Research Application Summary

Impact of thermostable new castle disease vaccination on productivity of free ranging indigenous chicken

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Abstract

This study was carried out in Bulyansiime village, Iganga District. A baseline survey was conducted to determine the serological status and flock dynamics of the free range chicken. This was followed by vaccination of all birds above 2 weeks and sera collection from adult birds after every 3 months for a period of 9 months. Haemagglutination Inhibition tests were performed to determine the level of antibody titers against New Castle Disease Virus. Flock production data per household was recorded alongside the vaccination and sera collection exercise. Results derived were compared to the baseline data collected. The percentage of adult flock with serum antibody titres above protection level of $\log_2 3$ increased from 32% pre-vaccination to 100% at the 9th month post-vaccination. An increase in flock size from 10.83±9.25 to 20.11±15.20 birds per household after 9 months birds was observed.

Keywords: Antibody titers, flock production data, serum

Résumé

Cette étude a été réalisée dans le village de Bulyansiime, district d'Iganga. Une enquête de référence a été menée pour déterminer le statut sérologique et la dynamique de troupeau des poulets fermiers. Elle a été suivie par la vaccination de tous les oiseaux de plus de 2 semaines et la collecte des sérums provenant d'oiseaux adultes après tous les 3 mois pour une période de 9 mois. Des tests de l'inhibition de l'hémagglutination ont été effectués pour déterminer le niveau des titres d'anticorps contre le virus de la maladie de Newcastle. Les données de la production du troupeau par ménage ont été enregistrées aux côtés de la vaccination et de l'exercice de collecte des sérums. Les résultats obtenus ont été comparés aux données de référence recueillies. Le pourcentage du troupeau adulte avec des titres d'anticorps sériques au-dessus du niveau de protection de log23 a augmenté, passant de 32% avant la vaccination à 100% au 9ème mois après la vaccination. Une augmentation

de la taille du troupeau de 10,83 ± 9,25 à 20,11 ± 15,20 d'oiseaux par ménage après les oiseaux de 9 mois a été observée.

Mots clés: Titres d'anticorps, données de production des troupeaux, sérum

Background

Village based projects have exhibited the potential of free range poultry to further transform the lives of rural poor through improved methods of management. These methods offer protection to chicks for the first two months and vaccination against New Castle disease (Alexander, 1990). Vaccination against New Castle disease leads to a reduction in poultry mortality (Alexander *et al.*, 2005). In order to ensure success of New Castle disease control programs, village based projects have included supply of NCD vaccines with adequate shelf life and active involvement of farmers in the vaccination programs (Alders *et al.*, 2010). Monitoring of these vaccination programs and diagnosis of New Castle disease is enhanced by the use of serological tests adapted to the conditions where vaccination is carried out (Tabidi *et al.*, 2004).

Literature Summary

Poultry provide households with income and animal protein in form of meat or eggs. They are considered to be very important for food security among rural communities. Poultry in rural communities are reared under semi-intensive and extensive systems. Rural poultry live a scavenging life with minimal input in terms of feed supplementation, housing and medical care. The semi-intensive system provides shelter to birds, which varies from the owners houses to makeshift housing placed in trees (FAO, 2008). Indigenous breeds of poultry reared under these systems have an average flock size of 10 (FAO, 2002). They tolerate adverse climatic conditions, are resistant to local diseases, exhibit highly pronounced broodiness and hatch their own brood. Females lay three clutches of 10-30 eggs per year. The weight gain and clutch size per hen per year in this production system is low (Alders *et al.*, 2010).

The thermostable vaccines were created by growing a homogenous population from a single infectious virus with the aim of selecting a vaccine virus that gives less vaccinal reaction and is thermal tolerant (Spadbrow, 2001). Vaccines from avirulent Australian New Castle Disease virus strainsV4 and I-2 have been created (Spadbrow, 2001). The I-2 can be used in rural communities because it is difficult to over dose with and has no evidence of respiratory signs or weight loss in chicks. In addition

I-2 is affordable and does not require refrigeration (Spadbrow, 2001).

Study Description

The study was carried out in Iganga District, Eastern Uganda. Based on the Livestock census data (UBOS, 2010), Iganga was selected from amongst the 27 highest poultry producing districts in the country by use of simple random selection.
With the help of the District Veterinary Officer, Sub-county Veterinary Officers, Community Development Officers, Local Council and Community leaders, the 18 Sub-counties in Iganga District were divided into three groups according to poultry production as high, medium and low. Using simple random selection, a Sub-county was chosen from the medium poultry producing group for the study. One Parish in the chosen Sub-county was selected, from which one Village with the lowest vaccination activity and without NCD out break during the previous six months was identified for the study.

Baseline surveys to establish the poultry vaccination history, demographics and strategies used by community members in diagnosis, treatment, control and prevention of New castle disease were carried out with the aid of a questionnaire. A maximum of 2mls of blood was collected from the wing veins of adult birds, placed in 4ml vaccutainer and placed on a bench for 12 hours to allow clotting. The sera obtained were tested for anti-NDV antibodies by Heamagglutination Inhibition Test. Titers ee $\log_2 3$ were indicative of protectivity. All birds above 2 weeks of age received I-2 Thermostable NCD vaccine by eye droplet method. Flock production records were taken concurrently with the vaccination and sera collection exercise.

Research Application

The percentages of antibody titers above protection levels of $\log_2 3$ in the flock pre vaccination were 32% and increased to 83%, 87% and 100% in the 3rd, 6th and 9th month respectively as shown in Table 1. The flock size and egg output per house hold increased from 10.83±9.25 birds to 20.11±15.20 birds and 6.16±8.41 to 9.26±10.31 respectively as shown in Table 2.

Table 1. Haemagglutination titers below and above or equal to protection levels of $\log_2 3$ pre and post vaccination.

Titre	Pre-vaccination	3-months	6 months	9 months
	N = 162	N = 120	N = 260	N = 278
Titred"$\log_2 3$	68	17	13	0
Titer >$\log_2 3$	32	83	87	100

Table 2. Showing flock production dynamics pre and post vaccination.

Category	Production dynamics			
	Pre-vaccination	3-months	6 months	9 months
Flock size	10.83	17.11	15.94	20.11
Cocks	0.90	0.99	1.36	1.41
Hens	3.81	5.26	6.56	10.09
Chicks	6.12	10.86	8.02	8.60
Egg output	6.16	6.96	7.63	9.26

Externalities such as predators, low food supply and harsh weather especially during rainy seasons affected the chick population.

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References

Alders, R. G. 2002. Strategies for vaccination of family Poultry against New Castle disease in Africa; Characteristics and parameters of family poultry production in Africa, *Results of a FAO/IAEA co-ordinated Research Programme on Assessment of the Effectiveness of Vaccination Strategies against New Castle disease and Gumboro disease using Immunoassay based Technologies for increasing Farmyard Poultry Production in Africa, Rome*

Alders, R.G. 2000. Strategies for vaccination of family Poultry against New Castle disease in Africa. Second IAEA/FAO Reasearch Coordination Meeting on Improvement of Health and Management of Family Poultry Production in Africa, Morogoro, Tanzania.

Alders, R.G., Bagnol, B. and Young, M. P. 2010. Technically sound and sustainable Newcastle disease control in village chickens: lessons learnt over fifteen years. *World's Poultry Science Journal* 66. doi:10.1017/s0043933910000516

Alders, R.G. and Bagnol, B. 2007. Effective communication: the key to efficient HPAI prevention and control. *World's Poultry Science Journal* 63:143-151.