

Research Paper

Level of Newcastle disease vaccination awareness and its effects on village chicken production in Gombe State, Nigeria

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In an attempt to evaluate the status of Newcastle disease (ND) in village poultry, the level of ND vaccination awareness and the major causes of village chicken losses in Gombe State, Nigeria. Structured questionnaire was used for interviewing farmers. Three hundred (300) village chicken farmers were interviewed, 55% suggested diseases as the major causes of village chicken mortality. However, 47.3% observed diarrhea as the major sign in diseased chickens while 41.4% observed twisting of the neck. These signs are consistent with those seen in birds affected with ND virus. There was no significant statistical difference ($P>0.05$) noted in the response of the respondents. 99% of the farmers suggested that diseases are most prevalent among chicken flocks during the dry hamattan season while 1% suggested the rainy season. There was significant statistical difference ($P<0.05$) noted in the response of the respondents. Whenever there is outbreak of disease, 65.5% of the farmers reported that they sell their birds, 8.3% attempt treatment of sick birds, 9.0% share out their birds as gift while 17.2% salvage birds to reduce the chances of loss. There was no statistical difference ($P>0.05$) noted in the response of the respondents. In the treatment of sick

chickens, 73% of the farmers reported that they attempt traditional methods while 27% employ conventional methods. There was significant difference ($P<0.05$) noted in the response of the respondents. 87% of the farmers reported that they are absolutely not aware that diseases in village chickens can be prevented by vaccination of any kind, while 13% are aware as applicable to the exotic commercial chickens. There was significant difference ($P<0.05$) was noted between those who know about vaccination and those who do not know. Newcastle disease is the most prevalent infectious poultry disease among village chickens flocks in Gombe State. Most village chicken farmers in the state are unaware that the threat posed by the disease to chicken production can effectively be controlled using appropriate vaccine. This is probably due to lack of awareness campaign to reach village chicken farmers in the state.

Key words: Newcastle disease, village poultry farmers, Gombe State, structured questionnaire, vaccination awareness.

INTRODUCTION

Village poultry production is an important available for most rural communities in Africa. It plays a major role in the rural economy of Afro-Asian and Latin American

countries as it accounts for about 80% of the world's poultry production and up to 90% in less developed nations including Nigeria (Copland and Alders, 2005; Nwanta

et al., 2006; Bebora *et al.*, 2010). This is because it utilizes spare family time and contributes significantly to nutritional security of weaker and vulnerable sections (women and children) of the society as well as being a reliable source of income with little or no capital investment (Alexander *et al.*, 2004; McAinsh *et al.*, 2004; Copland and Alders, 2005). Village poultry have also been reported to be used for traditional ceremonies and festivals as well as traditional treatment of illnesses in some cultures (Nwanta *et al.*, 2006; Alders *et al.*, 2007; Musa *et al.*, 2008), hence, they contribute significantly to the livelihoods of rural households in developing countries (Mack *et al.*, 2005; Nyoni and Masika, 2012). It has been estimated that up to 70% of poultry products (meat and egg) in the developing countries are produced by low-capital earning farmers and in family-managed poultry systems (Sonaiya, 2000), of which 80% are found in rural areas under the free range system (Alders and Spradbrow, 2001).

However, village poultry production is not rated high in the mainstream of national economies because of the lack of measurable indicators of output (Wethli, 2003). Productivity levels of village poultry in many African countries fall far below desirable levels. Output in terms of number of eggs per hen per year and flock sizes are low with relatively high mortality rates when compared to commercial poultry production (Gondwe and Wolly, 2007; Mapiye *et al.*, 2008). Nigeria has the largest poultry population in Africa (Duru *et al.*, 2008). It has been estimated that the country has about 130 to 150 million chickens (Duru *et al.*, 2008). Of these, only about 10 percent are the exotic breeds (Oyekunle *et al.*, 2006; Duru *et al.*, 2008). Village chickens account for the remaining population (Nwanta *et al.*, 2008). The village chickens constitute the majority of the chicken population in Northern Nigeria and are mainly kept under extensive management system where they roam freely and scavenge for food (Usman, 2002; Musa *et al.*, 2008).

Their movement is uncontrolled and they hardly receive any prophylactic treatment or vaccination against common poultry disease (Duru *et al.*, 2008; Musa *et al.*, 2008). Due to the low capital attached to village chickens production in relation to other livestock, village chicken farmers are often ignorant of small changes that could improve the quality, health and productivity of their chicken flocks (Acavomic *et al.*, 2005). An extra effort in the good management of poultry husbandry system, feeding and improved health care will increase village chicken productivity significantly (Sonaiya, 2007). Furthermore, strategic increases in village chicken production will greatly assist in poverty alleviation, improve household food security and in the long term curb the massive urban migration of the youth (Alexander, 2001; Sonaiya, 2007; Gillespie and Flanders, 2009). Newcastle disease (ND) is an acute, infectious and highly pathogenic disease of poultry (Seal *et al.*, 2000; Alexander, 2003) is reported to be one of the most

important viral disease of both commercial and village chickens in most parts of the world including developing countries like Nigeria (El-Yuguda and Baba, 2002; Zeleke *et al.*, 2005; Aziz and Ahmed, 2010). The main objective of this study was to study farmers' awareness on outbreaks of ND in their locality (Gombe State, North Eastern Nigeria) and the use of vaccine for its control through the use of a questionnaire survey.

MATERIALS AND METHODS

Study area

The study was carried out in Gombe State, Nigeria (Figure 1). The state has a population of 2.4 million people based on the 2006 population census by the National Population Commission (Anonymous, 2007). Gombe is one of the six States that form the North East geopolitical zone of Nigeria. The State has eleven local government areas that are populated by ethnic groups including Hausa, Fulani, Tera, Waja, Tangale and Bolawa among others. Gombe State is located between latitude 9°30' and 12°3' N and longitude 8°45' and 11°45' E (Anonymous, 2009). The state has a mean annual rainfall

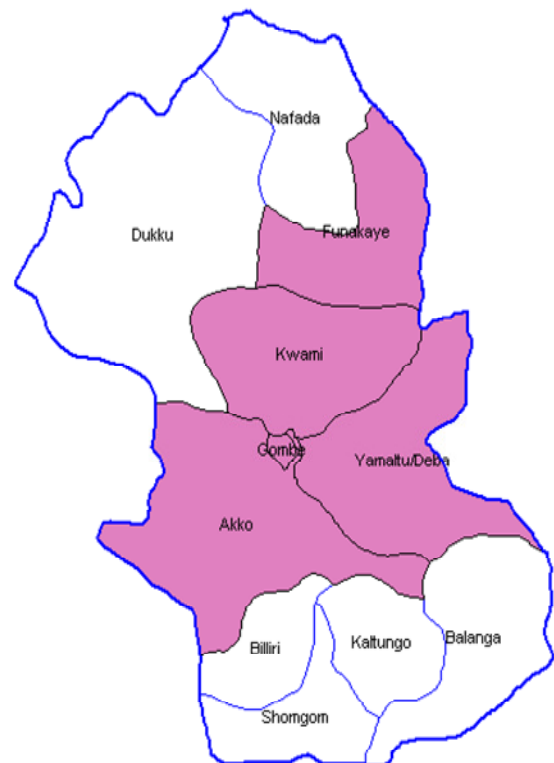


Figure 1. Map of Gombe State showing the study areas in pink colour.

of 818.5 mm, with a mean maximum temperature of 37°C and a mean minimum temperature of 12°C. The hottest months are March–May (40°C), and the coldest period is from December to February (harmattan). The state is also characterized with relative humidity of 90% in August and 10% in December. The climatic and edaphic factors favour crop and livestock agriculture. The total poultry population in Gombe State is approximately 508,305 comprising 462,000 village poultry and 46,305 exotic poultry (Adene and Oguntade, 2006).

Structured questionnaire survey

A total of 300 copies of a structured questionnaire were administered to the village poultry farmers and sellers within the study area. Interpreters were sought for where necessary. Numerical aspects of the information were collected and analyzed.

Statistical analysis

The data generated from the study were entered into excel spreadsheet. All categorical data were entered into contingency tables and analyzed using chi-square test, while the geometric means of all numeric data were compared using analysis of variance (ANOVA) for paired or multiple data columns respectively using Statgraphics Plus version 5.0, 2000 (Statistical Graphics Corp, Manugistics, Inc. USA). The level of statistical significance was set at p-value less than or equal to 0.05.

RESULTS

Table 1 shows the results of the responses of the village chicken farmers to the questionnaire survey on the causes of village chicken losses in the different local government areas of Gombe State. Out of the 300 respondents, 55% of respondents loss their birds due to diseases, 21% of respondents loss their birds as a result of prey, 11.7% of respondents loss their birds as a result of theft, 8% of respondents loss their birds due to cats and dogs, and 4.3% of respondents loss their birds due to others causes such as automobile accidents, as the major causes of village chicken mortality in their localities. There was significant statistical difference ($P<0.05$) noted in the response of the farmers in all the study areas. Table 2 shows the results of responses on the signs of diseases in village chickens as observed by farmers in the study areas of Gombe State. Out of the 300 respondents, 47.3% of respondents were noticed diarrhea as the major sign in diseased village chickens, 28.7% of respondents were noticed twisting of head and neck, 12.7% of respondents were noticed vesicle, boils, nodules and swelling on the comb and wattles, 6.3% of

Table 1. Distribution of respondents to major causes of losses in village chickens in Gombe State according to village poultry farmers.

Information	Frequency	Percentage (%)
Causes of village chicken losses		
Diseases	165	55.0
Prey of birds	63	21.0
Cats and dogs	24	8.0
Theft	35	11.7
Others	13	4.3
Total	300	100

Others: accidents, example: automobile, flood, fire, dust/ wind storm.

respondents were observed sudden death and 5% of respondents were noticed paralysis of the wings and legs. There was no significant statistical difference ($P>0.05$) noted in the response of the farmers in all the study areas. Table 2 also depicts the responses of village poultry farmers on the methods they employ in the treatment of diseases in village chickens in Gombe State. Out of the 300 respondents, 73% of respondents reported that they attempted use traditional methods to treat diseased chickens while 27% reported that they were applied the conventional methods to treat diseased village chickens. There was significant difference ($P<0.05$) noted in the response of the farmers in all the study areas. Table 3 depicts the distribution of respondents according to season of disease prevalence, action taken on sick birds and level of awareness on ND vaccination according to village poultry farmers in Gombe State. Seasonality of disease occurrence in village chickens was indicated by months of the year in which diseases are most prevalent among village chickens in Gombe State. Out of the 300 respondents, 99% of respondents noticed disease during dry harmattan season, while 1% of respondents noticed disease during wet rainy season. There was significant statistical difference ($P<0.05$) noted in the response of the farmers in all the study areas. However, the result of responses of the village chicken farmers on the actions taken by them on diseased village chickens in Gombe State reveals that out of the 145 respondents, 65.5% of respondents reported that they sell out their birds whenever they suspect an outbreak of disease in their localities, 8.3% of respondents treat them when they are sick, 9.0% of respondents give them out as gift to friends, relatives and close neighbors while 17.2% of respondents slaughter them when they are sick to reduce the chances of loss. There was no significant statistical difference ($P>0.05$) noted in the response of the farmers in all the study areas. The result of responses by the farmers on the awareness of disease prevention by vaccination in village chickens in Gombe State indicates that out of the 300 respondents, 87% of respondents are non-awareness that diseases in village chickens can be prevented by

Table 2. Distribution of respondents according to signs of sickness in village chickens and methods employed in treatment in Gombe State according to village poultry farmers.

Information	Frequency	Percentage (%)
Signs of sickness		
Sudden Death	19	6.3
Diarrhea	142	47.3
Twisting of Head and Neck	86	28.7
Vesicle, Nodules, Swelling on the Comb and Wattle	38	12.7
Paralysis of the Wings and Legs	15	5.0
Methods of treatment		
Conventional	81	27.0
Traditional	219	73.0

Table 3. Distribution of respondents according to season of disease prevalence, action taken on sick birds and level of awareness on Newcastle disease vaccination according to village poultry farmers in Gombe State

Information	Frequency	Percentage (%)
Season of disease prevalence		
Dry Harmattan Season	297	99.0
Wet Raining Season	3	1.0
Action taken on sick birds		
Treat them	12	8.3
Sell them	95	65.5
Give them out as gift	13	9.0
Slaughter them	25	17.2
Awareness of Newcastle disease vaccination		
Aware	39	13.0
Non-Aware	261	87.0

vaccination of any kind, while 13% of respondents are awareness that diseases in village chickens can be prevented by vaccinations as applicable to the exotic commercial chickens. While a significant difference ($P < 0.05$) was noted between those who know about vaccination and who do not know; there was no significant statistical difference ($P > 0.05$) noted in the response of the farmers in all the study areas.

DISCUSSION

The results of this study revealed that disease is the main cause of losses of village chicken as indicated by 63% of respondents to the questionnaire. This observation is consistent with previous report by El-Yuguda *et al.* (2007) that diseases and predation are the major causes of losses in village chickens in Borno State.

This therefore implies that preventing infectious diseases in village chickens will improve village chicken production and hence the economy in the study areas (El-Yuguda *et al.*, 2005). It is common to find different species of village poultry (ducks, guinea fowls, turkeys and pigeons) being reared together with village chickens, feeding and roosting in the same place with village chicken flock. These birds may serve as a source of infection to each other because they maintain the virus in

circulation indefinitely. The rearing of different species of birds together makes it difficult to control epidemics. Therefore, mechanisms are needed to control the disease in these birds as well as the village poultry. This is consistent with the findings of Ekwe *et al.* (2002) and Khalafalla *et al.* (2002) who reported that the rearing of ducks, guinea fowls, and pigeons with village chickens is more common in most village settings and their population in some cases is comparable. It was also observed in the study areas that the number of young village chickens was higher than those of the adult birds in a population of village chickens in each household. This could be attributed to frequent slaughter or sale of the adult chicken when compared to the younger birds which usually are bred to serve as replacement stock in a flock. This low population of adult birds could also arise from the annual decimation of village chickens especially during the harmattan. The higher number of chicks is a simple reflection of the regeneration of the population after the outbreaks from the few adults that survive (Hassan, 2006). On the other hand, a hen may lay and hatch between 7 - 15 chicks at a time, this agrees with previous studies by Sonaiya *et al.* (2002) and El-Yuguda *et al.* (2007) who reported that the average number of eggs laid per hen per clutch is 13, and hatchability is 83% in Nigeria and 14 eggs and hatchability of 80% in Botswana (Moreki and Masupu,

2001). But unfortunately chick mortality is usually very high with a few chicks growing to adulthood due to many factors that lead to village chicken losses such as ND and predators. The observation in this study agrees with previous reports by Mavale (2001) and Moreki and Masupu (2001). Although, farmers could not give the scientific name for common diseases affecting their village chicken flocks, but they were able to describe the signs of these diseases. The most prominent signs observed among sick village chickens by poultry farmers in Gombe State were greenish white diarrhea, gasping for air and twisting of the neck among others. These signs are consistent with signs of clinical cases of ND infection in chickens. The clinical signs of ND in village chickens as reported by Bhaiyat *et al.* (1994), Chansiripomchai and Sasipreyayan, (2006) and Roy and Chamham, (2007) included diarrhea, twisting of the neck and paralysis of the wing and legs. Musa *et al.* (2009) also confirmed that these are the major clinical signs seen in village chickens suffering from ND. Researchers have reported that ND usually affects the respiratory, gastrointestinal and nervous systems of the infected birds (Alders and Spradbrow, 2001; Chansiripornchai and Sasipreeyajan, 2006). These clinical signs were reported to be the signs of the initial phase of clinical Velogenic ND. The result of this study supports similar finding of El-Yuguda and Baba (2004), El-Yuguda *et al.* (2005) and El-Yuguda *et al.* (2009) who reported that ND is the predominant poultry disease in North Eastern Nigeria which have cause mortality of a large number of village chickens in outbreaks of the disease annually. While other signs such as wounds and boils on the featherless parts of the body and also sudden death of chickens seems not to be too common in village chicken production in Gombe State, probably because they are not noticed as they may not cause death.

The high prevalence of ND reported in this study from the months of November to March (harmattan season) tallies with previous reports of Manchang *et al.* (2004) and Abdu *et al.* (2005) that the windy harmattan encourages the spread of the NDV (Velogenic Newcastle Disease). Cold weather induces physiological stress on village chickens and subsequently decreases their immunity to ND. Sa'idu *et al.* (2006) and Musa *et al.* (2009) in a similar investigation reported that cold stress has been known to worsen the outcome of ND. Sa'idu *et al.* (2006) also reported that increased movement of sick and healthy chickens in anticipation of various festivals particularly Sallah, Christmas and New Year may have been responsible for the peaks of ND outbreaks within these periods (November to March). Although, some mild form of the disease is also observed in village chickens in other months of the year including the hot weather in Gombe State. However, this disagrees with previous investigations by El-Yuguda *et al.* (2009) who reported that ND outbreaks occurred all year round in a study in

Borno State.

It was observed from the questionnaire survey that farmers usually take their sick birds to the markets to sell when there is an outbreak of a poultry disease to minimize losses. These birds are likely to be purchased by other village chicken farmers to restock their chicken flocks and keep them for subsequent breeding in other localities. While doing so, there is the possibility of ND transmission to other susceptible birds stocked together in the same market place, and subsequently to naive village chicken flocks to which the infected birds are introduced as well as to commercial poultry farms in the same vicinity. This concurs with similar reports by Alders and Spradbrow (2001), Tadesse *et al.* (2005) and Zeleke *et al.* (2005) who observed the ease of contact of poultry from different areas at local open air markets, which are then taken back to new localities, which can undoubtedly facilitate the rapid spread and persistence of ND among village chickens. Some farmers give out their birds as gift to relatives and friends during visits, thus facilitates the spread of ND. Newcastle disease spreads rapidly by direct contact with faeces and respiratory discharges or by contamination of the environment including food, water, equipment and visitors as previously reported by El-Yuguda *et al.* (2007) and Adwar and Lukesova (2008).

Some farmers reported that they attempt to treat their sick flocks during outbreaks using various medications. A few are aware of the need to keep their birds in good health and when they are sick to source for prescription and procure medicines for treating their sick birds. Most poultry farmers living in the present study area however use traditional (indigenous) methods to treat birds during periods of disease outbreaks, employing the use of roots / barks of plants such as mahogany, ashes, onions bulbs, wild garden eggs and garlic among others soaked in the birds' drinking water troughs. The unavailability and high cost of veterinary drugs have contributed to low patronage by farmers in sourcing for drugs for treating their sick chickens (Musa *et al.* 2008). Very few farmers that live in urban or semi urbanized areas of the state use the conventional medication methods, using empiric antimicrobials such as Oxytetracycline water soluble powder and other medications such as ampicillin capsules, tetracycline capsules, sulphadimidine tablets, paracetamol tablets and other antibiotic originally meant for human use maybe mixed in drinking water for the birds. Sometimes, the farmers may be fortunate that their birds get better but most times the condition worsen and becomes hopeless, as the whole flocks in the village or community are wiped out and farmers have to wait for some times to restock the birds or may even get discouraged to restock. Iroegbu and Amadi (2004) previously reported that farmers in the village poultry business are discouraged by losses due to ND that may result in mortalities of up to 100% in unprotected flocks.

Vaccines are an important component in the prevention and control of poultry diseases worldwide. Unfortunately,

most village chicken farmers living in rural areas of Gombe State, where large population of village chickens are kept have no idea of any existing vaccine that can prevent poultry diseases. The few farmers who knew about vaccines do not know where to get it or cannot afford to buy the vaccines. In contrast, a few village chicken farmers living in suburban areas of Gombe State were aware of vaccines that can prevent infectious poultry diseases and have participated in several poultry vaccination campaigns which have yielded appreciable success. However, this group of respondents was observed to be engaged in keeping backyard exotic breed of chickens as well as village chickens husbandry.

Conclusions

From the findings of this study, it can be concluded that the major constraints eroding successful village chickens production in Gombe State include predators, lack of adequate veterinary health care and most especially the menace of infectious diseases such as Newcastle disease which poses a major threat to the poultry industry. Unfortunately, most village chickens farmers in Gombe State are ignorant of the fact that the threat posed by Newcastle disease to village chickens production can effectively be control by the use of the appropriate vaccine. This is probably as a result of high level of illiteracy and lack of awareness among the rural dwellers that rear large population of the village chickens in the state.

RECOMMENDATIONS

Therefore, there is need to introduce an enlightening campaign on the significance of routine vaccination against ND in poultry production in order to sustain the village chicken industry in Gombe State. This will remarkably make village chicken production in the state a profitable enterprise that will improve rural dwellers' livelihoods. There is also need to introduce into the village chicken production system the use of the recently developed thermostable ND vaccines that do not require cold chain to transport or maintain its potency. This will go a long way to solve the problems of lack of electricity in rural communities or refrigeration needed for cold chain transportation/potency maintenance of the conventional ND vaccines. Personnel should also be trained on the applications of such thermostable vaccines. Village chickens farmers should be encourage to report any case of mortality in their flock to the nearest veterinary unit.

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AUTHORS' DECLARATION

We declare that this study is an original research by our research team and we agree to publish it in the journal.

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