



Integrated Health Management And Disease Control In Dairy Herds

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Abstract

Integrated Health Management is one of the components of comprehensive herd health management, which includes feeding, housing, reproductive, vaccination, disease control, welfare and environmental management for dairy herd productiveness and disease prevention. Now-a-days, dairy production has shifted from treatment of diseased animals to herd health programs for prevention and control of infectious and production diseases, which are significant challenges to dairy herd productivity and reproduction. Herd health management requires the joint efforts of Veterinarians and nutritionists for the identification of disease control measures and husbandry, which can help in the prevention and control of various diseases. Proper feeding, hygienic management, regular health check-ups and precision dairy technologies can help reduce antimicrobial use in dairy herds.

Keywords: Dairy herd health, integrated health management, Biosecurity, Mastitis, Lameness, Disease prevention, Dairy nutrition

Introduction

Dairy production is crucial for food security, national livestock production, and socio-economic development; however, the intensified dairy production system creates numerous contagious diseases, welfare problems, and metabolic disorders that jeopardize dairy herd productiveness and profitability (Medeiros *et al.*, 2022). Traditionally, veterinary herd health services have been mainly focused on the treatment of dairy cattle's clinical diseases on an individual basis. Currently, the emphasis has shifted

towards the preventive herd health programs based on disease control and surveillance rather than the treatment of individual animals (Noordhuizen, 2012). Animal nutrition, housing, biosecurity, reproduction, vaccination, welfare, and disease surveillance are key elements of Integrated Health Management that comprise dairy herd health management in integrated dairy farming systems. This approach helps maximize dairy herd productivity and profit while minimizing the prevalence of infectious and production diseases (Svensson *et al.*, 2022).

Concept of Integrated Health Management

Integrated Health Management can be defined as a systematic approach that emphasizes the significance of preventive veterinary practices, herd management, and control measures for the maintenance of animal health (Noordhuizen, 2012). In addition to conventional disease control and preventive veterinary practices, integrated health management views the herd as a production unit while considering animal husbandry, nutrition, reproduction, the environment, welfare, and biosecurity (Medeiros *et al.*, 2022). Veterinary herd health management should be regarded as a permanent advisory service to animal owners based on herd performance, disease control, reproductive performance, milk production, and management to maximize farm profit (Svensson *et al.*, 2022).

Nutritional Management

Nutrition is a vital component of animal health management that should be emphasized in dairy herds to maintain animal health, reproduction, and productivity (Martins *et al.*, 2022). The adequate supply of calcium, phosphorus, magnesium, selenium, zinc, copper, vitamins A, D, and E promotes animal health and reproductive performance (O'Rourke, 2009). Modulation of the intestinal microbiota is an innovative approach to the prevention and control of subclinical mastitis and other inflammatory diseases by decreasing the systemic inflammatory response (Zhao *et al.*, 2025).

Vaccination Program

Vaccination is an essential component of integrated health management that minimizes the occurrence and severity of infectious diseases. An efficient vaccination program can significantly reduce the economic impact of infectious diseases by maximizing herd health and productivity (Noordhuizen, 2012). The vaccination program in dairy herds is mainly designed to control Foot & Mouth Disease, Haemorrhagic Septicaemia (HS), BQ, Brucellosis, Infectious Bovine Rhinotracheitis (IBR), Bovine Viral Diarrhoea, Leptospirosis and other local pathogens (Svensson *et al.*,

2022). An integrated approach to disease prevention and control, including nutrition, biosecurity, sanitation, and vaccination is critical in minimizing the occurrence of infectious diseases (Noordhuizen, 2012).

Udder Health and Mastitis Control

Mastitis is one of the most economically significant diseases in dairy herds that cause reduced milk yield and quality and sustain substantial treatment costs (Bhakat *et al.*, 2026). Housing and management also play a pivotal role in mastitis prevention and control by ensuring dry and clean animal housing and proper ventilation (Noordhuizen, 2012). Regular monitoring of udder health status, somatic cell count, California Mastitis Test, bacteriological examination and milk quality are essential for mastitis prevention and control (Bhakat *et al.*, 2026). The supplementation of selenium, zinc, copper, vitamins A & E can help enhance animal's immunity against mastitis (O'Rourke, 2009). Dry cow therapy, isolation of infected cows, regular maintenance of milking machines and culling of chronically infected cows are also essential mastitis control measures (Bhakat *et al.*, 2026).

Lameness Management

Lameness is one of the most severe production diseases that negatively affect dairy herd productivity and profitability. Hoof horn, interdigital fibroma, sole ulcers, laminitis and traumatic injury are the major causes of lameness in dairy cows. Painful locomotion often results in reduced feed intake, animal discomfort, reduced milk yield and delayed oestrus (Garvey, 2022). According to Garvey, 2022 housing is the major contributor to lameness that can be controlled by providing comfortable lying areas, suitable floor and bedding materials to prevent hoof injuries. Housing inspection and identification of potential causes of lameness are essential for the implementation of effective control measures (Garvey, 2022).

Reproductive Health Management

Reproduction is the most critical aspect of dairy herd management, which directly influences milk production, farm profit, and genetic potential of the herd (Noordhuizen,

2012). Heat detection and regular pregnancy diagnosis, along with nutritional management, play a essential role in reproductive health management. Regular reproductive examination of cows and heifers helps monitor reproductive performance, detect potential disorders, and implement effective control measures (Svensson *et al.*, 2022). The dry period and the first three weeks after parturition are considered the most critical periods that require special attention to prevent retained placenta, metritis and udder infections (Martins *et al.*, 2022).

Calf Health Management

Calf health status plays a critical role in dairy herd production, which requires special attention to prevent infectious diseases and maximize future productivity (Noordhuizen, 2012). An efficient calf health management plan should be aimed at preventing infectious diseases by emphasizing proper colostrum management, balanced nutrition, hygienic management, vaccination and regular health monitoring (Svensson *et al.*, 2022). Colostrum provides passive immunity to young animals, which protect them against various infections and diseases (Noordhuizen, 2012). Clean and disinfected calving shed, proper umbilical cord care, individual housing and regular bedding changes are essential in preventing neonatal infections, diarrhoea and pneumonia (Svensson *et al.*, 2022).

Disease Surveillance and Herd Monitoring

Disease surveillance is an essential component of integrated health management that focuses on regular animal health monitoring to ensure dairy herd productiveness and prevent disease occurrence (Noordhuizen, 2012). Regular herd monitoring is critical in disease prevention and control by promoting early disease detection and implementing appropriate control measures to minimize economic loss (Svensson *et al.*, 2022). Regular veterinary herd visits are also essential in animal health monitoring, where Veterinarians determine animal health status, nutritional requirements, udder health, reproductive performance and overall herd management (Medeiros *et al.*, 2022).

Precision Dairy Farming

Precision dairy farming has become an integral part of modern dairy production, which employs individual animal measurement and real-time production monitoring for efficient farm management and decision-making (Martins *et al.*, 2022). Animal-level monitoring helps detect disease early, which aids in reducing the spread and impact of disease while minimizing antimicrobial use in dairy herds (Svensson *et al.*, 2022). Various precision technologies, including wearable sensors, milking robots, activity monitoring systems and electronic identification, can be used in dairy herds to collect relevant information on animal health and production performance (Martins *et al.*, 2022). These technologies can also help detect mastitis, lameness, and metabolic disorders at early stages and promote herd health while maximizing farm profit (Svensson *et al.*, 2022).

One-Health Perspective

Integrated health management offers significant benefits to dairy farms while emphasizing the importance of dairy animal health and welfare, which contribute to public health and food security (Bhakat *et al.*, 2026). Integrated health management reduces antimicrobial use by emphasizing disease prevention and control while minimizing treatment costs (Noordhuizen, 2012). In addition, proper manure management, waste disposal, and water management are vital in promoting environmental health while reducing the risk of infectious disease occurrence (Medeiros *et al.*, 2022). Thus, integrated health management can have several benefits for public health, animal welfare, and the environment by reducing the incidence of disease and promoting sustainable dairy production (Bhakat *et al.*, 2026).

Future Perspectives

In the future, precision livestock farming, artificial intelligence, genomic selection and advanced diagnostics will be increasingly used in dairy farming to improve animal surveillance and early disease detection (Martins *et al.*, 2022). Future research on host immunology, rumen microbes, metabolomics

and precision nutrition will lead to the development of innovative approaches to the prevention and control of production diseases and metabolic disorders (Zhao *et al.*, 2025). Veterinarians, nutritionists, dairy farmers and researchers will play a significant role in the future of integrated health management by developing improved disease control and prevention strategies (Svensson *et al.*, 2022).

Conclusion

The Integrated Health Management concept encompasses disease prevention and control, nutrition, vaccination, housing, reproduction, surveillance and precision dairy farming. It emphasizes animal health, welfare, improving productivity while minimizing the impact of infectious and production disease complexes on dairy herd productivity and profitability. With the proper milking routines, hoof treatments, nutrition, reproductive examinations, mastitis, lameness, metabolic disorders and reproductive issues can be prevented and controlled. Animal health surveillance is crucial to dairy herd management since it ensures timely identification of potential health risks. The success of the integrated health management of dairy herds largely depends on the regular surveillance of dairy herds and the combined efforts of Veterinarians, nutritionists and dairy farmers to ensure dairy herd productivity and profitability.

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