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Masti 29+: A Multi-target Nutritional Strategy for Supporting Udder Health and Productive Recovery in Dairy Cattle-Scientific Rationale and Preliminary Field Evaluation

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Abstract

Bovine mastitis is a multifactorial inflammatory disorder in which mammary infection interacts with oxidative stress, immune dysfunction, nutritional status and impaired productive performance. This study evaluated Masti 29+, a multi-component nutritional formulation containing more than 29 active ingredients, designed to provide integrated nutritional, antioxidant, rumen-gut, immune and metabolic support in dairy cattle with mastitis. Thirty affected dairy cows were evaluated over 21 days, with observations recorded at baseline and Days 7, 14 and 21. Mean milk yield increased progressively from 11.6 L/cow/day at baseline to 12.3, 13.4 and 14.1 L/cow/day, respectively. Somatic cell count declined from $1,120 \times 10^3$ cells/mL to 850, 590 and 410×10^3 cells/mL. California Mastitis Test-positive animals decreased from 30/30 at baseline to 25/30, 17/30 and 10/30, while moderate-to-severe udder inflammation declined from 18 to 12, 6 and 3 animals. Abnormal milk findings decreased from 14/30 to 2/30, whereas animals showing normal feed intake increased from 19/30 to 29/30. By Day 21, 26/30 animals were classified as clinically improved/recovered. These observations demonstrate progressive improvement across mammary-health, productive and general clinical parameters during supplementation. The findings support further evaluation of a multi-target nutritional approach as an adjunct to conventional mastitis management. Controlled randomized studies incorporating microbiological cure and appropriate comparator groups are required to establish efficacy and causality.

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1. Introduction

Bovine mastitis remains one of the most important diseases affecting dairy cattle because of its consequences for animal health and welfare, milk production, milk quality and farm profitability. Mastitis is not merely a localized intramammary infection; its clinical expression and subsequent recovery reflect complex interactions among pathogen challenge, mammary inflammation, oxidative stress, immune competence, epithelial integrity, metabolic status and nutritional adequacy.

Somatic cell count (SCC) and the California Mastitis Test (CMT) are widely used indicators of mammary inflammatory status. Increased SCC is associated with inflammatory cell recruitment into the mammary gland and is frequently accompanied by alterations in milk characteristics and reduced productive efficiency.

Oxidative stress is another important component of the pathophysiology of mastitis. Excessive generation of reactive oxygen species during inflammatory responses may contribute to cellular injury, alteration of mammary epithelial function and impaired immune responses. Nutritional factors influencing endogenous antioxidant defence may therefore have relevance to the physiological response to mammary inflammation.

Trace minerals and vitamins participate in several antioxidant, immune and metabolic pathways. The bioavailability of trace minerals is an important determinant of their biological utilisation in ruminants. Furthermore, adequate nutritional support of rumen function, gastrointestinal microbial balance and metabolic activity is essential for maintaining feed intake and productive performance in lactating cattle. These observations provide a rationale for investigating nutritional

approaches that simultaneously support several physiological systems rather than correcting a single nutritional deficiency. Masti 29+ is a multi-component nutritional formulation containing more than 29 active ingredients, incorporating bioavailable trace minerals, antioxidant nutrients, amino acids, grape-seed polyphenols, probiotic and prebiotic components, yeast-derived ingredients and selected proteolytic enzymes. The present investigation was undertaken to examine the scientific rationale for this integrated nutritional strategy and to document preliminary field observations regarding mammary health, milk production, feed intake and clinical recovery in dairy cattle presenting with mastitis.

1.1 Formulation Concept and Scientific Rationale

The distinguishing principle of the formulation is the simultaneous provision of nutritional support to multiple physiological pathways potentially affected during mastitis. Rather than functioning as a conventional single-component mineral or vitamin supplement, the formulation integrates: bioavailable trace-mineral supplementation, antioxidant nutritional support, amino-acid and metabolic support, rumen and gastrointestinal support, probiotic/prebiotic components, yeast-derived nutritional support, plant-derived polyphenols, and selected proteolytic enzymes.

The intended biological targets of these components are summarized below.

Table 1: Functional components and proposed physiological roles

Functional category	Principal intended physiological role
Bioavailable trace minerals	Micronutrient availability, antioxidant enzyme systems and normal tissue function
Stabilized vitamin C and antioxidant nutrients	Support of endogenous antioxidant defence
Grape-seed polyphenols	Complementary antioxidant support
Amino acids	Metabolic and tissue nutritional support
Probiotic/prebiotic components	Gastrointestinal microbial and epithelial-barrier support
Yeast culture	Rumen fermentation and nutrient-utilisation support
Bromelain and serratiopeptidase	Proteolytic components with proposed inflammation-modulating roles requiring bovine-specific validation

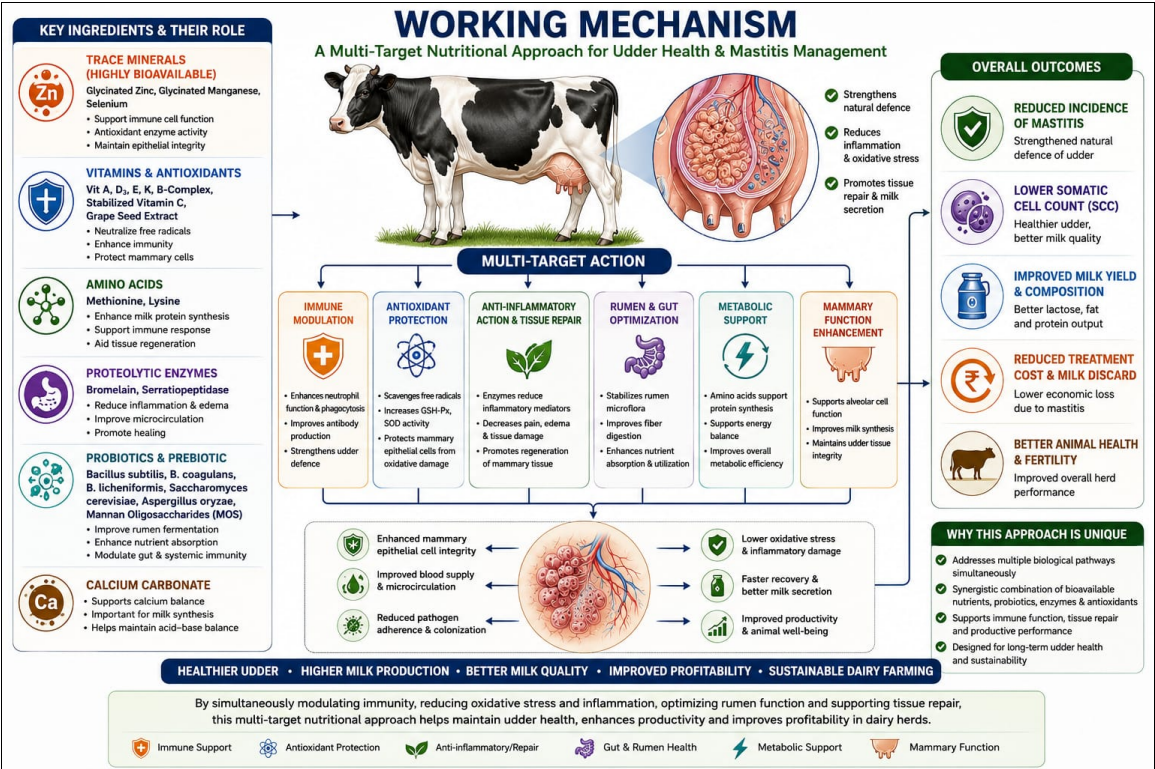


Fig 1: Working Mechanism of Masti 29+

1.2 Bioavailable Trace Minerals

Trace minerals are involved in numerous enzymatic, antioxidant, immune and metabolic processes relevant to dairy-cattle health. Mineral bioavailability is particularly important because dietary concentration alone does not necessarily represent the quantity available for absorption and biological utilisation. The incorporation of highly bioavailable mineral forms is therefore intended to improve micronutrient delivery during periods of increased physiological demand.

1.3 Antioxidant Nutritional Support

Oxidative stress has been implicated in the pathophysiology

of inflammatory disorders in dairy cattle, including mastitis. The combination of antioxidant vitamins, trace-mineral cofactors and plant-derived polyphenols provides complementary nutritional support for endogenous antioxidant defence mechanisms. This approach should be interpreted as antioxidant nutritional support, rather than evidence of direct antimicrobial activity.

1.4 Rumen–Gut and Metabolic Support

Maintenance of rumen function and nutrient utilisation is particularly important in lactating cattle experiencing disease-associated reduction in feed intake. Yeast culture

supplementation has been investigated for its effects on ruminal fermentation and productive performance in dairy cattle. Probiotic, prebiotic and yeast-derived components within the formulation are therefore intended to support gastrointestinal microbial ecology, nutrient utilisation and metabolic recovery. This represents an indirect rumen/gut–systemic–mammary support pathway, rather than direct action against intramammary pathogens.

1.5 Proteolytic Enzyme Components

Bromelain has been investigated for proteolytic and inflammation-modulating properties. Serratiopeptidase has similarly been investigated in broader biomedical literature. However, direct evidence supporting their efficacy specifically in bovine mastitis remains limited. Their inclusion should therefore be regarded as a biologically plausible component of the multi-target formulation that requires specific validation in controlled bovine studies.

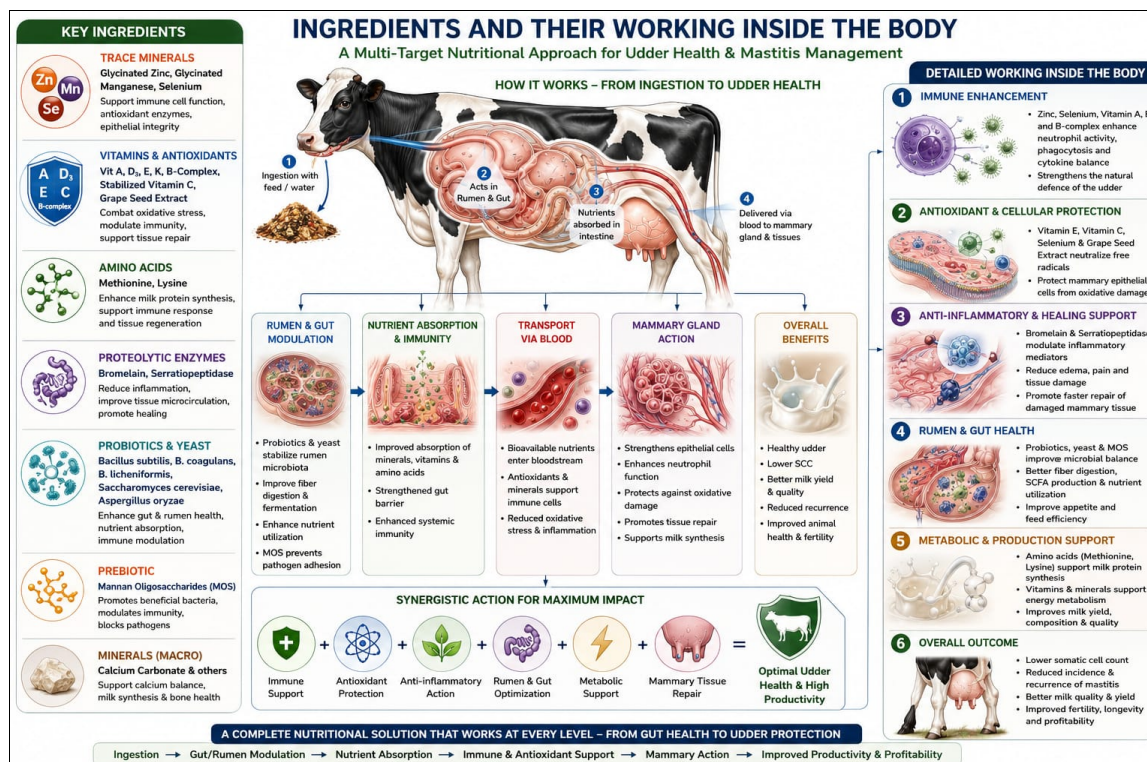


Fig 2: Masti 29+ Ingredients and their working inside the body

2. Materials and Methods

2.1 Study Population

A preliminary field evaluation was conducted in 30 dairy cows presenting with mastitis, at clinical and sub-clinical levels.

Animals were observed over a 21-day period during supplementation with Masti 29+, the multi-component nutritional formulation containing more than 29 active ingredients. Observations were recorded at: Day 0 – Baseline, Day 7, Day 14, Day 21. The formulation was used as nutritional support alongside routine dairy-farm management and veterinary care as applicable.

2.2 Parameters Evaluated

The principal parameters monitored were: daily milk yield, somatic cell count (SCC), California Mastitis Test (CMT) status, severity of udder inflammation, presence of abnormal milk, feed intake and overall clinical improvement/recovery.

3. Results

Progressive improvement was observed across milk-production, mammary-health and general clinical parameters during the 21-day observation period.

Table 2: Effect of Treatment on Milk Yield and Udder Health Over 21 Days

Parameter	Day 0	Day 7	Day 14	Day 21	Overall change
Milk yield (L/cow/day)	11.6	12.3	13.4	14.1	+21.6%
SCC ($\times 10^3$ cells/mL)	1,120	850	590	410	-63.4%
CMT-positive animals (n/30)	30	25	17	10	-66.7%
Moderate/severe udder inflammation (n/30)	18	12	6	3	-83.3%

Mean daily milk production increased progressively from 11.6 L/cow/day at baseline to 14.1 L/cow/day on Day 21, representing an overall increase of approximately 21.6%.

A particularly notable observation was the reduction in SCC. Mean SCC decreased from $1,120 \times 10^3$ cells/mL at baseline to 410×10^3 cells/mL by Day 21, corresponding to a 63.4% reduction.

The improvement in SCC was accompanied by changes in CMT status. All 30 animals were CMT-positive at baseline, whereas only 10 remained positive on Day 21. Similarly, the number of animals exhibiting moderate-to-severe udder inflammation decreased from 18/30 at baseline to 3/30 at Day 21, representing an 83.3% reduction.

Table 3: Changes in clinical and functional parameters

Parameter (n/30 animals)	Day 0	Day 7	Day 14	Day 21
Abnormal milk	14	9	4	2
Normal feed intake	19	24	28	29
Clinically improved/recovered	0	8	19	26

Abnormal milk findings progressively decreased from 14/30 animals at baseline to 2/30 animals at Day 21. Feed intake also improved during the observation period. Animals showing normal feed intake increased from 19/30 (63.3%) at baseline to 29/30 (96.7%) by Day 21. Clinical improvement/recovery showed a progressive temporal pattern. Eight animals were classified as improved/recovered by Day 7, increasing to 19 animals by Day 14 and 26/30 animals (86.7%) by Day 21. Thus, improvement was observed across multiple independent parameters rather than being restricted to a single clinical endpoint.

3.1 Discussion

The principal observation of this preliminary field evaluation was the concurrent and progressive improvement in mammary-health, productive and general clinical parameters over 21 days. Importantly, the observed response was not restricted to a single subjective parameter. Improvements were documented in milk production, SCC, CMT status, udder inflammation, milk appearance, feed intake and overall clinical condition.

3.1.1 Improvement in Mammary Inflammatory Indicators

The reduction in SCC from $1,120 \times 10^3$ to 410×10^3 cells/mL, representing a 63.4% decrease, is of particular interest because SCC is an established indicator of mammary inflammatory status. This reduction occurred simultaneously with a decline in CMT-positive animals from 30/30 to 10/30. Moderate-to-severe udder inflammation also decreased substantially, from 18/30 animals at baseline to 3/30 animals at Day 21. The concordance among SCC, CMT and clinical udder findings provides stronger observational evidence of improving mammary status than any of these parameters considered individually. Nevertheless, decreased SCC or CMT positivity should not be interpreted as microbiological cure in the absence of pathogen culture.

3.1.2 Productive Recovery

Improvement in mammary-health indicators occurred concurrently with restoration of productive performance. Mean milk production increased from 11.6 to 14.1 L/cow/day, corresponding to an approximately 21.6% increase over the observation period. Disease-associated reductions in appetite and metabolic efficiency can adversely influence lactational performance. The increase in animals showing normal feed intake from 63.3% to 96.7% therefore represents an important accompanying observation.

Improved nutrient intake and utilisation could have contributed to restoration of productive function.

3.1.3 Changes in Clinical Status

Abnormal milk was observed in 14 animals at baseline but in only two animals at Day 21. Similarly, the number of animals classified as clinically improved/recovered increased progressively:

8/30 on Day 7 → 19/30 on Day 14 → 26/30 on Day 21.

The temporal consistency of these changes is encouraging and suggests progressive recovery during the observation period. However, clinical recovery and bacteriological cure are distinct endpoints. Future investigations should therefore include microbiological culture and pathogen clearance.

3.1.4 Relevance of the Multi-Target Nutritional Strategy

Mastitis represents considerably more than a microbial challenge within the mammary gland. Infection is accompanied by inflammation, oxidative stress, altered nutrient utilisation, immune activation and frequently, reduced feed intake and milk production. The scientific rationale of Masti 29+ therefore lies primarily in the breadth and integration of its physiological targets. The formulation containing more than 29 active ingredients combines bioavailable trace minerals, antioxidant nutrients, amino acids, plant polyphenols, probiotics, prebiotics, yeast-derived components and selected proteolytic enzymes. Rather than relying on a single pathway, the formulation is intended to provide simultaneous:

micronutritional support → antioxidant support → rumen/gut support → metabolic support → immune nutritional support → productive recovery.

Such an integrated approach may be particularly relevant during disease-associated physiological stress.

3.1.5 Antioxidant and Immune Nutritional Support

Oxidative stress is associated with inflammatory and immune dysfunction in dairy cattle. Nutritional antioxidants and trace-mineral cofactors contribute to endogenous antioxidant defence mechanisms. The formulation therefore combines several complementary antioxidant nutritional components rather than relying upon a single antioxidant. The use of bioavailable trace minerals may additionally improve mineral delivery compared with poorly absorbed forms, although bioavailability does not by itself demonstrate improved mastitis outcome.

3.1.6 Rumen–Mammary Integration

A further feature of the formulation is the integration of gastrointestinal and rumen support into a mammary-health nutritional strategy. Yeast supplementation has been investigated for effects on ruminal fermentation and milk production. Supporting rumen function may help maintain nutrient availability during periods of physiological stress. The improvement in feed intake observed in the present evaluation provides some field support for this aspect of the formulation, although a causal relationship cannot be established from an uncontrolled study.

3.1.7 Interpretation of the Proteolytic Components

Bromelain and serratiopeptidase have been investigated for proteolytic and inflammation-modulating effects. Nevertheless, evidence for these enzymes specifically in bovine mastitis is substantially less established than that supporting nutritional antioxidant and mineral strategies. Accordingly, claims of direct anti-inflammatory efficacy in bovine mastitis would require dedicated pharmacokinetic and controlled clinical studies.

3.2 Practical Significance

The principal practical significance of this approach lies in combining several complementary nutritional strategies into a single formulation. The field observations suggest potential relevance to restoration of mammary-health parameters,

reduction in SCC, improvement in milk characteristics, recovery of feed intake, restoration of milk production, antioxidant nutritional support, micronutrient delivery, and overall productive recovery. The formulation should therefore be considered an adjunct nutritional strategy and not a substitute for appropriate mastitis diagnosis, veterinary care, antimicrobial therapy when clinically indicated, milking hygiene or herd-level disease-control programmes. This distinction is particularly important from the perspective of responsible antimicrobial stewardship.

3.3 Limitations and Future Validation

The results of this investigation should be interpreted within the limitations of a preliminary field evaluation. The study did not include a randomized placebo or matched control group. Consequently, natural disease progression, concurrent veterinary treatment, differences in management and other uncontrolled variables may have contributed to the observed improvements. Pathogen identification and bacteriological cure were not established as primary endpoints. Therefore, reductions in SCC, CMT positivity and clinical signs cannot be interpreted as direct evidence of pathogen elimination. Furthermore, the multi-component nature of the formulation prevents attribution of the observed response to any single ingredient or demonstration of true ingredient synergism. Future studies should therefore employ prospective, randomized and preferably blinded controlled designs.

Important endpoints should include SCC, quantitative CMT assessment, standardized clinical mastitis score, pathogen identification, bacteriological cure, milk yield, milk composition, feed intake, time to clinical resolution, recurrence rate, requirement for additional treatment, inflammatory biomarkers, oxidative-stress biomarkers, safety and palatability; and economic return.

Animals should preferably be stratified according to pathogen, parity, stage of lactation and baseline severity. Such studies would enable determination of whether the observed field improvements can be causally attributed to the nutritional intervention.

Conclusion

The present 21-day preliminary field evaluation of Masti 29+, a multi-component nutritional formulation containing more than 29 active ingredients, demonstrated progressive improvement across several clinically relevant mammary-health, productive and general physiological parameters in dairy cattle presenting with mastitis.

Mean milk production increased from 11.6 to 14.1 L/cow/day (+21.6%), while SCC decreased from $1,120 \times 10^3$ to 410×10^3 cells/mL (−63.4%). CMT-positive animals decreased from 30/30 to 10/30, and moderate-to-severe udder inflammation decreased from 18/30 to 3/30. Abnormal milk findings declined from 14/30 to 2/30, while normal feed intake increased from 19/30 to 29/30. By Day 21, 26/30 animals (86.7%) were classified as clinically improved/recovered.

The concordant improvement in objective mammary-health indicators, productive performance, feed intake and clinical condition provides a rationale for further investigation of this integrated nutritional strategy. The principal scientific feature of the formulation is its multi-target approach, integrating bioavailable micronutrients, antioxidant nutrition, amino acids, gastrointestinal and rumen support, probiotics/prebiotics, yeast-derived components, polyphenols and selected proteolytic enzymes within a single nutritional platform.

However, because the present field evaluation lacked randomization, an appropriate comparator group and microbiological confirmation of cure, the findings should be regarded as preliminary rather than confirmatory evidence of efficacy. Masti 29+ should therefore presently be considered a promising multi-component nutritional adjunct to comprehensive mastitis-management programmes, rather than an alternative to appropriate veterinary treatment. Larger randomized controlled multicentric studies are warranted to establish efficacy, safety, microbiological outcomes and economic relevance.

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Conflict of Interest

The author is associated with Advance Aqua Bio Technologies India Pvt. Ltd., the developer of the evaluated nutritional formulation. This relationship constitutes a potential conflict of interest and is disclosed for transparency.

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Author Contribution

Dr. Sujani Gudipati: Conceptualization, formulation development, field evaluation, scientific interpretation, literature synthesis and manuscript preparation.

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