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Mortality and Diseases Status in Layer Chicken Flocks Reared in Traditional Farms in Khartoum-Sudan

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Abstract: Ten poultry flocks of layer chicks were followed up and monitored during the first 16 weeks in Khartoum-Sudan. The management, diseases status and the mortality during this period were recorded. through direct visits. Each flock was visited at least once a week. Information were collected from a veterinarian supervising the flock and the flock owner as well using data sheet and semi-structured interview. The management including housing, hygiene measures, vaccination practices, diseases occurred and mortality were observed and recorded. The diseases and conditions causing mortality were found to be; Newcastle Disease (ND), Infectious Bursal Disease (IBD), Salmonellosis, Coccidiosis, Chronic Respiratory Disease (CRD), Tape Worms and different physical conditions (accidental death) which occupied 41.24, 25.9, 2.6, 4.93, 1.84, 1.66 and 11.42% of the total mortality respectively. These diseases caused mortality rates ranged as follows: ND = 7.77-43.47%, IBD = 16.32-24.44%, Salmonellosis = 1.6-10.78%, CRD = 1.11-5.59%, Coccidiosis = 2.88-6.41%, Tape Worms = 0.2-5.5% and physical conditions = 0.56-10.88%.

Key words: Mortality diseases, layer chicks, chronic respiratory disease

INTRODUCTION

Poultry production has become one of the most popular and visible enterprise in Sudan profitable poultry industry is always characterized by quick body gain and high egg production with less utilization of feed (Paul *et al*., 2004), accordingly poultry production has become a growing and perspective industry.

However it is difficult to reach the peak of production due to several constraints, such as diseases outbreaks, vaccination failure, feed adulteration, undesirable climatic conditions …… etc.

Concurrently in Sudan poultry producers are not only facing difficult times with rising cost of production and decreasing profit margins, but also increased mortality rate due to infectious diseases. Such mortality plays a major role in determining profit from egg type layer and countable of dead and culled birds (Faroog *et al*., 2002) Possible causes of high mortality in egg type layers chicks could be severe outbreaks of infectious diseases, accidental death, substandard hygiene and poor management with low quality chicks and feed (Majid *et al*., 1991). Kitsopanidis and Manos (1991) reported that the mortality of 2-5% reduce the net profit and North (1984) reported 10% mortality responsible for poor economical profit.

Diseases of chickens are mostly infectious in nature and therefore a wide variability in loss due to such disease is expected.

Singh *et al*. (1994) reported high prevalence of Infectious Bursal Disease (IBD), coccidiosis and *E. coli* at the age of 8-11 weak more than those aged 18-20 weak. The most prevalent diseases that have their negative impact in poultry industry are Infectious Bursal Disease (IBD) which caused mortality of 40.4% (Amin *et al*., 1995) and coccidiosis which is responsible for the mortality of 35.2% (Ghodasara *et al*., 1992).

The present study was done to study the current status of the different poultry diseases associated with different management conditions and relating to mortality rates in egg type layers during the first 16 weeks of age.

MATERIALS AND METHODS

Chicken flocks: The present study was conducted at 10 different chicks rearing units. Ten poultry farms in Khartoum state (Sudan); 5 at Khartoum town, 4 at Khartoum north town and 1 at Omdurman town, were randomly selected to follow newly admitted flocks, starting from 7 days before chicks arrival up to the end of weak 16 for the purpose of monitoring and follow up.

Data collection: Data were derived by visiting each flock once a weak at least as from the respective owner of the unit or the veterinarian supervising the flock, to fill in a given data sheet and structured questionnaire to gather information related to poultry management and diseases. Semi-structured interview guided by a check

Table 1: Birds flocks information and management

Flock No.	Area	No of Birds	Type of Birds	Breed/ Strain	Source	Hygiene measures	Feed and water*
1	Hilat Kuku	4000	Layers	Bovans	Coral	moderate	2
2	Elhalfaia	3700	Layers	Bovans	Aiad	Poor	2
3	Elkadaro	19200	Layers	Hisex	Razaz	Good	2
4	HajYousif	4500	Layers	Hiline	Elgaria	Moderate	1
5	Elrimala	2000	Layers	Hiline	Elgaria	Good	2
6	Soba	7500	Layers	Bovans	Coral	poor	3
7	Elkalakla	18000	Layers	Hisex	Coral	Good	1
8	giraif West	4000	Layers	Hiline	Coral	Poor	3
9	Elsalama	1750	Layers	Bovans	Coral	Moderate	1
10	Karari	12000	Layers	Hisex	Aiad	Poor	2

*Number of feeders and drinkers were classified as 1= reasonable , 2 = less than required , 3 = more than require

Table 2: Management practice of different chick rearing farms in Khartoum

Farm No.	Housing and roof	Floor space sq cm/bird	Litter	Lighting	Heating
1	Conjugated iron- brick floor	200-300	Saw dust	24h-2W**	heater
2	Conjugated iron- brick floor	100-200	Sand	18h-3W**	Lamps*
3	Conjugated iron- brick floor	250-300	Saw dust	24h-4W**	heater
4	Concrete -concrete	90-330	Sand	18h-2W**	Lamps*
5	Concrete-plastic sheets roof	50-250	Saw dust	18h-4W**	Lamps*
6	Concrete Conjugated iron-	150-200	Saw dust	24h-2W**	Lamps*
7	Conjugated iron- brick floor	200-400	Sand	24h-3W**	Lamps*
8	Brick floor- straw roof	75-150	Saw dust	24h-2W**	Lamps*
9	Conjugated iron-concrete floor	160-250	Sand	24h-2W**	Lamps*
10	Conjugated iron- brick floor	100-250	Saw dust	24h-4W**	Lamps*

*Tungsten lamps 60-100 watt **W watt/sq meter

list was conducted as well. This allows exhaustive harvesting of indigenous knowledge that was possessed in addition to the prescribed form to record observations on each flock.

The management system including sanitations, hygiene measures, diseases control measures, vaccination practices. Beside flock size, name of the hatchery from where chicks were obtained, disease and conditions causing mortality and immunization status were also included.

Diagnosis of chicken diseases: Diseases and conditions were diagnosed based on the history provided by the owner, clinical signs, characteristic postmortem gross lesions, mortality rates and laboratory investigations including bacteriological and parasitological examinations. Serological examination were preformed for diagnosis of viral infections.

Postmortem lesion examination were done as described by Fowler (1996). The most common poultry disease causing mortality were considered. These diseases were Newcastle Diseases (ND), Infectious Bursal Disease (IBD), salmenollosis, coccidiosis, tape worms, Chronic Respiratory Disease (CRD) and accidental death.

For laboratory examination birds were appraised before relevant samples were collected. The samples collected were blood serum, fresh feces and fresh dead and sick birds.

For diagnosis of New castle Disease (ND) and Infectious Bursal Disease (IBD), Enzyme Linked Immuono-Sorbent Assay (ELISA) was used to confirm the observed 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 and serum was then separated in Eppendorff tubes and preserved at -20°C. (Eterratossi *et al*., 1992; OIE Manual, 2004). Samples were transported from the farm to the laboratory under chilling condition.

Enzyme Linked Immuno-Sorbent Assay (ELISA) Technique was performed as described by the manufacturer, ELISA reader and ELISA reagent kits that obtained from Bio-Check company-Holland and as described by Blankford and Silk (1989).

Chronic Respiratory Disease (CRD) was based on gross lesions, history and clinical signs as described by Yonder (1984) and in OIE Manual (2004).

Pullorum disease tentative diagnosis that based on history, clinical signs and postmortem gross lesions was confirmed by direct agglutination method after isolation of the bacteria in salmonella-shigella media.

For coccidosis and tape worms, faecal samples were examined directly under the microscope. Postmortem gross picture was also studied to observe the lesions. Birds and their management are recorded in Table 1-4.

Table 3: Hygiene measures in different rearing farms m Khartoum state

Farm No.	Feed to birds exposed and rodents	Usage of new feed bags	Drinkers cleaning day	Water storage	Discard of dead birds	Discard of liter	Distance to the nearest poultry house-(Km)	Visitors to the farm	Entrance of birds and rodents to the house	Disin-fection	Routine cleaning days
1	yes	no	15	c. bariel	Nearby	Carried by a lorry	0.20	yes	yes	yes	60
2	yes	no	1	c. bariel	burial	Carried by a lorry	0.5	yes	yes	yes	30
3	yes	Yes	1	containerl	Nearby*	Carried by a lorry	0.1	no	yes	yes	7
4	yes	Yes	1	c. bariel	Nearby*	Carried by a lorry	0.05	yes	yes	yes	60
5	yes	no	7	c. bariel	burn	Used in the farm	0.05	yes	yes	yes	60
6	yes	Yes	1	unc. bariel	Nearby*	Carried by a lorry	0.025	yes	yes	yes	30
7	yes	Yes	1	c. bariel	Burial	Carried by a lorry	0.5	no	yes	yes	7
8	yes	Yes	2	c. bariel	Nearby*	Carried by a lorry	0.08	yes	yes	yes	60
9	yes	no	7	unc. bariel	burn	Carried by a lorry	0.04	yes	yes	yes	45
10	yes	yes	1	c. bariel	burial	Used in the farm	0.6	no	yes	yes	30

*Thrown nearby the farm without burial or burn c. =covered unc. = uncovered

RESULTS

The disease profile studied in the 10 rearing units which counting 76700 chicks showed that 19233 (25.08%) of the birds were died between the age of day 0 to the end of week 16 (Table 5). Of which 7967 (41.42%) died due to Newcastle Disease (ND), 4983 (25.91%) chicks died due to Infectious Bursal Disease (IBD), 1.84% due to Coccidiosis, 4.92% due to Salmonelloses, 1.66% due to tapeworms and 2.66% due to Chronic Respiratory Disease (CRD), 11.42%uf the total mortality was due to accidental death, while 7.07% of the causes of mortality has not been diagnosed.

Newcastle disease was found to be responsible for the death of 34.47, 7.77 and 19.6% in flock No, 3, 6 and 8, respectively. The disease appeared in flock No. 3 at the age of 90 days, in flock 6 at the age of 96 and in flock no. 8 at the age of 115 days.

Infectious Bursal diseases appeared at day 40, 55 and 35 in flock No.2, 4 and 7 and causing mortality of 16.32, 24.44 and 18.22%, respectively.

The mortality rate due to Salmonellosis was 10.87% of birds in flock No. 1, 5.05% of birds in flock No.4, 5.77% of birds in flock No.9 and 1.6% of birds inflock No. 10.

Coccidiosis is the only protozoal disease recorded. Mortality of 6.4% in flock No.2 and 2.88% in flock No.8.

Tape worm infestation was responsible for mortality of 2.13, 0.27, 0.48, 0.43 and 6.5% in flock No. 1, 2, 3, 8 and 9, respectively.

The mortality rates due to CRD in flocks No. 2,4,5 and 7 were 5.59, 1.11, 4.05 and 1.46%, respectively.

Mortality due to extreme cold weather, stress, rain, accumulation of chicks in corners or under heaters, killing by rates, cats or dogs, accidents or other physical conditions were observed in 2196 chicks(111.42% of total mortality). The 7.07% of the total mortality in the present study was undiagnosed.

DISCUSSION

Mortality rates due to Newcastle (ND) disease recorded in this study are lower than rates reported by Anjum *et al.* (1993) who found 50% mortality. But agreed with the general belief that ND causes a wide range of mortality and coincides with North (1989) who earlier reported 8-10% mortality and Sinthar *et al.* (1997) who reported mortality of 17.58%. ND infection occurred despite that these infected flocks were vaccinated 3-4 times against the disease.

Mortality of 16.32-24.44% caused by infectious bursal disease (IBD) reported in the present study support the findings of Sil *et al.* (2002), Talha *et al.* (2001) and the earlier report of Hongjib *et al.* (1996).But disagreed with mortality of 9% reported by Anjum *et al.* (1993). All flocks infected with IBD (Gumboro disease) were vaccinated against the disease as shown in Table 4. This can clearly propose problems in vaccine inocula preparation, preservation of the vaccine, performance of the vaccination procedure, timing and possible role of Maternally Derived Antibody (MDA). It also could be due to the virulence of the field challenged virus.

Salmonellae that infected 4 out of 10 flocks surveyed indicating high prevalence of the disease. As based on our careful investigation through both personal consultation and questionnaire, it appeared that poor hygiene was responsible for the high prevalence of the disease. Salmonellae are abundantly found in most of the promises and utensils used in poultry farming. Sasipreeyajan *et al.* (1996) isolated salmonella from chickens litter (42%), drinking water (36%) and from feed troughs (28%). This is why a great chance of contamination. In addition, salmonellae are vertically transmitted. Losses due to salmonella infections reported in this study were lower than those reported by North (1984) who reported 50%, this may be due to antibiotic therapy used to treat the disease.

Mortality of 1.11 and 1.45% due to chronic respiratory disease (CRD)match the findings of Balani (1983), while mortality of 4 and 5.59% agreed with Byrne and Lowndes (1975) and Talha *et al.* (2002).

Mortality due to the physical conditions was observed in all surveyed flocks. The highest rate that reported in flock

Table 4: Vaccination practices during the rearing period in different layer farms in Sudan

Farm No.	Vaccination against	Vaccine strain	Age (days) at vaccination	Vaccination route	(Mean) MDA against IBD	Coefficient of variation%	Predicted days to vaccinate
1	ND+IB	Colons 30	2	Aerosol	18212	40	23
	ND+IB	Colons 30	8	Aerosol			
	IBD	D 78	22	DW			
	IBD	D 78	31	DW			
	ND	Komorov	60	I/N			
	Fowl pox	-	88	WWP			
	ND	Komorov	118	I/N			
2	ND+IB	Colons 30	1	Aerosol			
	ND	Colons 30	10	Aerosol	10674	59	19
	IBD	228 E	14	DW			
	IBD	228 E	22	DW			
	Fowl pox	-	80	WWP			
	ND	Colons 30	103	Aerosol	7245	49	15
3	ND+IB	Colons 30	4	Aerosol			
	ND+IB	Colons 30	12	Aeroso			
	ND	Colons 30	18	Aerosol			
	IBD	D 78	30	DW			
	IBD	D 78	40	DW			
	ND	Colons 30	68	Aerosol			
4	ND+IB	Colons 30	2	Aerosol	1044	166	-1
	ND+IB	Colons 30	15	Aerosol			
	IBD	D 78	21	DW			
	IBD	D 78	42	DW			
	ND	La Sota	82	I/N			
	Fowl pox	-	94	WWP			
5	ND_IB	Colons 30	4	Aerosol	10570	30	24
	ND+IB	Colons 30	11	Aerosol			
	IBD	D 78	18	DW			
	ND	Colons 30	21	Aerosol			
6	ND+IB	Colons 30	3	Aerosol	7480	42	15
	ND+IB	Colons 30	11	Aerosol			
	ND	Colons 30	18	Aerosol			
	IBD	228 E	23	DW			
	IBD	228 E	26	DW			
	ND	Colons 30	78	Aerosol			
	Fowl pox	-	98	WWP			
7	ND+IB	Colons 30	1	Aerosol	13955	47	21
	ND+IB	Colons 30	8	Aerosol			
	IBD	D 78	21	DW			
	IBD	D 78	28	DW			
	Fowl pox	-	82	-			
	ND	Komorov	120	I/N			
8	ND	Colons 30	15	Aerosol	6112	102	8
	IBD	D 78	21	DW			
	IBD	D 78	28	DW			
	ND	Komorov	49	I/N			
	Fowl pox	-	94	WWP			
	ND	Komorov	111	I/N			
9	ND	Komorov	24	I/N	10448	59	19
	IBD	D78	31	DW			
	IBD	D78	45	DW			
	Fowl pox	-	90	WWP			
	ND	Komorov	110	I/N			
10	ND+IB	Colons 30	3	Aerosol	5622	57	14
	ND+IB	Colons 30	10	Aerosol			
	IBD	D 78	17	DW			
	IBD	228 E	29	DW			
	ND	Colons 30	70	Aerosol			
	Fowl pox	-	85	-			
	ND	La Sota	105	DW			

ND = Newcastle Disease, IB = Infectious bronchitis, IBD = Infectious bursal disease, DW = Drinking water, I/N = Intranasal, WWP = Wing wipping

Table 5: Occurance of diseases and conditions associated with mortality during the first 16 weeks

Farm No.	No of chicks	Diseases and conitions associated with mortality: ND	IBD	Cocci-diosis	Salmon-ellosis	Tape worms	CRD	Physical conditions	Unknown	Others	Total: No	Total: (%)
1	4000	00	00	00	431	85	00	278	45	00	839	20.98
2	3700	00	604	238	00	10	207	00	00	00	1159	30.91
3	19200	6620	00	00	00	93	00	677	247	00	7637	39.76
4	4500	00	1100	00	225	00	50	25	104	00	1504	33.42
5	2000	00	00	00	00	00	81	29	41	00	271	13.55
6	7500	587	00	00	00	00	00	138	128	22	884	11.79
7	18000	00	3279	00	00	00	262	421	369	00	4651	25.48
8	4000	760	00	115	00	17	00	435	72	00	1399	43.98
9	1750	00	00	00	101	114	00	127	93	00	335	19.14
10	12000	00	00	00	192	00	00	66	251	35	554	5.74
Total	76700	7967	4983	353	949	319	500	2196	1360	57	19233	25.08
Total mortality (%)			41.42%	25.91%	1.84%	4.93%	1.66%	2.60%	11.42%	7.07%	0.30%	100%

ND = Newcastle Disease, IBD = Infectious bursal disease, CRD = chronic respiratory disease

no. 8 (10.9%)in the present study is lower than the rate reported by Islam and Samad (2004) who has found 35.84% mortality.

Conclusions: As based on our follow up, there are various diseases still present in the layer type chicks. Out of these ailments Newcastle Disease (ND) and Infectious Bursal Disease (IBD) stand up as a priority in prevention and control strategies in future for improving the proper activities of poultry industry. Hygiene measures are crucial element for the control of poultry infectious diseases. Good management can reduce the mortality caused by physical conditions. Traditional poultry farming in Sudan require improvement.

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