

*E-Magazine*

# Farming Chronicle

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*an essence of Braj*



**Role of  
Animal Husbandry  
in  
Viksit Bharat**



**Department of Veterinary & Animal Husbandry Extension Education**  
**College of Veterinary Science and Animal Husbandry**  
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## ***From the Desk of Vice Chancellor***

Warm greetings to all of you. It gives me immense pleasure to announce the launch of the first issue of our E-Magazine entitled 'Farming Chronicle; an essence of Braj' dedicated to the theme "*Role of Animal Husbandry in Viksit Bharat*".

As our nation thrives to achieve sustainable growth, economic prosperity, and social well-being, it is essential to acknowledge the significant role animal husbandry plays in realizing this vision. Animal husbandry has been a corner stone of India's rural economy, playing a crucial role not only in ensuring food security but also in fostering employment and poverty alleviation since time immemorial. The significance of this sector in providing nutritional, economic, and social benefits is immense. From dairy farming to meat production, and from wool to leather, the diverse contributions of animal husbandry are fundamental to both the agricultural and industrial landscapes of our country.

In our pursuit of a Viksit Bharat, modernizing and advancing animal husbandry practices is of paramount importance. Innovations in livestock breeding, health management, nutrition, and waste management are transforming this sector. By incorporating advanced technologies and sustainable practices, we can significantly increase productivity, improve animal welfare, and reduce environmental impact.

This issue of the E-Magazine will explore these aspects and more, showcasing the potential of animal husbandry to drive rural economic development, create job opportunities, and enhance the livelihoods of millions of farmers and entrepreneurs across the nation. It will also highlight the need for education, research, and policy support to ensure the sector's growth and sustainability.

I extend my best wishes to the entire team for their hard work in compiling this insightful issue. I am confident that it will serve as a valuable resource for students, researchers, policy-makers, and practitioners alike. Let us all come together to foster the growth of animal husbandry as an essential component in shaping a prosperous, developed India.

Let us move forward with a shared vision of transforming our rural communities, ensuring food security, and contributing to the economic strength of our nation through the power of animal husbandry.

Warm regards,

(Prof. Anil K. Srivastava )





## *From the Desk of Dean, CoVSc.&AH*

Dear Reader

It is with great pleasure that I extend my warm greetings to the readers of *Farming Chronicle – An Essence of Braj*. The theme, "**Role of Animal Husbandry in Viksit Bharat**," is both timely and significant as India moves towards holistic and sustainable development.

Animal husbandry has long been a cornerstone of India's rural economy, providing livelihoods to millions, ensuring nutritional security, and supporting the agricultural ecosystem. With scientific advancements, improved veterinary care, and farmer-friendly policies, this sector is playing an instrumental role in achieving the vision of **Viksit Bharat**.

The Braj region, known for its deep-rooted agricultural and dairy traditions, exemplifies the potential of livestock farming in strengthening rural economies. Integrating modern animal husbandry practices with traditional wisdom can enhance productivity, improve animal health, and ensure economic prosperity for farmers. Furthermore, the expansion of telemedicine in veterinary services is revolutionizing livestock care, making quality healthcare more accessible to remote areas.

The adoption of climate-resilient livestock management, disease control strategies, and breed improvement programs will further accelerate the sector's contribution to India's growth. Strengthening the dairy, poultry, and fisheries industries through entrepreneurship, skill development, and digital integration will empower rural communities and create sustainable employment opportunities.

In addition, promoting indigenous breeds, organic dairy farming, and value-added livestock products will not only enhance farmers' income but also align with the **Atmanirbhar Bharat** initiative. Collaboration between academic institutions, government agencies, and industry stakeholders is crucial in ensuring the sector's progress. The role of veterinarians and researchers in disease prevention, food safety, and genetic advancements cannot be overstated.

As we progress towards a developed India, let us acknowledge the invaluable contributions of veterinarians, livestock farmers, and researchers in shaping a resilient and prosperous animal husbandry sector. I commend the efforts of *Farming Chronicle* in promoting awareness and knowledge sharing in this vital field.



(Prof. Vikas Pathak )

# Precision Livestock Farming: The Future of Animal Husbandry in India

*Vijay Kumar, Rakshit and Abhishek Saxena*  
*Department of Animal Genetics & Breeding*

India is an agrarian country, and animal husbandry forms an integral part of its agriculture. The contribution of livestock to the rural economy not only enhances farmers' income but also plays a crucial role in ensuring the nation's food security. However, with changing times and emerging challenges, animal husbandry must adopt a technological and scientific approach. In this context, Precision Livestock Farming (PLF) has emerged as a revolutionary technique that can transform the field of animal husbandry.

## What is Precision Livestock Farming?

Precision Livestock Farming is a modern approach that uses digital technologies, sensors, Artificial Intelligence (AI), and data analytics to monitor and manage livestock. Its goal is to improve health, nutrition, and productivity of animals. This expertise provides farmers with real-time data, enabling them to make improved decisions. For example, sensor-based collars help to measure animals' activities and health indicators.

## Key Aspects of Precision Livestock Farming

### Health Monitoring

Modern tools such as sensors and cameras provide information about animals' health indicators (e.g. heart rate, temperature, and feeding patterns). This helps in the early detection and treatment of diseases.

### Production Management

Precision Livestock Farming aids farmers in improving the production of milk, meat and wool. It enhances breeding efficiency and assists in timely interventions like artificial insemination.

### Food and Nutritional Management

Providing animals with a diet tailored to their

physiological needs increases productivity and reduces feed wastage.

## Environmental Sustainability

Reducing greenhouse gas emissions and managing water resources efficiently are key components of Precision Livestock Farming.

## Opportunities and Challenges in India

### Opportunities

#### 1. Digitization of Agriculture:

The rapidly growing digital network and technological advancements in India make Precision Livestock Farming a promising field.

#### 2. Increased Farmer Income:

It helps improve animal productivity while reducing costs.

#### 3. Improved Veterinary Services:

Remote monitoring and AI-based diagnostics make veterinary services more accessible in rural areas.

### Challenges

#### 1. High Initial Costs:

The high cost of Precision Livestock Farming equipment is a significant barrier for small and medium-scale farmers.

#### 2. Lack of Technical Knowledge:

Rural areas require greater awareness and training in the use of advanced technologies.

#### 3. Infrastructure Deficiency:

The lack of basic facilities like electricity, internet, and data storage hinders the implementation of this technology.

## Future Directions

The government of India and private sectors must collaborate to promote Precision Livestock Farming.

### ■ Subsidies and Financial Assistance:

Farmers should be provided with subsidies for purchasing equipment and technical training.

### ■ Education and Training Programs:

Technical training centers should be established at the rural level.

### ■ Encouraging Startups:

Startups focusing on innovation in livestock farming should be incentivized.

## Conclusion

Precision Livestock Farming is a robust solution that integrates traditional livestock management systems with modern technology in India. It will not only increase farmers' income but also help the nation achieve self-reliance while maintaining environmental balance. If implemented effectively with the right support and direction, Precision Livestock Farming can undoubtedly brighten and enrich the future of animal husbandry in India.



## Transformative Livestock Waste Management Strategies for a Sustainable Bharat

*Rajneesh Sirohi, Srashti Dixit and Vinayak Jaswal*  
*Department of Livestock Production Management*

**Introduction:** Effective livestock waste management is essential for achieving a sustainable and developed Bharat. With the rapid growth of the livestock sector, innovative waste management practices are critical to mitigate environmental impacts, enhance productivity, and promote economic development. This article explores transformative livestock waste management strategies that can contribute to environmental sustainability, economic growth, and improved animal welfare in India. Proper waste management not only minimizes environmental pollution but also turns waste into valuable resources. Benefits of efficient animal waste management are as follows:

**1. Energy Generation:** Animal waste can be used to produce biogas, which serves as a renewable energy source. This reduces

reliance on fossil fuels and promotes cleaner energy solutions.

- 2. Organic Fertilizers:** Properly treated animal waste can be converted into high-quality organic fertilizers, enriching the soil and boosting agricultural productivity.
- 3. Water Conservation:** Effective waste management systems help prevent the contamination of water bodies, ensuring clean and safe water for communities and livestock.
- 4. Improved Animal Health:** Keeping living environments clean and hygienic reduces the risk of disease outbreaks among livestock, leading to healthier and more productive animals.
- 5. Economic Opportunities:** Innovative waste management practices create new job

opportunities and support local economies, contributing to the overall development of rural areas.

Integrating these practices aligns with the principles of environmental sustainability and can significantly contribute to a "Viksit Bharat" by promoting a cleaner, greener, and healthier nation.

#### **Different methods of waste management:**

- 1. Anaerobic Digestion:** Anaerobic digestion involves the breakdown of organic matter in the absence of oxygen to produce biogas. This renewable energy source can be used for cooking, heating, and electricity generation, reducing dependence on fossil fuels. The by-product, digestate, is a nutrient-rich fertilizer that can enhance soil health and agricultural productivity.
- 2. Vermicomposting:** Vermicomposting utilizes earthworms to decompose organic waste into high-quality compost. This process not only reduces waste but also produces valuable organic fertilizer that improves soil structure and fertility. Vermicomposting is a cost-effective and eco-friendly waste management practice.
- 3. Composting:** Composting is the aerobic decomposition of organic matter under controlled conditions. It transforms livestock waste into stable organic matter (humus) that can be used to improve soil fertility. By converting livestock waste into compost, farmers can reduce their reliance on chemical fertilizers and promote organic farming practices.
- 4. Biochar Production:** Biochar is produced by pyrolyzing organic materials, such as livestock waste, in the absence of oxygen. This carbon-rich material can be used as a soil amendment to improve soil structure, water retention, and nutrient availability. Biochar production not

only sequesters carbon, reducing greenhouse gas emissions, but also enhances soil health and crop productivity.

- 5. Integrated Fish Farming:** Integrated fish farming involves using livestock waste as feed for fish farming. The waste provides essential nutrients for the fish, and the fish waste can be used as fertilizer for crops, creating a sustainable nutrient cycle.
- 6. Solid-Liquid Separation:** Solid-liquid separation techniques separate the solid and liquid components of livestock waste. The solid fraction can be composted or used as bedding material, while the liquid fraction can be treated and used for irrigation or further processed into biogas.
- 7. Phytoremediation:** Phytoremediation involves using plants to absorb and detoxify pollutants from livestock waste. Certain plants have the ability to accumulate heavy metals and other contaminants, reducing environmental pollution and improving soil health.
- 8. Recycling and Reuse:** Recycling livestock waste into new products, such as bio-based packaging materials or construction materials, can reduce waste and promote a circular economy.

**Conclusion:** Transformative livestock waste management strategies are essential for promoting a sustainable and developed Bharat. By adopting innovative practices such as anaerobic digestion, vermicomposting, composting, biochar production, integrated fish farming, solid-liquid separation, phytoremediation, and recycling, livestock farmers can enhance environmental sustainability, improve animal welfare, and contribute to economic growth. These strategies not only mitigate the environmental impacts of livestock farming but also create new opportunities for resource efficiency and economic development.



## ■ Role of Livestock Sector in Developed India

Chetna Gangwar\*, Pradeep Kumar<sup>1</sup> and Shriprakash Singh<sup>2</sup>

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<sup>2</sup>Department of Veterinary Anatomy

The role of livestock farming in **Viksit Bharat** is multifaceted and crucial for the country's overall economic, social, and environmental development. Livestock farming plays a significant role in strengthening India's rural economy, providing livelihoods, ensuring food security, and promoting sustainable agricultural practices. India is home to 536.76 million livestock and 851.81 million poultry birds. It contributes about 3.9% to national GDP and 28.4% to agricultural GDP (At 2011-12 Prices) in 2018-19 (GoI 2022). Country contributes 239.3 million tonnes of milk, 142.77 billion eggs, 10.25 million tonnes of meat and 33.69 million kgs of wool (MoFAHD, DAHD, GoI, 23-24).

**Table 1: Value of output from Livestock Sector**

**Value of Output From Livestock Sector- At Current Prices In Rs. Crore**

Item	2021-22	2022-23
1. Milk Group	1,023,005	1,116,241
2. Meat Group	381,060	422,560
2.1 Meat	354,064	392,516
2.2 Meat Products	13,132	14,778
2.3 By- Products	13,863	15,266
3. Eggs	54,691	58,380
4. Wool and Hair	577	594
5. Dung	77,497	86,596
6. Silk Worm, Cocoons and Honey	14,763	15,842
7. Increment in Stock	22,556	24,850
Value of Output From Livestock Sector	1,574,149	1,725,064

Source: National Accounts Statistics, MOSPI, GOI

It is a key sector in transforming India into a "Viksit Bharat" (Developed India) by addressing

several important aspects of the nation's growth.

### 1. Economic Contribution

- **Livelihood Support:** Animal husbandry supports millions of rural households, providing employment and income opportunities. About 20.5 million people depend upon livestock for their livelihood. Livestock contributed 16% to the income of small farm households as against an average of 14% for all rural households.
- **GDP Contribution:** Livestock and its by-products, such as milk, meat, eggs, wool, and leather, form an important part of India's agricultural GDP. Animal husbandry accounts for around 5% of India's total GDP and approximately 28% of agricultural GDP.

### 2. Food Security and Nutrition

- **Protein Source:** Animal husbandry provides a major source of protein in the form of milk, eggs, meat, and fish. This is essential for meeting the nutritional needs of India's large and diverse population.

### 3. Sustainable Agricultural Practices

- **Manure and Organic Fertilizers:** Animal husbandry contributes to sustainable agriculture by providing organic manure that enhances soil fertility.
- **Integrated Farming Systems:** Livestock provide dung for composting, which enriches soil, and in turn, the crops feed the livestock, creating a circular, sustainable farming ecosystem.

### 4. Employment Generation

- **Direct and Indirect Jobs:** Beyond farmers, animal husbandry supports a vast range of jobs in the dairy, meat, leather, and



pharmaceutical industries. These include roles in processing, packaging, marketing, veterinary services, and feed production.

## 5. Technological Advancements and Innovations

- **Improved Breeds and Genetics:** The development of high-yielding and disease-resistant animal breeds is enhancing productivity. India's push toward better veterinary care and breeding technologies is helping to improve the overall efficiency and sustainability of livestock farming.
- **Disease Control and Health:** Animal health is a key area in modernizing animal husbandry. Vaccinations, veterinary services, and disease monitoring programs are essential in ensuring healthy livestock, which in turn leads to greater productivity and reduced losses.
- **Precision Livestock Farming (PLF):** Innovations such as digital monitoring, data analysis, and IoT applications in livestock management.

## 6. Export Potential

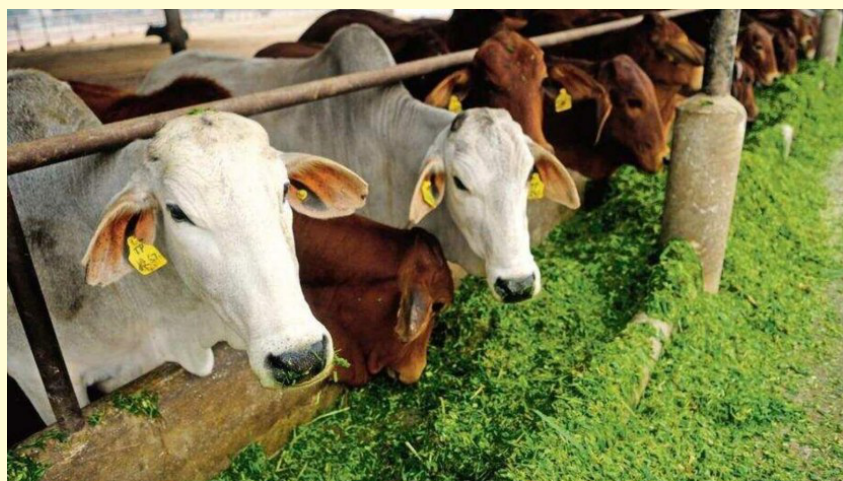
- **Global Trade:** India has the potential to become a global leader in exporting livestock and livestock products, especially dairy, leather, and meat. This opens up significant opportunities for foreign exchange and global market expansion.

## Challenges and Areas of Improvement

- **Diseases and Health Management:** Diseases like Foot-and-Mouth Disease (FMD) or avian influenza can severely impact animal productivity. Enhanced disease control and vaccination programs are essential for the growth of the sector.
- **High Marketing and transaction cost:** Ensuring better market access, supply chain management, and fair pricing systems is vital.
- **Climate Change:** Strategies for climate-resilient animal husbandry practices need to be developed, including climate-smart breeds and practices.
- **Greenhouse Gas Emissions:** Enteric methane emission from Indian livestock contributed 15.1% total global enteric methane emissions. Hence, improved feed, better waste management systems, and efficient livestock breeding practices to reduce emissions and minimize the environmental footprint.

## Conclusion:

In a **Viksit Bharat**, **Pashu Palan** plays an integral role in boosting economic growth, enhancing food security, fostering sustainable agriculture, empowering rural communities, and contributing to cultural heritage. With the right policies, technological advancements, and investment in animal welfare and infrastructure, the livestock sector can play a key role in India's journey toward becoming a developed nation.



# Parasites in Livestock: Challenges for Farmers in Viksit Bharat

*Supriya Sachan, Jitendra Tiwari and Amit Kumar Jaiswal*

*Department of Veterinary Parasitology*

Animal husbandry plays a crucial role in India's rural economy, providing income, nutrition, and employment to millions of households. However, parasitic infestations remain a significant challenge, affecting the health, productivity, and welfare of livestock. Parasites, both internal (helminths and protozoa) and external (ticks, mites, and flies), thrive in India's tropical climate and cause extensive economic and health-related issues. This article explores the challenges posed by parasites in animal husbandry and their implications for farmers and the livestock industry.

## 1. Reduced Livestock Productivity

Internal parasites such as gastrointestinal helminths impair the absorption of nutrients, leading to poor growth rates, reduced milk production, and lower fertility. External parasites, such as ticks and fleas, weaken animals by feeding on their blood, causing anaemia and stress. Chronic infestations often result in economic losses due to diminished meat, milk, and wool quality.

## 2. Transmission of Diseases

Parasites act as vectors for various diseases, compounding their impact. Ticks, for instance, spread diseases like babesiosis, anaplasmosis, and theileriosis, which can result in high mortality if untreated. Flies and mosquitoes transmit bacterial and viral infections such as bluetongue and Japanese encephalitis. These diseases not only affect the productivity of animals but also increase the financial burden on farmers due to the cost of treatments.

## 3. Increased Veterinary Costs

Frequent outbreaks of parasitic infections necessitate regular veterinary interventions and the costs associated with these treatments can be prohibitive for small-scale farmers. Moreover, the emergence of drug-

resistant parasite strains due to indiscriminate use of chemicals has increased the need for more expensive and sophisticated treatments.

## 4. Impact on Reproductive Performance

Animals infested with parasites often experience delayed puberty, lower conception rates, and higher incidences of infertility. Pregnant animals suffering from parasitic infections are more likely to produce weak offspring or experience abortions, affecting herd growth.

## 5. Animal Welfare Concerns

External parasites, such as lice and mites, can lead to skin lesions, hair loss, and secondary bacterial infections. Internal parasites can cause severe abdominal pain, diarrhoea, and weakness. These issues not only reduce the quality of life for livestock but also raise ethical concerns about animal welfare.

## 6. Environmental and Climatic Challenges

India's tropical climate creates ideal conditions for the proliferation of parasites. Seasonal changes exacerbate parasitic infestations. Overgrazing and poor pasture management further contribute to the persistence of parasites in the environment.

## 7. Economic Losses

The impact of parasitic infections leads to significant economic losses for farmers and the livestock industry. These include reduced income, lower productivity, increased veterinary expenses, losses from livestock mortality and degradation of the quality of hides and wool.

## 8. Zoonotic Threats

Some parasites pose a risk not only to livestock but also to human health. For

example, *Toxoplasma gondii*, a protozoan parasite, can infect humans through contaminated meat or contact with infected animals. Hydatid disease, also poses a significant zoonotic threat.

### 9. Lack of Awareness and Preventive Measures

Many farmers lack awareness about the lifecycle and control measures for parasites. Poor sanitation, improper waste disposal, and inadequate housing facilities contribute to the spread of parasites. Over-reliance on chemical treatments often leads to resistance, further complicating control efforts.

### Solutions to Address Parasitic Challenges

To mitigate the challenges posed by parasites, a comprehensive and integrated approach is essential:

#### 1. Improved Veterinary Services:

Strengthening veterinary infrastructure and ensuring access to affordable and effective treatments.

#### 2. Integrated Parasite Management (IPM):

Combining chemical control methods with natural approaches, such as rotational grazing and biological agents.

#### 3. Farmer Education:

Awareness programs about parasite control and preventive measures.

#### 4. Better Sanitation:

Ensuring clean housing and proper waste management to reduce breeding grounds for parasites.

#### 5. Research and Development:

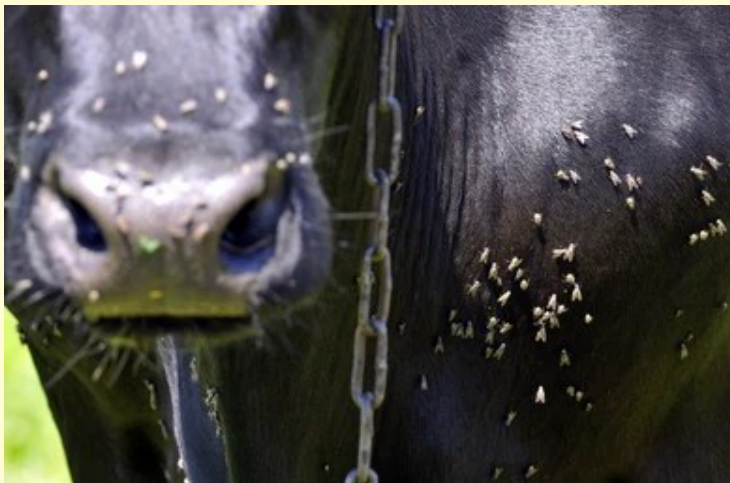
Investing in new antiparasitic drugs, vaccines, and sustainable control strategies.

#### 6. Breeding Policies:

Promoting breeds that are naturally resistant to parasitic infections.

### Conclusion

Parasitic infestations are a major hurdle in the development of animal husbandry in India, affecting livestock productivity, farmer incomes, and animal welfare. Addressing these challenges requires a coordinated effort involving the government, researchers, veterinarians, and farmers. By adopting sustainable and integrated parasite management practices, India can safeguard the health of its livestock and boost rural livelihoods.



## ■ Importance of Precision Feeding in Sustainable Agriculture

*Mokshata Gupta, Vinod Kumar and Muneendra Kumar*  
*Department of Animal Nutrition*

Precision feeding is a modern method in livestock farming that addresses critical challenges like resource inefficiency, environmental degradation, and economic sustainability. By integrating technology and science, it ensures a balance between productivity and environmental management, thereby making agriculture more sustainable.

### **What is Precision Feeding?**

Precision feeding is a practice of feeding that ensures animals receive diets as per their specific needs. Unlike traditional methods that use the same feed for all, precision feeding uses advanced tools like sensors and automated feeders to monitor and adjust feeding in real time. This prevents overfeeding or underfeeding, promoting healthier growth and better production. Sensors and other devices track feed intake, animal behavior, and health, while automated feeders deliver the exact amount needed, reduces labor and improves accuracy. Additionally, using software, the diets can be adjusted as needed, thus benefits both animals and the environment.

### **What is the Need for Precision Feeding?**

Traditional ways of feeding livestock are often wasteful and inefficient. Overfeeding not only increases costs but also causes nutrient runoff, which can pollute water bodies. On the other hand, underfeeding weakens animals, affecting their health and performance. Livestock farming also adds to environmental issues like greenhouse gas emissions (methane) from animals and nitrogen from manure. Generalized feeding methods often fail to meet the specific needs of individual animals, leading to poor growth and reproduction. Precision feeding solves these problems by modifying the diets on individual basis. This further improves productivity, reduces waste, and supports a more sustainable and eco-friendly environment.

### **Nutritional strategies for Precision Feeding**

#### **1. *Modifying Diets on Real-Time Needs:***

Animals' nutritional needs vary with age, size, production stage, genetics, etc. Precision feeding allows adjusting the feed as needed; ensuring animals get the right nutrition at the right time.

**2. *Balancing Protein and Energy*** to ensure healthy growth and productivity. Too much protein can lead to waste and pollution, while too little energy can affect growth and milk production. Precision feeding ensures this balance is maintained, avoiding waste and improving efficiency.

#### **3. *Use of Feed Additives:***

Additives like probiotics, enzymes, or hormones improve digestion and help animals absorb nutrients better. Some additives also reduce methane emissions, thus improves both animal health and the environment.

#### **4. *Addition of Micronutrients:***

Vitamins and minerals are vital for animal health, especially during specific stages like milk production when cows need extra calcium. Precision feeding systems adjust these nutrients based on real-time data to meet the animals' needs.

#### **5. *Using By-Products and Alternative Feeds:***

Crop leftovers and other by-products can be turned into animal feed. Precision feeding analyzes their nutrient content and balances them with other ingredients, reducing feed costs and minimizing waste.

#### **6. *Monitoring Feed Intake:***

Sensors track how much feed each animal eats. If an animal eats too little or too much, adjustments can be made to ensure they get the correct amount of feed.

## 7. Reducing Environmental Impact:

Precision feeding minimizes nutrient waste, reduces methane emissions and nutrient runoff, thus makes livestock farming more eco-friendly.

### Benefits of Precision Feeding

Precision feeding helps reduce feed waste, which lowers the overall cost of livestock production as feed contributes 50-70% of total expenses. By giving animals exactly what they need, this approach improves their health, growth, production and reproduction, leading to better profits for farmers. Healthy animals are also less likely to suffer from diseases or metabolic problems. Precision feeding reduces methane emissions from animals and prevents excess nutrients in manure, thereby protect the environment and fight climate change. It also improves animal welfare by reducing competition for feed, thus promotes harmony and stress-free behaviors.

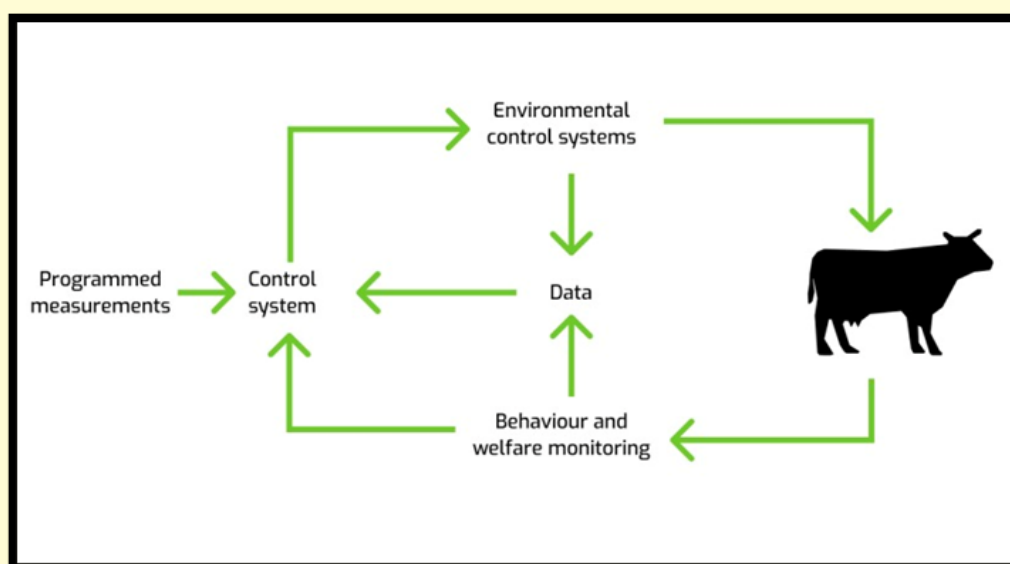
## Precision Feeding in Sustainable Agriculture

Precision feeding plays a key role in promoting global sustainability, including the United Nations Sustainable Development Goals (SDGs). Among 17, it supports SDG 2: Zero Hunger by improving feed efficiency, making feed more affordable, and boosting livestock productivity while preventing underfeeding. It also aligns with SDG 13: Climate Action by cutting down greenhouse gas emissions, reducing nutrient loss from manure, and encouraging resource-efficient farming. Additionally, it fits well with circular agriculture by using food industry by-products in animal diets, reducing waste, and supporting sustainable practices.

### Conclusion

Precision feeding is innovative approach that offers solutions to economic, environmental, and animal welfare challenges. By optimizing resource use and minimizing environmental impacts, it enables a balance between productivity and sustainability. Thus, it supports sustainable farming, making it an important part of achieving a healthier and more eco-friendly future for agriculture.

***Investing in proper nutrition is not just good for the herd  
but also a step towards sustainable and profitable dairy farming***



## ■ Revolutionizing animal husbandry through digitalization

**Pratikshya Panda, Chanda Singh and Varsha**

*Department of Veterinary and Animal Husbandry Extension Education*

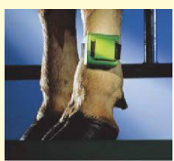


The introduction of digital technologies into animal husbandry is revolutionizing traditional farming practices, leading to enhanced productivity, improved animal welfare, and increased sustainability. With over 536.76 million livestock population (20th Livestock Census, 2019), India ranks as the largest livestock owner globally and also the leading producer of milk in the world with total milk production in the country 239.30 million tonnes during 2023-24 (FAO; BAHs, 2024). Despite this, income generated by dairy farmers doesn't match the production. The animal husbandry sector faces significant challenges, such as low productivity of animals, lack of modern infrastructure, fragmented data systems, limited adoption of technology by small livestock owners, inefficiencies in resource utilization, inefficient supply chains, limited access to markets, challenges in accessing fair prices for milk, and many more. So, digitalization offers

transformative potential to overcome these barriers, enhancing productivity, sustainability, and profitability in Indian livestock farming.

### **Digital Technologies in Animal Husbandry Sector**

Technology adoption is associated with better milk yield, Improved animal husbandry techniques, Poverty alleviation, Income generation and helps in achieving sustainable development goals (SDG) like SDG 1 no poverty, SDG 2 zero hunger, SDG 3 zero hunger etc. To overcome the present challenges of this sector, technological innovations, communication innovation as well as marketing innovations are necessary to transfer these innovations from lab to field in dairy farming system is mandatory for achieving expected animal productivity, and lowering down the cost of production for greater economic returns to the farmers.

### **Innovations in animal husbandry sector are:**

S.No.	Name of App	Developed by	Use
1	Moosense Pedometer 	ICAR-NDRI, Karnal	Measures the number of steps an animal takes and is used to detect heat, or estrous in animals.
2.	e-Gopala 	NDDB (National Dairy Development Board)	Farmers can avail information about artificial insemination, animal first aid, vaccination, due dates for animal vaccination, pregnancy diagnosis etc. They will also get information about government schemes.
3.	Bufelth 	ICAR-CIRB	Helps in getting information about buffalo health

4.	Buffalo Poshahaar 	ICAR-CIRB	Information about Buffalo Nutrition like, Buffalo feed management, Fodder management and conservation, Calf feed management, Common nutritional deficiency/metabolic diseases, Toxicity or poisoning in animals, Faulty feeding practice, Bloat, rumen acidosis etc.
5.	The Information Network for Animal Productivity and Health (INAPH) 	NDDB National Dairy Development Board	Facilitates capturing of real time reliable data on Breeding, Nutrition and Health Services delivered at Farmer's Doorstep. <a href="http://inaph.nddb.coop">http://inaph.nddb.coop</a>
6.	IVRI-Vaccination Guide App 	IVRI	Impart knowledge and skills to Graduating Veterinarians, field Veterinary Officers, paravets, Livestock, Poultry & Pet Owners about vaccination in domestic animals, poultry and pets.
7.	Dairy Information System Kiosk (DISK) 	Anand, Gujarat	Help the dairy farmers with timely messages and educating them on the care for their milch cattle and enhance the production of quality milk.
8.	Goat Farming 	ICAR-CIRG (Central Institute for Research on Goat)	Impart basic knowledge to farmers on Indian goat breeds, their breeding management, nutrition management of different age groups, shelter management and general care, health management and goat meat and milk products.
9.	BAIF Godhan Seva 	Bhartiya Agro Industries Foundation, Pune	Provides doorstep artificial insemination (AI) service, for crossbreeding of local/non-descript cattle.

## Way Forward

The digital revolution is paving the way for transformative changes in the animal husbandry sector. Through the integration of innovative technologies and applications, farmers can overcome persistent challenges such as low productivity, inefficiencies in supply chains, and inadequate access to resources. By bridging the gap between modern innovations and traditional practices, digital tools are empowering smallholder farmers to improve animal welfare, boost productivity, and achieve sustainable

growth. Moreover, these advancements contribute significantly to national and global goals such as poverty alleviation, zero hunger, and improved livelihoods for farming communities. Targeted efforts should be made in changing and building farmers' awareness, attitude and perceptions through training, demonstration, field visits, experience sharing etc. The future of animal husbandry depends on adopting these digital innovations to create a more sustainable, profitable, and resilient sector, paving the way for 'Viksit Bharat'.



## Impact of Climate Change on Livestock

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### Introduction

Livestock makes an important contribution to the Indian economy by supporting rural livelihood and food security. As of 2024, the livestock industry accounts for approximately 4.5 percent of the GDP of India (according to the BAHS Report 2024) and almost 25% of overall agricultural GDP. However, the effects of climate change, such as rising temperatures, severe variability in weather condition and changing rainfall patterns, are posing a growing danger to all sorts of living creatures. These changes affect not just cattle health and production, but also the socio-economic stability of millions of farmers who rely on solely on agriculture and livestock farming. This article investigates the issues presented by climate change to cattle and proposes effective methods to alleviate its negative consequences.

### Challenges Presented by Climate Change

#### 1. Heat Stress

Continuous increased global temperatures may cause heat stress in cattle, resulting in decreased

feed intake, milk output, and poor reproductive efficiency. Dairy cattle, particularly high-yielding individuals, are especially susceptible. Prolonged exposure to high temperatures affects thermo-regulation, resulting in reduced metabolic activity and immunity. Heat stress also decreases the quality of milk and meat, lowering farmers' economic returns.

#### 2. Cold Stress

Cold waves, particularly in northern India, have a negative impact on cattle by increasing the energy required for thermoregulation. Animals exposed to severe cold have lower output, poor development, and an increased vulnerability to respiratory illnesses. Small ruminants and newborn calves are especially vulnerable under such circumstances, resulting to greater death rates.

#### 3. Cyclones & Floods

The effects of climate change cause a rise in the frequency of cyclones and floods, which damage cattle shelters, grazing pastures, and water



supplies. Cyclones damage infrastructure, displacing animals and making them more vulnerable to illness. Floods, on the other hand, cause water logging, contamination of water, and destroy feed sources, which have a negative impact on cattle health. Prolonged contact to moist environments may lead to skin infections.

#### 4. Drought and fodder scarcity

Erratic rainfall patterns and extended droughts diminish the availability of water and forage for cattle, resulting in hunger and lower output. The scarcity of grazing ground increases the dependency of farmers on high priced commercial feeds, raising the production cost. Drought conditions may result in decreased reproductive performance in animals, particularly in arid and semi-arid areas.

#### 5. Vector-borne diseases

Climate change promotes the spread of vectors such as ticks, mosquitoes, and flies, which transmit illnesses such as bluetongue, anaplasmosis, and babesiosis. Warmer temperatures and higher humidity levels exacerbate the spread of many illnesses, resulting in substantial economic losses for cattle producers.

### Strategies for Mitigating Climate Change Impacts

#### 1. Developing Climate-Resilient Breeds

Heat-tolerant and disease-resistant breeds must be developed in order to continue livestock output in the face of changing weather patterns. Indigenous breeds that are naturally suited to local conditions should be encouraged and enhanced via selective breeding and grading up

efforts.

#### 2. Improved housing and management practices

Arrangement of well-ventilated and insulated shelters shield animals from severe heat and cold. Installing misting or sprinkler systems in dairy farms during the summer and providing suitable bedding during the winter may assist to reduce cattle stress.

#### 3. Sustainable Fodder Production

Promoting drought-resistant fodder crops, silage production, and hydroponic fodder production will ensure throughout the year availability of feed for our livestock. Initiatives like community fodder banks might be useful during natural disasters like floods and droughts.

#### 4. Early Warning Systems and Disease Management

Use of technology for climate monitoring and disease prediction may help farmers to prepare themselves for harsh weather and disease outbreak conditions. Mobile advice services should be encouraged to provide real-time information on animal health and management.

### Conclusion

Climate change presents a wide range of hazards to cattle, necessitating a multifaceted mitigation strategy. Policies encouraging climate-resilient livestock systems, sustainable resource management, and farmer education are critical to ensuring the livelihoods of millions who rely on this industry. Collaboration among academics, policymakers, and farmers will be important in establishing a sustainable and climate-resilient cattle industry in future.



## Improving Goat Milk Production: A Vision for India's Dairy Development

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India's dairy sector has experienced significant growth, establishing itself as the world's largest milk producer, with an output of 239.30 million tonnes in 2023-24 and 5.62% increase compared to 146.3 million tonnes in 2014-15. Traditionally, milk from cattle and buffaloes has dominated the Indian dairy landscape, contributing approximately 96% to the annual milk yield. However, there is a rising recognition of the role played by minor dairy species, such as sheep and goats. Goat milk, in particular, contributes 3.3% of India's total milk production, making the country the global leader in goat milk production with an output of 6.09 million tonnes. Rajasthan, Uttar Pradesh, Madhya Pradesh, Gujarat, and Maharashtra are the top five states, collectively producing 79.5% of the nation's goat milk. Despite this, the growth rate of milking goats lags behind the overall increase in goat populations. Additionally, official data may undervalue goat milk production, as a considerable share is consumed locally or sold through informal channels. In recent years, the health benefits of goat milk have gained recognition, not only for its volume but also for its medicinal properties, relevance in specific environmental conditions, and export potential. Consequently, improving both the quality and quantity of goat milk production is crucial to enhancing India's overall milk output.

### Strategies for improving goat milk production

Global demand for goat milk is increasing, fueled by its high nutritional content and therapeutic properties. This surge in demand has highlighted the need to focus on improving both the quality and quantity of goat milk production. To address this demand sustainably and effectively, it is essential to formulate the following strategies that enhance milk yield while maintaining premium quality:

- 1. Feeding and nutrition aspect:** Proper nutrition is crucial for high-yielding dairy goats to maximize their genetic potential for milk production. While goats generally require dry matter (DM) equivalent to 3-4% of their body weight, lactating goats need 4-7%. However, over 90% of farmers neglect to provide concentrates to lactating goats, resulting in reduced productivity and health issues like hypocalcaemia, ketosis, udder oedema, and mastitis. Providing high-energy diets during late pregnancy is vital for sustained milk production. Feed and fodder quality also significantly impact milk yield and composition, highlighting the need to improve pastures and resources to meet the demands of high-value cheese markets that require bioactive components like retinol, CLA, and  $\alpha$ -tocopherol.
- 2. Development of indigenous germplasm:** India's dairy goat breeds, such as Beetal, Jamunapari, Jakhrana, Surti, Zalawadi, and Gohilwadi, can produce 3-5 litres of milk daily or 300-500 litres per lactation (180-225 days). However, only 8-10% of the total population currently reaches the 300-400 litres range. To improve efficiency and profitability, breeding and selection programs must be restructured, focusing on accurate sire breeding value prediction and comprehensive management practices. Establishing milk-yield-focused sire lines for various breeds regionally is essential. Initially, programs can target one or two dairy breeds with stronger market presence and management, prioritizing milch breeds before expanding to dual-purpose breeds like Barbari, Malabari, and Sirohi. Collaboration with progressive dairy goat farmers nationwide and supporting communities like

the Rabbari, Raika, Gujar, and Gaddi in regions such as Gujarat, Rajasthan, and the Himalayan states will further strengthen the initiative.

**3. Breeding aspect – high quality bucks:** A major challenge is the scarcity of high-quality bucks, as many elite males are castrated or sold before replacement, leaving inferior ones for breeding. This has led to reverse selection in many flocks. To enhance the genetic potential of non-descript goats for milk and other economically important traits, it is crucial to ensure the availability of sufficient breeding males with high genetic merit. Nucleus schemes are effective for improving dairy goat genetics, especially in small flocks with limited data systems. Establishing seed units, multiplier flocks, semen banks, and high-yield breeds can meet buck demand and support sustainable farming. Using both proven and untested bucks, with artificial insemination for superior genetics, is key. Breeding goals should consider female weight, age at first service, post-partum interval, lactation length, and buck selection for milk quality. Breeding programmes concentrated in the breeding tracts (region specific breeding programmes) of dairy goats can be very effective in reaching their production potential.

**4. Health management:** Goat mortality, ranging from 15-30%, is largely attributed to inadequate health management. Key factors include the lack of cold chain infrastructure for vaccines, insufficient support services, and farmers' lack of awareness regarding preventive health practices. Therefore, ensuring proper herd health management is an essential step towards realizing the dairy potential of milch goats.

**5. Package of practices:** A well established set of management practices should be developed to address different systems, including: backyard systems (extensive), smallholder goat production (extensive/semi-intensive/intensive), medium to large flocks in extensive and semi-intensive systems, and

large flocks in intensive systems. Providing proper housing is crucial for the well-being and productivity of dairy goats. Overcrowding, poor hygiene, and sharing space with other animals or humans can negatively impact the health and performance of the dairy goats.

**6. Hygienic goat milk production and value addition:** Maintaining hygienic milk production is essential for the growth of the goat dairy industry. Best practices include checking somatic and bacterial counts, cleaning the udder and teats, sanitizing milking utensils, and ensuring handlers wash their hands. Hygiene helps preserve milk quality by preventing off-flavors, pathogens, and contaminants, thereby meeting consumer standards. Promoting the consumption of value-added goat milk products, such as dried milk, granulated milk, condensed milk, fruit yogurt, cheese, butter, cultured cream butter, ice cream, whey protein concentrate (WPC), evaporated milk, traditional Indian dairy items, and Turkish Yayik butter, can increase consumer acceptance and improve milk production quality. Additionally, goat milk is increasingly sought after for cosmetics like creams, lotions, shampoos, aftershave, and conditioners, especially in Western markets. The unique fatty acids in goat milk fat, such as caproic and caprylic acids, enhance skin permeability, making it an ideal ingredient for many cosmetic products.

**7. Support and services:** The marketing of goat milk and its products remains disorganized and limited, especially in rural areas where goat farms are concentrated but lack proper milk collection and processing infrastructure. In contrast, the cow milk sector benefits from a well-established system that could be leveraged for goat dairy production, provided there is sufficient consumer demand and supportive policies. However, many goat farmers lack resources and awareness of modern practices. Over 70% of their income comes from selling kids due to the absence of a formal goat milk market, leading to the loss of

valuable breeding stock without proper replacement. To address this, establishing organized collection, processing, and marketing systems is essential. This requires collaboration between private partners and NGOs, while also increasing consumer awareness of the health benefits of goat milk to support higher pricing and market expansion.

### **Conclusion**

Recently, the demand for goat milk has increased, driven by its use in various nutraceutical and pharmaceutical supplements, as well as processed and functional foods. Goat milk, often organic and nutrient-dense, commands premium prices. However, challenges exist in milk collection due to small flock sizes and seasonal production. Advancing the goat dairy sector requires focused efforts on the genetic improvement of dairy breeds, along with policy

support to encourage commercial farm investment. State-level milk federations can help streamline procurement, addressing market fragmentation. Additionally, addressing production gaps involves promoting supplementary and strategic feeding, capacity-building programs, technological advancements, and providing incentives and credit facilities to farmers. Overcoming challenges in milk procurement, processing, and marketing is crucial for sector growth, which can be supported by appropriate policy initiatives and the involvement of state federations in goat milk procurement and value addition. Furthermore, further research is needed to substantiate health benefits associated with goat milk and to identify its bioactive components, which will attract both industries and consumers, ultimately contributing to the growth and development of India's dairy and health sector.



## ■ Role of Veterinarian to Mitigate the Challenges of Emerging Diseases

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Modern world is facing the menace of newly yet established ailments in the form of emerging diseases. This is the high time for the world to unravel the concepts of emerging diseases. Emerging diseases are those discourses that either observed in a population for very first time or existed earlier albeit rapidly ingress the demographic and geographic plethora. Infectious disease that has recently grown in incidence and may have the probability to cause outbreaks in the coming years is classified as an emerging infectious disease (EID). This EID can be the source of pandemics or epidemics in livestock as well as human population.

These diseases are caused by a range of pathogens shared between animals and humans. It produces the infections with mild to severe morbidity and mortality.

Since predated, there are significant relevance of disease spread and global epidemiology among animals and human beings. Following is the brief list of emerging diseases:

1. Bovine Spongiform Encephalopathy (BSE)
2. Rift Valley Fever (RVF)
3. Lumpy Skin Disease (LSD)
4. Foot-and-Mouth Disease (FMD)
5. Classical Swine Fever (CSF)
6. Avian Influenza (AI)
7. African swine fever (ASF)
8. Newcastle disease (ND)

The incidence of emergence of zoonotic diseases are influenced by a number of factors:

1. Deforestation and urbanisation are causing changes in the human or animal habitat and thus changing the human animal interface. These changes result in greater interaction between production animals, wildlife and feral animals.

2. Changing climate dynamics cause changes in biodiversity, vector and reservoir populations and their concomitant pathogens with the great potential to increase the risk of disease introduction, transmission and occurrence.
3. Global mobility of humans enables zoonotic diseases to spread rapidly through means of transport of animals and animal products.
4. Degradation of their natural habitats, as well as the ready availability of food near human dwellings, encourages wildlife to move into suburban areas.
5. Breakdowns in public health measures such as sanitation and vaccination also increase the transmission of disease.

Disease outbreaks can therefore be very costly in terms of their repercussions on both animal and human health and the economic burden of their treatment imposes. The World Bank has estimated that the combined losses in trade, tourism and tax revenues due to animal disease outbreaks have amounted to approximately 200 billion dollars over the past decade. Additionally, uncertainty about the spread and consequences of zoonotic diseases can create widespread alarm among consumers and lead to dramatic shifts in buying behaviour, with serious implications for international trade in livestock products. Therefore, It is quite essential to adopt a 'One Health' approach to emerging zoonotic diseases to optimise health outcomes for humans, animals and the environment. For the same, role of Veterinarian to mitigate the challenges in prevention and control of emerging disease is of utmost importance.

- Veterinarians with their scientific acumen of epidemiology and environmental practices in animal health and disease, are ideally placed to respond to increased zoonotic risk in the public health, environmental and ecological fields.

- Veterinarians should be actively involved in the planning and development of government policy and interventions.
- Veterinarians can assist in prevention of zoonotic diseases by emphasising disease reservoirs and focusing on individual well-being. Both government and private veterinarians can play a key front-line role in national surveillance of zoonotic diseases.
- Government veterinarians play a vital role in the management of notifiable zoonotic diseases and emerging infectious disease occurrence.
- During outbreak, Veterinarian can work cooperatively and collaboratively with public health authorities to manage disease and implement various strategies to curb the menace of emerging disease outbreaks.
- Veterinary researchers are actively involved in advancing knowledge of the epidemiology and environmental drivers of zoonotic diseases, identification of risk factors and development of diagnostic tests, vaccines and treatments, all of which contribute to improved control and management of zoonoses.
- Veterinarians in private practice are uniquely positioned to detect zoonotic diseases in animals due to their daily contact with a broad range of animal species (companion animals, production animals and wildlife).
- Veterinarians should have knowledge of common and locally endemic zoonoses and their nature of outcome, they actively educating all the person to minimise the risk of infection. They should also take the responsibility to advise animal owner regarding the risk of exposure to a zoonotic disease and seek medical advice, and if required.
- Veterinarians require capacity and capability to recognise unusual and emerging zoonotic diseases. In cases of notifiable zoonotic diseases, or if a newly emerging disease are suspected or diagnosed, veterinarians must inform notice to the Chief Veterinary Officer in their State by either reporting the occurrence on the Emergency Animal Disease to Government veterinary services.
- In the era of increasing zoonotic EIDs, there should be establishment of a “National Communicable Diseases Organization” on priority basis and veterinarians should be an integral part of an infectious disease, public health and environmental health team.
- All veterinary clinics should have biosecurity protocols in place including appropriate PPE to ensure safety of their staff in the case of potential exposures to zoonotic diseases.
- Veterinarians play a crucial role in wildlife surveillance, which is a crucial component in the control of emerging zoonoses. As a result, cooperation between the human medical and veterinary communities involved in wildlife monitoring is essential for developing preventive strategies.
- Veterinarians have a whole range of useful tools in their 'toolbox' to prevent and control infectious livestock diseases for the sake of public health.
- Vaccination is very useful in the prevention and control of many diseases, so the vaccination programme is part of an integrated control strategy utilising a combination of control measures.

Good farm practices are a crucial step in ensuring that animals remain healthy. It can be practices done by good management and hygiene. Once an outbreak has developed, restricting the spread of illness and avoiding movement of animals. One should separate the affected animals immediately from the healthy animals. Moreover, It is concluded from the discussion that Veterinarian can be the key player in combating the menace of emerging infectious diseases through planning and implementing the modern strategies and tools for restricting and preventing the spread of the diseases in wider geographic lanes. Veterinarian should also take the responsibility to aware the government bodies regarding illegal animal trading and poaching as that could also impose a great threat for human and animal health.

## ■ Role of Animal Husbandry in Strengthening Rural Livelihood

*Mamta, Vishakha Singh Gaur and Rajneesh Sirohi*  
*Department of Livestock Production Management*

Viksit Bharat is a vision that echoes the shared aspirations of a nation representing a future where India emerges as a global powerhouse. It embodies a country where economic growth goes hand in hand with social equity where technological innovations empower citizens and where environmental responsibility is central to progress. Viksit Bharat is more than just a dream, it is a clarion call to action urging the nation to tap into its collective potential and forge a future that is prosperous, inclusive and sustainable. Animal husbandry plays a pivotal role in ensuring food security, creating rural livelihoods and driving the overall economic growth of the country. By fostering sustainable livestock practices, enhancing animal well-being and boosting productivity, we can fortify the agricultural sector and elevate the lives of millions of farmers and rural communities. Animal husbandry plays an essential role in realizing the vision of Viksit Bharat in the following ways:-

### ■ Driving economic growth through animal husbandry

The livestock sector is vital to India's economy, contributing 5.73% to the nation's Gross Value Added (GVA) and 30.19% to agricultural GVA in 2021-22. Growing at a Compound Annual Growth Rate (CAGR) of 7.38% (2014-15 to 2022-23), it showcases resilience and potential. India leads in global milk production (23% of the total) with 239.30 million tonnes in 2023-24, up from 187.75 million tonnes. The country ranks third globally in egg production and fifth in meat production. Livestock exports especially buffalo meat, are major foreign exchanges establishing India as one of the world's leading exporters in this sector.

### ■ Enhancing rural livelihoods through animal husbandry

Over 70% of rural households rely on livestock for additional earnings with small-scale farmers and

landless workers being the largest beneficiaries. Livestock farming provides steady income from milk, eggs and meat sales while also supporting agriculture through manure and draught power. Government initiatives like the National Livestock Mission and Rashtriya Gokul Mission have empowered rural communities by promoting indigenous breeds and modernizing farming practices.

### ■ Strengthening food security through animal husbandry

Animal husbandry is crucial in addressing malnutrition and ensuring balanced diets. Livestock products such as milk, meat and eggs are rich in essential amino acids, vitamins and minerals contributing to better nutrition. Thanks to various innovative programs, India has steadily increased the per capita availability of these products, making them more accessible and affordable. Additionally, the fisheries sector often intertwined with animal husbandry contributes significantly to food security. India the world's second-largest fish producer achieved a record 17.54 million tonnes of fish production in 2022-23, helping meet domestic demand and boosting exports.

### ■ Promoting environmental sustainability through livestock practices

Sustainable livestock farming is key to maintaining ecological balance. Practices such as rotational grazing, biogas production from manure and integrated farming systems help reduce greenhouse gas emissions and optimize resource use. Innovations like precision feeding and climate-resilient breeds improve efficiency while minimizing environmental impact. However, challenges such as feed shortages, water consumption and methane emissions persist, requiring ongoing investment in green solutions.

### ■ **Accelerating growth through technological innovation in livestock farming**

Digital platforms, automated milking systems, genetic improvements and advanced disease management practices are empowering farmers while reducing their economic costs. The government's e-Gopala app is a notable example providing farmers with valuable insights on breeding strategies, better nutrition for animals and market trends.

### ■ **Fostering women's empowerment through livestock farming**

Women, especially in rural India are the backbone of the animal husbandry sector with around 75% involvement in livestock farming. Their contributions are vital to both family sustenance and the rural economy, yet often go unrecognized. Empowering women through skill-building, microfinance access and advanced training can enhance productivity and promote gender equality. Programs like dairy cooperatives where women make up over 30% of members demonstrate the transformative impact of their involvement. Policies supporting livestock ownership, credit access and leadership roles can further elevate their socio-economic status, boosting incomes and improving community well-being.

### ■ **Promoting sustainable agriculture**

Animal husbandry is crucial for sustainable agriculture, particularly through the use of organic manure. Livestock manure enriches the soil with essential nutrients like nitrogen, phosphorus and potassium, reducing the need for chemical fertilizers. This enhances soil health, improves microbial activity and increases water retention leading to better crop yields and long-term productivity. Integrating livestock with crop production through mixed farming optimizes resource use with crop residues feeding animals and manure fertilizing fields.

### ■ **Climate change mitigation**

Livestock farming also offers significant climate

change mitigation potential. Indigenous breeds adapted to harsh conditions, require fewer resources and are ideal for climate-resilient agriculture. Innovations such as precision feeding, improved breeding techniques, rotational grazing and biogas systems can reduce greenhouse gas emissions and the environmental footprint of animal husbandry.

### ■ **Empowering tribal area and alleviating poverty through animal husbandry**

Traditionally dependent on forests and subsistence agriculture, livestock farming provides a sustainable source of income and nutrition, while reducing reliance on diminishing forest resources. Programs offering access to improved breeds, veterinary care and market linkages can boost productivity and income. Additionally, skill development in livestock management empowers tribal youth, fostering self-reliance and reducing migration. By integrating tribal communities into formal livestock value chains, this sector can strengthen the rural economy leading to better incomes, nutrition and education.

### ■ **Transforming the sector**

Strategic subsidies and investments in infrastructure and research are key to transforming animal husbandry. Subsidizing quality feed, veterinary care and modern equipment lowers costs and promotes sustainability. Improved infrastructure, such as cold storage, transport and processing facilities, reduces losses and boosts market access. Research in breeding, feed efficiency and disease prevention enhance productivity and resilience.

### **Conclusion**

Animal husbandry plays a key role in India's progress toward becoming a Viksit Bharat by fostering economic growth, improving rural livelihoods and ensuring food security. It boosts incomes, reduces poverty, promotes sustainable agriculture and paves the way for a self-reliant future.



## Various Interventions in Livestock Sector for Sustainable Economic Development

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### Introduction

Animal husbandry is essential to India's socio-economic development, playing a key role in its transition to a "Viksit Bharat" (Developed India). It supports rural livelihoods, food security, and environmental sustainability, while contributing significantly to economic growth. The sector includes dairy, poultry, meat, wool, and leather production, and is vital for millions of rural families' incomes. India is the world's largest producer and consumer of milk, with dairy farming at its core. Animal husbandry also generates employment, especially for women and small-scale farmers. Overcoming challenges like outdated practices and diseases, along with technological advancements, will strengthen the sector's contribution to India's growth and food security.

### Historical Context and Evolution of Animal Husbandry in India:

From the Indus Valley Civilization to modern times, livestock has been central to rural economies, providing milk, meat, labor, and transportation. The Mughal Empire expanded livestock use for trade and military needs. Post-independence, the Green Revolution boosted agricultural productivity, and the "Operation Flood" program made India the world's largest milk producer.

### Animal Husbandry and Economic Growth:

The sector contributes nearly 4.5% to the country's Gross Domestic Product (GDP) and over 25% to the agricultural GDP. The sector includes various sub-sectors such as dairy farming, poultry farming, goat and sheep farming, and the production of wool, leather, and other animal products. Each of these sub-sectors provides employment to millions of people across the country, especially in rural areas.

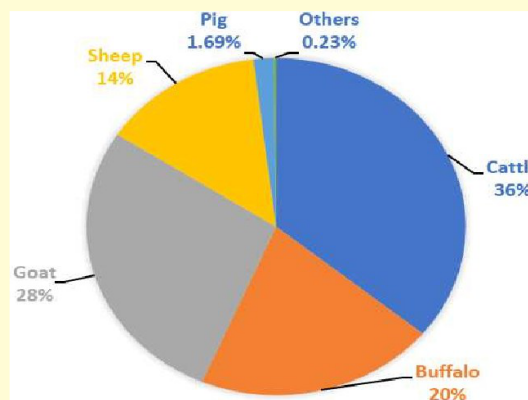


Fig.1 Total Livestock population percentage (2019)

Source: Dept. of Animal Husbandry and Dairying

India is the world's largest producer of milk, contributing over 20% of global production. The dairy industry is vital for millions of rural families, with government initiatives like the NDDB and Operation Flood boosting productivity and farmer incomes. Poultry farming has also grown rapidly, making India a top producer of eggs and broiler meat, creating numerous jobs.

### Animal Husbandry and Employment Generation:

In India, animal husbandry provides direct and indirect employment to millions of people.

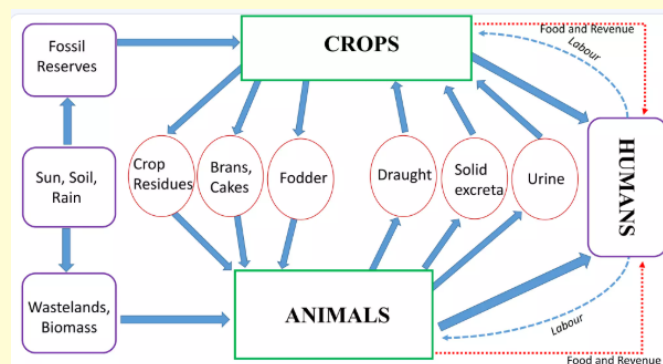


Fig.2 Different resource flows in dairy-based integrated farming system

(Source: <https://www.slideshare.net/slideshow/unit-1-role-of-livestock-in-national-economypptx/254123018#11>)

According to the 20th Livestock Census, there are over 500 million livestock in India, and the sector provides livelihood opportunities to nearly 8% of the country's population. Women play a key role in dairy farming, poultry, and small-scale livestock management. The sector also creates skilled and semi-skilled jobs in areas like veterinary services, breeding, feed manufacturing, and livestock health, contributing to increased productivity.

#### **Animal Husbandry and Food Security:**

Animal husbandry is crucial to India's food security, providing essential nutrients like protein, calcium, and vitamins through milk, eggs, and meat. These animal products are vital for a balanced diet, especially for children and the elderly. Livestock also serves as a backup source of food and income in rural areas, where crop failures due to drought or floods can occur.

#### **Sustainable Development and Environmental Considerations:**

Sustainable animal husbandry plays a key role in maintaining ecological balance, reducing greenhouse gas emissions, and improving resource efficiency. Integrating livestock with crop production improves soil fertility and reduces reliance on chemical fertilizers. While livestock farming contributes to methane emissions, advancements in management and agro-ecological practices like rotational grazing help mitigate environmental impact.

#### **Animal Welfare and Ethical Considerations:**

Ensuring proper healthcare, adequate housing, and humane treatment of animals is essential, supported by vaccination programs and disease control measures. There is a growing shift towards ethical farming practices, such as free-range systems for poultry and improved welfare standards for dairy cows. These practices not only benefit animal welfare but also cater to the increasing demand for ethically sourced animal products.

#### **Technological Advancements in Animal Husbandry:**

Advanced breeding techniques like artificial insemination and genetic selection have led to higher-yielding livestock. Automation in feeding, milking, and disease monitoring, along with precision livestock farming, helps in efficient resource management and early disease detection. The use of big data, AI, and machine learning enables farmers to optimize breeding, nutrition, and disease management, providing valuable insights for better decision-making and increased productivity.

#### **Challenges and the Way Forward:**

The animal husbandry sector in India faces several challenges, including **animal diseases** like parasitic infections and outbreaks of Foot and Mouth Disease (FMD), avian influenza, and bluetongue, which impact livestock health and productivity. **Climate change** also poses a threat, with extreme weather events affecting animal welfare and farm yields. Furthermore, farmers struggle with **market fluctuations**, where prices for milk, meat, and other products vary. To address these issues, enhancing **vaccination programs**, improving **climate-resilient practices**, and strengthening **market access** and **supply chains** are crucial for the sector's growth and stability.

#### **Conclusion**

Animal husbandry will remain crucial in India's journey toward becoming a "Viksit Bharat." By focusing on sustainable practices, technological advancements, and supportive policies, the sector can significantly boost economic growth, rural development, and food security. As India progresses, leveraging animal husbandry's potential will help address challenges like employment, environmental sustainability, and nutritional security.





## **Chief Editor's Desk ...**

Dear all

Welcome to the 1<sup>st</sup> issue of our E magazine, Farming Chronicle; an essence of Braj. With great enthusiasm and pride we present this special issue centered around the theme "*Role of Animal Husbandry in Viksit Bharat.*" As India continues to evolve towards becoming a global leader, it is essential to recognize the transformative potential of animal husbandry in shaping the future of our rural economy, ensuring food security, and contributing to the overall development of the nation.

Animal husbandry, often considered the backbone of our rural and agricultural landscape, offers numerous opportunities for growth. From providing essential food products such as milk, meat, and eggs, to creating employment, it plays a crucial role in supporting the livelihood of millions of farmers and rural households. Moreover, it contributes significantly to improving the economic conditions of these regions by fostering entrepreneurship, facilitating rural industrialization, and promoting sustainable agricultural practices.


In this issue, we aim to explore the multifaceted role of animal husbandry in the context of India's development, while shedding light on the challenges and opportunities that lie ahead. The articles featured will delve into innovative approaches in livestock management, the importance of veterinary care, advancements in breeding technologies, and the vital need for policies that support the growth and sustainability of the sector. Additionally, we will focus on the intersection of animal husbandry with environmental sustainability and how we can adapt to the changing dynamics of global agriculture.

I would like to take this opportunity to express my gratitude to the contributors, researchers, and experts who have shared their valuable insights in this issue. Their collective knowledge and vision for a developed India will undoubtedly inspire readers to understand the true potential of animal husbandry in shaping our nation's future.

I am confident that this issue will serve as a catalyst for further discussion, research, and collaboration in the field of animal husbandry, and I hope it will ignite the passion and commitment needed to push this sector to greater heights. As we continue to strive for a prosperous and self-reliant India, let us remember that the development of animal husbandry is not just a necessity but a vital component of our nation's growth story.

Thank you for your continued support, and I hope this issue proves to be both insightful and inspiring.

Warm regards,

  
(Dr. Amit Singh)

