Management System and the Prevalence of Infectious Bursal Disease (IBD) in Semi-Traditional Layer Type Poultry Farms in Sudan

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Abstract

This study was conducted during the period 2006 – 2007 in 107 commercial layer poultry farms to investigate the management systems in semi-traditional poultry farms in and around Khartoum state-Sudan. Infectious bursal disease (IBD) prevalence in these farms was also studied. Data were collected from poultry owners, veterinarians supervise on these flocks, labours work in the farms and through direct visits. Data carefully recorded by filling in two separate data sheets and semi-structured interview showed that: the size of 52 (48.6%) of the flocks was ranged between 2001 – 5000 birds. The majority, 67 (62.6%) farmers, were reared 2 to 3 flocks during the last year. Hisex and Bovans were the most common layer type strain preferred by the poultry farmers (30 and 26 farms, and represented 28% and 24.3% of the total poultry flocks respectively. Fivty two (48.6%) of the farmers were cleaned the poultry house weekly while 26 (22.3%) did so once a month. One hundred and three (96.3%) of the farmers disinfected the poultry house before entrance of each new chicks flock. The distance between poultry houses was less than 200 meters in 62 (57.9%) of the surveyed farms. The poultry houses in 85 (79.1%) of the farms allowed wild birds and rodents to enter and 48 (44.8%) allowed visitors. 85 (79.1%) of the farmers discarded chickens litter by carrying it outside the farm by a lorry and 48 (44.8%) of them did not burial or burn dead birds. Twenty seven (25.2%) of the farmers had no water source inside the farm and brought the water from outside. Ninety two (86%) of the farmers did not wash the drinkers daily and 27 (25.2%) of them did not keep regular records. All flocks surveyed in the present study were vaccinated against infectious bursal disease (IBD). One hundred and six (99.1%) of them were vaccinated twice. Forty seven (43.9%) of which were vaccinated without testing the birds to determine the maternally derived antibodies (MDA) and hence predicting the vaccination schedule. Thirty two (29.9%) of the flocks were infected with infectious bursal disease virus (IBDV). The infection in 43 (40.2%) of them

occurred at the age above six weeks of age and causing mortality of less than 9% in 50% of the infected flocks. Hisex strain of chickens was found to be the most susceptible layer strain to IBD since 42.3% of Hisex flocks were infected.

Keywords: *disinfection, Farming system, IBD, hygiene, layer flock, poultry house, vaccination,*

Introduction

Commercial poultry industry has become one of the most popular and visible enterprise because of its less financial investment input and quick retain under semi-traditional poultry farming system. In Sudan poultry production has reached an advanced stage, and considered to be self sufficient at the present in a way that no poultry meat or table eggs are imported. More than seven large scale modern poultry farms have been established around Khartoum state during the last decade. In spite of the modern poultry farms, semi-traditional poultry farms remain steady supplier of a considerable part of chicken meat and table eggs to local market.

It is troublesome to attain the peak of production in poultry flocks overcoming several constraints such as diseases, vaccination failure, feed adulteration...etc **(17)**. Out of these constraints, diseases and management are the main hurdles to the health and productivity in poultry industry **(14)**. Diseases outbreaks remain the greatest single cause of local chickens mortality in Kenya **(15)**. Conditions that affect poultry in Tanzania include Gumboro disease, fowl typhoid, colibacillosis and infectious coryza which occasionally cause mortality **(12)**.

IBDV is a major poultry pathogen in poultry industry **(10)**. Since 1987 acute and severe IBD outbreaks have been reported in Europe **(6)**, the disease is endemic in the most parts of Great Britain **(22)**. Meddle East **(18)**, Asia **(3)**, Latain America **(5)** and Africa **(9)**. **(2)** reported IBD as a second most poultry disease that cause mortality in the Sudan. . A high incidence of the disease among cases submitted to the veterinary hospitals was reported by **(19), (7)**.

Chickens infected with IBDV shed the virus in their feces. Feed, water, and chickens in the house become infected by ingestion of the virus **(8)**. The virus is highly resistant to physical and chemical agents, and can persist for long period in the poultry house environment. This makes management and

hygiene crucial factors in controlling the disease. Usually 5-10% of the birds die but mortality can reach 30-40% (**16**). IBD causes a degree of immune-suppression in the effected birds (**13**) and hence the appearance of infectious diseases.

The present work is an effort to study the management systems of the semi- traditional poultry farms in and around Khartoum state which has become a known biggest poultry producing area in the Sudan. In addition to their relation to IBD prevalence which has become a major poultry disease in Khartoum state.

Materials and Methods

Area of the survey

The present study was carried out during the years Juli 2006-December 2007. One hundred and seven commercial layers poultry farms semi-traditionally managed located in and around Khartoum state-Sudan were investigated. Forty two flocks around Khartoum town, 52 flocks around Khartoum North town and 13 flocks around Omdrman town were involved to demonstrate the management and hygiene measures performed in these farms in addition to the prevalence of IBD in relation to vaccination practices adopted and against each management performed. .

Data collection

Data were collected through filling two separate but interrelated data sheets by direct visits to the farms and careful personal observations and by interviewing the farm owners, veterinarians supervise on these farms and labours work in the farm.using semi-structured guide line questions.

Serology (ELISA)

Enzyme linked immuno-sorbent assay (ELISA) was performed to confirm the diagnosis of IBD based on history, clinical signs and postmortem gross lesions. For serology, twenty three birds in each flock were bled and blood for serum was collected from wing vein using 1 ml syringe and kept overnight at room temperature which adjusted to 22-27°C and serum was then separated and preserved at -20.

Serum samples that preserved at -20°C, the antigen coated plate that

consisted of 96 wells and the ELISA kit reagents that preserved at 2-4°C were adjusted to room temperature of 22-27°C prior to the test. ELISA test was performed according to (6).

The absorbance values were measured and recorded at wavelength 405nm using ELISA reader. IBD antibody titers and sample absorbance to positive control absorbance (S/P) ratio were calculated to interpret the results according to the manufacturer of ELISA reader and Gumboro ELISA kit (Bio-Check company-Holland).using software program which automatically calculate and interpret the results.

Clinical signs

Clinical signs of the IBD including anorexia, dullness, birds reluctant to move on drive, in-coordination, watery diarrhea and ruffed feathers (16) was observed 2-3 days post challenge (1).

Postmortem gross lesions

Gross lesions of IBD including enlarged or atrophied bursa of Fabricius and covered with yellowish serious fibrous exudates or hemorrhagic with cherry appearance, swollen pale kidneys, dry dehydrated muscles, hemorrhage on the body skeletal muscles surfaces, erosions and hemorrhages of the mucosa of proventriculus (16) and classified as positive or negative..

Data analysis

Data collected were analyzed using SPSS program in Microsoft excel to generate descriptive statistics and frequency distribution of variables from data sheets.

Results and Discussion

A through investigation on the management aspect of 107 poultry farms demonstrated that; 43 (40.3%) of them were found to be admitted more than 10. 000 chickens per year compared to 3 (2.8%) only introduced less than 1.000 chickens.67 (62.6%)of the farms introduced 2 to 3 flocks during the same period indicating lack of all in-all out rearing policy. The most common flock size was rangeen 2 001 to 5 000 chickens, and 102 (95.3%) of them were found to be of less than 5 000 chickens. White leghorn was the dominant commercial layer breed reported and no brown egg laying breed

was recorded. This could be due to the fact that white eggs are preferable by the customers. Hisex and Bovans formed the major layer strain of chickens reared and represented 30 (28%) and 26 (24.3%) respectively. Fifty two (48.6%) of the farmers cleaned the poultry house routinely every week while 26 (22.3%) of them did so once a month. Njue et al (2001) reported only 10% of traditional poultry farmers whom cleaned their poultry houses in Kenya. Regarding disinfection of the poultry house before introduction of a new chicks flock , One hundred and three (96.3%) of the farmers did so .The distance to the nearest poultry house was found to be 200 meters or less in 62 (57.9%) of the surveyed farms. Eighty five (79.1%) of the poultry houses allowed wild birds and rodents to get access to enter into, and 48 (44.8%) allowed people to visit the farm and allowed the farm labours to visit other poultry farms. 85 (79.1%) of the farmers disposed off the poultry litter by carrying it outside the farm by a lorry; the same lorry carried the litter from other farms, 48 (44.8) of the farmers participated in the present study get rid off dead birds by leaving them nearby the farm without burial or burning. and 67 (34.3%) of them used uncovered barrels for water storage, that rendered water exposed to wild birds and visitors. Twenty seven (25.2%) of the farmers had no water source inside the farm and brought the water from out side using different means such as cars, donkeys ...etc. The survey observed that only 15 18.6 % of the farmers washed the traditional hand drinkers every day. Feed in 60 (56%) of the farms exposed to wild birds and rodents during storage and 41(38.3%) used the same old empty feed bags for bagging newly manufactured feed batch. Investigation on 107 poultry farms has identified a number of risk factors including management practices and technical arrangements associated with the occurrence of poultry diseases in Khartoum state.

Vaccination of chickens against IBDV was done in all surveyed poultry farms reflecting the awareness with the fact that IBD is endemic in Khartoum state. Sixty two farmers (57.9%) were vaccinated their birds at the age of two weeks 105. (98.1%) vaccinated their birds twice, although the booster dose timing was varied greatly from 3 (2.8%) at the age above 6 weeks to35 (32.7%) at the age of 3 weeks. Seventy one farmers (66.4%) used Nobilis Gumboro D78 strain vaccine followed by 14 (13.1%) used

228E strain. Forty five (42.1%) of the farmers were not tested their birds to determine MDA titer against IBD and hence predicting the optimal time for vaccination. However among flocks tested, the titer level in 38 (35.5%) was found to be above 10. 000. at day one. Forty nine percent of the farmers used general tap water for reconstitution of the vaccine. Tap water in Khartoum is known to be containing chlorine. Cooling of the water used for vaccine reconstitution in 64 (59.8%) of the farms was done by adding ice purchased from a commercial factory and 86 (80.4%) added skimmed milk to the water compared to 14 (13.1%) added full cream milk.

Clinical IBD was reported in 32 (29.9%) of the surveyed flocks despite the fact that all these flocks were vaccinated against the disease. In their studies **(11)** reported mortality caused by infectious bursal disease (Gumboro disease) in chickens double vaccinated against IBD, with Nobilis Gumboro D78 strain vaccine which suggests vaccination failure. The diagnosis based on history, clinical signs and postmortem gross lesions was confirmed by high anti-IBD antibody titer (more than 16000 compared to other uninfected flocks. This finding agrees with, **(23)**. The clinical signs of IBD were appeared at the end of the second week in one flock after one day of vaccination, this suggests that vaccination may done during the incubation period, or could be induced by the vaccine itself. As **(4)** early reported, the present study showed that different vaccine strains used failed to prevent chickens against the infection.IBD caused mortality between 0-9% in 16 50%0 of the infected flocks agree with reports in **(16)**. Twenty seven (25.2%) of the flocks infected with IBDV were reported to be followed by New castle disease and 34 (3.14%) were infested by coccidiosis. The relation between IBD and the susceptibility to coccidiosis **(21)** and Newcastle disease **(20)** has demonstrated. The effect of the flock size on the prevalence of IBD is reported as follows; 11.8%, 40.7%, 29.4%, 57.1% and 00% from the flocks size ranged between 1-1000, 1001-2000, 2001-5000, 5001-10 000 and more than 10 000 birds respectively. The rate of infection with IBD among flocks tested at one day old to predict vaccination timing (31.3%) is less than (68.8%) reported in flocks did not tested. Fifty percent of the flocks vaccinated with IBD vaccine reconstituted in water supplemented with full creamed powder milk were found to be

infected with the disease compared to 27% of the flocks their owners added skimmed powder milk. No flock was infected of those vaccinated using water not supplemented with powder milk .

.The prevalence of the disease in relation to management practiced is recorded in tables 1 – 8.

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Tables

Table (1): Age at which clinical IBD appeared

Age	1st week	2nd week	3rd week	4th week	5th week	6th week	Above 6th week	Total
No	00	1	1	4	٥	8	13	32
%	00%	3.13%	3.13%	12.5%	15.5%	25%	40.6%	100%

Table (2): Course of the clinical IBD

Duration	1 week	2 weeks	3 weeks	More than 3 weeks	Total
No	8	16	6	2	32
%	25%	50%	18.6%	6.3%	100%

Table (3): Mortality rate and culling rate due to IBD

	0-9%	10-19%	20-29%	30-39%	40-49%	50-59%	60% or more	Total
Mortality	50%	31.3%	6.3%	6.3%	3.13%	3.13%	..%	١100%
Culling	81.3%	12.5%	3.13%	3.13%	00%	00%	00%	100%

Table (4.): Dealing with dead birds post IBD infection

The way	Burial	Burning	Thrown nearby	Total
No	11	11	10	32
%	34.4%	34.4%	31.3%	100%

Table (5): Ways of get rid off poultry litter during the clinical course of IBD

The way	Carried outside by a lorry	Used in the farm	Others	Total
No	18	12	2	32
%	56.3%	37.6%	6.3%	100%

Table (6): Susceptability of different poultry breeds to IBD

Breed	Hisex	Bovans	Hybrid	Loghman	Others	Total
No of flocks infected	11	9	3	1	8	32
Total No of flocks	26	23	18	3	37	107
%	42.3%	39.1%	16.7%	33.3%	21.6%	29.9%

Table (7): Effect of age at 1st vaccination against IBD on the disease prevalence

Age	1st week	2nd week	3rd week	4th week	5th week	Above 5th week	Total
Infected flocks	7	20	5	00	00	00	32
Total flocks	23	62	16	4	1	1	107
%	30.4%	32.3%	31.3%	00%	00%	00%	29.9%

Table (8): Effect of age at 2nd vaccination against IBD on disease prevalence

Age	2nd week	3rd week	4th week	5th week	6th week	Above 6th week	Not done	Total
Infected flocks	6	5	13	4	2	1	1	32
Total flocks	20	35	32	9	6	3	1	107
%	30%	14.3%	40.6%	44.4%	33.3%	33.3%	-	29.9%

Table (9): Effect of vaccine strain used on IBD prevalence

Vaccine strain	D78	228E	Bio-Gumboro	Gumboro3	Others	Total
Infected Flocks	19	4	3	2	4	32
Total flocks No	71	14	6	2	14	107
%	26.8%	28.6%	50%	100%	28.6%	29.9%