



## Popular Article

Domain: **Veterinary Science**

Vol 5 Issue 5, May 2026, 623-628

# Precision Livestock Farming: Using Technology for Monitoring Animal Health and Performance

Dr. Suraj C. Koujalagi<sup>1</sup>, Dr. Swarnalata Bara<sup>2\*</sup>, Dr. M. Ramasamy<sup>3</sup> and A. Balaji<sup>4</sup>

<sup>1</sup>Scientist-Animal Science, ICAR-KVK (Belagavi-1), Karnataka, India

<sup>2</sup>Assistant Professor, Department of Livestock Production and Management, University - IGKV, Raipur, Institute - Kumari Devi Chaubey, College of Agriculture and Research Station Saja, Bemetara-491993, (C.G.), India.

<sup>3</sup>Assistant Professor, Veterinary and Animal Sciences, Krishi Vigyan Kendra, Tamil Nadu Agricultural University, Virinjipuram Post, K.V. Kuppam Taluk, Vellore-632104, Tamil Nadu, India.

<sup>4</sup>Faculty, Department of Science, Tamil Nadu Board of Secondary School Education, Pattanam Post, Rasipuram Taluk, Namakkal, Tamil Nadu, India.

\*Corresponding Address: [swarnalata14366@gmail.com](mailto:swarnalata14366@gmail.com)  
[doi.org/10.5281/trendsinaagriculture.20152710](https://doi.org/10.5281/trendsinaagriculture.20152710)

### Abstract

In recent times, there have been many changes in livestock production because of technological advancements in animal production techniques. Precision Livestock Farming (PLF) refers to the use of sensors, automation, artificial intelligence, and big data analysis for monitoring the health, well-being, productivity, and environment of farm animals continuously. Most conventional approaches to livestock management rely on direct observations by humans, which may be ineffective as the early warning signs of health issues are not detected. The use of precise technologies allows farmers to monitor their livestock efficiently and take appropriate action accordingly. Modern technologies such as wearable sensors, automated feeders, smart cameras, thermal cameras, and IoT devices are increasingly used in the livestock industry, particularly dairy, poultry, swine, and meat production. These technologies facilitate the improvement of productivity, prevention of disease outbreaks, promotion of animal welfare, and efficient use of resources. This essay provides an overview of the idea of precision livestock farming and its main technologies, applications, advantages, challenges, and future prospects.

**Keywords:** Precision livestock farming, animal health monitoring, smart livestock systems, wearable sensors, artificial intelligence, dairy farming, IoT, livestock management, animal welfare

### Introduction

Livestock farming is indispensable in agriculture because it supplies such commodities as milk, meat, eggs, wool, etc. With an ever-growing number of people, there has been an increase in demand for animal products too. In addition, farmers raising livestock have to deal

with several issues including high production costs, shortage of labor, diseases, environmental issues, and higher demands on animal welfare.

Observation and experience were always the means of monitoring livestock, which is important though. It becomes more difficult, however, with the growth of the number of animals. The first symptoms of the health condition deterioration might not be noticed until the issue becomes serious enough.

Precision Livestock Farming (PLF) represents a contemporary approach to livestock rearing. It implies the implementation of digital technologies allowing for the constant gathering of data about the animals and their conditions. Special sensors, cameras, wearable technology, and other devices can help monitor individual animals and identify any signs of the change in their behavior and health status. The objective of PLF is to increase efficiency, improve animal welfare, and become more environmentally-friendly with the help of modern technologies. Some recent research findings indicate the adoption of PLF systems in dairy and cattle farms.

### **Concept of Precision Livestock Farming**

Precision Livestock Farming involves the use of technology to monitor livestock production continuously in an automatic manner. It aims to monitor individual animals as opposed to observing the herd as a whole.

The various types of information collected from PLF systems include:

- Activity and movements of animals
- Body temperatures
- Behavior of the animals
- Amount of feed consumed
- Amount of milk produced
- Environmental conditions
- Health status of animals, especially reproductive status

The various pieces of information are analyzed with the help of software and AI programs, which can detect any issues such as health or behavioral problems.

Contemporary Precision Livestock systems aim at improving productivity, as well as ensuring welfare and sustainability.

### **Technologies Used in Precision Livestock Farming**

#### **2. Smart Cameras and Computer Vision**

Computer vision systems employ the use of cameras and artificial intelligence to watch animal movements in a non-invasive way.

Some of the capabilities of computer vision systems include:

- Lameness detection
- Unusual movement
- Feeding behaviors
- Body condition
- Animal interaction

There have been great advancements in machine learning and deep learning that have made it possible for computer vision to work effectively.

## **2. Wearable Sensors**

Among the most commonly utilized technologies in PLF are wearable devices. Such devices are worn by the animals either by way of collars, ear tags, leg bands, or rumen boluses. The data that is monitored includes:

- Body temperature
- Heart rate
- Rumination
- Eating habits
- Activity

Any change in the animal's habits or activity levels could be a sign of illness or stress, while the latter is usually a sign of reproductive activity.

## **3. Automated Feeding Systems**

The automated feeding systems give accurate amounts of food to the animals according to their nutritional needs.

They assist in:

- Preventing feed wastage
- Enhancing feed efficiency
- Tracking feed consumption behavior
- Identifying decreased appetite associated with diseases

## **4. Milking Robots**

Robotic milking machines are used in dairy farming to milk cattle while gathering data about their milk production, quality, and the health of their udders.

The use of robotic milking machines decreases manpower needs and enables constant surveillance of the dairy farm animals.

## **5. Thermal Imaging**

Thermal cameras sense the difference in temperatures in the animal's body surface. This could be caused by fever, inflammation, mastitis, or stress.

The application of thermal imaging is especially beneficial since it enables monitoring without causing any harm to the animal.

## **6. Internet of Things (IoT)**

The Internet of Things allows sensors and monitoring devices to communicate via wireless networks and cloud technologies.

A farmer is able to monitor the health of the animal from his smartphone or computer at any time.

### **Applications of Precision Livestock Farming**

#### **1. Disease Detection and Health Monitoring**

The other critical use of PLF is early diagnosis of diseases.

Monitoring and sensing devices can detect the onset of changes in:

- Body temperature
- Feed consumption
- Ruminant behavior
- Mobility
- Breathing habits

Such changes typically manifest before the occurrence of any noticeable symptoms.

Modern PLF technology is gradually becoming essential for detecting mastitis, respiratory, metabolic problems, and locomotive disorders in dairy cows.

#### **2. Monitoring Animal Welfare**

The PLF technology can assist farmers in evaluating the welfare of the animals based on their behavior and physiology.

Continuous monitoring aids in identifying:

- Heat stress
- Social aggression
- Lack of mobility
- Pain or discomfort

Enhancing the welfare of the animals leads to improved production and public acceptance of livestock farming.

#### **3. Reproductive Management**

- Activity monitoring devices can aid in detecting estrus in dairy cattle and other livestock species.
- Detection of estrus accurately can enhance breeding practices and reproduction rates.

#### **4. Precision Feeding**

Precision feeding can ensure that each animal receives balanced nutrients depending on its requirements.

This practice enhances:

- Growth rate
- Feed utilization
- Milk production
- Nutrient efficiency

It also minimizes environmental contamination due to excessive nutrient excretion.

## **5. Environmental Monitoring**

Environmental sensors monitor:

- Humidity
- Air quality
- Temperature
- Gas concentrations

Maintaining optimal environmental conditions reduces stress and improves animal health.

## **Benefits of Precision Livestock Farming**

- Reduced Labor Requirements
- Efficient Resource Utilization
- Reduced Economic Losses
- Improved Productivity
- Better Animal Welfare

## **Challenges in Precision Livestock Farming**

Despite its advantages, PLF faces several challenges.

- Data Management Issues
- Connectivity Problems
- High Initial Investment
- Technical Complexity
- Farmer Acceptance

## **Future Prospects**

The future potential of precision livestock farming is tremendously positive and directly related to quick advancements in artificial intelligence, robotics, cloud computing, and data analysis. Innovations will change the way animal production systems operate by introducing AI-based health condition predictive systems that allow detecting possible diseases early on and treating them in time in order to cut losses and increase efficiency. Fully automated livestock farms represent another prospective development where all routine operations such

as feeding, milking, and other activities will be done with little human input. The implementation of non-contact monitoring technologies will also increase animals' welfare allowing continuous and stress-free health condition assessment. Moreover, innovations such as robots and drones are currently being used to design optimal smart grazing systems. Advanced wearable biosensors will help monitor the state of livestock in terms of their behavior and physiological conditions continuously. Present trends also include the focus on combining various sources of data and information that help make decisions in regard to livestock management more precise and accurate. Finally, the current trend indicates a tendency toward more autonomous livestock robot applications used to manage pastures and monitor the health of animals.

### **Conclusion**

PLF is changing the face of modern animal husbandry through the application of various technological tools that will allow for real-time tracking of animal well-being, health status, and performance. With the help of sensors, wearables, machine learning algorithms, and automation technologies, farmers will be able to make better and faster management decisions that will enhance efficiency, minimize disease occurrences, increase the use of available resources, and facilitate sustainable livestock production. Even though certain barriers such as cost, complexity of application, and issues with data management are present, rapid technological advancement continues to enable the successful implementation of precision livestock farming systems. As global demand for livestock products grows, PLF will become essential.

### **References**

- Wathes, C. M., et al. (2008). Precision livestock farming for animal health and welfare. *Animal Welfare*, 17, 361–369.
- Kleen, J. L., & Guatteo, R. (2023). Precision Livestock Farming: What does it contain and what are the perspectives? *Animals*, 13(5), 779.
- Berckmans, D. (2017). General introduction to precision livestock farming. *Animal Frontiers*, 7(1), 6–11.
- Norton, T., et al. (2019). Precision livestock farming technologies and their applications.
- Liu, N., et al. (2023). Information technologies applicable to precision dairy farming. *Agriculture*, 13(10), 1858.
- Mahmud, M. S., et al. (2021). Deep learning applications in precision livestock farming.
- Rahman, A., et al. (2024). Scoping review of precision technologies for cattle monitoring. *Smart Agricultural Technology*, 9, 100596.
- Sani, M. I., et al. (2026). Application of precision livestock farming: challenges and opportunities. *Animal Bioscience*.
- FAO. (2021). Digital technologies in sustainable livestock production.
- Neethirajan, S., & Kemp, B. (2021). Digital livestock farming technologies for welfare and production monitoring.