Research Application Summary

Participatory control of Newcastle disease in village poultry using thermostable vaccines in Uganda

Byarugaba, D.K.[*1], Nakavuma, J.L. [1] & State, A.[2]
[1]Department of Veterinary Microbiology and Parasitology, Faculty of Veterinary Medicine, Makerere University, P. O. Box 7062, Kampala, Uganda
[2]Department of Sociology, Faculty of Social Sciences, Makerere University, P. O. Box 7062, Kampala, Uganda
Corresponding author: dkb@vetmed.mak.ac.ug

Abstract

Village poultry is one of those abundant assets for the rural poor in Uganda that could be utilized to eradicate poverty in the country since poultry farming addresses the needs of the underprivileged in society especially women and children. Newcastle disease has been identified as the principal disease limiting rural poultry production in low-income food-deficit countries (LIFDCs). The disease kills up to 70-100% of household poultry and therefore is a major constrain in village free-range poultry production. It causes heavy losses estimated between US$ 62 million and US$ 78 million per annum in Uganda. The available vaccines in the country are not suitable for the free-range village production system because their costs are high and administered in doses and require cold chain. Novel genotypes of Newcastle disease virus (NDV) strains have also been reported in Uganda recently which may result in vaccination failures. Although studies have demonstrated immense benefits that accrue from vaccination, there has not been a successful vaccination programme for decades in Uganda because of lack of suitable vaccines and lack of understanding of the challenges and therefore the opportunities for a successful vaccination strategy for the free-range poultry production system. This study will use participatory action research to understand the challenges and limitations that constrain effective Newcastle disease (ND) control among village rural poultry in Uganda and work closely with farmers and stakeholders to identify opportunities to effectively control of the disease.

Key words: Newcastle disease, Uganda, vaccines, village poultry

Résumé

La volaille du village constitue l'un de ces actifs abondants pour les pauvres ruraux en Ouganda, qui pourraient être utilisés pour éliminer la pauvreté dans le pays depuis que l'aviculture répond aux besoins des personnes défavorisées dans la société,

en particulier les femmes et les enfants. La maladie de Newcastle a été identifiée comme la principale maladie qui limite la production de l'aviculture rurale dans les pays à déficit alimentaire et à faible revenu. La maladie tue jusqu'à 70-100% de la volaille domestique et est donc une contrainte majeure dans la production de volaille fermière du village. Elle provoque de lourdes pertes estimées entre 62 millions de dollars US et 78 millions de dollars US par an en Ouganda. Les vaccins disponibles dans le pays ne sont pas compatibles avec le système de production fermière du village parce que leurs coûts sont élevés, ils sont administrés à des doses et nécessitent la chaîne de froid. Les nouveaux génotypes des souches du virus de la maladie de Newcastle (NDV) ont également été signalés récemment en Ouganda. Cela peut entraîner des échecs de vaccination. Bien que des études aient démontré d'immenses avantages qui découlent de la vaccination, il n'y eut pas un programme de vaccination depuis des décennies en Ouganda par manque de vaccins adaptés et par manque de compréhension des enjeux et donc les possibilités d'une stratégie de vaccination réussie pour le système de production de volaille fermière. Cette étude utilise la recherche-action participative pour comprendre les enjeux et les limites qui entravent le contrôle efficace de la maladie de Newcastle (ND) au sein de l'aviculture rurale en Ouganda et travaillent en étroite collaboration avec les agriculteurs et les intervenants afin de cerner les possibilités de lutter efficacement contre la maladie.

Mots clés: Maladie de Newcastle, Ouganda, vaccins, volaille du village

Background

Although vaccination offers the best control strategy for Newcastle disease, conventional vaccines are unsuitable for sustained use in village poultry production because of their cost, large dose preparations, thermolability and cold chain requirements (Spradbrow,1992). Thermostable vaccines, such as V-4 and I-2, are not yet available in Uganda and only limited immunological tests on the I-2 have been done. Also the challenges for successful and sustainable vaccination strategies have not been investigated. Vaccination failures have also been reported in some countries due to differences in the vaccines used and the circulating virulent NDV (Seal *et al*., 2005). A novel genotype of NDV that does not cluster with any strains in the world, not even in the East Africa region, may also result in vaccine failures, has also been reported in Uganda (Otim *et al.*, 2004) although cross-protection of ND vaccines is well

known. Little success has been attained in Uganda to contain this disease and the population continues to incur losses ranging between US$ 62 million and US$ 78 million per annum. Besides the technical problems mentioned above, there are also socio-economic issues that have not been well investigated that limit successful and sustainable vaccination programmes. The knowledge, attitudes and practices of the communities with regard to ND vaccination has not been extensively studied and this seriously limits successful and sustainable vaccination programmes of free-range poultry which form 80% of the national flock. The purpose of this study is to identify opportunities for successful and sustainable ND vaccination strategies among communities for the free-range poultry production system in Uganda.

Literature Summary

Newcastle disease is a highly contagious disease affecting chickens and other poultry species and wild birds. It often devastates unvaccinated flocks in periodic outbreaks. It usually results in 70-100% mortalities, which is a huge loss to the households (Mukiibi-Muka, 1992). It is caused by RNA viruses of the Avian Paramyxovirus serotype 1 (APMV-1) (synonym: Newcastle disease viruses). A novel genetype has been reported among NDV isolates from Uganda (Otim *et al*., 2004). Newcastle disease in village chickens is attributed to birds that are shedding virus during and after incubation or post vaccination. It has been suggested that outbreaks that occur in the dry season are not because the virus survives better under these conditions but because villagers have more time and move around quite a lot with chickens in markets and to friends carrying the virus with them (Spradrow, 2001). The major source of infection of ND is the introduction of new birds to a flock. Markets also serve as a common source of Newcastle disease infection, sometimes through the random sale of infected birds during outbreaks to salvage those not yet showing clinical signs (Otim *et al*., 2007). Recent assessment of the effect of vaccination in village poultry in Uganda showed a flock size increase significantly higher than in unvaccinated flocks (Nahamya *et al*., 2006). Understanding the knowledge, attitudes, and practices as well as involving farmers in solving their problems is critical in successful implementation of programmes in the communities, an aspect that has many times been ignored in purely biomedical research.

Study Description

An action research methodology will be employed in this study embracing the principles of participation and reflection as well

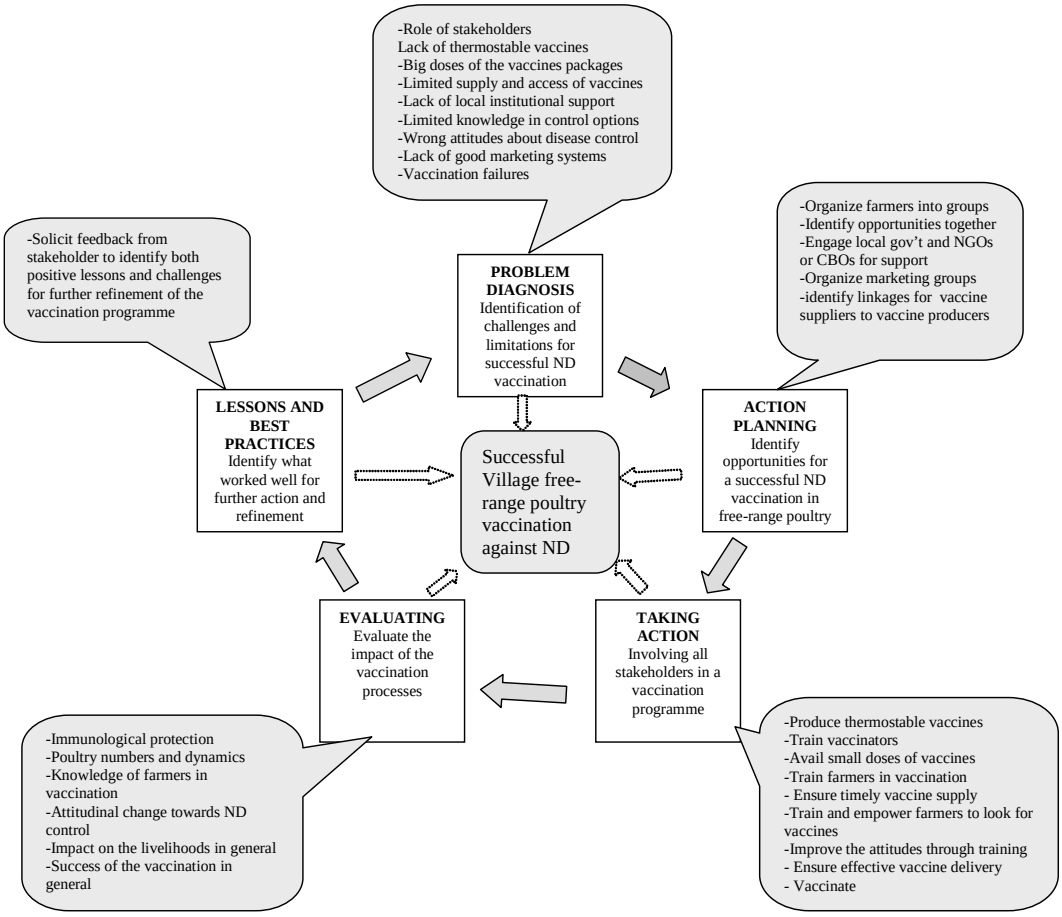

Figure 1. Conceptual framework for the study.

as empowerment and emancipation of people and groups with regard to arriving at strategies for a successful and sustainable vaccination programme for ND of free-range village poultry in the communities. The study will involve wide groups of stakeholder and actors in Newcastle disease control. The study will involve qualitative, quantitative and experimental data collection methodologies to address the research problem. Qualitative methods will be used to understand the challenges and limitations that constrain effective Newcastle disease (ND) control among village rural poultry in Uganda. A KAP study component will be used to establish the basic information of current knowledge, attitudes and practices that will also identify the current challenges and limitations that constrain successful vaccination programmes. The process will lead to participatory identification of opportunities for successful and sustainable control strategies of the disease. Quantitative methods will be used to collect poultry production data both before and after

vaccination to evaluate the impact of vaccination. Experimental methods will be used to produce the thermostable vaccines as well as evaluation of the immunological protection of the vaccinated poultry. The study will start with a stakeholder analysis to identify all the stakeholders and their roles in a successful vaccination programme for ND in village communities. The study will be conducted in Iganga district in eastern Uganda.

Research Application

Vaccination is the best tool for controlling ND in poultry. The study hopes to identify the opportunities that exist to control this disease in communities. This is expected to increase poultry production and thus enhance people's livelihoods.

Acknowlegement

This study is financed by the Regional Universities Forum for Capacity Building in Agriculture.

References

Mukiibi, M.G. 1992. Epidemiology of Newcastle disease and the need to vaccinate local chickens in Uganda. pp. 155-163. In: Spradbrow, P.B. (Ed.). Newcastle disease in village chickens: control with thermostable oral vaccines. Proceeding no. 39 of the International Workshop held in Australia Centre for International Agricultural Research. Australian Center for International Agricultural Research, Canberra, Australia

Nahamya, F.H, Mukiibi-Muka, G., Nasinyama, G.W. and Kabasa, J.D. 2006. Assessment of the cost effectiveness of vaccinating free range poultry against Newcastle disease in Busedde sub-county, Jinja district, Uganda. *Livestock Research for Rural Development.* Volume 18, Article No. 158. Retrieved August 30, 2010, from http://www.lrrd.org/lrrd18/11/naha18158.htm

Otim, M.O., Christensen, H., Jørgensen, P.H., Handberg, K.J, Bisgaard, M. 2004. Molecular characterization and phylogenetic study of newcastle disease virus isolates from recent outbreaks in eastern Uganda. *J Clin Microbiol*. 42(6):2802-5.

Otim, M.O., Kabagambe, E.K., Mukiibi, G.M., Christensen, H. and Bisgaard, M. 2007. A study of risk factors associated with Newcastle disease epidemics in village free-range chickens in Uganda, *Trop. Anim Health and Prod.*39(1): 27-35.

Seal, B.S., Wise, M.G., Pedersen, J.C., Senne, D.A., Alvarez, R., Scott, M.S., King, D.J., Yu, Q. and Kapczynski, D. R. 2005. Genomic sequences of low-virulence avian

paramyxovirus-1 (Newcastle disease virus) isolates obtained from live-bird markets in North America not related to commonly utilized commercial vaccine strains. *Vet. Microbiol*. 106:7-16.

Spradbrow, P.B. (Ed.). 1992. Newcastle disease in village chickens: control with thermostable oral vaccines. Proceeding no. 39 of the International Workshop, Australia Centre for International Agricultural Research. Australian Center for International Agricultural Research, Canberra, Australia.