

International Journal of Agriculture Extension and Social Development

Volume 9; SP-Issue 7; July 2026; Page No. 29-32

Received: 24-04-2026

Accepted: 28-05-2026

Indexed Journal

Peer Reviewed Journal

Biosecurity and health management practices followed by dairy farmers of the Kandi area

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DOI: <https://doi.org/10.33545/26180723.2026.v9.i7Sa.3859>

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Abstract

Biosecurity and sound health management are essential for sustainable dairy production, especially in resource-limited areas like the Kandi region of Punjab, where small dairy farmers form the majority. The present study was conducted to assess the biosecurity and health management practices followed by dairy farmers in this region, characterized by limited access to quality fodder and feed, inadequate housing facilities, and low-producing animals. Data were collected through structured interviews and field observations to evaluate awareness, adoption, and constraints related to key biosecurity measures, including cleaning, disinfection, vaccination, deworming, and ectoparasite control. Findings revealed that although farmers possessed basic knowledge of animal health management, adoption of recommended practices was poor. Most animals were housed on *kuccha* floors with no proper segregation, sanitation, or drainage. Cleaning and disinfection routines were irregular, and milking hygiene—such as udder cleaning and teat dipping—was rarely practiced. Calf management was inadequate, with limited colostrum feeding and poor housing, while transition cows were maintained under unhygienic conditions with minimal sanitation management. Adoption of improved practices was restricted due to low productivity, economic constraints, and limited veterinary access. The study highlights the urgent need to promote region-specific, low-cost biosecurity and management interventions and strengthen farmer training to improve herd health and dairy productivity in the Kandi region.

Keywords: Biosecurity, Kandi region, dairy farmers, health management

Introduction

Dairying is an important component of the agricultural economy in India, contributing significantly to food security, rural employment, and household income. India is the world's largest producer and consumer of milk; however, the productivity of dairy animals remains constrained by several managerial and health-related factors (Singh *et al.*, 2024) [7]. Diseases such as mastitis, reproductive disorders, parasitic infestations, and other infectious conditions continue to reduce milk production, increase treatment costs, and adversely affect animal welfare and farm profitability (Mpatshwenumugabo, 2024) [4].

Preventive health care and improved farm management practices are essential for sustaining dairy productivity (Tariq *et al.*, 2025) [9]. Adoption of biosecurity and health management measures can reduce disease incidence, improve animal performance, lower antimicrobial use, and minimize the risk of zoonotic disease transmission (Mariasusai *et al.*, 2025) [3]. Nevertheless, the implementation of these practices varies considerably among dairy farms and is influenced by factors such as farmers' awareness, economic resources, herd size, and access to veterinary services (Singh *et al.*, 2020) [8]. In many cases, inadequate knowledge and limited extension support result in greater reliance on treatment rather than disease prevention.

The Kandi region of Punjab is characterized by mixed crop–livestock farming systems where dairy farming serves as an important source of livelihood (NAIP, 2014) [5]. However, variations in housing, sanitation, waste disposal, and disease prevention practices may predispose dairy herds to health problems and productivity losses. Information regarding the adoption of biosecurity and health management practices among dairy farmers in this region is limited. Therefore, the present study was undertaken to assess the existing biosecurity and health management practices adopted by dairy farmers in the Kandi region of Punjab and to identify gaps that may help guide future extension and disease-control interventions.

Materials and Methods

A cross-sectional field survey was conducted among 50 dairy farmers from the Kandi region of Hoshiarpur district, Punjab. The respondents were selected from villages located in the blocks of Hajipur, Talwara, Mukerian, and Dasuya using the available database of dairy farmers at the Regional Research and Training Centre (RRTC), Talwara.

Data on biosecurity and health management practices were collected through personal interviews using a pre-tested structured questionnaire and verified through on-farm observations wherever possible. The questionnaire was designed to assess the adoption of various practices related to disease prevention, farm hygiene, mastitis control, calf

management, reproductive health management, and general farm biosecurity. The biosecurity parameters evaluated included the presence of farm fencing, provision of footbaths or disinfection facilities at farm entrances, quarantine of newly introduced animals, isolation of sick animals, adherence to deworming and vaccination schedules, regular veterinary consultation, cleaning and disinfection of animal sheds and utensils, use of disinfectants, changing clothes or footwear before entering animal sheds, restriction of visitor and vendor access, safe disposal of manure and carcasses, testing of newly purchased animals for infectious diseases, post-mortem examination of dead animals, reporting of animal deaths to veterinary authorities, vegetation control around animal sheds, implementation of insect and ectoparasite control programmes, availability of hand-washing or sanitizing facilities, maintenance of health records, routine health monitoring, and the existence of a farm biosecurity plan.

Health management practices assessed included drying of teats before milking, fore-stripping, post-milking teat dipping, teat disinfection, maintaining animals in a standing position after milking, disposal of milk from treated animals during the withdrawal period, hoof trimming, dry cow therapy, segregation of sick animals, grouping of animals according to age or physiological status, cleaning of animals, provision of colostrum immediately after birth, individual calf housing, separation of calves from adult animals, pre-calving disinfection of calving areas, safe disposal of placenta, testing of aborted animals for infectious diseases, and isolation of animals following abortion.

The level of adoption of each practice was categorized into three response classes: “Always,” “Sometimes,” and “Never.” The collected data were compiled and entered into Microsoft Excel for analysis. Descriptive statistics, including frequencies and percentages, were used to summarize the adoption patterns of various biosecurity and health management practices among the surveyed dairy farmers.

Results and Discussion

The findings revealed substantial variation in the adoption of biosecurity and health management practices among dairy farmers in the Kandi region (Table 1.). Preventive healthcare measures that are routinely promoted through veterinary services, such as vaccination, deworming, and regular veterinary consultation, were generally better adopted than specialized biosecurity interventions. This suggests that farmers place greater emphasis on curative and routine preventive healthcare than on comprehensive disease prevention strategies.

Farm hygiene practices, including shed cleaning, cleaning of utensils, and maintenance of personal hygiene facilities, showed moderate levels of adoption. However, the use of disinfectants and other scientifically recommended sanitation measures was comparatively limited, indicating that routine cleaning often occurs without adequate disinfection. Similar observations have been reported in smallholder dairy systems where farmers recognize the importance of cleanliness but have limited awareness regarding pathogen control through disinfection (Mpatwenumugabo, 2024) ^[4]. Majority of the farmers had no knowledge of zoonotic diseases did not test their herd for

zoonotic diseases, did not screen new animal for disease did not follow quarantine protocol (Singh *et al.*, 2020) ^[8].

A major concern emerging from the study was the poor adoption of quarantine-related measures. Practices such as quarantine of newly purchased animals, disease testing before introduction into the herd, isolation of sick animals, and restriction of visitor movement were largely neglected. Several important biosecurity measures showed poor adoption. None of the respondents consistently maintained footbaths, quarantine facilities, visitor restrictions, or clothing changes before entering animal sheds. Quarantine of newly purchased animals (88% never), isolation of sick animals (93% never), and disease testing of newly introduced animals (100% never) were particularly neglected. These findings suggest a substantial risk of disease introduction and transmission within dairy herds. The absence of these measures increases the risk of disease introduction and transmission within farms and highlights a significant gap in farm-level biosecurity. Such deficiencies are common in smallholder dairy production systems where limited infrastructure, inadequate awareness, and resource constraints hinder the implementation of preventive measures (Singh *et al.*, 2020) ^[8]. The effective control of the infectious diseases is important for animal health. This mainly relies on the maintenance of healthy environment involving cleaning and disinfection. Across the regions, 185 (84.09 per cent) dairy farmers from Shivalik-Foothills region, 82 (82 per cent) from Central Plains region and 89 (89 per cent) dairy farmers from South-West Dry region do not disinfect the dairy shed at all (Kaur and Toor, 2022) ^[2].

The study also indicated inadequate adoption of mastitis prevention practices (Table 2.). Scientifically recommended measures such as post-milking teat dipping, teat disinfection, fore-stripping, dry cow therapy, and maintenance of udder health records were poorly implemented. Mastitis prevention practices were also inadequately adopted. While 29% of farmers consistently dried teats before milking, fore-stripping was regularly practiced by only 18% of respondents. Post-milking teat dipping was not practiced regularly by any farmer, and 83% never adopted this measure. Likewise, none of the respondents used disinfectants specifically for teat cleaning. The poor adoption of these proven mastitis-control practices may contribute to increased susceptibility to udder infections and associated economic losses. Insufficient adoption of these practices may contribute to a higher prevalence of subclinical and clinical mastitis, ultimately affecting milk quality, milk yield, and farm profitability. Similar findings have been documented in several studies on smallholder dairy farms where mastitis control programmes are often underutilized (Nimbalkar *et al.*, 2020) ^[6]. Further, the majority of farmers were found using milk of diseased animals, do not check early mastitis in animals, did not change clothes before milking, did not sponge the udder after washing and did not follow teat dip practices after milking (Singh *et al.*, 2020) ^[8].

Record keeping and monitoring practices were weak. Only 2% of farmers consistently maintained health records, whereas 87% never maintained records. Similarly, regular health monitoring was performed by only 11% of respondents. The absence of systematic record keeping limits disease surveillance and informed decision-making at the farm level. Record keeping and systematic health

monitoring were among the weakest management areas observed. Most farmers relied on memory rather than written records for monitoring animal health, treatment history, reproductive performance, and disease occurrence. The absence of proper records limits the ability to identify health trends, evaluate herd performance, and make evidence-based management decisions (Alawneh *et al.*, 2018) ^[1].

Vector and pest control measures were also inadequately addressed. Limited emphasis on insect control, ectoparasite management, and vegetation control around animal sheds may facilitate the persistence of disease vectors and increase the likelihood of pathogen transmission. Effective vector control is particularly important in regions where climatic conditions favor the proliferation of flies, ticks, and other disease-carrying organisms.

Calf and reproductive management practices also revealed important gaps (Table 3). Individual calf housing (91%), calf-adult separation (76%), testing of aborted cows (100%), and separation of aborted animals (86%) were rarely practiced. Similarly, cow grouping according to age or physiological status was absent on most farms (90%). These deficiencies may increase the risk of disease transmission and negatively affect calf survival and productivity. Calf and reproductive management practices exhibited considerable scope for improvement. Although farmers generally recognized the importance of colostrum feeding and proper disposal of placental materials, practices such as individual calf housing, calf-adult separation, testing of aborted animals, and segregation of abortion cases were poorly adopted. These deficiencies may compromise calf health and increase the risk of transmission of reproductive diseases within the herd (Singh *et al.*, 2024) ^[7].

Overall, the study demonstrates that while dairy farmers in the Kandi region have adopted certain basic health management practices, the implementation of comprehensive biosecurity measures remains inadequate. The findings underscore the need for targeted extension programmes, practical farmer training, and continuous veterinary support to improve awareness and adoption of recommended biosecurity interventions. Strengthening these practices would contribute to improved herd health, enhanced productivity, reduced disease losses, and greater sustainability of dairy farming systems in the region.

Table 1: Biosecurity Measures Adopted by Dairy Farmers of Kandi area (n = 100)

Biosecurity Practice	Always	Sometime	Never
Fencing around farm	28	38	34
Foot/Dip bath provision	0	27	73
Quarantine procedure adopted	0	12	88
Quarantine of sick animals	0	7	93
Deworming schedule followed	24	57	19
Vaccination schedule followed	61	27	12
Regular contact with veterinarian	72	28	0
Regular cleaning of shed & utensils	17	64	9
Use of disinfectants	12	34	54
Change clothes/slippers before entry	0	12	88
Restrict visitor/vendor entry	0	33	67
Safe disposal of dead animals/manure	9	77	14
Testing new animals for diseases	0	0	100
Post-mortem examination	0	0	100
Reporting animal deaths	0	0	100

Table 2: Udder health and pest control Measures Adopted by Dairy Farmers of Kandi area (n = 100)

Practice	Always	Sometime	Never
Dry teats before milking	29	53	18
Fore-stripping	18	36	46
Post-milking teat dip	0	17	83
Keep cow upright	26	58	16
Discard treated milk	9	59	32
Teat clean (disinfectant)	0	0	100
Maintain health records	2	11	87
Hoof trimming	1	7	92
Dry cow therapy	2	3	95
Separate sick animals	23	34	43
Restrict visitor/vendor entry	0	33	67
Control vegetation around shed	12	35	53
Insect control plan	0	0	100
Ectoparasite control plan	7	23	70
Hand-washing/sanitizer facility	43	49	8

Table 3: Health, Calf Biosecurity Measures Adopted by Dairy Farmers of Kandi area (n = 100)

Practice	Always	Sometime	Never
Shed cleaning	23	58	19
Cow grouping	0	10	90
Animal cleaning	14	54	37
Health monitoring	11	34	55
Biosecurity plan	0	0	100
Immediate colostrum	34	32	34
Individual calf housing	2	7	91
Calf-adult separation	8	16	76
Pre-calving disinfection	23	37	40
Placenta disposal	56	38	6
Testing aborted cows	0	0	100
Separation of aborted cows	6	8	86

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