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POPULAR ARTICLE

Fungi: From Farm Villains to Veterinary Heroes

G. Bhuvaneswari*

*M.V.Sc. Scholar,

Department of Livestock Production and Management,

RIVER, Puducherry – 605009

*Corresponding Author: galibhuvaneswari@gmail.comDOI: <https://doi.org/10.5281/zenodo.17527685>

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Abstract:

Fungi have long been viewed as harmful agents in livestock farming, causing moldy feed, mycotoxin contamination, and infections that reduce animal health and productivity. However, many fungi also offer significant benefits in veterinary medicine, nutrition, and environmental management. This article, *"Fungi: From Farm Villains to Veterinary Heroes,"* explores this dual nature. Pathogenic fungi cause diseases such as ringworm and aspergillosis, while mycotoxins like aflatoxins and ochratoxins impair growth and immunity. Conversely, beneficial fungi such as *Saccharomyces cerevisiae* improve gut health and feed efficiency, and fungal enzymes like cellulase and protease enhance nutrient utilization. Fungal antibiotics, including penicillin and cephalosporins, have revolutionized animal health, while mycorrhizal fungi and mycoremediation promote soil fertility and sustainability. Applying the One Health approach—integrating hygiene, feed safety, and biotechnology—can reduce fungal risks while harnessing their benefits. Recognizing this balance can transform fungi from farm villains into valuable allies for sustainable livestock production and animal wellbeing.

Keywords: Fungi, Livestock, Mycotoxins, Probiotics, Enzymes, Veterinary Medicine, One Health, Mycoremediation, Sustainable Farming.

Introduction:

For generations, livestock farmers have regarded fungi—the enigmatic kingdom that thrives in darkness—as silent killers. Their negative impacts can severely impair animal health and productivity, ranging from moldy feed and fungal skin infections to debilitating mycotoxins. Beneath this infamous image, however, lies another often-overlooked reality: many fungi are powerful allies that provide probiotics, enzymes, antibiotics, and even ecological solutions supporting modern animal husbandry.

The idea that fungi can be both friends and foes is beautifully captured in the theme *"Mycosis & Medicine – The Two Faces of the Fungal Kingdom."* In an era defined by climate change, antibiotic resistance, and the growing demand for sustainable farming, understanding these two sides has never been more

important for livestock professionals. This article explores how scientific innovation and sound management can transform fungi from farm villains into veterinary heroes, lighting the way toward a healthier and more resilient livestock future.

Fungi as Farm Enemies: The Villain Side

Fungi pose a significant threat to livestock production through mycoses and mycotoxicoses, both of which have serious health and economic consequences. Among the most common fungal infections is dermatophytosis (ringworm), which targets the skin and hair of animals, leading to irritation, lesions, and production losses. Other diseases such as aspergillosis and candidiasis affect the respiratory and reproductive systems, further compromising animal health.

Equally concerning are mycotoxicoses, caused by toxic metabolites such as aflatoxins, ochratoxins, and Fusarium toxins that develop in improperly stored feed, these toxins represent a silent yet persistent threat to livestock, leading to liver damage, immunosuppression, and poor growth performance.

The economic and production impacts of fungal contamination are substantial. Reduced feed intake, decreased milk yield, and impaired fertility are common outcomes of infection or toxin exposure, directly affecting farm profitability. Additionally, reduced product quality, higher veterinary costs, and prolonged recovery periods contribute to hidden financial losses across dairy, poultry, and swine operations.

To address these challenges, farmers should adopt preventive management practices such as proper feed storage, good ventilation, and humidity control to inhibit mold growth. The inclusion of mycotoxin binders, particularly clay-based additives, can also significantly reduce toxin absorption in the digestive tract.

Though often branded as farm villains, some fungi also play beneficial roles in soil health and nutrient cycling, revealing a complex relationship between fungi and agriculture. Transforming fear into informed management begins with understanding this dual nature.

Type of Fungi/Toxin	Major Source/Host	Disease Condition	Main Effects in Livestock	Control Measures
<i>Aspergillus flavus</i>	Contaminated feed grains	Aflatoxicosis	Liver damage, poor growth, immunosuppression	Proper feed storage, mycotoxin binders
<i>Fusarium spp.</i>	Moldy cereals (maize, wheat)	Fusariotoxycosis	Reduced fertility, feed refusal	Dry storage, toxin adsorbents
<i>Penicillium spp.</i>	Silage and stored feed	Ochratoxicosis	Kidney damage, reduced performance	Feed hygiene, ventilation
<i>Trichophyton verrucosum</i>	Skin and hair of cattle	Dermatophytosis (Ringworm)	Skin lesions, reduced hide value	Topical antifungals, disinfection
<i>Candida albicans</i>	Mucosal surfaces	Candidiasis	Reproductive tract infections	Hygiene, antifungal therapy

Table 1. Common Harmful Fungi Affecting Livestock and Their Impacts

The Hero Side: Friendships with Fungi in Veterinary Medicine

Despite their destructive reputation, fungi are also the unsung heroes of veterinary medicine. Beyond their harmful forms, many fungi provide therapeutic, nutritional, and environmental benefits that have transformed animal health and sustainable livestock management. From probiotic yeasts to life-saving antibiotics, their contributions reveal the brighter face of this diverse kingdom.

• Medicinal Contributions:

Fungi have long served as the cornerstone of antibiotic discovery, providing natural sources of penicillin and cephalosporins, which revolutionized both human and veterinary medicine. These antibiotics, derived from *Ascomycete* molds, are highly effective against bacterial infections by disrupting protein and cell wall synthesis.

Beyond antibiotics, numerous fungal species synthesize bioactive compounds with antifungal and immunomodulatory properties that aid in treating a range of infectious and metabolic disorders in livestock.

• Nutritional Applications:

In modern livestock nutrition, yeast-based probiotics such as *Saccharomyces cerevisiae* play a vital role by improving gut health, nutrient absorption, and immune function. Additionally, fungus-derived enzymes—including cellulase, xylanase, and protease—are widely incorporated into feed formulations to enhance fiber digestibility and rumen efficiency, thereby improving growth and productivity.

• Environmental and Biotechnological Roles:

Fungi also contribute to environmental sustainability through mycoremediation, decomposing farm waste, detoxifying pollutants, and recycling nutrients back into the soil. Similarly, mycorrhizal fungi form symbiotic relationships with plant roots, acting as biofertilizers that boost soil fertility, nutrient uptake, and forage crop yield.

While fungi offer vast potential, their applications must be carefully managed to avoid challenges such as mycotoxin contamination and antibiotic resistance. Through continued research and responsible innovation, these once-feared organisms can become powerful allies in shaping a healthier, more sustainable future for livestock production.

Fungal Species/Product	Application Area	Function/Benefit	Impact on Livestock
<i>Saccharomyces cerevisiae</i>	Feed additive	Probiotic; enhances rumen function	Improved digestion, growth, immunity
<i>Aspergillus niger</i>	Enzyme source	Produces cellulase and xylanase	Better fiber digestion, higher feed efficiency
<i>Penicillium chrysogenum</i>	Antibiotic production	Source of penicillin	Controls bacterial infections
<i>Trichoderma spp.</i>	Biocontrol agent	Suppresses plant and soil pathogens	Reduces chemical pesticide use
Mycorrhizal fungi	Soil-plant interface	Enhance nutrient and water uptake	Better forage yield and quality

Table 2. Beneficial Fungal Species and Their Applications in Livestock Production

Finding a Balance: Smart Management and Future Prospects

Managing fungi in livestock production requires striking a careful balance between avoiding their harmful effects and encouraging their beneficial uses. The *One Health* approach provides a comprehensive framework for fungal management, emphasizing the close connection between animal, human, and environmental wellbeing. This perspective combines biotechnology, feed safety, and hygiene to prevent infections while using fungi to foster innovation and sustainability.

- **Avoiding Harmful Fungi:**

Implementing strict hygiene protocols in livestock facilities can greatly reduce fungal contamination and the spread of disease. Equally important is maintaining feed safety by ensuring that rations remain free from mycotoxins and other harmful fungal species to protect both animal health and food quality.

- **Promoting the Use of Beneficial Fungi:**

Beneficial fungi can improve gut health, nutrient absorption, and overall productivity by acting as probiotics. In addition, certain fungal species serve as biocontrol agents, naturally inhibiting pathogens and pests while reducing the dependence on chemical treatments.

- **The One Health Perspective:**

Monitoring and controlling fungal threats require integrated, cross-sectoral cooperation. Fostering sustainable microbial ecosystems helps prevent the emergence of pathogenic fungi while promoting healthier livestock environments.

Ultimately, by acknowledging both the risks and opportunities posed by fungi, the livestock sector can transform a potential hazard into a resource for innovation, resilience, and sustainability in animal agriculture.

Conclusion:

Fungi remind us that nature's power is not one-sided. The same organisms that endanger animal health through infections and toxins also provide vital medicines, nutrient-rich probiotics, and ecological balance. Sustainable livestock production depends on managing this duality through biotechnology, hygiene, and the *One Health* approach. Just as Diwali celebrates the triumph of light over darkness, science illuminates the hidden world of fungi. By embracing their dual nature with insight and creativity, the livestock industry can transform these ancient adversaries into a source of inspiration for future animal health and productivity.

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