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FEATHERS AND FORTUNES: AN OVERVIEW OF COMMERCIAL JAPANESE QUAIL PRODUCTION AND DISEASE MANAGEMENT IN THE THRIVING INDIAN MARKET

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Abstract
Commercial Japanese quail farming is on the rise in India and currently holds the second largest poultry population next to chickens. This 400-word abstract will discuss the general management practices, feeding management, and disease management in this growing industry. Though Japanese quail are hardier compared to chickens, they are still susceptible to various infectious and non-infectious diseases due to intensive rearing systems. This abstract will explore common diseases such as brooder pneumonia, omphalitis, coccidiosis, ulcerative enteritis, mycoplasmosis, pasteurellosis, and Newcastle disease, and the importance of implementing strict bio-security procedures to prevent and control pathogens in and around the farm.

Keywords: Japanese quail, common diseases and management.

Introduction

The Japanese quail (Coturnix japonica) has gained significant attention in recent years due to its potential for commercial production, providing a valuable source of meat and eggs for human consumption (Minvielle, 2004). This small bird, native to East Asia, has been domesticated and selectively bred for centuries for its desirable characteristics, such as rapid growth, early sexual maturity, and high feed conversion efficiency (Sarsenbek et al., 2013). In India, the commercial quail industry has been expanding rapidly, given its potential for contributing to the nation's food security, generating income, and providing employment opportunities for rural communities (Dey et al., 2019). As the industry continues to grow, it is crucial to understand the factors affecting the success of commercial quail production, particularly in terms of disease management and biosecurity practices. This paper aims to provide an overview of the current state of the commercial Japanese quail industry in India and to discuss the challenges and opportunities for disease management in this expanding sector. The commercial quail industry in India has its origins in the 1960s when the Japanese quail was introduced to the country for the first time (Narayan, 2004). Since then, it has expanded rapidly, particularly in the southern states of Kerala, Tamil Nadu, and Karnataka, where quail farming has become a popular and profitable enterprise (Dey et al., 2019). The growth of the industry can be attributed to several factors, including the increasing demand for quail meat and eggs, which are considered to be healthier alternatives to chicken due to their lower fat content and higher nutritional value (Dhama et al., 2014). Moreover, quail production requires relatively low capital investments, allowing small-scale farmers and entrepreneurs to enter the

market and contribute to the growth of the industry (Dey et al., 2019). Despite the potential benefits of commercial quail production, the industry faces several challenges, particularly in terms of disease management and biosecurity. As a relatively new and rapidly expanding sector, there is limited information available on the prevalence and impact of diseases in commercial quail flocks in India (Dhama et al., 2014). However, it is known that quail are susceptible to many of the same diseases that affect poultry, such as avian influenza, Newcastle disease, and infectious bursal disease (Swayne et al., 2013). In addition, quail-specific diseases, such as quail bronchitis and quail pox, have been reported in commercial flocks in India (Dhama et al., 2014). These diseases can have significant impacts on the productivity and profitability of quail farms, leading to high mortality rates, reduced growth, and decreased egg production (Dey et al., 2019). To mitigate the risks associated with disease outbreaks, it is essential for the commercial quail industry in India to adopt effective disease management and biosecurity practices. One of the key challenges in this regard is the lack of standardized guidelines and regulations for quail production, which can lead to inconsistencies in management practices and increased vulnerability to diseases (Dhama et al., 2014). Moreover, the rapid expansion of the industry has outpaced the development of research and extension services, which are critical for providing farmers with the knowledge and tools necessary to manage diseases effectively (Dey et al., 2019). Therefore, there is a need for greater collaboration between researchers, industry stakeholders, and policymakers to develop and implement evidence-based disease management strategies and biosecurity protocols to ensure the long-term sustainability and success of the commercial quail industry in India.

The commercial Japanese quail industry in India represents a growing sector with significant potential for contributing to the nation's food security, income generation, and rural development. However, the success of the industry is dependent on the effective management of diseases and the adoption of robust biosecurity practices. As the industry continues to expand, it is crucial for researchers, industry stakeholders, and policymakers to work together to address the challenges associated with disease management and to develop evidence-based strategies for ensuring the long-term sustainability and success of the commercial quail industry in India.

Japanese quail hybrids

Since the heritability for growth rate is medium to high, higher body weights in Japanese quail is generally obtained by mere selection. However, due to short-generation interval, the inbreeding depression will set in the selected birds after few years and thus leads to poor fertility, hatchability and livability. Hence, employing line crossing and utilizing the principles of heterosis are the alternatives for evolving high-yielding meat-type J. quail strains. The same principles can be employed for evolving egg-type J. quail strains as well.

General management of Japanese quail chicks

The hatch weight of meat-type quail chick is only 9.5 gm that needs more attention during first few days of age. Early chick mortalities are mainly due to drowning in chick drinkers. Drowning can be practically avoided by keeping pebbles inside the drinker during first 7 days. Now a days, separate Japanese quail chick drinkers are available that will avoid drowning of chicks in the drinking water. Moreover, suitable nipple drinking system can be used for the day-old J. quail chicks itself, which will provide hygienic water continuously.

Another reason for early chick mortality is due to huddling and stampeding during unexpected power failure. It can be avoided by brooding lesser number of chicks in one brood, preferably lesser than 150 quail chicks in one brooder.

Since quail chicks are fragile in nature, spreading of corrugated paper or gunny cloth over the wire mesh or litter, in case of floor brooding for the first one week will avoid sprawling of legs. Japanese

quail chicks can be reared either in battery or floor system. But battery type brooding appears to be better than floor type brooding. Heating sources like electric bulbs or heaters or gas brooders can be employed to provide heat during brooding period. The behaviour of the chicks is the indication of the optimum temperature requirement as they are evenly scattered. In general, the starting temperature should be around 37° C and gradually reduced at the rate of 3° C every four days.

Grower / finisher management

Chicks used for meat purpose can be grown on 24 hours light up to market age for more feed consumption and body weight gain. The floor space, feeder space and drinker space requirement of Japanese quail under cage system of rearing during brooding and growing periods are,

Space requirements	**Brooding period (0 – 2 weeks)**	**Growing period (3 – 5 weeks)**
Floor space	100 cm^2/bird	250 cm^2 / bird
Feeder space	3.2 cm	6.6 cm
Drinker space	1.6 cm	3.3 cm

The body weight gain, feed consumption and feed conversion efficiency of meat type Japanese quail is as follows:

Week	**Body weight (g)**	**Cumulative Feed consumption (g)**	**Feed conversion ratio**
1 – Week	40	53	1.7
2 – Week	95	163	1.9
3 – Week	157	311	2.1
4 – Week	219	482	2.3

Feeding of Japanese quail

Feeding nutritionally balanced diet is vital for profitable quail farming. They can be fed with different types of diets during their life span. The major nutrient requirements of Japanese quail are as follows:

Nutrients	**0-2 weeks**	**3-4 weeks**
ME/kg (Kcal)	2900	3000
Protein (%)	24	20
Calcium (%)	1.20	1.20
Available Phosphorus (%)	0.45	0.45
Lysine (%)	1.40	1.20
Methionine (%)	0.60	0.50
Methionine + Cystine (%)	0.80	0.75

The ingredients used for feed formulation are similar to that for Chicken. However, usage of animal feed ingredients like fish meal and meat meal can be avoided, since they are prone for clostridia contamination. Unlike chicken, quail waste more quantity of feed that can be prevented by designing suitable feeder with grill.

Diseases affecting Japanese quail

Japanese quail have been reported to be more resistant to common poultry diseases [1]. The mortalities encountered in Japanese quail are mainly due to management issues, especially in young chicks. Major reasons for mortalities during the brooding period (0-10 days of age) are inadequate brooder temperature, entry of chill air due to broken side curtains, too many chicks under one brood, improper drinkers etc. If adequate attention is given, the mortality rate can be restricted to 2 per cent from day-old to market age. Due to intensive system of rearing in large numbers, the Japanese quails are also being affected with infectious and non-infectious diseases as that of chicken. Major diseases affecting Japanese quail and the preventive measures are as follows:

1) Brooder pneumonia

Japanese quail chicks are more sensitive to aspergillosis (brooder pneumonia), a fungal disease. It is caused by inhalation of spores of *Aspergillus fumigatus*. When the moist litter material, especially improperly dried coir pith are used for brooding chicks or when the hatcher trays are contaminated with aspergillus spores, the incidence of occurrence of brooder pneumonia is more. The affected chicks feel difficulties in breathing; gasping may be noticed. Chicks may show paralytic symptoms. On post-mortem examination, white colour nodules of pin head to larger size may be noticed in the lungs and air sacs.

Using dry litter material and receiving chicks from hygienically maintained hatcheries, the occurrence of brooder pneumonia in Japanese quail chicks is lesser. Providing 0.05% $CuSO_4$ solution in drinking water of affected flock curtails the seriousness of the disease.

2) Omphalitis

Improper healing of naval, incomplete yolk sac absorption and inflammation of naval along with bacterial infection, especially *Eischerichia coli* results in Omphalitis. It is otherwise called as "Mushy chick disease". Since yolk is the focus of infection, many embryos die before hatching, especially during later period of incubation. If hatched, the chicks show enlarged abdomen. The navels become inflamed and moist.

The mortalities can be prevented or reduced by administering proper antibiotics (eg. Cephalaxin) in the drinking water during first 5 days of age. Improvement in hatchery hygiene will help to control colibacillosis and reduce production losses [2].

3) Coccidiosis

Coccidiosis is a protozoan disease affecting the intestines. Confinement of quail in floor pens promotes the spread of coccidial infections (*Eimeria uzura, E. bateri and E. tsunodai).*

Bloody droppings, ruffled feathers, hunched posture and mortalities are the symptoms of coccidiosis in Japanese quail. The life cycle of quail coccidian is approximately seven days. Young quail are more susceptible than adults; recovered birds have resistance to the particular strain they recovered from but can be infected with other strains. The cage reared quails are less prone for coccidiosis.

Appropriate usage of anticoccidial drugs in the feed of floor reared birds reduces the incidence of occurrence. During outbreaks water medication with amprolium or other anticoccidial drugs will control the disease.

4) Ulcerative enteritis (Quail disease)

This is an acute bacterial infection characterized by the sudden onset of rapidly increasing mortality. Ulcerative enteritis is caused by *Clostridium colinum,* which affects quail of all ages, though young birds are more susceptible. Dying birds may exhibit no premonitory signs. They usually well muscled and have filled crops; healthy quail often exhibit the watery white droppings, sometimes associated with the disease.

Prophylactic administration of 100 g bacitracin / tonne of feed provide protection against infection. It is important to note that quail become 100 percent susceptible to infection after discontinuing medication. Cage reared birds are less affected since the infectious organism is in the droppings and remains viable almost indefinitely in litter.

5) Mycoplasmosis

It is caused by *Mycoplasma gallispeticum*, which commonly affects Japanese quail from 4 weeks of age onwards. Unlike other respiratory diseases, it spreads relatively slowly to other birds, and thus called as Chronic Respiratory Disease (CRD). Affected birds show the symptoms of sneezing, coughing and gargling sounds during respiration. Eyes may show frothy exudates and conjunctivitis. The most important pathological lesion is cloudy appearance of one or more air sacs. The severity of the mycoplamosis is depending on the ammonia level in the farm [3].

Addition of 0.05 to 0.1 per cent tylosin in drinking water for 3 to 5 days or tiamutin 45 per cent soluble granules at a concentration of 0.025 per cent for 3 consecutive days in drinking water controls the disease. The drugs like monensin, naracin or salinomycin are incompatible with tiamutin. Treatment may also be given for *E. Coli*, the common complicating organisms in case of CRD.

6) Pasteurellosis

Fowl cholera caused by *Pasteurella multocia* usually appears as a septicaemic disease often associated with high morbidity and mortality and affects all types of birds. Among domestic birds, turkeys tend to be more susceptible. However, it affects Japanese quail also. Generally, fowl cholera occurs between 10 to 13 weeks in chicken. However, in quails the outbreak of pasteurellosis is reported as early as 8 days of age by [4]. Obvious clinical signs of acute fowl cholera may not occur until very late in the infection and include depression, ruffled feathers, mucous discharge from the mouth, diarrhoea and respiratory distress.

Avian pasteurellosis can be treated with suitable antimicrobial agents. However, multiple antimicrobial resistant is noticed due to the presence of small plasmids in the bacteria [5]. Hence, selection of antimicrobial agent based on antimicrobial sensitivity test is advocated. Usage of fowl cholera vaccines is also advisable to control pasteurellosis in Japanese quail farms.

7) Newcastle disease

Avian paramyxo virus causes Newcastle disease that commonly affects chicken, ducks and turkeys. Japanese quails are somewhat resistant to NDV infection; nevertheless they may be infected under stressful circumstances. Mohamed and Abdel Hafez [6] studied about the occurrence of Newcastle disease in Japanese quail when reared nearer to chicken farm and reported that susceptibility of quails to NDV infection was lesser than that of chickens. Further they added that quails play an important role in the epidemiology of ND and its transmission to chickens causing heavy economic losses. It gives an insight to develop new vaccine strategies for use in quails to protect birds from both disease and infection and to reduce virus shedding and spreading to other birds.

Conclusion

Japanese quails reared under intensive system are subjected to production stress as that of chicken due to fast growth rate and / or higher egg production. When these birds are subjected to stress, their immune mechanism is also affected, leading to the occurrence of various chicken diseases. Though usage of suitable antimicrobial agents or vaccines can control various infectious diseases, the controlling mechanism adds additional expenditure on production cost, apart from production losses. Adopting strict bio-security procedures will aid in preventing the entry and control the pathogens in and around the farm.

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