Research Journal of Poultry Sciences 6 (4-6): 73-78, 2013
ISSN: 1993-5285

Causes of Mortality in Japanese Quails Reared on Deep Litter in Vom, Nigeria

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Abstract: A 10 years, 2001 to 2012, study in a multispecies farm was undertaken to investigate the cause of mortality in Japanese quails (*Coturnix coturnix japonica*) reared on deep litter in Vom, Plateau State, Nigeria. Clinical signs and gross lesions were also recorded. One viral, four bacterial, two protozoan and three miscellaneous conditions were the cause of mortality. Infectious diseases included Newcastle disease, salmonellosis, colibacillosis and pasteurellosis. The diseases caused 1,411,079 deaths in chicks, growers and adult quails. Smothering was the major (303,600; 21.52%) cause of mortality in chicks followed by salmonellosis (285,360; 20.22%) and Newcastle disease (237,600; 16.84%) in adults. Coccidiosis and histomoniasis caused mortality of 0.60% (8,400) and 0.94% (13,200) in growers and adults, respectively. The signs and gross lesions caused by the diseases encountered in the quails were similar to those reported previously in chickens. It was concluded that Japanese quails are susceptible to diseases affecting chicken and they exhibit similar signs and develop similar gross lesions. As the infectious diseases diagnosed in the quails were also encountered in chickens concurrently reared on the same farm the quails could have been the source of the pathogens for the chickens. Adequate biosecurity and control measures currently practiced in chickens would prevent mortality and spread of disease in quails.

Key words: Diseases, Japanese quails, mortality, chickens, spread

INTRODUCTION

The importance of quail production in Nigeria, currently established at backyard level cannot be overemphasized. It generate jobs, requires small land area to establish, needs comparatively low investment but ensures fast return on investment and is a source of animal protein. Japanese quail are hardy, thrive in small cages or deep litter and inexpensive to produce. Though quail are affected by common poultry diseases, they are reported to be fairly disease resistant (Maurice and Gerry, 2008).

Japanese quail (*Coturnix coturnix japonica*) were introduced in Nigeria in 1992 (Haruna *et al*., 1997). Quail production has now become an important part of the poultry industry in Nigeria and there is an increase in the demand for quail products for consumption due to the belief by an appreciable number of consumers of its medicinal properties in curing common ailment affecting human (Sati *et al*., 2012). As a result of this belief, demand for quail and quail eggs have increased and outstripped supply resulting in high price of the products. This is supported by the failure of the farm studied, the main supplier of quails in Nigeria, to satisfy demand and a crate of quail eggs it sells at ₦100 ($0.63) is sold by traders for up to ₦300 ($1.90) or more. This became an incentive for increase in the production of quails with farmers stepping up production from small to large scale production. However, despite the tremendous increase in quail production in Nigeria, literature on their diseases is scarce.

Quails have been reported to be less susceptible to diseases compared to other poultry (Naveen and Arun, 1992). The agents responsible for the diseases in quails could be bacteria, viruses, parasites or fungi. Some of the factors which encourage the introduction of these agent are poor management practices such as poor hygiene, housing and environmental conditions (Musa *et al*., 2008). This study presents the diseases that affected and caused mortality in quails reared on deep litter in Vom, Plateau State, Nigeria between 2001 and 2012.

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MATERIALS AND METHODS

Poultry species reared on the farm: Chickens (8,000 breeders with their matching cocks), geese (23), ducks (1570), guinea fowls (1800) and about 28,000 quails are reared in the farm.

Management systems: Quails, geese, ducks, guineafowls, turkeys and bantams were reared on deep litter system and chickens were reared intensively on battery cages.

Feed and feeding: The birds were fed adlib with chick mash, growers mash and breeders mash to chicks and growers and quail breeders, respectively.

Housing and brooding: Open side poultry house was used in rearing the different species of birds; in addition the ducks were kept on semi intensive system where they were kept in a fenced area provided with water ponds and lock up in a house in the night.

Data collection: From June 2001 to June 2012 quail reared on deep litter and in a multispecies farm in Vom, Plateau State, Nigeria were observed for signs of ill health that resulted in mortality or low production. Clinical sign exhibited by sick quail were recorded while dead quail were removed from the flock. Dead quails and those manifesting severe clinical signs were collected and submitted to the Diagnostic Laboratory at the National Veterinary Research Institute Vom, Plateau State, Nigeria for necropsy and microbiology. Farm records of the clinical signs and mortality and diagnoses made on farm and those in the laboratory were analyzed by descriptive statistic using Statistical Package for Social Sciences (SPSS) Version 17 Program.

RESULTS AND DISCUSSION

Ten major conditions that included one viral, four bacterial, two protozoan and three miscellaneous conditions were recorded during the period of study. The most important infectious diseases included Newcastle Disease (ND), salmonellosis, colibacillosis and pasteurellosis (Table 1).

Newcastle disease was diagnosed only in adults and growers based on clinical signs and pathology. *Salmonella* sp. was isolated in all age group (adults, growers and chicks) while colibacillosis occurred only in adults and growers. Coccidiosis occurred in growers only while histomoniasis, pasteurellosis and citrobacter maulinae infection were recorded in adults.

Table 1: Distribution of cause of mortality in Japanese quails on deep litter in Vom, Plateau State, Nigeria

Cause of mortality	Age group affected	Number affected (dead %)
Newcastle disease	Adult	237,600 (16.84)
	Grower	58,800 (4.18)
Citrobacter murliniae infection	Adult	118,800 (8.42)
Salmonellosis	Adult	285,360 (20.22)
	Grower	42,000 (2.98)
	Chick	49,200 (3.49)
Pasteurellosis	Adult	66,000 (4.68)
Colibacillosis	Adult	82,119 (5.82)
	Grower	25,200 (1.79)
Coccidiosis	Grower	8,400 (0.60)
Histomoniasis	Adult	13,200 (0.94)
Drowning	Chicks <1 week old	94,400 (6.69)
Smothering	Chicks <1 week old	303,600 (21.52%)
Cannibalism	All age group	26,400 (1.87)
Total		1,411,079 (100%)

Fig. 1: Severe depression, ruffled feathers and somnolence caused by Newcastle disease in a Japanese quail

Mortality was recorded in all age groups and all disease condition. Smoothering 303,600 (21.52%) was highest cause of mortality in chicks, followed by salmonellosis 285,360 (20.22%) in adults and Newcastle disease 237,600 (16.84%) in adults. Coccidiosis and histomoniasis were the minor cause mortality with mortality of 0.60% (8.400) and 0.94% (13,200) in growers and adults, respectively.

Most of the clinical signs due to ND were seen in growers and adults. In growers signs due to ND included anorexia, diarrhoe and nervous signs like torticollis, leg and wing paralysis and lateral recumbency. In the mild form of the disease, affected birds exhibited labored breathing, gasping, etc. In adults, severe drop in egg production, soft shelled eggs, misshapened eggs, discoloration of eggs and mortality were noticed. Other signs caused by ND include severe depression, ruffled feathers and somnolence (Fig. 1), dyspnoea, diarrhoea and inappetence. In few cases, gross lesions consisted of congestion of the mucus membranes, pancreas, testes, liver, trachea and splenomegally. Other lesions were congestion of skeletal muscles, pancreas,

Fig. 2: Congestion of lungs, muscles, kidneys and oviduct and haemorrhages in testis caused by Newcastle disease in a Japanese quails

Fig. 3: Smothering in quail chicks due to cold as a result of power (heat) failure

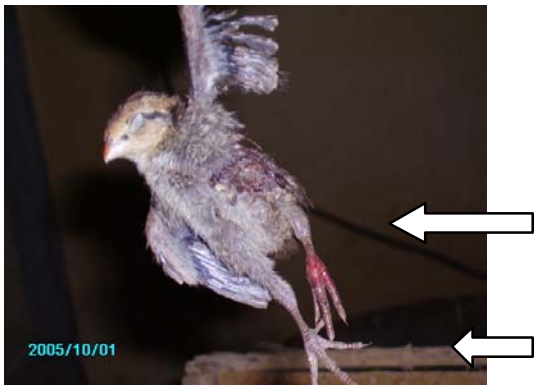

Fig. 4: Thigh and toe pecking in quail chicks

thickened ovarian follicles (Fig. 2) and congestion of the trachea and distended duodenum, pericarditis, pale liver with necrotic foci.

Citrobacter murliniae infection resulted in whitish diarrhoea with pasty vents, ruffled feathers, dullness, sitting on hocks, drop in egg production and mortality of five to eight quails per day. At postmortem examination haemorrhagic enteritis and egg yolk peritonitis were observed.

Salmonella infected quails showed incoordination, loss of appetite, huddling together, dullness and depression. The gross lesions observed included congestion of the heart, liver, intestines, lungs, pericarditis and perihepatitis.

Pasteurellosis occurred in per acute and acute forms. Large numbers of quails were usually found dead but in good body conditions with no premonitory clinical signs. In few cases the noticeable clinical sign included marked depression, anorexia, fetid diarrhoea with dehydration and lethargy. Death occurred within few hours after the onset of clinical signs. *Pasteurella multocida multocida* serovar A4 was isolated as a causative organism. In per acute case, postmortem examinations of the dead quails showed that gross lesions were absent in majority of the birds, although few had generalized hyperemia, enlarged liver with multiple foci of necrosis, thrombi in the lungs and liver, petechial and ecchymottic haemorrhages involving the epicardium of the heart and increased pericardial and peritoneal fluids. While in the acute form, greenish diarrhea, pasted vent, pale skeletal muscles, congested lungs, congested intestines and enlarged kidneys were observed.

Collibacillosis caused by *E. coli* result in, pasted vent feathers, diarhoea, reduced feed intake, huddling together and dullness. Gross lesions included congestion of the heart, liver, intestine, lungs and pericarditis. In some cases, haemorrhages, oedematous swelling of the intestines and whitish necrotic areas on the liver were also observed.

Coccidiosis was characterized by slow growth, poor feed conversion and low mortality. In adults, egg production was negatively affected. An attempt made to isolate the causative organism was unsuccessful.

The clinical caused signs by histomoniasis were depression, anorexia and huddling. At post mortem, necrotic foci in liver, ulceration with caseous core in caeca observed.

No obvious clinical signs were seen in quails that drowned or smothered but were usually found dead and wet (soaked with water). Those that were found alive were wet, shivery as well as huddling together (Fig. 3). Grossly, no changes were observed except pulmonary congestion and oedema.

Cannibalism was characterized by discomfort, running away from other birds and weight loss. Grossly, traumatic injuries with bleeding related to pecking were seen on the face, legs, vents and other parts of the body that were non specific (Fig. 4). Some of the wounds were septic while most were dry.

This study showed that Newcastle disease, pasteurellosis, salmonellosis and colibacillosis are major causes of mortality in quails on deep litter. The occurrence of these diseases may be associated with the fact that the quails were raised in close proximity with chickens, ducks, guinea fowls and turkeys. These poultry species could have served as sources of the pathogens that caused the diseases diagnosed in the quails. However, Japanese quails have been shown to be carriers of virulent strains of ND virus that was pathongenic for susceptible broilers and layers (Ucan and Cataloluk, 2009; Lima *et al*., 2004). Smoothering apparently caused the highest mortality 303,600 (21.52%) in quail chicks. This perhaps was as a result of inadequate or interrupted power supply resulting in congregation of birds to pen corners because of inadequate warmth.

Newcastle disease is a fatal, viral disease of poultry (Alexander, 1997). Under natural conditions intensive management practices, rearing of quails in large number in close proximity to poultry may increase the susceptibility of quails to ND (Narayan, 1992). The clinical signs and gross lesions caused by ND in this study are similar to those reported by Lancaster (1963), Higgins and Shortridge (1988) and Alexander (1997) in chickens, ducks and geese. Quails have been shown to be susceptible to a virulent Nigeria strain of the ND virus isolated from ducks (Oladele *et al*., 2008). Chickens have been shown to be susceptible to a virulent strain of the virus isolated for quails (Senthilvelan *et al*., 1996). Experiences on the study farm revealed that vaccination with ND La Sota in drinking water reduce or prevent mortality completely and restored egg production and quality.

Inactivated La Sota vaccine and live vaccine B1 and La Sota vaccines for chickens against ND were found to be safe and induced the production of high and moderate antibody titre levels respectively in Japanese quails (Paulillo *et al*., 2009). Strains of quails that produce high and low antibody titre levels following vaccination with inactivated ND virus have been developed in Japan (Takahashi *et al*., 1984).

Citrobacter species isolated from the quails in this study are regarded as opportunistic intestinal pathogens associated with diarrhoea and secondary invasion in compromised patients and have occasionally been isolated from severe primary septic processes (Haruna *et al*., 2004). Quails are therefore possible sources of Citrobacter for humans.

Several serotypes of Salmonella have been isolated from quails (Bigland *et al*., 1965; Naveen and Arun, 1992) but their exact role in causing disease is not yet clear. However, heavy mortality has been reported in cases of infection with *Salmonealla bareilly* and *Salmonella gallinarum*. As there is a possibility of spread of salmonellae from quail to chickens or vice versa, the disease in quail requires keen observation. Good sanitation and hygiene would help reduce mature bird to bird transmission of salmonella (Bigland *et al*., 1965).

Pasteurellosis recorded in this study might have been as a result of the presence of multiple species of poultry in the farm and cross infection from one specie of birds to another might have occurred. Furthermore, the carrier nature of rodents that are found in the study farm might have help in maintaining and spreading the infections to quails. Previous studies have acknowledged the role of rodents as a major source of primary pasteurellosis outbreak in poultry (Curtis, 1979; Mwankon *et al*., 2009). The clinic opathological features of the cases recorded in this study were similar to previously reported cases of pasteurellosis in quails (Glisson *et al*., 1989; Odugbo *et al*., 2004). The clinic opathological manifestation and mortality caused by pasteurellosis in study were mild when compared with the disease in experimentally infected quail in which fever (42.9°C), drop in packed cell volume (12.6%) and egg production (19.6%) and high mortality (92.%) were recorded (Akpavi *et al*., 2011).

Coccidiosis is a disease of birds kept on deep litter with humidity and warmth as predisposing factors. The quails in this study were raised on deep litter and suffered from coccidiosis thus indicating the presence of predisposing factors. Naveen and Arun (1992) reported coccidiosis in quails and isolated *E. colini*, *E. dispersa*, *E. acteri*, *E. uzura* and *E. coturnicus* as the causative agents. Repeated examinations of faeces for *Eimeria* sp. did not demonstrate the presence of oocysts and so the diagnosis of coccidiosis was based on clinical signs and response to treatment with anticoccidial drugs. Though, histomoniasis is caused by the protozoan Histomonas meleagridis (Naveen and Arun, 1992). Diagnosis was made based on clinical signs and postmortem lesions. As observed, smothering and drowning were the major causes of mortality in quails. This is because there no specific quail drinkers, feeders and cages currently in Nigeria. The drinkers used are chicken drinkers and are not suitable for quail production. The possibility for quail drowning in chicken drinkers' filled with water is high. Musa *et al*. (2004) found placing small stone pebbles in chick drinker receptacle helpful in reducing the incidence of drowning.

Up to 1.87% (26,400) of the quails were cannibalized during the period of study. This may be attributed to high stocking density. Due to high demand for quail and quail eggs massive production was undertaken on the farm in

order to meet the demands of farmers and researchers. Although, the space to keep quails is limited, beak trimming was considered as a routine management practice in commercial chicken, aimed at the prevention of cannibalism and at reducing social stress (Pizzolante *et al*., 2007). According to Cloutier *et al*. (2000), beak trimming is the main method used to prevent feather pecking and cannibalism in poultry industry. However, beak trimming is controversial in quail production. It is condemned by environmentalist who argued that it is a painful mutilation. In addition to the pain, feed intake is impaired days after beak trimming quail (Gentle, 1986). Adequate stocking density, mating ratio, ventilation and balanced ration may reduce the incidence of cannibalism in quails.

CONCLUSION

Quails are susceptible to several pathogens of chickens. It is therefore recommended that good husbandry, management and sanitation should be practiced at all times and quails reared separately from other poultry using different poultry attendants to reduce disease spread and transmission. Vaccination programmes recommended for chickens where applicable could be introduced to prevent, control or eradicate infectious diseases such as ND in quails.

ACKNOWLEDGEMENTS

Researchers are grateful to the technical staff of the Epidemiological Research Department, National Veterinary Research Institute, Vom (NVRI) for diagnostic records keeping and sample analysis also grateful to poultry attendants and supervisors at NVRI that participated in the study for sample collection and management of the birds.

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