**)** even after the study period. This demonstrates the practical scalability and field acceptability of TANUVAS-GRAND as a rural dairy innovation.

Fig 1: Demonstration of TANUVAS-GRAND nutrition to farmers at Battam village.

Fig 2: Farm-level preparation and mixing of TANUVAS-GRAND in feeding trough

4. Conclusion

The field results clearly show that TANUVAS-GRAND can significantly improve production and health parameters in crossbred dairy cows maintained under rural household conditions. The integration of this supplement into traditional feeding systems can address hidden hunger, correct subclinical conditions like SARA and infertility, and enhance rural dairy productivity. Its farmer-friendly format and ease of use make it highly scalable for wider adoption under livestock extension programs.

Conflict of Interest
Not available

Financial Support
Not available

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How to Cite This Article
Ramakrishnan V, Kumaran SS. Field evaluation of TANUVAS-GRAND: A nutritional intervention to enhance dairy cattle productivity in Sivagangai district, Tamil Nadu. International Journal of Veterinary Sciences and Animal Husbandry. 2025;SP-10(7):106-109.