

## Outbreak of Viscerotropic Velogenic form of Newcastle disease in vaccinated six weeks old pullets

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### Abstract

An outbreak of very virulent form of Newcastle disease in 6 week old pullets is reported. The flock was vaccinated against Newcastle disease with Newcastle disease vaccine intra ocular at the hatchery and Newcastle disease vaccine Lasota at 4weeks of age at the farm. The signs noticed by the farm Manager were yellowish and greenish watery faeces, weakness and decrease in feed consumption. Response to treatment with Bioxin<sup>®</sup> (oxy tetracycline) was poor. The sick birds never recovered. The gross lesions observed were: Necrosis of the gastrointestinal tract (Payers patches), caecal tonsils and bursa of fabricius. The disease lasted for 11 days and the mortality rate was 99.7%. The high mortality rate suggested that the vaccine had failed to immunize the birds against Newcastle disease and the birds were highly susceptible and had been infected with a very pathogenic strain of Newcastle disease virus.

*Key words:* Velogenic Newcastle Disease, Vaccine, Pullets and Mortality

### Introduction

Newcastle disease (ND) is an acute contagious and pathogenic disease of poultry (Heath *et al.*, 1991). The mortality rate can be up to 100% and it is considered to be among the most important viral diseases of poultry in the World (Heath *et al.*, 1991; Alders and Spradbrow, 2001). The disease is characterized by respiratory signs, Nervous manifestation and diarrhoea (Alexander, 1990). Different isolates and strains of the virus may produce enormous variations in the severity of the disease in a given host even the chicken (Alexander, 1997). The first documented outbreak of the disease occurred between December 1952 and February 1953 in and around Ibadan (Hill *et al.*, 1953). Since then the disease has been reported to endemic in both Local and Commercial poultry with annual epidemics being recorded in highly susceptible poultry flocks (Adu *et al.*, 1986; Sa'idu *et al.*, 1994; Halle *et al.*, 1999; Orajaka *et al.*, 1999). ND was also described as one of the most economically important disease of poultry in Nigeria (Okeke and Lamorde, 1988). The disease was also reported to be more common during the dry harmattan period (Sa'idu *et al.*, 1994; Halle *et al.*, 1999) and the stress of the harmattan period is

known to worsen the out come of the disease (Abdu *et al.*, 1992).

Newcastle disease vaccines have been of considerable value in reducing losses from the disease in general (Philip, 1973; Allan *et al.*, 1978.; Shamaki *et al.*, 1989). However the disease continues to occur in both vaccinated and unvaccinated flocks (Halle *et al.*, 1999; Sa'idu *et al.*, 2006). This paper reports an outbreak of the viscerotropic velogenic form of Newcastle disease in a vaccinated flock in due to vaccine failure.

### Materials and Methods

On presentation, the flock history was obtained, the farm was visited and the clinical signs observed were recorded, Post mortem (P M) examination was conducted on dead birds. The flock was monitored on daily basis throughout the course of the disease and the daily morbidity and mortality were recorded. Ten birds were selected randomly and bled through the wing vein at the onset of the disease and three weeks after on set of the disease. Extra vials of the Newcastle disease vaccine and Gumboro disease vaccines used were obtained from the farm manager. Five Local chickens and five 6 week old chickens were used for vaccine trials .The birds were bled before vaccination and 2

weeks post vaccination. Serum was separated from the blood by centrifugation at 2000 rpm for 10 minutes. The sera were used for haemagglutination inhibition (HI) test as described by Allan and Gough (1974) Allan *et al.* (1978). The antigen used for the HI test contain 4 HA units. The sera were also tested for antibodies to Infectious bursal disease by the Agar gel precipitin test (AGPT) as described by Hirai *et al.* (1972) and Wood *et al.* (1979). Bursa of fabricius of birds that suffered from typical Infectious bursal disease (IBD) was used as positive antigens for the AGPT. The sera were also tested for antibodies to Salmonella and Mycoplasma by the rapid plate test. Sections of the intestine and caeca were taken for parasitological examination.

## Results

### History

A total of 5,054 day old Lohman brown chicks were bought from S and D farms Abeokuta. They were divided into 2 and housed in two different pens (1 and 4). Pen 1 contains 2542 and pen 4 contains 2512 chicks. The following drugs were used before the outbreak, Tetroxy<sup>®</sup> (oxytetracycline) within the first week, Vitaperos<sup>®</sup> (vitamins and minerals) for 5 days at 2 weeks, FuraprolR (Furaltadone 20% and Amprol 20%) for 5 days at 3 weeks Vitaperos<sup>®</sup> for 3days at 4 and 5 weeks of age. In addition the birds were vaccinated against ND with ND vaccine intra ocular (i/o) at the hatchery and on the farm, NDV Lasota at 4weeks and Gumboro disease vaccine at 2 and 5 weeks of age. The vaccines were purchased directly from the manufacturer. The birds were fed with Sjlver<sup>®</sup> feed *ad libitum*.

The signs observed by the farm manager were yellowish and greenish watery faeces, Weakness, Sleepiness and decrease in feed consumption. Response to administration of Bioxin<sup>®</sup> (oxytetracycline) in drinking water was poor and sick birds never recovered. The disease was first noticed in house 1 and by the sixth day after onset of the disease it spread to house 4.

### Clinical Examination

Yellowish or greenish diarrhea, anorexia, weakness, somnolence, dropped beak prostration, severe depression, dehydration, abnormal respiration and

trembling were noticed at the onset of the outbreak. Later tracheal rales, sneezing, gasping, coughing and clonic spasms were also noticed. Towards the end of the outbreak the remaining birds showed circling, trembling, torticollis and star gazing. The mortality pattern is shown in table 1. The total mortality was 99.7% and the disease lasted for 11days and most of the death (80%) was recorded on the 5th day (house 4) and on the 9th day (house 1) after onset of the disease.

### Post Mortem Examination

The trachea, lungs, pancreas, thymus and muscles were congested. There were haemorrhages in the trachea, proventriculus, duodenum, jejunum, ileum, caeca, caecal tonsils and bursa of fabricius. Necrosis was observed in the gastrointestinal tract (Peyers patches areas), caecal tonsils and bursa of fabricius, other gross lesions seen were ascites, caecal cores, regression of the bursa and enlargement of the spleen, liver and kidneys.

### Laboratory Findings

Antibodies to Salmonella and Mycoplasma were not detected. However 82% of the birds tested had antibodies to Gumboro disease. At the onset of the outbreak the mean HI antibody titre to ND was low ( $\leq \log_2, 2.6$ ). The mean antibody titre to ND however increased three (3) fold, 3 weeks after the onset of the disease. ( $\geq \log_2, 9.0$ ). Very few coccidian oocyst were seen in the intestinal content and *Histomonas* specie were present in the intestinal and caecal segments. The antibody titre to Gumboro disease in experimentally vaccinated birds was low ( $\leq \log_2, 2.0$ ) at 2 weeks post vaccination and the HI titre for ND was equally low ( $\leq \log_2, 4.0$ ) (Table 2).

### Treatment

Furaprol<sup>®</sup> at the dose rate of 5 gram per 5 litres of drinking water for 7 days

### Advice

The client was advised to ensure day old vaccination against ND and 3 weeks with Lasota rather than 4 weeks of age. He was also advised to sero-monitor the birds before and 2 weeks post vaccination to ensure that they have produced enough anti-bodies that will ensure they are well protected when exposed to pathogenic ND.

Table 1:

Course and mortality rate of the Newcastle disease in vaccinated pullets.

House	Course of the disease in days	Mortality rate ( % )
1	11	99.7
4	10	99.7

Table 2: Comparison of antibody response of chickens vaccinated with Newcastle disease Vaccine (Lasota), Gumboro vaccine and chickens suffering from Newcastle disease

Type of birds	Mean HI antibody titre log <sub>2</sub>		Mean antibody titre to Gumboro disease log <sub>2</sub>	
	Pre-vaccination	2weeks post vaccination	Pre-vaccination	2 weeks post vaccination
Improved chickens	2.0	3.3	-	2.0
Local chickens	2.1	3.8	-	0.4
Sick chickens	At onset of the disease	3 weeks Post on set	At onset of the disease	3 weeks Post on set
	2.6	10.2	-	0.4

## Discussion

The chicks were susceptible to ND at the onset of the outbreak despite prior vaccination 11 days earlier, because the antibody level in the sera of the chicks were similar to those of the birds that have not been vaccinated against ND or exposed to ND previously (OIE, 1996). It was either that the vaccines used contain very low viral titres or the birds failed to respond to the vaccination. The most likely reason was the former based on the antibody response of the vaccinated birds as the mean HI titre expected in vaccinated birds ranges from log<sub>2</sub>, 4.0 – log<sub>2</sub>, 6.0 (Alexander, 1990; OIE, 1996). The clinical signs, mortality rate and post mortem lesions are similar to what was reported in birds infected by the Viscerotropic Velogenic ND virus (Alexander, 1990). The histomonas and the coccidian oocyst seen in intestinal sections in this case might have been complications following infection with the viscerotropic velogenic ND virus. It is well known that *Histomonas meleagridis* is a primary cause of disease in turkeys and occasionally in chickens and other species of birds (Tress, 1990). Treatment was not reviewed because the furaprol contain drugs active against coccidian, histomonas, gram negative and positive bacteria. This report highlights the need to conduct pre and post vaccination serology.

## References

Abdu, P.A., Mera, U.M. and Sa'idu, L. (1992). A study of chicken mortality in Zaria, Nigeria. In: *Proceedings of National Workshop on Livestock and Veterinary Services, held at the National Veterinary Research*

*Institute, Vom. 11th – 14th August, 1992.* pp. 51 -55.

Adu, F.D., Edo, U and Sokale, (1986). Newcastle disease: The Immunological status of Nigerian Local chickens. *Tropical Veterinarian. 4:* 149 – 159.

Alders, R. and Spradbrow, P.B. (2001). Controlling Newcastle disease in Village chicken. *A field Manual.* Australian Centre for International Agricultural Research. Monograph No. 82. p. 37.

Alexander, D.J. (1990). Newcastle disease and others. In: (Jordan, F. T., editor) *Poultry Diseases (3rd edition).* ELBS/Bailliere Tindall, London. pp. 121 – 146.

Allan, W.H. and Gough, R.E. (1974). A standard haemagglutination inhibition test for Newcastle disease (1). A comparison of Macro and Micro Methods. *Veterinary Record. 95:* 120 – 123.

Allan, W.H., Lancaster, J.E. and Troth, B. (1978). *Newcastle disease vaccines; their production and use.* Animal Production series No. 10. FAO, Rome, Italy.

Halle, P.D., Umoh, J.U. Sa'idu, L. and Abdu, P.A. Prevalence and seasonality of Newcastle disease in Zaria, Nigeria. *Tropical Veterinarian. 17:* 53 – 62

Heath, B.C., Lindsey, M.S., McManus, K.P. and Claxon, P.D. (1991). Webster's Newcastle disease vaccine for village chickens. In: (Spradbrow, P. B., editor) *Newcastle Disease in Village Chickens.* Australian Centre for International Agricultural Research, Canberra. No. 39. p. 103.

- Hill, D.H., Davis, O.S. and Wilde, J.K. (1953). Newcastle disease in Nigeria. *British Veterinary Journal*, **109**: 381 – 385.
- Hirai, K., Shimakura, S. and Hirota, M. (1972). Immunodiffusion reaction of avian infectious bursal disease virus. *Avian Diseases*, **16**: 961 – 964.
- OIE. (1996). Standards for diagnostic tests and vaccines. In: (D.J. Alexander, editor) *A Laboratory Manual for the Isolation and Identification of Avian Pathogens*. American Association of Avian Pathologists, Florida, USA. pp. 156 – 163
- Okeke, C.N. and Lamorde, A.G. (1988). Newcastle disease and its control in Nigeria. In: (W.A. Olufemi & W.N. Masiga, editors) *Viral Diseases of Animals in Africa*. OAU/CTA Publication. pp. 283 – 287.
- Orajaka, L.J.E., Adene, D.F., Anene, B.M. and Onuoha, E.A. (1999). Seroprevalence of Newcastle disease in Local chickens from south east derived savannah zone of Nigeria. *Revue d' Elevage Medicine veterinaire des Tropicaux*. **52**: 185 – 188.
- Phillips, J.M. (1973). Vaccination against Newcastle disease. An assessment of Haemagglutination inhibition titres obtained from field samples. *Veterinary Record*. **93**: 577 – 583.
- Sa'idu, L., Abdu, P.A., Tekdek, L.B. and Umoh, J.U. (2006). Newcastle disease in Nigeria. *Nigerian Veterinary Journal*. **27**(2): 23 – 32.
- Sa'idu, L., Abdu, P.A., Umoh, J.U. and Abdullahi, U.S. (1994). Diseases of Nigerian Indigenous chickens. *Bulletin of Animal Health and Production in Africa*. **42**: 25 – 30.
- Shamaki, D., Durojaiye, O.A. and Ojeh, C.K. (1989). Immunogenicity of Newcastle disease vaccines used in Nigeria. *Zariya Veterinarian*, **4**: 19 – 24.
- Trees, D.J. (1990). Parasitic Diseases. In: (F.T.W. Jordan, editor) *Poultry Diseases (3rd edition)*. ELBS/Bailliere-Tindall, London. pp. 226 – 253.
- Wood, G.W., Muskett, J.C., Hebert, C.N. and Thornton, D.H. (1979). Standardization of the quantitative agar gel precipitin test for infectious bursal disease. *Journal of Biological Standards*, **7**: 89 – 96.