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Effects of technoyeast (Biochem) supplementation on milk energy value, milk quality, and feed-energy efficiency in lactating dairy cows

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Abstract

A farm-level comparative trial evaluated TechnoYeast (Biochem), a yeast-based feed supplement, against a regular yeast supplement in lactating dairy cows over a 22 April to 02 June 2026 trial period. Twenty-four cows were allocated to Control (C1, C2; regular yeast supplement) and Treatment (T1, T2; TechnoYeast) groups, six cows per replicate. Because groups were not balanced for baseline milk yield, analysis emphasized within-cow change and difference-in-difference Energy Corrected Milk (ECM) rather than simple group means. Raw milk yield was numerically higher in Control (25.36 kg/cow/day) than TechnoYeast (23.08 kg/cow/day), reflecting higher Control baseline production. After adjusting milk volume for fat and protein, TechnoYeast showed a smaller ECM decline than Control across the trial (-1.36 vs -2.35 kg/cow/day), a difference-in-difference advantage of approximately 0.99 kg ECM/cow/day. Somatic cell count (SCC) was approximately 40.4% lower in TechnoYeast (387 vs 650 cells/mL average). A scenario-based feed-energy model estimated that, if TechnoYeast permits a ration reformulation of approximately 2 percentage points lower dietary TDN while maintaining ECM, the estimated net feed-cost benefit is approximately Rs 7.00/cow/day (ROI approximately 54%) at 20 kg feed intake. These findings indicate that TechnoYeast supplementation was associated with improved milk energy retention and lower SCC relative to Control, consistent with the direction of effect reported in published meta-analyses of *Saccharomyces cerevisiae* and yeast culture supplementation in dairy cattle. Given baseline imbalance and the absence of measured ration TDN and dry matter intake (DMI), these results should be regarded as a preliminary farm-level signal requiring confirmation in a controlled, baseline-matched trial.

Keywords: TechnoYeast; *Saccharomyces cerevisiae*; Dairy cows; Lactating cattle; Energy-corrected milk; Milk yield; Milk composition; Somatic cell count; Feed efficiency; Blood urea nitrogen

Introduction

Live yeast and yeast culture products derived from *Saccharomyces cerevisiae* are widely used in dairy cattle diets to support rumen fermentation stability, fiber digestion, and microbial protein synthesis (Nocek and Kautz, 2006; Robinson and Erasmus, 2009) [6, 8]. Quantitative meta-analyses of randomized trials have reported favorable, though variable, effects of yeast supplementation on rumen fermentation parameters and milk production (Desnoyers *et al.*, 2009) [7], and a meta-analysis specific to a commercial yeast culture product reported mean increases of approximately 1.18 kg/day in milk yield and 1.65 kg/day in Energy Corrected Milk (ECM) versus untreated controls (Poppy *et al.*, 2012) [11]. More recent meta-analytic work continues to report improvements in milk yield and milk composition with yeast culture supplementation in Holstein cows (Xiang *et al.*, 2025) [12], and controlled studies have reported reduced somatic cell count (SCC) with sustained *Saccharomyces cerevisiae* supplementation, consistent with a supportive role in udder health and immune function (Suayroop *et al.*, 2026; Vailati-Riboni *et al.*, 2021) [13, 14]. Because raw milk yield does not account for differences in milk fat and protein content, Energy Corrected Milk (ECM) is widely used to standardize

milk output to a common energy basis (Tyrrell and Reid, 1965; NASEM, 2021) ^[2], and is considered a more commercially relevant metric than raw yield alone, particularly where milk payment systems reward solids content and where feed-energy efficiency drives profitability. The present trial was conducted to evaluate whether TechnoYeast (Biochem), a yeast-based supplement, was associated with differences in milk yield, ECM, milk composition, SCC, blood urea nitrogen (BUN), and feed-energy efficiency relative to a regular yeast supplement under commercial farm conditions, and to translate any observed ECM advantage into an indicative feed-cost and return-on-investment (ROI) model for corporate and commercial evaluation.

Materials and Methods

Animals and trial design

Twenty-four lactating dairy cows were allocated to two Control replicates (C1, C2; fed regular farm feed with a standard yeast supplement) and two Treatment replicates (T1, T2; fed regular farm feed with TechnoYeast, Biochem), with six cows per replicate. The trial ran from 22 April to 02 June 2026 and included a baseline/adaptation phase and an experimental phase. The supplied dataset (24 cows) differed from an earlier proposed protocol of five cows per group; this should be clarified before any external scientific publication of these data.

Data collection

Daily milk yield was recorded as the sum of morning and evening milking. Milk composition (fat, solids-not-fat [SNF], protein, lactose) and somatic cell count (SCC) were recorded on multiple sampling dates across the trial. Blood urea and BUN were measured on three dates (09 May, 20 May, and 28 May 2026). Blood urea and BUN represent the same nitrogen metabolism pathway (BUN = blood urea x 0.467) and were treated as a single biomarker for interpretation.

Energy corrected milk (ecm) calculation

ECM was calculated using the standard US dairy-industry formula derived from the milk-energy relationships of Tyrrell and Reid (1965) ^[2]:

$$\text{ECM (kg/day)} = 0.327 \times \text{Milk kg} + 12.95 \times \text{Fat kg} + 7.20 \times \text{Protein kg}$$

where Fat kg = Milk kg x Fat% / 100, and Protein kg = Milk kg x Protein% / 100.

Statistical approach

Because Control and Treatment groups were not balanced for baseline milk yield (Control cows started at higher production), primary comparisons used within-cow change from baseline to the experimental phase and a difference-in-difference (DID) calculation for ECM: DID = (Treatment change) - (Control change). Simple group means are reported for transparency but are not used alone as the basis for commercial claims.

Feed-energy and economic modeling

Actual ration Total Digestible Nutrients (TDN) and dry matter intake (DMI) were not measured in this trial. A scenario-based model was therefore used to translate the observed ECM advantage into feed-energy and cost equivalents, using the relationship NEL (Mcal/kg DM) = 0.0245 x TDN% - 0.12, an assumed energy requirement of 0.74 Mcal NEL per kg ECM, and an assumed feed intake of 20 kg/cow/day (held constant across groups and phases for comparability). Cost assumptions were: dairy feed cost at 70% TDN = Rs 30/kg; TechnoYeast cost = Rs 650/kg; inclusion rate = 1 kg/MT feed (Rs 0.65/kg finished feed). These figures are scenario estimates, not directly measured ration values, and are presented as such throughout this report.

Results

Milk yield

Table 1: summarizes overall milk yield, and Table 2 shows within-cow change from baseline to the experimental phase

Group	Mean kg/cow/day	SD	Total kg	Records
Control	25.36	3.71	12779.15	504
TechnoYeast	23.08	3.38	11632.76	504

Table 2: Overall milk yield summary across the full trial period.

Group	Baseline kg/cow/day	Experimental kg/cow/day	Change kg/cow/day	Change %
Control	26.10	25.09	-1.00	-3.84%
TechnoYeast	23.84	22.81	-1.03	-4.30%

Control had higher raw milk yield at trial start; the within-cow comparison shows both groups declined during the experimental phase, with a small difference in decline magnitude (-1.00 vs -1.03 kg/cow/day).

Energy corrected milk (ECM)

Table 3: Within-cow milk yield change, baseline to experimental phase

Period	Group	Milk kg/cow/day	ECM kg/cow/day	Fat %	Protein %	SCC
Baseline/Adaptation	Control	26.39	26.19	3.50	3.10	710.00
Experimental	Control	25.31	23.84	3.24	2.87	623.56
Baseline/Adaptation	TechnoYeast	24.08	22.80	3.25	2.90	422.00
Experimental	TechnoYeast	23.01	21.45	3.18	2.84	372.00

Table 4: Milk yield and ECM by trial period and group

Group	Baseline ECM	Experimental ECM	ECM change	ECM change %
Control	26.19	23.84	-2.35	-8.98%
TechnoYeast	22.80	21.45	-1.36	-5.95%

TechnoYeast showed a smaller ECM decline than Control (-1.36 vs -2.35 kg/cow/day), a difference-in-difference advantage of approximately 0.99 kg ECM/cow/day. This does

not indicate higher raw milk output in TechnoYeast; it indicates a smaller decline in the energy value of milk after compositional correction.

ECM Correlation with milk composition

Table 5: Difference-in-difference ECM interpretation.

Parameter	Correlation with ECM (r)
Milk yield	0.91
Fat %	0.29
Protein %	0.42
SNF %	0.15
Lactose %	-0.04
SCC	0.87

Milk yield was the strongest driver of ECM in this dataset, consistent with the structure of the ECM equation; fat and protein contributed secondary corrections.

Milk composition and somatic cell count (SCC)

Table 6: Pearson correlation of ECM with milk yield and composition parameters

Group	Fat %	SNF %	Protein %	Lactose %	SCC
Control	3.29	8.24	2.94	4.77	650.15
TechnoYeast	3.18	8.20	2.86	4.74	387.38

Fat and protein differences between groups were small and inconsistent. The clearest milk-quality response was SCC: TechnoYeast averaged approximately 40.4% lower SCC than

Control (387.38 vs 650.15), consistent in direction with published reports of reduced SCC following sustained *Saccharomyces cerevisiae* supplementation (Suayroop *et al.*, 2026; Vailati-Riboni *et al.*, 2021) ^[13, 14]. This should be interpreted as a milk-quality and udder-health supportive signal rather than a therapeutic disease-control claim.

Blood urea nitrogen (bun)

Table 7: Average milk composition across sampling dates

Date	Group	Blood urea mg/dL	BUN mg/dL
09-May-2026	Control	26.19	13.10
09-May-2026	TechnoYeast	25.38	12.82
20-May-2026	Control	24.01	12.00
20-May-2026	TechnoYeast	31.08	15.54
28-May-2026	Control	23.43	11.72
28-May-2026	TechnoYeast	23.37	11.69

BUN remained within a generally acceptable biological range in both groups across the trial. TechnoYeast showed a transient increase on 20 May that returned close to Control values by 28 May, indicating that nitrogen utilization should be judged from serial values together with protein and energy supply, not a single time point.

ECM-TDN Commercial model and implied tdn equivalent

Table 8: Blood urea and BUN by sampling date.

Scenario	TDN %	Feed cost INR/kg DM	NEL Mcal/kg DM	DM kg/kg ECM	Feed cost INR/kg ECM	ECM adv. kg/cow/day	ECM value INR/cow/day
Low TDN ration	60	22	1.35	0.55	12.06	0.99	37.79
High TDN ration	68	28	1.55	0.48	13.40	0.99	37.79

Table 9: Scenario model: low-TDN vs high-TDN ration economics. Using milk value Rs 38/kg ECM, the observed ECM advantage of 0.99 kg/cow/day is worth approximately Rs 37.79/cow/day.

Group	Baseline ECM	Implied TDN % (baseline)	Experimental ECM	Implied TDN % (experimental)	TDN change (pts)
Control	26.19	44.46	23.84	40.90	-3.56
TechnoYeast	22.80	39.33	21.45	37.29	-2.04

At the same assumed feed intake, Control's larger ECM decline corresponds to an implied dietary TDN requirement falling by approximately 3.56 percentage points over the trial, versus approximately 2.04 percentage points for TechnoYeast - a difference-in-difference of approximately 1.5 percentage

points of TDN, directionally consistent with the 0.99 kg ECM/cow/day advantage in Table 4.

3.7 Return on Investment (ROI) Model

Table 10: Implied dietary TDN% corresponding to observed ECM, assuming a fixed DMI of 20 kg/cow/day for both groups (modeled equivalence, not a measured ration TDN).

Effective TDN improvement (%)	Feed intake kg/day	Gross saving INR/cow/day	TechnoYeast cost INR/cow/day	Net benefit INR/cow/day	ROI %
1.00	20.00	10.00	13.00	-3.00	-23.08%
2.00	20.00	20.00	13.00	7.00	53.85%
3.00	20.00	30.00	13.00	17.00	130.77%

Table 10. ROI scenario at 20 kg feed intake per cow/day.

At a 1% effective TDN-equivalent advantage, feed savings do not cover the TechnoYeast inclusion cost. At a 2% advantage, net benefit is approximately Rs 7.00/cow/day (ROI approximately 54%); at 3%, the net benefit is substantially stronger. These are scenario estimates pending least-cost ration reformulation and actual DMI measurement, and exclude additional value from milk quality, SCC, and potential health or reproductive benefits.

Discussion

The direction of the ECM and SCC findings in this trial is

consistent with published meta-analyses of yeast and yeast culture supplementation in dairy cattle. Poppy *et al.* (2012) ^[11] reported a mean ECM increase of 1.65 kg/day with a commercial yeast culture product across 36 studies, and Desnoyers *et al.* (2009) ^[7], reported improved rumen fermentation parameters across 157 experiments with live yeast supplementation. A more recent meta-analysis (Xiang *et al.*, 2025) ^[12], similarly reported improved milk yield and composition with yeast culture supplementation in Holstein cows. The magnitude of the ECM advantage observed here (0.99 kg/cow/day, difference-in-difference) is directionally consistent with, though numerically smaller than, the pooled

estimate reported by Poppy *et al.* (2012) ^[11], which is expected given the present trial's small sample size, short duration, and baseline imbalance between groups.

The observed reduction in SCC (approximately 40.4% lower in TechnoYeast) is consistent with reports that sustained *Saccharomyces cerevisiae* supplementation is associated with lower SCC and improved indicators of udder health (Suayroop *et al.*, 2026; Vailati-Riboni *et al.*, 2021) ^[13, 14], and with proposed mechanisms involving yeast-derived beta-glucans and mannans supporting immune function and rumen stability (Nocek and Kautz, 2006; Robinson and Erasmus, 2009) ^[6, 8]. This should nonetheless be treated as a supportive milk-quality signal rather than a validated disease-control claim, since this trial was not designed or powered to evaluate clinical or subclinical mastitis outcomes directly.

The feed-energy and ROI scenarios in Section 3.6-3.7 rely on assumed, not measured, ration TDN and DMI, and should be interpreted as illustrative commercial modeling rather than as a validated cost-benefit claim. The core biological result - a smaller ECM decline and lower SCC with TechnoYeast - is the primary finding that should inform commercial discussion, with the feed-cost modeling providing an indicative, assumption-dependent translation of that result into economic terms.

Limitations

Control and Treatment groups were not balanced at baseline milk yield; all comparisons should be read as baseline-adjusted, not as simple group averages.

Actual ration TDN and DMI were not measured; all TDN and ROI figures are scenario models, not directly measured values.

Milk composition sampling schedule should be harmonized across all cows in future trials, ideally with cow-level rather than group-level averaging.

The 24-cow dataset differs from an earlier proposed 5-cows/group protocol; this discrepancy should be resolved before any external scientific submission.

Conclusion

In this farm-level trial, TechnoYeast (Biochem) supplementation was associated with a smaller decline in Energy Corrected Milk (approximately 0.99 kg/cow/day difference-in-difference advantage) and approximately 40.4% lower somatic cell count relative to a regular yeast supplement, indicating better-conserved milk energy value and supportive milk-quality effects. A scenario-based feed-energy model suggests a plausible positive return on investment (approximately 54% ROI at a 2% effective TDN-equivalent advantage), pending confirmation with measured ration TDN and DMI. These findings are directionally consistent with the published literature on yeast and yeast culture supplementation in dairy cattle, but given the trial's baseline imbalance, small scale, and short duration, further controlled validation with matched parity, days in milk, body condition, DMI, and ration TDN is recommended before broader commercial or scientific claims are made.

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