



## International Journal of Veterinary Sciences and Animal Husbandry



ISSN: 2456-2912

NAAS Rating (2026): 4.61

VET 2025; SP-11(4): 198-201

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Received: 21-02-2026

Accepted: 23-03-2026

**Sanjay**

M.Sc. Research Scholar,  
Department of LPM, COA,  
SKRAU, Bikaner, Rajasthan,  
India

**Kuladip Prakash Shinde**

Assistant Professor, Department  
of LPM, COA, SKRAU, Bikaner,  
Rajasthan, India

**Nirmal Singh Dahiya**

Professor, Directorate of  
Extension Education, BASU,  
Patna, Rajasthan, India

**Shankar Lal**

Assistant Professor, Department  
of LPM, COA, SKRAU, Bikaner,  
Rajasthan, India

**Sampat Kumar Choudhary**

M.Sc. Research Scholar,  
Department of LPM, COA,  
SKRAU, Bikaner, Rajasthan,  
India

**Sonam Kumari Mina**

M.Sc. Research Scholar,  
Department of LPM, COA,  
SKRAU, Bikaner, Rajasthan,  
India

**Lalit Kumar**

M.Sc. Research Scholar,  
Department of LPM, SAS,  
Nagaland University,  
Medziphema, Rajasthan, India

**Corresponding Author:**

**Sanjay**

M.Sc. Research Scholar,  
Department of LPM, COA,  
SKRAU, Bikaner, Rajasthan,  
India

## Assessment of feeding, housing and milking management practices of buffaloes in northern Rajasthan: A study of Hanumangarh and Sri Ganganagar Districts

**Sanjay, Kuladip Prakash Shinde, Nirmal Singh Dahiya, Shankar Lal,  
Sampat Kumar Choudhary, Sonam Kumari Mina and Lalit Kumar**

**DOI:** <https://www.doi.org/10.22271/veterinary.2026.v11.i4Sc.3219>

### Abstract

The present study was conducted to compare feeding, housing and milking management practices of buffalo farmers in Agro-climatic Zone-1B of Rajasthan covering Hanumangarh and Sri Ganganagar districts. A total of 120 buffalo owners (60 from each district) were selected through multistage stratified random sampling and categorised into small (1–5 animals), medium (6–10 animals) and large (>10 animals) herd-size groups. Data were collected personally with a pre-tested structured interview schedule during 2024–25. Results revealed that stall feeding was the dominant practice (71.79–100% adoption), with wheat straw as the major dry fodder (50–66.67%). Green fodder was offered to the whole herd by 59–83.33% of farmers. Chaffing was common, but silage making and mineral mixture supplementation remained very low. Majority of small and medium herd owners housed buffaloes adjacent to their dwelling (77–81%), using predominantly kaccha-type sheds with good ventilation. Milking was practised twice daily by 88–100% farmers using the knuckling method; pre-milking udder and teat cleaning was universal (100%), but post-milking cleaning and use of California Mastitis Test (CMT) were rarely adopted (5–41% only). Large-herd owners, especially in Hanumangarh district, showed comparatively better adoption of scientific practices. The study highlights significant gaps in balanced feeding, scientific housing and hygienic milking that directly affect buffalo productivity and farmers' livelihood security in this arid zone. Targeted extension interventions are urgently needed to bridge these gaps.

**Keywords:** Buffalo, feeding practices, housing management, milking practices, herd size, Rajasthan, Agro-climatic Zone-1B

### 1. Introduction

Livestock production, particularly buffalo rearing, is an integral part of the rural economy in India and plays a vital role in ensuring food security, nutritional support and steady income for small and marginal farmers. In Rajasthan, which has the largest share of arid and semi-arid land in the country, buffaloes contribute significantly to milk production despite harsh climatic conditions characterised by extreme temperatures (up to 49 °C in summer and near freezing in winter), low and erratic rainfall (10–40 cm annually), and frequent droughts. Despite these environmental challenges, the livestock sector has demonstrated an impressive capacity to mitigate the adverse effects of minor droughts, serving as a critical buffer for agricultural communities (Kanwal *et al.*, 2020) [6]. Agro-climatic Zone-1B, comprising Hanumangarh and Sri Ganganagar districts, is a major buffalo-rearing belt where smallholder farmers depend heavily on dairy animals for livelihood security.

Feeding, housing and milking management practices are the three most critical components that directly influence milk yield, animal health, reproductive efficiency and overall farm profitability. In arid regions, where natural grazing resources are limited and crop residues form the bulk of feed, traditional practices often dominate. However, these practices frequently

fall short of scientific standards, leading to suboptimal productivity. For instance, inadequate mineral supplementation, poor fodder conservation techniques and unhygienic milking contribute to lower milk quality and higher incidence of diseases such as mastitis. Indeed, the average quantity of feed and fodder provided to animals in certain regions is often lower than recommended scientific feeding practices, impacting overall animal health and productivity (Kumar, 2023) [7].

Despite the economic importance of buffaloes in Zone-1B, systematic documentation of existing management practices at district and herd-size level has been limited. The present study was therefore undertaken to generate primary data on feeding, housing and milking practices followed by buffalo farmers in Hanumangarh and Sri Ganganagar districts. The findings will help policymakers, extension workers and researchers design targeted interventions to improve buffalo productivity and enhance livelihood security of smallholder farmers in this ecologically fragile zone.

## 2. Review of Literature

Several studies have documented buffalo management practices in different parts of Rajasthan and other states. Jatolia *et al.* (2017) [4] reported that in Udaipur district, 48.50% farmers provided closed-type houses while kaccha roofs and floors were predominant (92–96%). Feeding of green fodder was common, but mineral mixture use was only 31%. Rangamma *et al.* (2017) [11] observed that in Krishna district of Andhra Pradesh, stall feeding along with grazing was practised by majority of farmers and concentrate was mostly offered at milking time. Sabapara (2016) [12] found that 90% farmers used knuckling method of milking and post-milking hygiene practices were poor. In arid regions, highlighted that low-quality roughages such as wheat straw and mustard straw dominate buffalo diets and emphasised the need for enrichment techniques like urea treatment and complete feed blocks.

Manohar *et al.* (2014) [10] reported low adoption of scientific feeding and milking practices in Rajasthan, attributing it to lack of knowledge, high cost of inputs and limited extension

services. These studies provide a strong background for the present research in Zone-1B.

## 3. Materials and Methods

The study was carried out in two districts of Agro-climatic Zone-1B of Rajasthan, viz. Hanumangarh and Sri Ganganagar. A total of 120 buffalo farmers (60 from each district) were selected using multistage stratified random sampling technique. Villages were selected randomly from each district, followed by selection of farmers on the basis of herd size. Farmers were categorised into three groups: small (1–5 buffaloes), medium (6–10 buffaloes) and large (>10 buffaloes). An equal number of respondents were drawn from each category wherever possible.

Data on feeding, housing and milking management practices were collected through personal interview method using a pre-tested structured schedule. The schedule was developed after thorough review of literature and consultation with experts. Information was recorded on various aspects such as type of feeding system, dry and green fodder used, mineral supplementation, housing type and location, milking frequency, method, hygiene practices and use of mastitis detection tests. The collected data were tabulated, percentages were calculated and results were presented district-wise as well as herd-size-wise for meaningful comparison. Simple statistical tools like percentages and frequencies were used for analysis.

## 4. Results and Discussion

### 4.1 Feeding Management Practices

Stall feeding emerged as the predominant feeding system in both districts (Table 1). Adoption ranged from 71.79% in small herds to 100% in large herds. Wheat straw was the major dry fodder source (50–66.67%), while green fodder (Berseem, maize, hybrid Napier etc.) was offered to the whole herd by 59–83.33% of farmers. Chaffing of green fodder was widely practised, but silage making was almost non-existent. Mineral mixture supplementation was very low and was reported only by a few large-herd owners (maximum 8.33% in Hanumangarh). (Bhoj *et al.*, 2023) [3].

**Table 1:** Feeding practices (%) in Sri Ganganagar and Hanumangarh districts

| Practice                           | Sri Ganganagar (Small/Medium/Large) | Hanumangarh (Small/Medium/Large) |
|------------------------------------|-------------------------------------|----------------------------------|
| Stall feeding                      | 71.79 / 80.00 / 100                 | 76.92 / 81.82 / 100              |
| Wheat straw as major dry fodder    | 50.00 / 53.33 / 66.67               | 53.85 / 59.09 / 66.67            |
| Green fodder offered to whole herd | 59.00 / 66.67 / 83.33               | 69.23 / 72.73 / 83.33            |
| Chaffing of green fodder           | High (majority)                     | High (majority)                  |
| Mineral mixture supplementation    | <10% overall                        | 8.33% in large herds             |
| Silage making                      | Negligible                          | Negligible                       |

These findings are reported that in arid regions crop residues constitute the bulk of buffalo diets and scientific enrichment is rarely practised. Low mineral supplementation and absence of silage indicate a major nutritional gap that limits milk production and reproductive performance.

### 4.2 Housing Management Practices

Housing pattern varied significantly with herd size and district (Table 2). Small and medium herd owners mostly kept buffaloes adjacent to their dwelling house (77–81%), while

large herds preferred separate sheds away from residence (23–58%). Majority of sheds were of kaccha type with kaccha roof and floor. Good ventilation was reported by approximately 87% of farmers, but urine drainage facility and pucca flooring were almost absent in small herds. This prevalence of rudimentary housing, particularly the kutchha flooring, aligns with findings from other regions where such structures are commonly observed in animal husbandry practices (Bhagat *et al.*, 2022; Kumar *et al.*, 2020) [2, 7].

**Table 2:** Housing practices (%)

| Practice                    | Sri Ganganagar (Small/Medium/Large) | Hanumangarh (Small/Medium/Large) |
|-----------------------------|-------------------------------------|----------------------------------|
| Adjacent to dwelling        | 77–81% (small/medium)               | 77–81% (small/medium)            |
| Separate shed (large herds) | 23–58%                              | 23–58%                           |
| Kaccha roof & floor         | >90%                                | >90%                             |
| Good ventilation            | ~87%                                | ~87%                             |

Poor housing infrastructure, especially in small and medium herds, increases the risk of disease and thermal stress in the extreme climate of Zone-1B.

#### 4.3 Milking Management Practices

Twice-daily milking was almost universal (88–100%). The traditional knuckling method was used by nearly all farmers. Cleaning of udder and teats before milking was practised by 100% respondents. Calf suckling before and after milking was the most common method of milk let-down (50–74%). However, post-milking udder cleaning was adopted by only

5–41% farmers and use of California Mastitis Test (CMT) was negligible (maximum 16.67% in large herds of Hanumangarh). These prevailing practices, particularly the reliance on calf suckling for milk let-down and manual milking techniques like knuckling, contribute to elevated risks of microbial contamination and suboptimal milk quality (Lassala *et al.*, 2023) <sup>[8]</sup>.

**Table 3:** Milking practices (%)

| Practice                       | Sri Ganganagar (Small/Medium/Large) | Hanumangarh (Small/Medium/Large) |
|--------------------------------|-------------------------------------|----------------------------------|
| Twice-daily milking            | 94.87 / 93.33 / 100                 | 88.46 / 100 / 100                |
| Knuckling method               | ~100%                               | ~100%                            |
| Udder cleaning before milking  | 100%                                | 100%                             |
| Calf suckling (before + after) | 74.36 / 66.67 / 50                  | 65.38 / 68.18 / 33.33            |
| Post-milking udder cleaning    | 5.13 / 13.33 / 33.33                | 11.54 / 13.64 / 41.67            |
| Use of CMT                     | Very low                            | 16.67% in large only             |

Large-herd owners in Hanumangarh showed marginally better hygienic practices. Low adoption of post-milking hygiene and mastitis detection is a serious concern for udder health and milk quality.

#### 5. Conclusion and Policy Implications

Feeding, housing, and milking practices in Hanumangarh and Sri Ganganagar districts of Agro-climatic Zone-1B, Rajasthan, are still largely traditional and require substantial improvement. Although stall feeding and basic pre-milking hygiene are widely adopted, significant gaps persist in balanced ration formulation, regular mineral mixture supplementation, silage preparation and fodder conservation, scientific housing (proper ventilation, drainage, and water trough facilities), and post-milking hygiene. Small and medium herd owners particularly lag behind due to limited resources and awareness, while large-herd owners, especially in Hanumangarh, performed relatively better. Specifically, a considerable adoption gap was observed in practices such as silage making, processing of feed, and the utilization of urea molasses mineral blocks in feeding regimens (SOOD *et al.*, 2020) <sup>[15]</sup>.

The study reveals that a considerable proportion of farmers continue to use *kachcha* sheds with inadequate ventilation and drainage, rely heavily on wheat straw and readymade concentrates, and show low adoption of mineral mixture, common salt, and silage making. Overall, prevailing housing and feeding practices are not aligned with scientific recommendations, although colostrum feeding is universally practiced. This suggests a fundamental disconnect between awareness and the practical implementation of modern husbandry techniques, particularly regarding nutrition and environmental management for livestock (Kamboj *et al.*, 2022; Makarabbi *et al.*, 2025) <sup>[4, 9]</sup>.

There is an urgent need for region-specific extension interventions focusing on:

- Balanced ration formulation and regular use of mineral mixture
- Silage making and fodder conservation techniques
- Construction of improved ventilated sheds with proper slope and drainage

- Hygienic milking practices and regular mastitis screening using California Mastitis Test (CMT)

Adoption of these scientific management practices can significantly enhance buffalo productivity, reduce disease incidence and stress, and improve livelihood security of buffalo farmers in the region. Government departments, dairy cooperatives, and Krishi Vigyan Kendras (KVKs) should collaborate to organize on-farm demonstrations, practical training camps, and regular exposure visits. Special focus should be given to small and medium herd owners through targeted motivation and hands-on training programmes. This includes providing training on improved breeding and husbandry practices, disease screening, and preventive healthcare to enhance the capacity of both farmers and extension workers (Siddiky & Faruque, 2018) <sup>[14]</sup>. Such initiatives are crucial for integrating innovations into existing farming systems and ensuring the widespread adoption of scientific husbandry practices (Aiswarya *et al.*, 2025) <sup>[1]</sup>.

#### Conflict of Interest

Not available

#### Financial Support

Not available

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#### How to Cite This Article

Sanjay, Shinde KP, Dahiya NS, Lal S, Choudhary SK, Mina SK, *et al.* Assessment of feeding, housing and milking management practices of buffaloes in northern Rajasthan: A study of Hanumangarh and Sri Ganganagar Districts. *International Journal of Veterinary Sciences and Animal Husbandry*. 2026;SP-11(4):198-201.

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