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Awareness of Poultry Farmers on Biosafety Practices against Infectious Diseases in Kano State, Nigeria

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Abstract

The study examined the awareness level of poultry farmers on biosafety practices on infectious diseases in Kano state, Nigeria. A two-stage sampling procedure was used in selecting 166 respondents through the use of questionnaire. The data were analysed using mean, percentages, and standard deviation. The result showed that the main sources of awareness of biosafety practices were mass media (48.8%), family/friends/neighbours (25.9%) and poultry farmers' association (PAN) (11.4%).

Awareness of biosafety were in the following component cleaning (low pressure washer (\bar{x} =1.602) and hand washing after toileting (\bar{x} =1.789), disinfection covering feeds in the store (\bar{x} =1.560), manure management (\bar{x} =1.608) and removal of dead carcasses (\bar{x} =1.530). component. At segregation and traffic control all the subcomponents were known except; banning keeping of birds at home (\bar{x} =1.114), exclusion of rodents & wild birds (\bar{x} =1.054) and presence of buffer areas around the farm (\bar{x} =1.000). The Majority of the respondents claimed very low levels of awareness of biosafety practices (81.9%), major constraints to biosafety practices among the clientele were; complexity of the biosecurity, inadequate capital (93.4%) and high cost of the biosafety practices (83.1%). Awareness level of the respondents should be improved upon through sensitization and provision of more extension services in addition to the mass media effort.

Keywords: Poultry-farmers, awareness, biosafety

Introduction

Poultry production is the domestication of chicken for the purposes of egg and meat. It also generates income and creates employment opportunity for the populace. Poultry production is one of the easiest ways to increase the availability of protein in food because eggs contain essential nutrients such as amino acids, minerals and vitamins that can augment protein deficiency in the body. Production of meats and eggs occupies a prime position for improving animal protein consumption of both rural and urban households in Nigeria (Eze, Chah, Uddin & Anugwa, 2017; Alhaji & Suleiman, 2017). According to the Food and Agriculture Organization (FAO, 2021) reports, Nigeria has low animal protein intake with an average of 6g per head per day while the world average is 34g per head per day.

The significance of poultry farming to the economic, social and biological needs of people in any nation cannot be over emphasized (AGRIS-FAO, 2021). It has been observed in recent time that the improvement of the poultry industry in Nigeria are being threatened by outbreaks of infectious diseases such as Newcastle disease (ND), infectious bursal disease, infectious coccidiosis and avian influenza (AI) among others causing high mortality and huge economic losses to farmers as well as their psychosocial wellbeing (Abah, Abdu, & Assam, 2017; Oladipo, et.al 2020). Several attempts were made in the past to reduce the negative effects of infectious diseases from endangering the lives of chicken. These measures among others are medications and vaccination. These attempts proved abortive except the implementation and compliance to recommended standard biosafety practices (Lawal, El-Yuguda & Ibrahim, 2016).

Biosecurity according to the Food and Agriculture Organization (FAO, 2016) has been identified as the only sustainable solution to reducing the negative effects of infectious pathogens on poultry. Biosecurity also referred to as biosafety is regarded as all the management practices aimed at excluding or reducing the potential for transmission and spread of diseases to animals, humans or an area initially free from the disease-causing agents (Eze, et.al, 2017; Matilda, Ralf, Jurgen & Eva, 2020). It can also be defined as measures or practices taken to prevent or control the introduction and spread of infectious agents to a flock. Such infectious agents,

whether they cause clinical or subclinical disease, significantly reduce the productivity, profitability and long-term financial viability of poultry production (Abah, Abdu, & Assam, 2017). FAO (2016), further classified biosecurity into two forms and three components. The classification based on forms is bio-containment and bio-exclusion (Oladipo, *et.al.*, 2020). The classification based on the three components includes: Isolation, traffic control and sanitation. Isolation involves keeping birds protected from any source of infection like unauthorized access and carriers of disease, separating groups of animals to minimize the spread of infection across flock.

Traffic control is the limitation of incoming human and material traffic within the farm and controlling the movement of equipment, vehicles, people, feeds, birds and eggs to prevent exposure to disease while sanitation is the regular cleaning, disinfection of poultry houses, equipment, vehicles, and people to eradicate disease causing agents (Abah, Abdu, & Assam, 2017; Oluwasusi, Akanni & Sodiq, 2018).

A breach in biosafety practices in poultry production systems in many parts of Nigeria is due to lack of awareness and the refusal to implement biosafety practices resulting in recurrent outbreaks of infectious diseases. This will significantly reduce profit or lead to capital loss in the industry. The biosafety operational cost is usually low and the benefit-cost ratio is high (Ifeduba, Achonwa, Ukwu, Ogbuwu, & Okoli, 2020), but inadequate implementation of biosafety practices may be due to insufficient sensitization, lack of understanding of its economic benefits and motivation (Matilda, Ralf, Jurgen, & Eva, 2020; Maduka, Igbokwe, & Atsanda, 2016). Strict biosafety measures, in addition to vaccinations, are strategies to prevent and control some infectious poultry diseases as vaccination alone is not enough to curb the menace under field conditions (Oluwasusi, Akanni & Sodiq, 2018).

Good husbandry practices such as adequate feeding, housing and stocking to avoid overcrowding, good ventilation, proper disposal of wastes, cleaning and disinfection of poultry premises help to keep out infections and their spread (Mirza, Jaisan & Marya, 2020). To avert human health risks (zoonosis) and economic losses, biosafety measures are inevitable in farms through isolation, limitations in number of visitors coming into the farm and/or sanitation practices. Poor or absence of biosafety practices in farms results in high levels of baseline mortality due to predators such as rodents, snakes, small carnivores or infectious diseases like Newcastle Disease-ND, salmonellosis, Gumboro disease or fowl typhoid. (Eze, *et.al* 2017).

The structure of the commercial poultry industry in Nigeria is made up of sector two and three systems with little or no biosecurity and constant introduction of new birds from completely unknown sources thereby worsening the biosecurity problems (Oluwasusi, Akanni & Sodiq, 2018). The sector 1 systems are those with full compliance to biosafety management practices on regular basis (Oladipo, *et.al* 2020; Abah, Abdu, & Assam, 2017). Biosafety level in most commercial poultry enterprise is minimal or in some cases non-existing and this may lead to the spread of multiple infections within and between farms (Abah, *et.al* 2017). According to Olumade, *et al.*, (2020) high percentage of the outbreaks of infectious diseases of poultry occurred in

Kano and Kaduna states, indicating that the Northwest zone is highly affected due to biosecurity in-compliant. According to Akanbi *et al.*, (2016), outbreaks of infectious diseases had occurred in North-western Nigeria such as Kano and Kaduna from 2006 all through to 2015. This was evident in January, 2015, when the National Veterinary Research Institute, Vom, Nigeria received some chicken carcasses from Kano State Ministry of Agriculture. These carcasses were obtained from a backyard commercial poultry farm and Live market (LBM) in Kaduna and Sobon Gari Kano State, Nigeria.

Although, previous studies have shown a survey of Newcastle disease virus antibody in local chicken, ducks and pigeon managed under biosecurity non-compliance and another study where farmers practice unethical activities in poultry such as keeping of multi-aged and multi-species in the same poultry pen, improper disposal of dead carcasses, contaminated litter, poor farm traffic control and sanitation were identified as major biosafety risks in commercial poultry farms (Abah, 2020; Adedeji, Akanbi, Luka & Abdu, 2019).

However, there is dearth of information on the awareness of poultry farmers on biosafety practices against infectious diseases. This study investigated the awareness level of poultry farmers on biosafety practices against infectious diseases in Kano State, Nigeria. The specific objectives were to:

1. identify the main source(s) of information on biosafety practices;
2. determine the awareness level of the respondents on biosafety practices; and
3. highlight the respondents' constraints to biosafety practices against infectious poultry diseases.

Methodology

Kano State has 44 local government areas, with a population of 13,076,892 people (National Bureau of Statistics-NBS, 2018) and poultry population of 3, 852, 135 birds (Adedeji, *et al*, 2019). Total land area of 20,131km², and coordinates of 11^o 30^lN 8^o30^lE. The state is made up of three agricultural development programme zones: I, II and III. The population of the study comprises all the poultry farmers in Kano State.

A simple random selection was used to elicit data from 50% of the list of registered poultry farmers in the Poultry Association of Nigeria (PAN) to make a sample size of 166 respondents for the study. List of possible sources of information were developed for respondents to identify the particular ones they use on their poultry farms. The biosafety practices expected from livestock farmers according to the Ceva Chicks Programme-CEVA, (2016) and FAO (2016) template was presented to respondents to indicate accordingly if they were aware of biosafety practices with coding of Aware (A) as 2 and Not Aware (NA) as 1. The overall weighted mean was generated by summation of the weighted mean for each component divided by 3 to derive an overall mean of 1.41 which was set as benchmark and used to categorized into low and high level of awareness: 1.41 or less than (low); greater than 1.41 (high). The constraints to biosafety practices among poultry farmers was measured as constraint'-1 and 'not a constraint'-0. Data collected were analysed using

percentages, mean, standard deviation and ranking. Data were collected through the use of questionnaire and analysed using percentages, mean and standard deviation.

Results and Discussion

Source(s) of Information on Biosafety Practices

Table 1 shows that the major source of information by poultry farmers on biosafety practices was mass media (48.8%), followed by family/friends/neighbours (25.9%) and the Poultry Association of Nigeria (11.4%). Information from extension services was very low (9.0%). The extension service delivery system is saddled with the responsibility of disseminating improved practices, innovation and information from research points to the farmers and also bringing current issues from farmers back to research for solutions (Echetama, Ani & Onoh, 2017) are lacking. They receive little information from veterinary personnel (3.0%) as well as community health officers (1.8%). This result corroborates the position of FAO (2017) and Alhaji & Suleiman (2017) that the major source of information of farmers on infectious poultry diseases in Nigeria is Mass-Media. Ehien, Orifah, & Oloruntoba, (2017) also agreed that the main source of awareness for farmers on agricultural information in Ogun State, Nigeria is mass-media.

Table 1: Source(s) of information on biosafety practices against infectious diseases

Variables	%
Mass Media	48.8
Family/friends/neighbours	25.9
PAN (Farmers' Association)	11.4
Extension Services	9.0
Veterinary personnel	3.0
Community health officers	1.8

Source: Field Survey, 2019.

Awareness Level on Biosafety Practices against Infectious Poultry Diseases

The awareness of the poultry farmers on biosafety practices on infectious diseases is indicated in Table 2.

For the cleaning components of biosecurity, the respondents were not aware of most of the sub-components of biosecurity practices except; low pressure washers ($\bar{x}=1.602$) probably because knapsack sprayer is a common instrument used for the spraying on farm for many purposes. Also, they were aware of hand washing after toileting ($\bar{x}=1.789$) while the weighted mean score of the awareness of cleaning component (WMC) is $\bar{x}=1.318$. This is an indication of a very low awareness of this component. This could also be because hand washing after using the toilet is a general human hygiene factor against diseases prevention.

This result is in line with that of Okpukpara (2016), that poultry farmers may be aware of some biosecurity and at the same time may not be aware of the subcomponents supporting each. The implication of biosecurity cleaning practices

on infectious diseases of poultry is that it is indispensable to the success of any poultry production without which there will be low production, economic losses coupled with socio-psychological damages on the lives of farmers. Thus, with farmers not aware of most of the sub-components there would be continued outbreaks of infectious poultry diseases occurrence. This implies that with no awareness there can't be adoption too.

Similarly, in disinfection component of the biosafety practices, poultry farmers were only aware of; covering of feeds in the store ($\bar{x}=1.560$), manure management ($\bar{x}=1.608$) and removal of dead carcasses from farm site ($\bar{x}=1.530$) respectively with Weighted Mean Score of the Disinfection Component (WMD) as $\bar{x}=1.341$. This also implies a very low awareness of this component. Manure is a very crucial material in this part of the country and a lot of revenues are generated from the sales of dried bagged manure as a substitute for commercial fertilizer. Similarly, the dead carcasses of chicken are good source of soil fertility as well. These could be the reasons for their awareness of these two sub-components under disinfection. This is in agreement with the submission of Olumade *et al.*, (2020) that the knowledge of poultry farmers on infectious diseases biosafety practices is generally low.

Lastly, in segregation and traffic control components of biosecurity practices, the respondents were fairly aware of most of the sub-components except; banning keeping of birds at home by workers ($\bar{x}=1.114$), exclusion of rodents and wild birds in farm site ($\bar{x}=1.000$). The Weighted Mean Segregation & Traffic Control component (WMS&T) is $\bar{x}=1.568$. This is in agreement with the submission of Olumade *et al.*, (2020) that the knowledge of poultry farmers on biosafety practices against infectious diseases is generally low. This result is contrary to the position of Alhaji and Suleiman (2017) that most of the poultry farmers closely interact with wild birds and other livestock which invariably implies that they did not comply with the standard biosafety practices of keeping infectious pathogens away from their farms.

Table 2: Awareness of biosafety practices against Infectious poultry diseases

Variables	Mean= \bar{x}	SD= δ
Cleaning components		
High pressure washer	1.133	1.064
Low pressure washer	1.602	1.264
Cleaning foot wear with soap & water	1.235	1.110
Hand Washing after going to the toilet	1.789	1.336
Visitors Entry Cleaning Protocols	1.066	1.032
Vehicular Entry Cleaning Protocols	1.084	1.040
Weighted mean cleaning (WMC)	1.318	
Disinfection components		
Shower with changing of cloth/footwear	1.072	1.035
Covering of feeds in the store	1.560	1.250
Manure Management	1.608	1.268
Removal of dead carcasses from farm	1.530	1.235
Periodic disinfection of farm site	1.211	1.099
Use of controlled verification	1.066	1.030
Weighted Mean Disinfection (WMD)	1.341	
Segregation and traffic control components		
All in All Out System	2.000	1.314
Full fencing and closing of farm entrances	1.837	1.355
Strict control of entrance and exit	1.964	1.400
Annex to other poultry for biosecurity compliance	1.596	1.259
Permanent housing of chicken	1.976	1.391
Banning keeping birds at home by workers	1.114	1.043
Exclusion of rodents & wild birds in farm site	1.054	1.015
Presence of Buffer Areas around farm site	1.000	0.989
Weighted mean segregation and traffic control (WMS&T)	1.568	
Overall weighted mean	1.41	

Source: Field Survey, 2019 Aware (A=1) and Not Aware (NA=0), Standard Deviation=SD, $\bar{x} \leq 1.000$ implies NA.

Constraints to Use of Biosafety Practices against Infectious Poultry Diseases

The constraints of the poultry farmers to biosafety practices against infectious poultry diseases are as shown in Table 4. Among the array of variables investigated, the most severe among the constraints was inadequate capital and complexity of the biosafety practices (93.4%). This was followed by low-literacy level of the respondents (89.8%) and high cost of the biosafety practices (83.1%). There was also too much time involved in the implementation of these biosafety practices (66.9%) as well as poor infrastructural facilities (60.8%). There is another issue of poor understanding of the biosafety practices due to low education (56.0%). Other constraints were not seen as severe by the respondents in the study area. This is in line with the submission of Adedeji, *et al* (2019); Mshelia *et.al* (2016) that the major constraints of poultry farmers to keeping standard biosafety in Nigeria were lack of capital, bad infrastructure, too much time involved in the practice and cost implication of these practices.

Table 4: Constraints to use of biosafety practices against infectious poultry diseases

Variable	%	Rank
Complexity of biosecurity practices	93.4	1 st
Inadequate capital	93.4	1 st
High cost of the practices	83.1	3 nd
Too much time is involved	66.9	4 th
Sociological perception that diseases are natural	9.6	10 th
Poor understanding/ knowledge of some measures	56.0	6 th
Inadequate constant extension services delivery	48.2	7 th
Inadequate man power	17.5	8 th
Poor infrastructures	60.8	5 th
None-literacy	89.8	2 nd
Cultural influences	6.0	11 th
Poor weather condition	12.7	9 th

Source: Field Survey, 2019

Conclusion and Recommendations

The respondents' awareness level on biosafety practices was low. Major constraints were complexity of the biosafety practices, inadequate capital and high cost of the biosafety practices among others. Awareness level should be increased through more advocacies and enlightenment in poultry farmers' group on biosafety practices. More extension services involvement is also needed to build the capacity of the poultry farmers on implementation and application of biosafety practices as well as compliance. Hindrances to biosafety awareness could be addressed by non-governmental organization, farmers' group, and development partners' poultry livestock sector.

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