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Assessment of farmer opinions on vaccination of village chickens against Newcastle disease and its benefit in eight communities in Bauchi State, Nigeria

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Abstract

Newcastle disease (ND) is a major limitation to the production, consumption and sales of village chickens in Africa. A pagrticipatory proportional piling exercise was conducted among village chicken farmers selected during focus group discussions held in eight communities in Bauchi State to assess their opinions on vaccination of their village chickens with thermostable Newcastle disease vaccine I-2 (I-2 NDV) and its benefits. The assessment involved 64 participants (8 from each community) whose chickens had received two I-2 NDV three months apart and 12 participants whose chicken had received only one I-2 NDV. Of the 64 farmers who initially were selected and had volunteered to participate in the study, two of the participants were not available to give their opinion on the importance and benefit of vaccination; while, eight of participants did not think the vaccine is important and have chosen not to participate in the assessment exercise. The remaining 54 participants had endorsed the vaccine with a total score of 100% (270/270). They also awarded 91.3% (283/310) of their scores to flock increase due to reduced mortality by I-2 NDV with the remaining 8.7% (27/310) of the scores indicating no flock increase. A probing of the reason why some of these farmers did not experience flock increase revealed the occurrence of fowl pox disease that has killed some of their chickens. The scores from participants whose chicken had received only one vaccine was 100% for both endorsement of the vaccine (60/60) and observation of flock increase (60/60). The study highlights I-2 NDV as an appropriate vaccine that could be used to control ND in village chickens in Bauchi State and beyond.

Keywords: Newcastle disease, Thermostable Newcastle disease vaccine (I-2), Village chickens, Bauchi State, Nigeria

Introduction

Newcastle disease is a major constraint to the production of village chickens which have the potential of producing excess meat and eggs that could be consumed or sold to generate income to the owners of these chickens (Sonaiya, 2009; Knueppel *et al.,* 2010). Vaccination has been suggested as the best strategy for the control of ND in village chickens in Nigeria where the disease is

endemic (Nwanta *et al*., 2008; Sonaiya, 2009); and for increasing the productivity of village chickens by up to 40% through reduction of chicken mortality (Sonaiya, 2009). Even though commercial ND vaccines in the form of inactivated, cloned or live vaccines (FAO, 2002; Young *et al*., 2012) could be used to control ND in chickens, such vaccines were found to be unsuitable for control of ND in village chickens because of their high cost and the need of trained personnel to administer the vaccines that come in high doses and therefore not appropriate for use in village chickens which characteristically are reared in small flocks of different ages. Another major reason why commercial vaccines are inappropriate for use in village chickens is the lack of stable electricity supply to maintain cold chain facility that will maintain the viability of live vaccines in most rural communities where these chickens are raised. The development of thermostable vaccines (strain V4 and I-2) had greatly reduced the need for cold chain in maintaining the viability of the vaccine. The use of thermostable I-2 NDV which is free of commercial patent has also made the vaccine affordable to poor farmers. The ease of administration of I-2 NDV via eye drop, water and food means farmers can easily learn and administer such vaccine without specialized training.

Field trials with thermostable vaccines had been undertaken with success in many countries in Africa and Asia (Tu *et al.,* 1998; Wanbura *et al.,* 2000; Nwanta *et al*., 2005; Musa *et al.,* 2010). Expanding such vaccination trials could increase awareness and adoption of the vaccine among village chicken farmers as well as reduce chicken mortality due to ND across many States in Nigeria. Critical to expansion of ND vaccination programme in village chickens is the need to assess farmers endorsement of such vaccination for their chickens and whether such vaccination holds any benefit in terms of flock increase. Participatory impact assessment is a recommended cost effective bottom up village chicken vaccination evaluation methods (Alders & Spradbrow, 2001). Participatory approaches are based on flexible programmes or checklist, systematic and documented methodologies, specific recording of data, triangulation, respect for people and knowledge, willingness to learn and iterative analysis of results (FAO, 2000). A description of some of the methods and tools of participatory studies by Bagnol *et al.* (2014) include: informal interview, visualization method and ranking and scoring methods. One valuable tool known as proportional piling could be used for assessment of impact of vaccination, estimating age structure, disease incidence, mortality estimates, etc. (FAO, 2002; Bagnol *et al.,* 2014). Proportional piling is a semi quantitative way for determining common priorities and requires participants to receive predetermined number of objects like stones or beans to pile according to the proportion of the importance of items like diseases that are being ranked, with the most significant problem eventually receiving the highest score (FAO, 2002). The lack of the practice of vaccination of village chickens against ND and the lack of information on approval of ND vaccine and its benefit in Bauchi State made it necessary to undertake this study for the purpose of providing such information that could aid the design of a programme for the control of ND. The aim of this research was to determine the level of endorsement and the benefits of vaccination with I-2 NDV among village chicken farmers in eight communities in Bauchi State.

Materials and Methods

Study area

This study was carried out in Bauchi State, Nigeria (Figure I). The State lies on the Bauchi plateau and occupies a land mass of 48,382 sq km that is located within latitudes 7^{o} 52'N and 8^{o} 56'N and longitudes 7^{o} 25'E and 9^{o} 37'E. It has dry and wet seasons with a vegetation regarded as Savannah woodland, with rivers Hadejia in its northern part and River Gongola in its southern part. It shares boundaries with Kaduna, Benue, Yobe, Gombe, Plateau, Taraba, Kano and Jigawa States (Independent National Electoral Commission, 2008). The state has twenty Local Government Areas (LGAs), a human population of 5,515,300 (NPC, 2011) whose occupation is mainly farming and a village poultry population of about 5,832,750 (Adene & Oguntade, 2006).

Sampling frame

The study was carried out in eight communities (Chinade, Gongoro, Kafin-Madaki, Jalam, Kutaru, Dass, Toro and Udubo) (Figure I) randomly selected from a list of towns in Bauchi State. The aim was to select from each of the three Senatorial districts of the State three Local Government Areas from which one community was randomnly selected from a list of towns in that LGA.

Selection of respondents

A community animal health worker was identified in each community and contacted with the help of the Director of Veterinary Services, Bauchi State. Each of these community animal health workers was

mandated to convene a meeting involving community leaders, farmers, chicken traders and community animal workers. Our team which comprised of a veterinarian, a sociologist and one secretary/photographer held a focus group discussion where eight (8) farmers who owned more than 20 chickens and were willing to participate in the study were selected. Consent for the study for married women farmers was obtained from their husbands. All the participants in the study eventually had their chickens vaccinated with thermostable I-2 NDV after which respondents were asked to rank for approval or rejection of thermostable vaccine and whether the vaccine was beneficial or not.

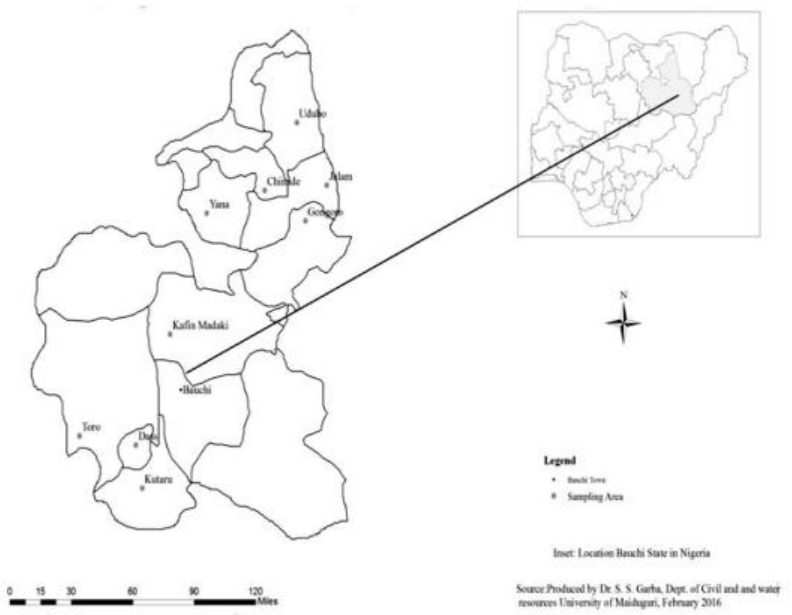

Figure I: Map of Bauchi State, Nigeria showing communities included in the study and Bauchi town

Vaccines

Newcastle disease vaccines were obtained from National Veterinary Research Institute Vom, Plateau State, Nigeria and transported over ice in an ice pack to the field in a vaccine carrier. Each vaccine was reconstituted in 2.5 mls to obtain a dose for 50 chickens and administered with the aid of a dropper via the eye drop.

Vaccination

Two vaccination exercises were conducted at three months interval in all the 54 households participating in this study. Demands for vaccination by farmers who were neighbours to those who participated in the first vaccination exercise and were engaged in the initial focus group discussion had led to the expansion of vaccination to additonal 64 households involving 746 chickens during the second vaccination exercise (table 1).

Proportional piling exercise for assessment of approval and benefit of ND vaccination of chickens

Proportional piling exercise was used to determine approval of the vaccine given to their chickens and the benefit of the vaccine in terms of flock increase. Five to ten beans were shared to farmers to score for approval or disapproval and for benefit of vaccination in terms of flock increase or for absence of flock increase.

Data analyses

Results generated from participatory studies were summarised in tables according to the themes and discussed together.

Results

Vaccination with NDV I-2 was first carried out on 1017 chickens within 64 households (table 1). The highest number of chickens (165) vaccinated was from Toro while the lowest number of chickens vaccinated was from Chinade. The second vaccination involved 814 chickens within 54 households with vaccines being given to more chickens from Gongoro and less chickens were vaccinated in Chinade (table 1). Rejection was experienced in 8 households (four each from Chinade and Jalam) who eventually dropped out of the study.The study was discontinued in Yana which had 8 households (figure I) due to challenges related to insecurity at the time of the study. Supplementary vaccination was also given to additional 746 chickens from 64 households in six of the eight communities during the second vaccination campaign (table 1). Fifty four (54) farmers were involved in the proportional piling exercise to assess acceptance and benefit of vaccination against ND. All the 54 participants with 5 beans each had endorsed the vaccination by piling 270 beans with no beans

Table 1: Distribution of households that participated in vaccination of village against Newcastle disease in Bauchi State, Nigeria

	First vaccination of chickens		Second vaccination of chickens		supplementary vaccination given to chickens from neighbouring households during second vaccination	
Community	Number of participating households	Number of chickens vaccinated	Number of participating households	Number of chickens vaccinated	Number of participating households	Number of chickens vaccinated
Chinade	8	92	4	56	11	124
Dass	8	131	8	139	16	165
Gongoro	8	135	8	147	6	55
Jalam	8	98	4	48	8	71
Kafin Madaki	8	132	8	118	Nil	Nil
Kutaru	8	121	8	108	19	273
Toro	8	165	6	110	4	58
Udubo	8	143	8	88	Nil	Nil
Total	64	1,017	54	814	64	746

Table 2: Farmers' endorsement of vaccination of village chickens against Newcastle disease in Bauchi State, Nigeria

Community	Number of participants	Number of beans shared Per participant	Total piles for endorsement of vaccination	Total piles for rejection of vaccination
Udubo	8	5	40	0
Chinade	4	5	20	0
Jalam	4	5	20	0
Gongoro	8	5	40	0
Kutaru	8	5	40	0
Dass	8	5	40	0
Toro	6	5	30	0
Kafin Madaki	8	5	40	0
Total	54		270	0

piled for rejection of vaccination (Table 2). The proportional piling scores for changes in flock size was 283 for flock increase with 27 beans piled for no changes in flock size (table 3). The proportional piling scores from 12 farmers whose chickens received supplimentary vaccination only once was 60/60 for both the endorsement of the vaccine and for experience of flock increase following the administration of I-2 NDV (table 4).

Discussion

Although vaccination against ND in village chickens was first carried out within 64 households, four households in Chinade and four households in Jalam did not participate in the second vaccination because they had lost their chickens a few days after the first vaccination exercise in Chinade and Jalam communities. Farmers from these households refused to participate in the second vaccination campaign because they attributed their loss of chickens to ND vaccine administered to their chickens.

While, the discription of clinical signs were similar to that of ND, such outbreaks are not likely caused by the I-2 NDV administered to their chickens since the vaccine has been known to stimulate no adverse reaction in chickens. A common practice of buying chickens for naming ceremonies and marriages are possibly the main source of introduction of sick chickens that may be harbouring velogenic ND which I-2 NDV was unable to contain because the chickens have not developed protective immunity.

Table 3: Farmers assessment of changes in flock size following two vaccinations against Newcastle disease in village chickens in Bauchi State, Nigeria

Community	Number of participants involved in proportional piling exercise	Number of beans shared to Participants	Scores for increase in flock size	Scores for no increase in flock size
Udubo	8	10	53	27
Chinade	4	5	20	0
Jalam	4	5	20	0
Gongoro	8	5	40	0
Kutaru	8	5	40	0
Dass	8	5	40	0
Toro	6	5	30	0
Kafin Madaki	8	5	40	0
Total	54		283	27

Table 4: Farmers assessment of changes in flock size following one vaccination against Newcastle disease in village chickens in Bauchi State, Nigeria

Community	Number of participants involved in proportional piling exercise for approval of vaccination	Number of beans shared to Participants	Scores for endorsement of vaccination	Scores for non endorsement of Newcastle disease vaccination	Scores for increase in flock size after Newcastle disease vaccination	Scores for no increase in flock size after Newcastle disease vaccination
Chinade	5	5	25	0	25	0
Jalam	4	5	20	0	20	0
Gongoro	2	5	10	0	10	0
Dass	1	5	5	0	5	0
Total	12		60	0	60	0

This finding seem to show the importance of suspending any vaccination in the event of any suspected outbreak of disease to avoid the likelihood that chickens may be incubating the disease agent and to also dispel the impression that the vaccine can cause the disease in chickens.

Conversely, the vaccination in the remaining households might probably have averted the occurrence of outbreaks of ND in the some parts of the village since, ND takes many months for an outbreak to pass through chicken population in a village (Martins, 1992).

A total of 66 participants (Fifty four of the farmers whose birds were vaccinated twice and 12 additional farmers from neighbouring households whose chicken received one supplementary vaccination) participated in proportional piling exercise to assess acceptance and benefits in terms of flock increase. All the 54 participants had piled beans to endorse vaccination of their chickens against ND (270/270) with no rejection All the farmers who had piled for flock increase had attributed it to the absence of mortality following vaccination of their chickens with the exception of Udubo where 33.7% (27/80) of the scores was not in favour of flock increase following vaccination. A probing of the reason why some scores was not awarded for flock increase may not be unconnected to fowl pox outbreak that killed their grower chickens in Udubo. This finding seem to suggest that other diseases could become important when ND is put under control. This finding seem to highlight the need for a holistic control programme for common diseases of village chickens following the control of ND in village chickens.

The complaint by some of the members of the households in Dass and Kutaru (Personal communition) on the reduction of their periodic consumption of chicken due to outbreaks of ND are indicators of the effectiveness of ND vaccination of village chickens. Such complaints seem to suggest that outbreaks of ND favor both consumption and sales of chickens perhaps due to low prices sick

chickens command in the market or perhaps due to panic sales during such periods. It is also possible that the control of ND offers opportunity for greater income than consumption which is suggestive of the possibility of an inverse relationship between control of ND and domestic consumption of chickens and linear relationship between increase in flock size and sales of chickens for income generation.

The participation and vaccination against ND in additional 64 HHs with 746 chickens attest to the endorsement of vaccination against ND in village chickens in such communities. Twelve of the farmers from some of these HHs had specifically requested to participate in the proportional piling exercise that was done to express their opinion on the importance and benefit derived from vaccination of chickens with I-2 NDV. The exhaustion of our reserved vaccines in Kutaru and Dass has precluded us from given supplimetary vaccines to HHs selected for the study in Kafin Madaki and Udubo inspite of the desire by interested farmers in neighbouring HHs.

The findings from this study could be used to launch a vaccination campaign against ND. The results raises hope as to the possibility of adopting ND vaccination of village chickens as a control measure for ND across the State and possibly at national level.

In conclusion, the study was able to demostrate endorsement by farmers of vaccination with thermostable I-2 NDV. And that vaccination with I-2 NDV has the potential of increasing flock size. The study recommends the implementation of vaccination program for the control of ND in Bauchi State, Nigeria and also calls for an expanded National Programme of Immunization of village chickens against Newcastle disease in Nigeria.

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Conflicts of Interest

The authors declare no conflicts of interest.

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