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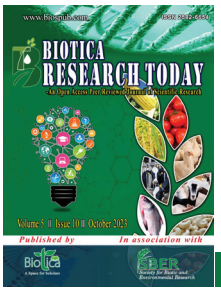

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Biosecurity in Poultry Farms - An Overview

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Abstract

Poultry farming relies on comprehensive biosecurity measures to prevent disease transmission and reduce stress among birds. It encompasses conceptual, structural, operational and management elements. Conceptual biosecurity involves selecting isolated locations, maintaining distance from other poultry sites and separating breeder farms from grow-out facilities. Structural precautions include fencing to deter unauthorized access, regular water source testing, proper vehicle sanitation areas, feed storage, all-weather roads and dead bird disposal. Wildlife-proof housing with segregated storage, along with a vegetation-free perimeter, reduces the risk of rodent and wildlife intrusion. Operational biosecurity involves clear procedures, decontamination, visitor and worker hygiene, visitor records and restrictions on equipment within breeder farms. Poultry units follow minimum inter-flock intervals, implement pest control, adopt disease diagnosis and vaccination schedules and consider all-in-all-out systems for small-scale egg production. Management factors emphasize age-based bird isolation, litter management, sourcing quality chicks and ensuring balanced nutrition. Adequate water quality and proper dead bird disposal are critical.

Keywords: Biosecurity types, Disinfection, Management, Poultry farms

Introduction

Biosecurity, a term that emphasizes the safety of living organisms, is a comprehensive program aimed at safeguarding poultry from disease-causing agents by mitigating the introduction and spread of pathogens among farms (Delpont *et al.*, 2023). It encompasses various measures such as isolation, traffic control, sanitation, vaccination, serological disease monitoring and air quality maintenance. These practices collectively aid in the prevention and containment of pathogens within and around the farm. Biosecurity is not only a cost-effective but also an incredibly efficient means of disease control, without which any disease prevention initiative is bound to fall short. It serves as a defensive health strategy and a hygiene protocol essential for maintaining a disease-free farm environment. Biosecurity forms an integral part of overall farm operations.

With the increasing efficiency of poultry operations, there is a simultaneous rise in the potential threat to both the operations themselves and neighboring farms due to the higher concentration of birds in limited space. To counter this, poultry farmers must prioritize the elimination of disease-causing agents. It is, therefore, wiser to exercise patience and delay the introduction of a new flock to minimize the risk of infecting them. In the context of modern poultry production, especially where birds are closely housed, biosecurity stands as the most potent form of defence against diseases. It primarily involves excluding diseases from the farm environment and is the linchpin for achieving successful and profitable poultry farming.

In the realm of disease control, there are three interconnected aspects: biosecurity, medication/ vaccination and effective farm management (Lera, 2023). To yield positive outcomes, poultry must be raised in an environment where disease and infection are rigorously controlled, enabling vaccination and medication to have their intended beneficial effects. Biosecurity emerges as the pivotal element in this triumvirate of disease control.

Article History

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Conceptual Biosecurity

Optimal farm location entails selecting a remote site, with a minimum separation of 3 km from the nearest poultry for breeder farms and 1.6 km for commercial layer and broiler farms. For breeder facilities, it is advisable to position the farm away from major thoroughfares commonly utilized for transporting commercial and backyard poultry. Additionally, it is essential to maintain substantial distances between breeder farms and other key facilities, including hatcheries and feed mills, to mitigate potential disease transmission.

Structural Biosecurity

• Erect a perimeter fence to deter unauthorized access to the farm.

• Conduct regular assessments of the water source to check for mineral content, bacterial presence, chemical pollutants and pathogen levels.

• Establish a concrete platform equipped with adequate water and power supply for the thorough sanitation of vehicles.

• Designate a well-suited location for the storage of bagged feed.

• Implement the construction of all-weather roads within the farm premises to facilitate cleaning processes and to minimize the potential spread of microbes by vehicles and footwear.

• Develop proper facilities for the safe and scientific disposal of deceased birds.

• Ensure secure housing structures that are effectively safeguarded against wild birds and rodents.

• Maintain a distinct section for the storage of feed, litter and equipment, separate from the live bird area to prevent contamination.

• Keep a three-meter perimeter around the buildings clear of all vegetation to discourage rodent and wildlife activity.

Operational Biosecurity

• Develop comprehensive operation manuals for the daily activities within feed mills, hatcheries, breeding and grow-out facilities, integrating emergency protocols.

• Ensure the thorough decontamination and disinfection of equipment and housing following the depletion of each flock.

• Enforce strict hygiene measures at breeder farms, requiring all visitors and workers to shower and don clean farm clothing to prevent cross-contamination.

• Maintain a meticulous record of all visitors, documenting their purpose and duration of stay.

• Implement a no-vehicle or equipment policy within breeder farms, from the time of flock delivery until disposal.

• In commercial broiler units, it is advisable to observe a minimum two-week interval between flocks.

• Employ a comprehensive integrated pest management program that incorporates biological, chemical and mechanical methods to control pests and rodents effectively.

• Establish a well-structured program for disease diagnosis and vaccination schedules.

• In small-scale egg production units, adhere to an all-in-all-out system and in cases where this is not feasible, source pullets from disease-free suppliers to avoid vertically transmitted diseases.

• Prior to entry into the farm, ensure the decontamination of recycled egg packing materials and related items.

• Implement routine disease monitoring procedures such as post-mortem examinations and periodic serum antibody assays to assess the flock's immune status.

• Maintain a regimen of regular culling for birds that are unhealthy, unproductive, or suffering from diseases.

Management Factors in Disease Prevention

Several key management practices play a vital role in reducing disease transmission and stress among birds.

Isolation

Mixing birds of different age groups within the same housing is discouraged. The adoption of an all-in-all-out system is recommended whenever possible. Proper house layout and design to prevent rodent ingress, appropriate ventilation and the design of feeders and drinkers to minimize spillage are fundamental in preventing disease.

Litter Management

Wet litter can serve as a potential source of disease transmission. It is imperative to maintain proper litter conditions, as previously advised.

Quality Chicks

Ensuring the quality of chicks is paramount. They should originate from hatcheries that prioritize preventive care for breeder birds, guarding against mycoplasmosis, salmonellosis and infectious bursal disease. History of Marek's disease vaccination, signs of dehydration and adherence to healthy weight ranges should be diligently checked.

Proper Nutrition

A balanced feed, tailored to meet the nutritional requirements of birds at various ages, is crucial for maintaining good health and an effective immune system. The addition of coccidiostats, as well as vitamin and mineral supplements, is essential.

Water Quality

Often overlooked, water quality is vital for poultry. Both the microbiological and chemical quality of water should be assessed before establishing a poultry farm in a specific area. Microbial contamination can occur at the source, during transportation and storage and due to unhygienic practices on the farm. Faecal contamination contributes to the presence of coliform organisms. Mineral levels are influenced by soil conditions and exhibit minor seasonal fluctuations, affecting water hardness and taste. Maintaining pristine water quality is imperative to mitigate the risk of disease spread and ensure bird health.

Dead Bird Disposal

When disposing of poultry carcasses, it is imperative to adhere to the following guidelines:

• *Prompt Removal*: Dead birds should be swiftly removed from the flock to prevent the potential spread of disease.

• *Avoid Stream Deposit*: Carcasses must not be deposited in or near flowing streams to prevent contamination.

• *Spillage Prevention*: Take necessary precautions to avert the spillage of infectious materials during the transportation of carcasses from the farm or post-mortem room to the designated disposal site.

• *Biosecurity Measures*: Implement robust biosecurity measures at disposal sites to minimize the risk of disease transmission.

Moreover, given the heightened environmental awareness, the poultry industry should actively pursue efforts to safeguard the environment. This entails in exploring environmentally safe and scientifically sound methods for carcass disposal. In addition to carcass disposal, efficient litter management is essential.

Litter Removal

After emptying the pens, it is crucial to promptly remove deep litter and caged layer droppings to a field located away from the poultry shed. These materials should be spread out to dry in the sun. Accumulation of litter should be avoided and disposal should occur as soon as possible for use as manure or for other purposes. Composting is a preferable approach, as the heat generated during the process can effectively destroy pathogens, further contributing to biosecurity and environmental protection.

Disinfection

Disinfection is the procedure of eradicating pathogenic microorganisms. A disinfectant refers to a substance capable of annihilating disease-causing organisms and can be applied to non-living objects or employed as a footbath. Various disinfectants, including phenol, cresol, chlorine compounds and iodophors, prove effective in purging surfaces, such as egg rooms, feeders, drinkers, buildings and even footwear. Additionally, a 5% concentration of liquid formalin or the use of formaldehyde gas through fumigation serves as potent disinfection methods. When dealing with washed equipment, air drying under sunlight is an option. For cement surfaces, applying dry heat through a flame is recommended. For combating fungi, a 0.5% solution of copper sulphate demonstrates effectiveness.

Rodent Control

• From the very outset of farming, establish measures to prevent rodent infestations, as eliminating them once they've infiltrated the farm can be an arduous task.

• Regularly clear away accumulations of unused equipment and empty gunny bags, which can become breeding grounds for rats, mice and squirrels.

• Ensure that any spilt feed is promptly removed on a daily basis. Store feed in well-ventilated spaces that are impervious to rodent entry.

• In the early stages, employ traps to manage rodent populations and as the infestation progresses, consider the judicious use of rodenticides. Follow the specified guidelines for applying rodenticides, with particular attention to night-time application.

Insect Control

Implementing measures to control insects is essential for maintaining a hygienic environment, as insects play a significant role in transmitting disease-causing microorganisms and parasites like tapeworms. Flies, in particular, pose a considerable nuisance to birds, causing irritation, disrupting their feeding and drinking patterns and inducing stress, which can lead to reduced egg production, especially in cage-rearing setups (Tsegaye *et al.*, 2023).

Effective insect and fly control strategies encompass the following:

• Preventing water stagnation in and around the farm premises.

• Ensuring the availability of proper drainage facilities and promptly addressing issues like leaky drinkers and water lines.

• Utilizing insecticide sprays or periodic dusting at recommended intervals.

• Regularly inspecting birds and monitoring the quality of feed and water to prevent issues such as watery droppings.

• Maintaining cleanliness in the surroundings by either covering the area with treated soil free of vegetation or cultivating grass lawns.

Conclusion

In conclusion, biosecurity measures in poultry farming are multifaceted and critical for maintaining the health and productivity of the flock. Conceptual, structural, operational and managerial strategies collectively contribute to a comprehensive biosecurity framework. Conceptual biosecurity emphasizes strategic farm location, highlighting the need for isolation from other poultry operations and careful management of distances between different types of farms. Structural biosecurity involves physical measures such as fencing, testing water sources and providing suitable facilities for sanitation and storage. Operational biosecurity encompasses day-to-day practices, from developing operation manuals to maintaining strict hygiene, including visitor protocols and pest control. The poultry industry must continuously adapt and improve its biosecurity measures to address evolving challenges, including emerging diseases and environmental concerns. These comprehensive biosecurity practices ultimately safeguard the welfare of poultry, promote food safety and protect the environment.

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