

Newcastle Disease Outbreak and Intervention in a Chicken Flock with Unknown History: A Case Report

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Abstract

Newcastle Disease (NCD) is a highly contagious and economically damaging viral disease that affects chickens all over the world. It is marked by high mortality, which in unvaccinated flocks reaches 100%. This case study describes an NCD outbreak at a small-scale poultry farm in the Bela sub-city of Addis Ababa, Ethiopia. This farm began with 75 chickens with no previous flock history. When the owners visited the veterinary teaching hospital in Bishoftu, 15 chickens were died and 10 chickens were sick with a history of reduced feed intake, coughing, wing dropping, neck twisting, and incoordination. In addition, there were greenish watery diarrhea and depression. Hemorrhages in the trachea, gut, proventriculus, and cloaca were discovered during post-mortem examinations for gross pathological evaluation on two of the sick chickens. To save the lives of the remaining chickens and prevent economic losses, enrofloxacin oral suspension (1 ml per one liter of drinking water) was administered to 10 chickens with evident clinical signs for 5 days in a row. All fifty eight chickens were administered resergen oral immune stimulant suspension at a dose of 1 g/5 lit until excellent progress was warranted. Finally, the remaining 27 chickens healed completely and began producing eggs. Thus, to avoid economic harm to the farm or perhaps the country, poultry farming should be done using flocks that have a recognized history.

Keywords: Enrofloxacin • Immune stimulant • Newcastle disease • Proventriculus • Cloaca

Introduction

Newcastle disease is well known by its most significant and economically important disease in the poultry industry worldwide. Chickens are particularly susceptible species and morbidity and mortality rates can reach up to 100%. In developing countries outbreaks in backyard chickens have a great impact on in chickens health [1,2].

Newcastle Disease Virus (NDV), also called avian paramyxovirus serotype 1, is the causative agent of new castle disease. This virus is belongs to the genus *Avula* and family *Paramyxoviridae*. NDV is enveloped, single-stranded negative sense RNA virus and has approximately 15 kb genome that contains six genes encoding major structural proteins and the main protein that contribute for the pathogenesis NCV is F protein precursor as well as the presence of a number of basic residues in the fusion protein cleavage site According to their pathogenicity these virus can be categorized into three main groups. velogenic strains, highly pathogenic one, cause severe intestinal lesions with neurological disease, resulting in high mortality in chickens. Mesogenic viruses have intermediate virulence and cause respiratory disease. The lentogenic isolates do not usually

cause any disease in adult birds and are considered to be mildly virulent or avirulent [3,4].

Newcastle disease is transmitted through direct contact with infected birds. When infected birds are introduced into susceptible flocks all birds will be infected within 2 to 6 days. Aerosol transmission is another important route of transmission. This disease can affect around 230 species of birds including poultry. NCD also can cause conjunctivitis in human because it has mild zoonotic importance [5].

Various clinical signs are present in NCD affected animal that depend on the virulence and tropism of the NCD virus involved, the species, age of host and the immune status of the host and environmental conditions. Initial clinical signs vary but include anorexia, lethargy, ruffled feathers, edema and injection of conjunctiva. As the disease progresses, birds may develop watery greenish or white diarrhea, and dyspnea. In later stages of the disease, neurologic signs including; wing/leg paresis or paralysis, tremors, spasms, torticollis and aberrant circling behavior are evident. In layers sharp egg drop abnormalities in egg can be seen [6,7].

Clinical diagnosis is made based on history, clinical signs and post mortem findings to establish a strong tentative diagnosis but many

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other diseases like infectious bronchitis, infectious laryngotracheitis and avian influenza can have similar characteristics. Therefore, the laboratory confirmation by diagnostic assays such as Enzyme Linked Immune-Sorbent Assay (ELISA), Haemagglutination (HA) and Haemagglutination Inhibition (HI) test, virus neutralization test, plaque neutralization test and Reverse-Transcriptase Polymerase Chain Reaction (RT-PCR) are used for confirmation of the ND virus [8-10]. Real-time PCR is now one of the most important techniques for the detection and monitoring of NCV infections because real-time PCR is sensitive and specific in a rapid format [11].

The general approaches to the control of Newcastle disease are sanitization (cleaning, disinfection, limiting access to wild birds and personal hygiene) and vaccination, which is the most effective way. As a treatment no specific treatment is found for Newcastle disease but antibiotics can be given for 3-5 days to prevent secondary bacterial infections like *E. coli* [6,12].

Therefore the objective of this case report is to show the diagnosis and treatment approaches and the impact of those interventions towards New Castle outbreak in a small scale farm.

Case Presentation

On January 12, 2021, two owners arrive with their two chickens, which have been severely affected by an unknown disease that has spread over their farm in Addis Ababa's Bela sub-city. There were 75 chickens in the farm, but 15 of them were dead when they arrived at the veterinary teaching hospital in Bishoftu, Ethiopia and 10 chicks suspected of having the same condition were isolated. Reduced feed intake, coughing, wing drooping, and some of them twisting their necks were the main complaints. Because the chickens were purchased from a local market (with no flock records), no information regarding vaccination history, age or breed was available. The chickens showed depression, wing and limb paralysis, incoordination, and greenish watery diarrhea during physical examination at the veterinary teaching hospital. The two chickens were subjected to a post-mortem examination after an in-depth clinical examination, which revealed hemorrhage in the trachea, gut, proventriculus, and cloaca. When the flock became ill, they used oxytetracycline antibiotics and vitamins, even though they were unaware of its usage. The owners are aware of biosecurity precautions in theory, but they do not have a foot bath or working protective clothing and shoes. The case was tentatively identified as Newcastle disease (NDV) based on the history, clinical signs, pathological findings, and farm visit (Figures 1 and 2).



Figure 1. Infected chickens in VTH during the first visit. A.Status of the flock during the course of the diseases; B.Diseased chickens in

isolation area; C. Some of them were with twisted neck; D.Loss of coordination.



Figure 2. A.Tracheal hemorrhage; B.Slight hemorrhage in proventriculus; C.Hemorrhage in the intestine; D.Petechial hemorrhage in cloaca.

Results

Laboratory diagnosis

For further confirmation of the case, pulled tracheal and cloacal samples were taken by using sterile swab from affected chickens and virus transporting media (VTM) was used to collect and store the sample until processes. Then Real-time reverse transcriptase polymerase chain reaction (RT-PCR) confirmatory diagnosis was done at National Animal Health Diagnostic Center (NAHDIC), Sebeta. This test indicated the cycle threshold (CT value, the number of cycles required for the fluorescent signal to cross the threshold) of the positive control show a value of 25.71 and 23.26 was the sample CT value, this indicates the sample is positive for Newcastle disease. Therefore, the laboratory finding complemented the tentative diagnosis and confirmed the chickens were affected by NCD (Figure 3).

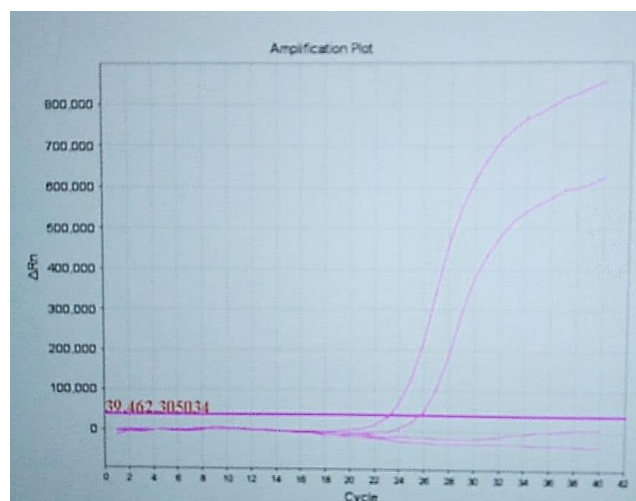


Figure 3. RT PCR result in graph: Two lines moving up from which the first one is the positive control (known sample having Ct

value=23.26) and the other consecutive one is the target sample (unknown one with Ct value=25.71).

Below the cut off line (Ct value greater or equal to 35), there is a negative control lying on the horizontal straight line.

Case management and out come

The disease was tentatively diagnosed as new-castle disease after physical and post-mortem examinations. As a result, the treatment was targeted at reducing secondary bacterial problems, reducing environmental stress, and increasing immunity. To reduce secondary bacterial complications, enrofloxacin (ashienro 10%) oral suspension 1 ml per liter of drinking water was given to 10 diseased chickens for 5 consecutive days, and an immune stimulant called Resurgen (Quadrigen Vet Health Pvt. Ltd) oral suspension containing essential oils, vitamin E, and selenium was given to all 58 chickens in a dose of 1 g/5 lit until good progress was being made. After the first fatality, two or three deaths each day were documented. Even though the mortality rate reached 64%, the deaths stopped a few weeks later, and the surviving flock returned to normal status. The owners were also given tips on how to raise chickens and how to avoid and treat NCD and other poultry illnesses. After two months, the flock's physical conditions as well as the size of the layers returned to normal, and they began to lay eggs (Figure 4).



Figure 4. The status of chickens after the treatment.

Discussion

Newcastle disease in these clinically affected chickens involves different systems and organs. Signs associated with GIT include anorexia and diarrhea, signs associated with respiratory signs like coughing and signs associated with nervous symptoms like paralysis of wings and legs, twisting of neck were highly visible signs. These clinical signs are in line with the clinical signs listed by Bhaiyat, et al. [13]. The post mortem findings indicate the presence of hemorrhage in gastrointestinal tract and respiratory tract that include tracheal, periventricular and cloacal hemorrhage. This is in agreement with the review of Alexander DJ, et al. [6].

From prevention and control perspective as vaccination history of the flock is not known because the flock was brought from a local market, two possible scenarios can be proposed about the mortality of the affected flock. This idea is in line with Usman M report. The

second one is as many reports the mortality rate of NCD in unvaccinated flock can reach 100%, but in this case the mortality was 64%. This may be due to the vaccination of the remained flock, protect them from more complicated case and mortality because as Abdisa and Tagesu review says that ND vaccination usually protects the bird from the more serious consequences of disease in the presence of the virus [13,14].

Regarding vaccination the challenge in this small scale farm is about the vaccine itself. As the remained flock has to be vaccinated protecting the proper vaccination procedure is very important for its effectiveness but challenges are present like the vaccine is prepared for high numbered flock but to overcome this challenge local traders are taken as a choice to get the vaccine in the available flock number but still management problem like transportation and vaccine handling were the challenges this idea is agree with Alders, Abdisa and Tagesu study and review [7,14].

Enrofloxacin was used in this case to combat secondary bacterial complications. The reason behind was that the flock was previously treated with oxytetracycline groups therefore to change the mechanism of fighting against the secondary bacterial complications; Fluoroquinolones group of drug was used. The other reason was this group of drugs has a very good action in different body systems including GIT and respiratory systems; this is in agreement with Sahu and Saxena [15-18].

Conclusion

The aim of the vitamin treatment was in order to boost the immune system, reduce the signs related to nervous system, gastrointestinal and muscular system. There for immune-modulant called Resergen was administered because it has essential oils and significant amount of vitamin E (10 g) and selenium (100 ppm). According to different author's vitamin E is one of the most effective nutrients known to modulate immune system to fight off invading bacteria and viruses, used as nature's most effective antioxidant for prevention of encephalomalacia, in a specific role with selenium, for prevention of exudative diathesis as well as prevention of nutritional muscular dystrophy.

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References

1. CFSPH. "Newcastle disease." 8(2016): 1-9.
2. Narayanan, MS, Parthiban M, Sathiya P, and Kumanan K, "Molecular Detection of Newcastle Disease Virus using Flinders Tehnology Associates-PCR." *Vet Arh* 80(2010): 51-60.
3. Miller, PJ and Afonso CL. "Newcastle Disease Virus." (2011).
4. Mulisa, DD, Kiros MK, Alemu RB and Keno MS, et al. "Characterization of Newcastle Disease Virus and Poultry-handling Practices in Live Poultry Markets, Ethiopia." *Springerplus* 3(2014): 1-6.
5. Yune, N and Abdela N. "Update on Epidemology, Diagnosis and Control Technique of Newcastle Disease." *J Vet Sci Technol* 8(2017): 1-6.

6. Getabalew, M, Alemneh T, Akeberegn D, and Getahun D, et al. "Epidemiology, Diagnosis & Prevention of Newcastle Disease in Poultry." *Am J Biomed Sci Res* 3(2019): 50-59.
7. Alders, R and Bagnol B. "Controlling Newcastle Disease in village chickens in Mozambique." 21(2001).
8. Bhutia, LD, Rajkhowa T, Arya RS. "Occurrence of Newcastle Disease in Poultry Population of Mizoram, India." *Indian J Vet Pathol* 41(2017): 151.
9. MSD. "Important poultry diseases -MSD Animal Health." 2012.
10. Mesfin, Z and Bihonegn T. "New Castel Disease in Ethiopia: A Review." *Int J Adv Res Biol Sci* 5(2018):95-102.
11. Al-Habee, MA, Mohamed MHA and Sharwi S. "Detection and Characterization of Newcastle Disease Virus in Clinical Samples Using Real Time RT-PCR and Melting Curve Analysis Based on Matrix and Fusion Genes Amplification." *Vet World* 6(2013): 239-243.
12. Butcher, GD, Jacob JP, and Mather FB. "Common Poultry Diseases." (2018).
13. Ashraf, A and Shah MS. "Newcastle Disease: Present Status and Future Challenges for Developing Countries." *Afr J Microbiol Res* 8(2014): 411-416.
14. Abdisa, T and Tagesu T. "Review on Newcastle Disease of Poultry and its Public Health Importance." *J Vet Sci Technol* 8(2017): 1-7.
15. Sahu, R and Saxena P. "Antibiotics in Chicken Meat." Centre for Science and Environment, New Delhi. (2014):1-36.
16. Moriguchi, S and Kaneyasu M. "Role of Vitamin E in Immune System." *J Clin Biochem Nutr* 34(2003): 97-109.
17. Lewis, ED, Meydani SN, and Wu D. "Regulatory Role of Vitamin E in the Immune System and Inflammation." *IUBMB Life* 71(2019): 487-494.
18. Scott, ML. "Vitamin E in Health and Disease of Poultry." *Vitam Mineral* 20(1962): 621-632.

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