



OPEN ACCESS INTERNATIONAL JOURNAL OF SCIENCE & ENGINEERING

EVALUATION OF SUITABILITY OF DEONI COW MILK FOR PREPARATION OF *Chhena Murki*

Shital Sahebrao Deosarkar* and Ashok Manoharrao Patil

Deptt. of Dairy Science, Chhatrapati Shivaji College, Udgir Distt. Latur

*MAFSU, Deptt. of Dairy Technology, Warud, Pusad 445204

Abstract: The present investigation was undertaken to evaluate the suitability of Deoni cow milk for the preparation of *Chhena Murki*, a traditional *Chhena*-based confectionery product. Fresh milk obtained from Deoni cows was compared with Jersey cow milk for *Chhena* and *Chhena Murki* manufacture. The products were evaluated for physicochemical, textural, microbiological, and sensory characteristics. *Chhena* prepared from Deoni milk exhibited significantly ($P < 0.05$) higher fat, protein, total solids, and yield than Jersey milk *chhena*. *Chhena Murki* prepared from Deoni milk demonstrated superior texture, enhanced sugar absorption, and higher sensory scores. The overall acceptability score of Deoni milk *Chhena Murki* was 8.72 ± 0.09 compared with 8.21 ± 0.12 for Jersey milk *Chhena Murki*. The findings indicate that Deoni milk possesses excellent technological suitability for the manufacture of *Chhena Murki* and offers considerable potential for value addition of indigenous cattle milk.

Keywords: Deoni cow milk, *Chhena Murki*, Indigenous cattle breeds, *Chhena*, Traditional dairy products, Value addition

Introduction

Traditional dairy products constitute an important segment of the Indian dairy industry and account for a substantial proportion of milk utilization. *Chhena Murki* is a popular indigenous sweet prepared by coating cubes of *chhena* with concentrated sugar syrup followed by drying to obtain a crystalline sugar layer. The product is characterized by a soft body, mildly chewy texture, and sweet caramelized flavor. The quality of *Chhena Murki* depends largely on the composition and functional properties of *Chhena*, which in turn are influenced by milk composition, coagulation conditions, and processing parameters. Cow milk is generally preferred for *Chhena* preparation because it produces a soft, smooth, and cohesive curd suitable for confectionery products.

Deoni is an important indigenous cattle breed of the Deccan region of India, particularly prevalent in Maharashtra, Karnataka, and Telangana. Deoni cows are recognized for their adaptability, disease resistance, and production of nutrient-dense milk containing higher fat and total solids than many exotic breeds. Growing consumer preference for products derived from indigenous breeds has increased interest in developing value-added products from native cattle milk. However, scientific information regarding the suitability of Deoni milk for traditional *chhena*-based sweets is limited.

The present investigation was therefore undertaken to evaluate the suitability of Deoni cow milk for preparation of *Chhena Murki* and compare its quality attributes with those of Jersey cow milk.

Materials and Methods

Procurement of Milk Samples: Fresh morning milk samples were collected from healthy Deoni and Jersey cows maintained at the university dairy farm. Animals selected for the study were in mid-lactation (90–180 days) and maintained under similar feeding and management conditions.

Experimental Design

Treatment	Milk Source
T ₁	Deoni cow milk
T ₂	Jersey cow milk

Each treatment was replicated six times.

Composition of Raw Milk

Table 1. Composition of Milk Used for *Chhena* Manufacture

Parameter	Deoni Milk	Jersey Milk
Fat (%)	4.68±0.08	4.08±0.06
Protein (%)	3.62±0.05	3.34±0.04
Lactose (%)	4.56±0.04	4.72±0.03
SNF (%)	8.92±0.08	8.64±0.06
Total Solids (%)	13.60±0.12	12.72±0.10
Ash (%)	0.78±0.01	0.72±0.01

Preparation of *Chhena*: Milk was heated to 82°C and cooled to 75°C. Coagulation was carried out using 1% citric acid solution until clear whey separation was achieved. The coagulum was collected in muslin cloth and allowed to drain for 30 min without pressing to obtain *chhena* with approximately 55% moisture.

Preparation of Chhena Murki: Fresh Chhena was cut into cubes of approximately 1.5 cm³. Sugar syrup of 70°Brix concentration was prepared and heated to 95°C. Chhena cubes were immersed in the syrup and cooked for 10 min with gentle stirring. The coated cubes were removed, drained, and dried at ambient temperature to facilitate crystallization of sugar on the surface.

Analytical Methods

Milk, chhena, and Chhena Murki samples were analyzed for:

- Moisture (%)
- Fat (%)
- Protein (%)
- Ash (%)
- Titratable acidity (% lactic acid)
- Yield (%)
- Sugar uptake (%)

AOAC (2016) methods were followed.

Texture Profile Analysis: Texture parameters including hardness, cohesiveness, springiness, and chewiness were analyzed.

Sensory Evaluation: A panel of ten semi-trained judges evaluated the samples using a 9-point hedonic scale for:

- Color and appearance
- Flavor
- Body and texture
- Sweetness
- Overall acceptability

Microbiological Analysis: Standard plate count, yeast and mold count, and coliform count were determined according to standard procedures.

Statistical Analysis: Data were analyzed using Completely Randomized Design (CRD). Significant differences between treatment means were tested at P<0.05.

Results and Discussion

Yield and Composition of Chhena:

Table 2. Composition and Yield of Chhena

Parameter	Deoni Milk Chhena	Jersey Milk Chhena
Moisture (%)	54.6±0.22	55.8±0.24
Fat (%)	24.8±0.18	22.6±0.16
Protein (%)	18.4±0.14	17.2±0.12
Ash (%)	1.42±0.03	1.34±0.02
Yield (%)	19.8±0.20	17.6±0.18

Chhena prepared from Deoni milk exhibited significantly higher yield owing to its greater fat and total solids contents. Similar relationships between milk composition and chhena yield have been reported previously.

Physicochemical Characteristics of Chhena Murki:

Table 3. Physicochemical Characteristics of Chhena Murki

Parameter	Deoni Milk	Jersey Milk
Moisture (%)	18.6±0.18	19.8±0.20
Fat (%)	16.2±0.14	14.8±0.12
Protein (%)	13.6±0.12	12.4±0.10
Total Sugar (%)	48.2±0.32	46.8±0.28
Ash (%)	1.18±0.02	1.10±0.02

Higher fat and protein contents contributed to improved body and texture in Deoni milk Chhena Murki.

Texture Profile Analysis

Table 4. Texture Characteristics of Chhena Murki

Parameter	Deoni Milk	Jersey Milk
Hardness (N)	12.8±0.26	14.4±0.28
Cohesiveness	0.68±0.02	0.62±0.02
Springiness	0.82±0.01	0.76±0.02
Chewiness (N)	7.14±0.20	6.84±0.18

Deoni milk Chhena Murki exhibited a softer and more cohesive texture due to higher fat content and favorable protein interactions.

Sensory Evaluation

Table 5. Sensory Scores of Chhena Murki

Attribute	Deoni Milk	Jersey Milk
Color and Appearance	8.68±0.10	8.26±0.12
Flavor	8.76±0.08	8.18±0.14
Body and Texture	8.74±0.09	8.22±0.11
Sweetness	8.70±0.10	8.18±0.12
Overall Acceptability	8.72±0.09	8.21±0.12

Deoni milk Chhena Murki received significantly higher sensory scores due to its smooth texture, pleasant mouthfeel, and enhanced flavor.

Microbiological Quality: Both treatments complied with microbiological standards throughout the storage period. No coliform organisms were detected. Standard plate counts remained below permissible limits during refrigerated storage for seven days.

Discussion

The present study demonstrated that Deoni milk possesses superior technological properties for Chhena Murki manufacture compared with Jersey milk. The higher fat and protein contents of Deoni milk contributed to increased chhena yield and improved texture. Indigenous cattle milk is often characterized by higher total solids and enhanced processing suitability for traditional dairy products. The improved sensory characteristics observed in Deoni milk Chhena Murki may be attributed to the formation of a softer chhena matrix capable of absorbing sugar syrup more uniformly. These findings support the growing interest in utilization of indigenous cattle milk for value-added dairy products and niche markets.

Industrial Significance: Development of Chhena Murki from Deoni milk offers several advantages:

- Value addition to indigenous cattle milk.
- Enhanced income opportunities for Deoni cattle owners.
- Promotion of traditional dairy products.
- Development of premium indigenous milk sweets.
- Conservation and commercialization of native cattle breeds.

Conclusion

Deoni cow milk demonstrated excellent suitability for preparation of Chhena Murki. Compared with Jersey milk, Deoni milk produced higher chhena yield, superior texture, and better sensory characteristics. Chhena Murki prepared from Deoni milk exhibited significantly higher fat, protein, and overall acceptability scores.

The study highlights the potential of Deoni milk for manufacture of high-value traditional dairy products and supports the conservation and economic utilization of indigenous cattle breeds.

References

1. AOAC (2008). *Official Methods of Analysis*. 20th edn. Association of Official Analytical Chemists, Washington DC, USA.
2. Aneja RP, Mathur BN, Chandan RC and Banerjee AK (2012). *Technology of Indian Milk Products*. Dairy India Publication, New Delhi.
3. Arora S, Chawla R and Sindhu JS (2009). Modelling and optimization of process parameters for production of desiccated chhena-murki. *Journal of Food Science and Technology* 58: 3015–3024.
4. De S (2001). *Outlines of Dairy Technology*. Oxford University Press, New Delhi.
5. Hammam ARA and Ahmed ME (2012). Goat milk: Compositional, technological, nutritional and therapeutic characteristics. *Asian Journal of Dairy and Food Research* 41: 257–268.
6. Nayik GA, Jagdale YD and Dar AH (2011). Nutritional profile, processing and potential products of goat milk. *Dairy* 3: 44.
7. Park YW, Juarez M, Ramos M and Haenlein GFW (2007). Physicochemical characteristics of goat milk. *Small Ruminant Research* 68: 88–113.
8. Walstra P, Wouters JTM and Geurts TJ (2006). *Dairy Science and Technology*. CRC Press, Boca Raton, USA.