ISSN 1682-8356
ansinet.org/ijps

INTERNATIONAL JOURNAL OF

POULTRY SCIENCE

ANSInet
308 Lasani Town, Sargodha Road, Faisalabad - Pakistan
Mob: +92 300 3008585, Fax: +92 41 8815544
E-mail: editorijps@gmail.com

International Journal of Poultry Science 9 (5): 446-449, 2010
ISSN 1682-8356

A Survey of Early Chick Mortality on Small-Scale Poultry Farms in Jos, Central Nigeria

M. Muhammad[1], L.U. Muhammad[2], A.G. Ambali[3] and A.U. Mani[3]
[1]Department of Bacterial Research, National Veterinary Research Institute, Vom, Nigeria
[2]Veterinary Extension Research and Liaison Services, National Veterinary Research Institute, Vom, Nigeria
[3]Department of Veterinary Medicine, University of Maiduguri, Nigeria

Abstract: A questionnaire-based survey was conducted to investigate early chick mortality and its causes during the first two weeks on small-scale poultry farms in Jos, central Nigeria. The survey covered layer and broiler farms procuring day-old chicks from three selected hatcheries. Flock sizes varied from 20 birds up to 2000. Average mortality was 10.4 per flock with a standard deviation of 14.4. As a percentage of flock size, mortality was 11.4% with a standard deviation of 18.8%. The major causes of mortality were stress, Pullorum disease and diarrhoea. There was no significant relationship ($p = 0.01$, $R^2 = 0.02$) between flock size and mortality. There was also no significant relationship ($p = 0.01$, $R^2 = 0.04$) between mortality and the breed of stock. Of farms experiencing mortalities, only 28.8% consulted a veterinarian for diagnosis and treatment. The other 71% self-diagnosed the problems and instituted treatment which included vitamin supplementation or antimicrobial therapy, with enrofloxacin and gentamycin being the most popular drugs. Medication without consultation with qualified veterinarians may result in the abuse and misuse of antibiotics with the attendant consequences of resistance and the occurrence of drug residues in poultry and poultry products. The wide-spread use of antibiotics in the study area is cause for concern from both a veterinary and public health point of view. Although factors responsible for early chick mortality are complex, information on chick mortality on small-scale farms can be used for the training of farmers on its control. A better understanding of the causes of mortality in the crucial first few weeks of the chick's life may lead farmers to rely more on better management such as better hygiene and sanitation and less on antibiotics for problems encountered during the early brooding period.

Key words: Early chick mortality, chick quality, culling, hatchery

INTRODUCTION

Records of mortality during the first seven days of brooding have been used to assess the quality of chicks in the broiler industry (Chou *et al*., 2004). In layer-type production, mortality plays a major role in determining profit from egg production (Farooq *et al*., 2002). Apart from genetic characteristics, disease, management and nutrition have been known to play a role in chick quality and to result in early chick mortality. Poor quality hatches have been reported to increase mortality from 0.8-1.3% (With, 2001) and some diseases such as salmonellosis, aspergillosis and colibacillosis are known to increase mortality in the initial few weeks of the life of chicks (Shane, 1999). Newly hatched poultry exposed to opportunistic pathogens such as *Salmonella* during the first week post-hatch are highly susceptible to infection. The infection of neonatal poultry may be partly due to insufficient immune defenses, inadequate macrophage phagocytosis which is age-dependent and insufficient T cells and humoral immunity (Henderson *et al*., 1999).

Poultry flocks in Nigeria are classified into four sectors based on the modifications of UNDP (2006). The four sectors are described based on the production system and flock size, type of birds kept, number of species reared together, level of biosecurity and the marketing channel for birds and products. The larger proportion of the Nigerian poultry population belongs to Sector 1 with flock sizes ranging from 5-49 birds of local stock. These are kept on free-range system and sometimes kept together with other species of poultry. This system is generally described as a low input low output type. Poultry flocks belonging to Sector 2 represent the beginning stage of intensive poultry farming. They are represented by predominantly smallholder backyard systems with flock sizes ranging between 50 and 999 birds. The system is made up of exotic chickens, although sometimes a few local chickens or other species of poultry may be kept together in the case of those with fewer than 100. The spent chickens from these flocks find sales outlets primarily through the local live chicken markets. The aggregate number of birds in Sectors 1 and 2 make up 70% or more of the total poultry population in Nigeria (UNDP, 2006). The birds in Sector 3 are classified as semi-commercial with the main operation being egg production and flock sizes ranging

Corresponding Author: M. Muhammad, Department of Bacterial Research, National Veterinary Research Institute, Vom, Nigeria

from 1000-4999 birds. Higher standards of management are usually adopted than in Sectors 1 and 2 and the level of biosecurity is moderately high. Commercial poultry belongs in Sector 4 and is capital intensive, employing varying degrees of modern technology from open ventilated, deep litter housing systems with simple facilities to the more sophisticated environmentally improved and fully automated housing systems.

The objectives of this study were to obtain data on chick mortality from day-old through the first two weeks of placement of chicks on designated small scale farms which procured day-old chicks from three selected hatcheries in and around Jos. It was also to determine if the levels of mortality in the first two weeks on farms were similar to those in the hatchery at hatching. Other relevant information such as the level of drug use, vaccination history and other management practices were also obtained.

MATERIALS AND METHODS

Questionnaire administration: A single-visit questionnaire survey was conducted. The questionnaire incorporated open-ended and closed questions and was designed to obtain data to meet the objectives of the study. Data collection techniques included direct questioning and discussions with farmers and where possible a review of farmers' records. Observations were used to verify the data collected.

Selection of farms: A list of farmers was obtained from the retail outlets of three selected hatcheries classified into small (H1), medium (H2) and large (H3). The consent of farmers was sought to contact them within the first two weeks of the placement of chicks on their farms. Only farms procuring day-old chicks from the selected hatcheries and located within a 50 km-radius of Jos were included in the survey.

Data collection and analysis: Questions included in the survey were the source of day-old chicks, type of reception, levels of mortality in the first and second weeks, causes of mortality, any treatments administered and who made the diagnosis. The questionnaire was pretested on ten small poultry farms around Vom to obtain an indication of possible responses. Data from the pre-testing were however, not included in the results. No reliable data were available on the number and distribution of small-scale poultry producers in the Jos area but this is thought to be in the hundreds judging by the number of sales from hatchery retail outlets. Data were analyzed using Epi Info version 3.4.1 (CDC, 2007) to calculate the frequency of distribution of flocks, breeds and the percentage mortality and also to examine relationships amongst breed, flock size and mortality.

RESULTS AND DISCUSSION

One hundred and fifty questionnaires were distributed but only ninety were returned. The survey was conducted over a six-month period between July and December, 2007 to capture both the rainy and dry seasons. It included a total of 19,764 chicks made up of 5,520 broilers and 14,244 layers. Fifty (55.5%) were broiler farms and 40 (44.4%) layers farms. Seventeen (18.9%) of the farms sourced their day-old chicks from H1 (Yaffa) and produced broilers. Thirty three (36.6%) farms obtained their day-old chicks from H2 (Anak) also for broiler production while forty (44.4%) egg layer farms sourced their day-old chicks from H3 (Lohman Brown). Flock sizes in individual farms differed markedly with some farms owning as few as 20 birds mostly for broiler production and up to 2000 birds for layer production. Average flock size was 219.6 with a standard deviation of 385. Farms with flocks of less than 100 birds numbered 44 (48.9%), made up of 31 (34.5%) broiler producers and 13 (14.4%) layer producers. Twenty seven (30%) of farms owned flocks of between 100 and 200 birds, comprising 12 (13.3%) broilers and 14 (15.6%) layers. Eleven (12.2%) of farms had flock sizes of between 201 and 500 birds made up of 5 (5.6%) broilers and 4 (4.4%) layers. Eight (8.8%) of farms had flocks of over 500 chicks of which only 1(1.1%) was for broiler production while 7(7.8%) were layers.

All farmers (100%) housed their birds on deep litter and stated that they prepared adequately to receive their chicks with feeding and lighting. All farmers (100%) vaccinated their flocks against Infectious Bursal Disease (Gumboro) in the first week and used commercial chick marsh for feeding. All farmers supplemented their chicks with vitamins in water while some added glucose to boost the energy levels of chicks. Of the 90 farms surveyed 70 (77.8%) of the labour was family and the balance a combination of family and hired labour. In general farms with small flock sizes tended to use family labour while larger ones particularly those with over 500 birds used hired labour. Women appear to play a major role in small-scale poultry farming in the study area with 52% of farms being owned by them and even where the women did not own the flocks, they contributed substantially to the labour for raising flocks.

Early chick mortality is associated with disease, poor management, inadequate brooding temperatures and heat stress in hot climates (Chou *et al*., 2004). Poor quality hatches have also been reported to increase first week mortality from 0.8-13% (With, 2001). Some studies have also reported overall mortality due to various diseases and production factors in the tropics (Farooq *et al*., 2002; Chou *et al*., 2004; Usman and Diarra, 2008). But the data were not disaggregated by age in order to give a clearer picture of chick mortality in the crucial first and second weeks. However, the first week after hatching is known to be the highest risk period for

raising chicks (Chou *et al*., 2004). The level of chick mortality in the study area was 11.4% of flock size in the first two weeks of life and the major predisposing factors associated with these mortalities appear to be disease and management.

The major problem encountered during the first two weeks was mortality. Forty five (50%) farms experienced mortality in the first two weeks of the chicks' life. There was a wide variation in mortality ranging from 1% up to 100% on one farm. Average mortality per flock was calculated to be 10.4 chicks with a standard deviation of 14.4 chicks per flock. Average mortality as a percentage of flock size was 11.4% with a standard deviation of 18.8%. The level of mortality varied from 9% amongst the Lohman Brown (H3, layer) breed, 16% amongst the Anak (H2, broiler) breed and 22% amongst the Yaffa (H1, broiler) breed. However, there was no significant relationship ($p = 0.01$, $R^2 = 0.02$) between flock size and mortality indicating that mortality was not influenced by the size of the flock. There was also no significant relationship ($p = 0.01$, $R^2 = 0.04$) between mortality and the breed of stock indicating that the breed did not influence mortality. Of the 45 farms experiencing mortality, there was also a wide variation in the causes of mortality. The major diseases or conditions that farmers associated with mortality included stress (25.6%), Pullorum disease (13.3%), diarrhoea (13.3%), coccidiosis (4.4%), Chronic Respiratory Disease (CRD) (1.1%) and management causes such as overcrowding and poor ventilation (8%). Six (6.7%) of farmers claimed they did not know the cause of mortality. One farmer who lost 258 (12.9%) chicks out of a flock of 2000 diagnosed the cause of death as fowl cholera. Twenty two (42%) of farms had no mortalities while the rest (8%) experienced stunted growth.

Although there was no significant relationship between mortality and breed of flock, the highest chick mortality rates (22%) were observed amongst farmers procuring day-old chicks from H1 which also had the highest culling rates from an earlier survey conducted in the hatcheries. These similar high rates of culling in the hatchery and mortality in flocks from the same hatchery could be due to poor quality chicks from this hatchery. The flocks from this hatchery also had the highest rates of mortality due to Pullorum. The mortality rates amongst flocks from H3 were the lowest (9%), although high culling rates were observed in this hatchery. The high mortality rates amongst farms procuring chicks from this hatchery could be attributed to management or disease problems on the farms as opposed to poor quality chicks. Farms procuring chicks from H2 which had the lowest culling rates experienced high (16%) mortality rates. This could also mean that factors other than chick quality such as management and disease on the farm could have predisposed chicks to mortality.

Of the 45 farms experiencing mortalities only 13 (28.8%) consulted a veterinarian for diagnosis and treatment. The other 71% self-diagnosed the problems and instituted treatment. Of the 12 farms that experienced Pullorum, 7 (87%) were diagnosed by a professional while of the 25 farms experiencing stress only 6 (24%) were diagnosed by a professional. Therapy ranged from vitamin supplementation to antimicrobial therapy with enrofloxacin® and gentamycin® being the most popular drugs used. Embaceryl® a combination antibiotic and vitamin preparation and Selko® a water sanitizer were also commonly used for therapy.

An attempt was made to obtain expenditure in order to calculate the cost of production in the first two weeks. This was not easy as up to 70% of the farmers did not keep records that indicated costs related to their production. However, the following assumptions have been made in order to obtain an indication of economic costs of early chick mortality in the study area. It was assumed that the average cost of day-old pullets in 2008 ranged from between N140 and N150/chick while broilers cost N200/chick. When the cost of feeding and medication were factored-in at the rate of N40/chick for feeding and N10 for vitamins, vaccination and medication, the average cost of production of a chick was calculated to be between N200 and N250/chick for the first two weeks. Since most small farmers utilize family labour, this cost has been discounted. At an average mortality of between 11.4 and 18.8% per flock and an expenditure profile of N250 per chick for the first two weeks of life, it is estimated that a farmer with a flock size of 500 birds could lose between N14, 250 and N 23,500 in the first two weeks due to chick mortality alone. This cost may be higher on larger farms where the cost of labour which is estimated at 3% of production costs is added to the figure.

There was a high level (71%) of self medication amongst farms particularly with enrofloxacin and gentamycin. Medication without consultation with qualified veterinarians may result in the abuse and misuse of antibiotics with the attendant consequences of resistance and the occurrence of drug residues in poultry and poultry products. Although factors responsible for early chick mortality are complex and may include chick quality, disease, stress and nutrition, information on chick mortality on small-scale farms can be used for the training of farmers on brooding, disease control and sanitation. Most farmers in the study area recognized that conditions such as stress could affect their flocks in the initial first weeks and supplemented their chicks with vitamins and glucose in order to mitigate its effects. It appears therefore that stress may play a smaller role when compared to disease, other management factors and the source of chicks in predisposing to early chick mortality. The breed of birds

and flock size were found not to be predisposing factors to chick mortality.

Conclusion: A better understanding of the causes of mortality in the crucial first few weeks of the chick's life may lead farmers to procure good quality chicks and rely more on better management such as better hygiene and sanitation. This may result in less reliance on antibiotics for problems encountered during the early brooding period. The wide-spread use of antibiotics in the area is cause for concern from both a veterinary and public health point of view. Farmers need to be aware that excessive use of antibiotics can lead to drug resistance in both humans and livestock through the spread of drug resistant bacteria. To operate an efficient and cost-effective system, farmers need to maintain proper production and financial records.

REFERENCES

Chou, C.C., D.D. Jiang and Y.P. Hung, 2004. Risk factors for cumulative mortality in broiler chicken flocks in the first week of life in Taiwan. Br. Poult. Sci., 45: 573-577.

CDC, 2008, Epi Info Epi Info Version 3.5.1 CDC Atlanta Georgia, USA.

Farooq, M., M.A. Mian, F.R. Durrani and M. Syed, 2002. Prevalent diseases and mortality in egg type layers under subtropical environment. Livestock Res. Rural Dev., Vol. 14.

Henderson, S.C., D.I. Bounous and M.D. Lee, 1999. Early events in the pathogenesis of avian Salmonellosis. Infection and Immunity, 67: 3580-3586.

Shane, S., 1999. Promoting chick quality and liveability. ASA Technical Bulletin, PO43: 1-3.

Usman, B.A. and S.S. Diarra, 2008. Prevalent diseases and mortality in egg-type layers: An overview. Int. J. Poult. Sci., 7: 304-310.

UNDP Nigeria, Abuja, 2006. Socio-Economic Impact of Avian Influenza in Nigeria. www.un-nigeria.org/docs/socioecon_ai.pdf. Accessed on 3rd August, 2008.

With, L., 2001. Problems associated with hatching Coab 500 broiler chicks in New Zealand conditions. http://www.jcu.edu.au/school/bms/avpa/avpa_NZ_2001/. Accessed 9th July, 2007.