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Comparative Evaluation of Efficacy of a Polyherbal Restorative (*Avasarga*TM Liquid) at Improving Composition and Yield of Milk in Heat-stressed Cows

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Abstract

Background: Thermal stress presents a key stress in dairy production. Heat-stressed dairy animals exhibit depression in both yield and composition of milk. Phytogetic products have been commonly used to alleviate heat stress and improve production traits of dairy cows.

Methods: A trial was undertaken to evaluate the efficacy of a polyherbal restorative, *Avasarga*TM liquid, at improving the composition and yield of milk in heat-stressed cattle and buffalo cows. *Avasarga*TM was administered orally at 50 mL twice daily for five days to eight cattle and eight buffalo cows under severe to extreme heat stress. Another commercially available anti-stressor product was also included for comparison in an equal number of cattle and buffalo cows, reared under identical conditions of thermal stress. Milk-related parameters, viz., milk yield, fat content, and solids-not-fat, and clinical parameters, viz., body temperature, respiration rate, and heart rate, were recorded and compared before and after treatment.

Results: Clinical parameters did not worsen in the *Avasarga*TM-treated cows despite a progressive increase in thermal stress. Significant improvements in almost all milk-related parameters were observed in both cattle and buffaloes. Treatment with the other anti-stressor formulation also yielded similar results, but the improvements were greater with *Avasarga*TM treatment.

Conclusion: Based on the findings of the trial, it could be concluded that *Avasarga*TM liquid, administered orally at 50 mL twice daily for five days, is efficacious at improving the composition and yield of milk in heat-stressed cattle and buffalo.

Keywords: Dairy, heat stress, herbal, milk, restorative, thermal stress, *Avasarga*TM

Introduction

Tackling thermal stress is a key challenge in dairy production systems, and the gravity of the challenge is increasing with climate change and intensive dairying practices (Guo *et al.*, 2023) [1]. Thermal stress results in disturbed water consumption, reduced feed intake, slower transit of feed through the gut, and diversion of energy and bodily resources from production to fighting stress (Yang *et al.*, 2022) [2]. Dairy animals under thermal stress suffer losses in both composition and yield of milk (Abulaiti *et al.*, 2024) [3].

Besides good housing and husbandry practices, management of thermal stress may require supplementation with anti-stressors (Guo *et al.*, 2023; Wang *et al.*, 2026) [1, 6]. Products of plant-origin, comprising whole plant parts or herbal extracts, have been used successfully for the management of heat stress in dairy animals (Bhamare *et al.*, 2022 a & b) [4, 5]. Many Indian herbs, traditionally reputed for their adaptogenic and galactagogue properties, have been found useful for combating thermal stress towards improving performance in dairy animals (Devi *et al.*, 2024; Pahuja *et al.*, 2024; Gupta *et al.*, 2025; Devasena *et al.*, 2026) [7, 8, 9, 10]. This study reports the results of a trial aimed at comparative evaluation of two polyherbal restoratives (*Avasarga*TM liquid; M/s Indian Immunologicals Limited, Hyderabad and another commercially available product) on the composition and yield of milk in heat-stressed dairy animals.

Materials and methods

The trial was held at the Livestock Farm Complex of Khalsa College of Veterinary and Animal Sciences (KCVAS), Amritsar (Latitude: 31.63°N, Longitude: 74.87°E, Height: 229 msl), from 06.05.2026 to 11.05.2026. The trial recruited 16 each of apparently healthy crossbred cattle and Murrah buffalo lactating cows, maintained under intensive management conditions with proper ventilation, hygienic

surroundings, and adequate space allocation. All animals had *ad libitum* access to feed and clean drinking water throughout the study period. Standard feeding, housing, and health management practices were followed uniformly to ensure optimum welfare and consistent management conditions. The animals were divided into four equal sub-groups, as presented in Table 1.

Table 1: Scheme of study design

Group	Arm	Treatment	n
Crossbred cattle	C-I	<i>Avasarga</i> TM @ 50 mL orally twice daily for 5 days	8
	C-II	Product X @ 50 mL orally twice daily for 5 days	8
Buffalo	B-I	<i>Avasarga</i> TM @ 50 mL orally twice daily for 5 days	8
	B-II	Product X @ 50 mL orally twice daily for 5 days	8

Since the study compared non-experimental, licensed products without any invasive testing, ethics committee approval was not required. The treatment was given for five days from 06.05.2026 to 10.05.2026. Milk yield (litres) was recorded, and milk fat (%) and solids-not-fat (SNF, %) were estimated on day 1 before the start of treatment and on day 6 after completion of treatment. Clinical parameters *i.e.* body temperature, respiration rate, and heart rate were also recorded once daily at about 02:30 to 03:00 PM. Local minimum and maximum temperature and relative humidity data were obtained from a popular meteorological website (www.timeanddate.com) and used to calculate the thermal humidity index (THI) as per the formula by NRC (1971):

$$\text{THI} = (1.8 \times T_{\text{avg}} + 32) - [(0.55 - 0.0055 \times \text{RH}_{\text{avg}}) \times (1.8 \times T_{\text{avg}} - 26.8)];$$

where T_{avg} and RH_{avg} are the average temperature and average relative humidity, obtained as the arithmetic mean of the daily minimum and maximum, respectively. Milk yield was recorded, and fat and SNF content were estimated by standard methods (Arora *et al.*, 1996). Fat-corrected milk yield (4% for cattle and 6% for buffaloes), total milk fat (product of milk yield and fat content), and total SNF (product of milk yield and SNF content) were calculated. Milk yield, fat content, SNF content, fat-

corrected milk yield, total milk fat, total SNF, and clinical parameters on days 1 and 6 were compared between treatment arms within groups.

A 2×2 mixed Analysis of Variance (ANOVA) was conducted for each parameter to compare the efficacy of *Avasarga*TM with another product. The treatment Arm (*Avasarga*TM vs. Product X) was treated as the between-subjects factor, and Time (before vs. after treatment) was treated as the within-subjects factor. The primary statistical focus was directed at the Arm $\times$ Time interaction effect to determine if changes in a parameter differed significantly between the two arms. *Post-hoc* pairwise comparisons were drawn based on estimated Marginal Means to isolate where specific differences occurred and to determine which treatment yielded superior results. A Bonferroni correction was applied to all post-hoc adjusted *p*-values to control for inflation of the Type I error rate across multiple comparisons. All statistical analyses were performed in JASP v.0.96 (Love *et al.*, 2019) with the *a priori* significance threshold set at $\alpha = 0.05$.

Results and Discussion

The meteorological variables and THI over the five days of treatment are shown in Table 2, and the animal-wise milk parameters are shown in Tables 3-6.

Table 2: Meteorological variables and calculated THI over the five days of treatment

Date	Temperature (°C)			Relative Humidity (%)			THI
	Min.	Max.	Average	Min.	Max.	Average	
06.05.2026	19.0	34.0	26.5	24.0	78.0	51.0	74.07
07.05.2026	21.0	34.0	27.5	28.0	64.0	46.0	74.76
08.05.2026	21.0	34.0	27.5	32.0	78.0	55.0	75.88
09.05.2026	25.0	35.0	30.0	34.0	65.0	49.5	78.45
10.05.2026	26.0	36.0	31.0	34.0	65.0	49.5	79.75

Min.= minimum, Max. = maximum

Of the many formulae available for the calculation of THI, our study used the formula by NRC (1971), which has been shown to have greater accuracy in both cattle and buffaloes under varying conditions (Behera *et al.*, 2018; Haritha lekshmi and Ajithkumar, 2021) ^[14]. As can be seen from

Table 2, the THI during the five days increased progressively from 74.07 to 79.75, corresponding to severe stress for crossbred cattle and extreme stress for buffaloes (Jeelani *et al.*, 2019; Umar *et al.*, 2021) ^[15, 16].

Table 3: Milk parameters in Arm C-I before and after treatment

Animal Number	Day 1			Day 6		
	Milk Yield (L)	Milk Fat (%)	SNF (%)	Milk Yield (L)	Milk Fat (%)	SNF (%)
CB-001	4.4	2.8	8.1	6.1	3.9	10.3
CB-002	4.2	3.1	8.4	5.1	5.8	9.6
CB-003	5.3	3.8	7.9	6.8	4.8	9.3
CB-004	7.9	4.2	8.4	8.4	8.5	9.8
CB-005	4.2	2.8	7.3	4.3	5.1	10.7
CB-006	3.1	3.2	7.8	3.7	3.7	8.6
CB-007	4.3	3.6	8.2	4.4	4.3	8.7
CB-008	6.9	4.7	6.6	8.9	7.2	8.5

Table 4: Milk parameters in Arm C-II before and after treatment

Animal Number	Day 1			Day 6		
	Milk Yield (L)	Milk Fat (%)	SNF (%)	Milk Yield (L)	Milk Fat (%)	SNF (%)
CB-009	5.7	3.2	8.8	5.9	3.6	12.1
CB-010	4.9	3.3	8.2	5.5	2.9	8.4
CB-011	5.5	3.3	9.3	5.8	4.0	12.6
CB-012	8.6	2.1	7.6	8.9	2.9	8.1
CB-013	5.7	3.6	8.9	2.1 [†]	3.7	9.3
CB-014	7.1	2.9	8.7	7.3	3.3	9.3
CB-015	6.7	3.6	9.2	6.7	3.5	10.2
CB-016	3.2	4.8	10.7	3.4	5.6	12.4

[†]One teat closed due to injury**Table 5:** Milk parameters in Arm B-I before and after treatment

Animal Number	Day 1			Day 6		
	Milk Yield (L)	Milk Fat (%)	SNF (%)	Milk Yield (L)	Milk Fat (%)	SNF (%)
MT- 001	3.8	6.3	9.8	4.4	8.2	10.4
MT- 002	4.1	5.5	8.7	4.7	8.1	10.7
MT- 003	3.7	5.8	8.5	4.8	7.0	9.4
MT- 004	2.9	6.2	9.2	3.3	8.5	9.8
MT- 005	4.1	7.1	9.2	4.2	8.6	9.6
MT- 006	3.8	7.3	10.1	3.6	8.3	10.8
MT- 007	3.2	6.9	10.0	3.1	9.7	11.3
MT- 008	2.9	5.9	9.8	3.7	9.1	9.9

Table 6: Milk parameters in Arm B-II before and after treatment

Animal Number	Day 1			Day 6		
	Milk Yield (L)	Milk Fat (%)	SNF (%)	Milk Yield (L)	Milk Fat (%)	SNF (%)
MT- 009	3.3	6.7	8.3	3.2	9.0	9.9
MT- 010	2.5	6.3	7.9	2.8	8.6	9.4
MT- 011	4.3	7.4	8.6	4.1	9.1	8.6
MT- 012	2.1	7.0	9.1	2.5	8.5	9.4
MT- 013	3.6	7.8	10.1	4.2	7.9	10.3
MT- 014	2.7	6.5	9.8	2.9	6.8	9.9
MT- 015	1.9	8.1	8.9	2.3	8.3	9.1
MT- 016	3.1	7.8	10.7	1.8 [‡]	7.7	10.8

[‡]Animal in estrus

One animal each from the arms C-II and B-II suffered loss of milk due to unrelated reasons and were excluded from the analysis. The marginal means ($\pm$ 95% confidence intervals) of milk yield (L), fat content (%), SNF content (%), corrected milk yield (L), total fat (g), and total SNF (g)

before and after treatment in both arms of both groups have been compared in Figure 1. Since milk-related parameters, viz., milk yield, fat content, and SNF content, depend on individual factors, a 2×2 mixed ANOVA was used to compare the values before and after treatment.

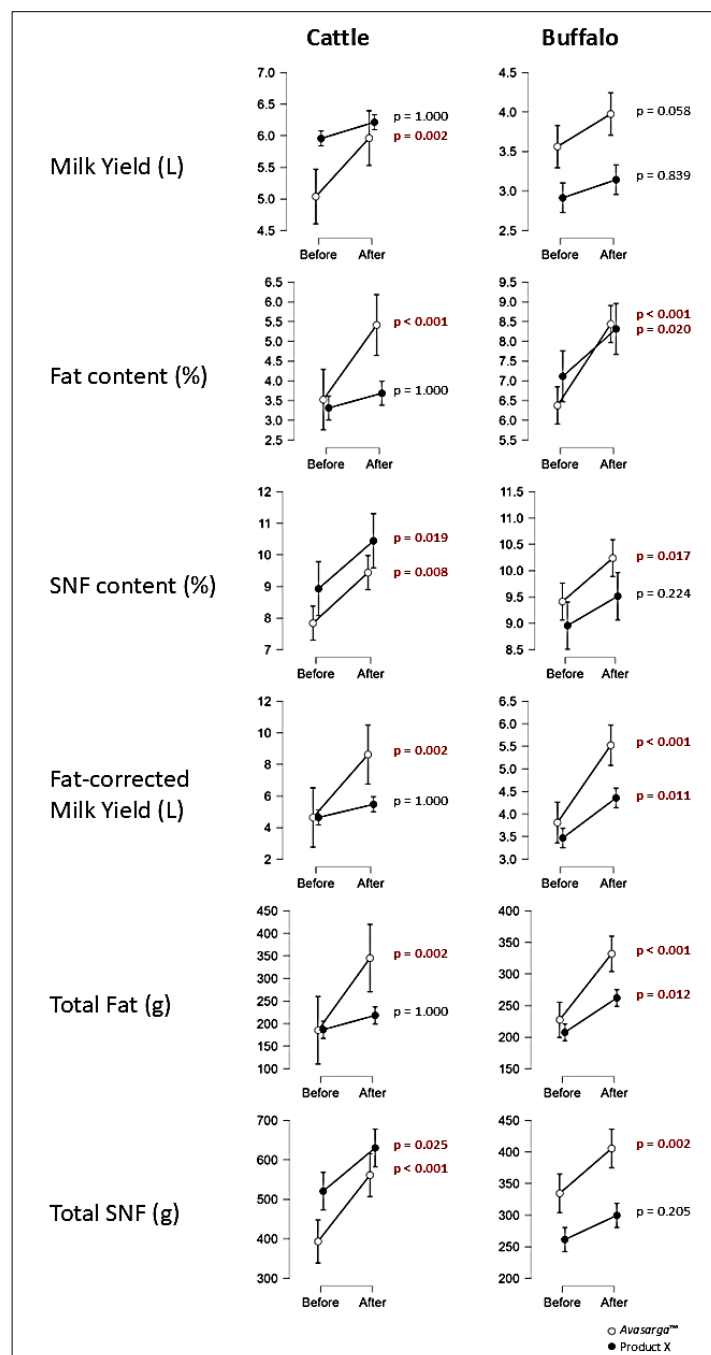


Fig 1: Marginal means ($\pm$ 95% confidence interval) of daily milk yield (L), fat content (%), SNF content (%), corrected milk yield (L), total fat (g), and total SNF (g) before and after treatment with Avasarga™ or Product X in cattle and buffaloes (significant *p*-values in red).

Treatment of heat-stressed cows with the polyherbal restorative, Avasarga™ liquid, at 50 mL orally twice daily for five days resulted in significant improvements of all milk-related parameters in both cattle and buffaloes, except milk yield in buffaloes. However, when the milk yield of buffaloes was corrected for 6% fat content, improvements in yield were also found to be highly significant. Product X, administered orally at 50 mL twice daily for five days, also yielded significant improvements in most parameters, although the improvements obtained with Avasarga™ treatment were greater. Neither treatment resulted in any appreciable changes in the clinical parameters of the cows (data not shown). However, the clinical parameters did not worsen despite the progressive increase in heat stress during the study period.

Avasarga™ liquid is a rationally-formulated polyherbal restorative, licensed for use in ruminants, camels, horses and

pigs. It contains several herbal constituents reputed in traditional Indian *materia medica* for their potent anti-stressor, adaptogenic, and galactagogue activities. Indian ginseng, Indian gooseberry, holy basil, and Indian licorice, present in Avasarga™, help to cope with somatic stressors, in general, and thermal stress, in particular, through various mechanisms that involve free radical quenching and anti-oxidation, ultraviolet (UV) B amelioration, and induction of molecular chaperones (Wahab *et al.*, 2021; Kumari *et al.*, 2024; Verma *et al.*, 2024; Kour *et al.*, 2025) [20, 17, 19, 18]. Besides inducing thermotolerance, licorice is gluconeogenic and supplements the galactagogue activity of asparagus by promoting the yield and improving the composition of milk (Wahab *et al.*, 2021; Gajarmal *et al.*, 2025) [20, 21].

Based on the findings of the study, it was concluded that herbal products can be used to restore heat stress-associated depressions in the yield and composition of milk of lactating

cows. Further, it was concluded that the herbal restorative, *Avasarga*[™] liquid, administered orally at 50 mL twice daily for five days, is efficacious at improving milk yield and composition of cattle and buffaloes under severe to extreme thermal stress.

Conflict of Interest

Avasarga[™] liquid is commercially manufactured and marketed by M/s Indian Immunologicals Limited (IIL). JPP, SKR, ST, and BG are employees of IIL. JPP, SR, ST, and BG were only involved in collation and analysis of data, and manuscript preparation, and did not influence the outcomes of the study in any manner.

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