Biosecurity in Poultry farming

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Over the last four decades or so, the poultry sector has grown fastest among the livestock species transforming itself into supplier of the most economic sources of protein for consumers through development of value chains. The growth in the India poultry industry is being driven by rising disposable incomes and a change in food habits. The shift from the traditional diet, which relied heavily on pulses, to food products such as meat, eggs, and dairy products to meet the protein requirements is significantly aiding the industry growth. The increasing awareness about health and wellness is further driving the demand for a protein-rich diet. As per the estimates of the Economic Survey (2022-23), the livestock sector comprising dairy, poultry meat, eggs and fisheries witnessed a compound annual growth rate (CAGR) of 7.9% during 2014-15 to 2020-21 (at constant prices), and its contribution to total agriculture GVA (at constant prices) has increased from 24.3% in 2014-15 to 30.1% in 2020-21. Looking to the data of department of animal husbandry and dairying, GOI annual report (2022-23), poultry production in India has emerged from conventional farming practices to commercial production systems with state-of-the-art technological interventions. Chicken meat production in the India is estimated at around 5 million tonne (MT) annually. Therefore, to ensure the healthy status of industry, it is important that birds should be kept in good health and all the measures to prevent the introduction and spread of harmful biological substances in the poultry population should be carefully designed. So, biosecurity acts as a cornerstone for reaping the maximal benefits out of this profitable enterprise.

Why to follow the biosecurity measures?

Poultry diseases have expanded greatly with the expansion of poultry population and its accessory business. The risk for disease outbreak is high because of high production performances of bird at a price of weak immune system of birds, which ultimately causes severe economic losses to the poultry industry. A Influenza outbreak in a poultry dense area can cause havoc in a large area. Introduction of disease in any farm can lead to morbidity and/or mortality among birds. Due to lack of basic husbandry practices of disease containment. The infection can spread in many farms. So, it is necessary to implement hygienic measures to prevent the spread of infectious pathogens.

What is biosecurity?

Biosecurity is defined, in general terms, as the set of sanitary and preventive measures that, if applied permanently, prevent and avoid the entry and exit of infectious agents. These measures should be applied in general in all animal production systems. In the following article we will specifically address biosecurity on farms dedicated to poultry production in all its forms: laying hens, broilers, or reproductive birds. There are manuals that each producer association or animal health institution publishes in each country. These are often called the Manual of Good Biosafety Practices. Besides, some emphasize the recommended measures for each type of poultry production.

The OIE defines biosecurity as the implementation of measures to reduce the risk of the introduction and spread of disease agents. Different measures used by the farm persons to protect their farm from entry and spread of disease are referred to as farm biosecurity. Biosecurity measures play a pivotal role for quality production of poultry. Both commercial and backyard poultry needs such measures as they have close interaction with humans. Backyard poultry is often characterized by small flocks with low biosecurity measures

Risk factors for poultry industry

The various factors under Indian farming conditions can increase the likelihood of occurrence /spread of diseases in poultry farms are as follows:

1. 1 Negligence towards disease control practices.
2. Lack of scientific poultry farming practices resulting in outbreaks of highly infectious disease like Highly pathogenic Avian influenza (HPAI), Newcastle Disease, Salmonellosis, Gumboro etc.
3. 3 The spread of microbial pathogen among poultry flocks through physical objects such as contaminated equipment, clothing and footwear etc. is the main source of infection which is often neglected.
4. Poultry trading is often viewed as a risk factor for various diseases like HPAI and NCD in the flock. Poultry farmers are therefore advised to avoid visiting live bird markets or other trading places.

Risks to human Health

Many infectious diseases of poultry (e.g. Avian influenza, New Castle disease, campylobacteriosis, salmonellosis, chlamydiosis etc.) are zoonotic in nature hence

they can be transmitted and can affect susceptible human beings. Therefore, there should be some recommendations to limit their risk to humans. This includes separating people especially children from poultry and adopting personal hygienic measures such as hand washing or wearing personal protective equipments like gloves, aprons etc. when handling poultry. The correct approach to combat zoonotic poultry diseases should be holistic, based on the principle of improving personal and community hygiene to prevent all infectious diseases in poultry to eventually mitigate exposure and transmission risk to humans.

Biosecurity measures to be applied

Biosecurity is based on three main principles prevention of entry of pathogens (isolation), separation of infected birds from healthy birds and making of physical barriers (traffic control) to prevent infection to neighboring farms. Isolation refers to the confinement of birds/animals within a controlled environment. A fence keeps the birds in, but it also keeps other animals out. Isolation also applies to the practice of separating birds by age group. Traffic control includes both the traffic onto the farm and within the farm. Sanitation addresses the disinfection of materials, people and equipment entering the farm and the cleanliness of the personnel on the farm. By following these three simple rules, the producer should effectively be able to minimize any preventable disease outbreaks. Thus, such biosecurity measures can be achieved by:

Biosecurity includes the physical plant where the poultry farm is established. Numerous details are taken into account and are listed below:

1. **Location:** The farm should be located away from urban centers and other animal production systems, especially away from pig farms. This biosecurity measure prevents the mobilization of infectious agents.
2. **Entry and exit**: The farm must have a comfortable entrance for vehicles and external personnel; likewise, there must be a parking area away from the poultry production area. This entrance and exit must-have cleaning and disinfection mechanisms to avoid the movement of microorganisms and ensure the biosecurity of the farm.
3. **Disinfection points**: Each area of the poultry farm must have well-marked cleaning and disinfection points, which must be used permanently by all workers and external personnel.
4. **Protection:** The infrastructure of the shed must have protection from the external environment, preventing the entry of insects, rodents, or wild birds, which can mobilize microorganisms to poultry farm. It must also have protection against solar radiation, strong winds, and rain.
5. **Management of the internal environment**: the shed must have good lighting, adequate ventilation systems, registration and control of temperature and humidity. All of this maintains a biosecure environment for birds and staff.
6. **Distance**: according to the regulations of each country, there must be a minimum distance between the sheds that reduces the movement of microorganisms through the air, the vectors, and the personnel themselves. Also, it facilitates different procedures.
7. **Materials**: the shed must be built with materials that allow adequate washing, cleaning, and disinfection and that facilitate these processes.
8. **Maintenance**: all equipment and instruments used on the farm must have periodic maintenance to ensure its proper functioning. Besides, these must be cleaned and disinfected frequently.

An important component within biosecurity is the measures carried out by the staff working on the farm or by outsiders. Following measures can be adopted -

1. **Restricting entry of people**: Humans are among the most important determinants in the spread of diseases. Restriction of unnecessary human movement in the farm is an important component of a sound biosecurity programme. Restricting people movement limits the risk of introducing infectious agents into flocks. Therefore, farm manager should not allow visitors without any reason. The entry of all those persons who work with or had recent contact with poultry should be guided with proper protective covering like boots, coveralls, and headgears etc.
2. **Restricting entry of vehicles**: Since many poultry diseases are known to be spread by transportation and thus it is of paramount importance to clean and disinfect vehicles before entry into farm premises. Normally many vehicles enter the farm for various works e.g. for bringing chicks to the farm, feed from mills, etc. Only necessary vehicle should be allowed to enter with proper disinfection at the entry point.
3. **Regular cleaning and sanitation of the farm**: Effective cleaning and disinfection is an essential component of good hygiene and thus one of the key biosecurity measures for disease prevention and control. Decontamination of farm floor, equipments, vehicles, water, etc. is essential for reducing the spread of pathogens. Approved disinfectants like chlorine dioxide and peracetic acid can be used in the farm for disinfection or sterilization may be used. Other available

disinfectants include phenols, hypochlorites (chlorine), iodophors (iodine), quaternary ammonium, formaldehyde gas, chlorhexidine, formaldehyde powder and alkali.

4. **Restrict animals away from poultry farm**: It means restricting access to a farm by employing fences and enclosures which creates a barrier between clean areas where poultry are kept and outside environment and it is the most important biosecurity measures for restricting source of infection away from farm and even from the infected farm to other non-infected farm. Various wild birds– resident fowl or migratory birds can be the carriers of poultry pathogens. Therefore, they should have no contact with the flock through the use of screens or overlying nets.
5. **Disease prevention by pest and rodents control**: Farmers have a documented pest control program to reduce the risk of diseases being carried on to the farm by rodents. Rats, mice, and insects such as flies and darkling beetles can carry and spread microorganisms. These pests annoy and stress the birds and may serve as carriers of diseases. In some cases the pests are simply mechanical vectors. However; in other cases, such as salmonella in rodents and wild birds, they serve as biological vectors. Some pests can travel between poultry houses and even between farms. Wire mesh siding is suggested at all openings into the poultry house to prevent entry of even small birds and rodents.
6. **Restrict contact with non-commercialized birds**: Non-commercial sources of poultry including backyard flocks, fanciers, fairs, poultry shows, and markets, are never fully vaccinated for the major poultry diseases and they are often exposed to many types of unhealthy and healthy flocks of birds. Non-commercial birds have extremely high-risk contacts and their entry should be restricted.
7. **Avoid visits to live markets and routinely inspect the flock**: Poultry trading is considered as a risk factor for various infectious diseases. Poultry farmers are therefore advised to avoid visiting live bird markets or other trading places. However, this practice persists in many parts of India. Flock should be regularly inspected to check mortality that should be disposed off timely.
8. **Avoid mixing**: One recommended husbandry measure is to separate poultry by age and species or to consider raising one species instead of several, given that mixing species increases HPAIA/H5N1 virus transmission. In large poultry operations, age separation would facilitate the all in – all out strategy whereby sanitary cleaning can be carried out between the complete exit and renewal of flocks. However, age separation would not be feasible in developing countries where farmers keep several ages to ensure meat production throughout the year.

In addition to the biosecurity measures described, there are some others focused on the management of birds and their different requirements.

1. **All-in and all-out system**: it consists of the entry and exit of all the birds of the production at the same time, that is, the same group enters and leaves. There should be no crossings of groups of birds of different origins or ages because this facilitates the entry of microorganisms. Besides, it allows that, between productive periods, the entire farm can be emptied, cleaned, and disinfected.
2. **Vaccination**: in poultry farming, each farm must be aware about the diseases that circulate in the region where they are located and vaccinate to prevent them. Vaccination is a vital biosecurity process that every farm must implement to control serious infectious diseases such as Marek's Disease, Newcastle disease, or Avian Infectious Bronchitis, among others.
3. **Medicines:** all medicines used for treatment of birds should have proper records. Owner of the farm should be aware of residual effects of the medicine (the time that the drug can remain in the animal and remain in its meat or eggs). Drugs should be used when extremely necessary due to the costs and effects they generate.
4. **Mortality:** a correct disposition of the carcasses of the birds must be made in a biosecure zone destined for that. Also, if possible, do all the diagnostic tests required to find out the cause of death. Among these tests is necropsy, microbiological samples, serologies, or histopathology, among others.
5. **Diseases:** the farm must make a constant evaluation of the prevalent diseases within its facilities to control them.
6. **Water and feed**: the birds must have fresh, potable, and treated water at all times. Besides, the supplied food must be stored in the required conditions that keep it safe and free from dangerous microorganisms.
7. **Stress:** Some mechanisms must be implemented to reduce the stress of the birds (due to thirst, heat, fear, overcrowding) since this affects their immune system and favors the proliferation of infectious and contagious diseases.
8. **Egg handling**: biosecurity processes must be implemented to ensure proper handling and transport of the egg and keep it safe.
9. **Waste management**: The farm must implement within its biosecurity a program for the management of chicken manure and waste generated by birds, for example, using them for composting.

Conclusion

Biosecurity in poultry farming is not optional—it is a necessity. By adopting robust biosecurity measures, you are not only protecting your birds but also safeguarding the sustainability of your farm. From controlling access to maintaining hygiene and conducting regular audits, every step you take contributes to a healthier and more productive poultry flock. In an ever-evolving industry, biosecurity remains a constant factor, ensuring the well-being of your chickens and the continued satisfaction of consumers. The effectiveness of a biosecurity program can be optimized by active adoption of biosecurity measures by all the farmers of a particular poultry growing zone. Though few steps of biosecurity will also be helpful, however collective efforts of all the poultry growers in a particular locality can enhance the effectiveness of the programme manifold. Practicing optimum biosecurity protocols in day-to-day management of poultry business can substantially reduce the chances of a disease outbreak and its further spread.

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