

THE PREVALANCE OF SALMONELLA SPECIES AMONG POULTRY BIRDS IN EKPOMA EDO-STATE, NIGERIA.

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ABSTRACT

Fowl typhoid is acute infectious enteritis causing heavy mortality in growers or adult birds; though chicks can be affected. It is caused by the bacterium *salmonella enteric Serovars Gallinarum*, a member of the family *enterobacteriaceae*. This research was designed to determine the prevalence of *salmonella species* among poultry birds in Esan West Local Government Area, Ekpoma, Edo state, Nigeria. A total of 160 faecal samples were collected from Cockerels, Layers, Broilers and Chicks (n=40 each). The samples were then subjected to microbiological analysis using standard biological and biochemical procedures, while the susceptibility patterns of the isolates was determined using the disc diffusion method. Of all the samples examined 6 (3.75%) were positive for *Salmonella species*, 142 (88.75%) were positive for *Escherichia coli* and 12 (7.5%) were positive for *Staphylococcus species*. The results showed that the prevalence of *Salmonella species* was relatively lower than envisaged owing to routine vaccination, but more prevalent among cockerels and chicks. Although, susceptibility pattern of fowl typhoid varies with season, type of poultry bird, immunization status and level of hygiene, it is our recommendation that prompt vaccination of poultry birds is important, while basic hygiene practices should be strengthened.

Keywords: Prevalence and poultry Birds, Salmonella species in Ekpoma community.

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INTRODUCTION

One critical public health and industrial concern in poultry farming is the presence of food-borne pathogens (Mead *et al.*, 1999) that can cause illnesses when sufficient infective doses are ingested (Adams, 1990). Prominent among these pathogens is *Salmonella* which is a member of the family *Enterobacteriaceae* and consisting of more than 2330 serologically distinguishable variants (Bryan and Doyle, 1995; Tauxe, 1991).

According to the United State Centre for Disease Control and Prevention, *Salmonella* alone affects about 1.4 million people each year in the United States with about 16,000 hospitalizations and more than 500 deaths annually. Not only does *Salmonella* pose a public health threat, it also impacts negatively on the poultry industry. Contamination of poultry birds can arise from contaminated feeds (Jones *et al.*, 1991), faeces, nest, litters, floors, and incubators (Bryan *et al.*, 1979; Bryan and Doyle, 1995); as well as rodents, insects, wild birds (Ashton, 1990; Baily *et al.*, 2001) and humans (Lahellec and Colin, 1985).

Salmonella contamination of birds may occur before, during, or after the 'grow-out' phase of production (Baines, 1972). Available data has shown that *Salmonella* serotypes isolated from the final commercial products are generally found in the production house litters and the environment (Bains and Mackenzie, 1974; Lahellec and Colin, 1985). This study therefore, was conducted to determine the prevalence of *Salmonella species* in apparently healthy chickens and assess the relative importance of fowl typhoid and pullorum disease in the morbidity and mortality of intensively managed chickens within designated poultry farms in Ekpoma, Edo State, Nigeria.

MATERIALS AND METHODS.

Research Design and Duration: This study is a descriptive survey conducted between the months of November, 2011 to the month of May, 2012.

Ethical Consideration: The principle of voluntary participation and confidentiality was employed in this study and after thorough explanation of the objective

and the significance of the study, an informed consent was granted by each participant.

Sample Size: A total of one hundred and sixty (160) samples were collected from designated poultry farms located at Ujoelen, Ujemen, Ebhoakuala and Emaudo; all in Ekpoma, Edo State, Nigeria. The sample collection involved a total of forty Cockerels, Layers, Chicks and Broilers in equal numbers respectively and from the respective farms (i.e. n=10 x4 respectively).

Data and Sample Collection/Analysis: Fresh faecal samples were collected with the aid of sterile rubber spatula into clean sterile universal leak-proof containers. The samples were first examined macroscopically and recorded as watery, semi-formed, bloody, and containing pus or mucus. Samples of the faeces collected were then suspended in ten milliliters of sterile normal saline to form a faecal suspension. The turbid suspension was filtered into another clean container to reduce organic matter content that might lower the effectiveness of the media and distort colony appearance of the organism on the plate. The faecal suspensions were then added into selenite F broth for enrichment and cultivated using appropriate media and incubated at 37^oc for eighteen hours. Growth from each broth culture was subsequently sub-cultured on deoxycholate citrate agar (DCA) the following day and incubated at 37^oc for another eighteen hours. Biochemical identification was then carried out using standard procedures.

RESULTS

Of the 160 faecal samples collected from the poultry farms, 142 were positive for *Escherihia Coli*, while 12 were positive for *Staphylococcus* species (See tables 1 and 2). The prevalence of *Salmonella* species among the poultry birds varied according to the breed: 1.25%, 0.625%, 0.625% and 1.25% for cockerels, layers, broilers and chicks respectively. Two out of the 40 faecal samples from cockerels tested positive; one out of 40 faecal samples from broilers tested positive; one out of 40 faecal samples from broilers tested positive; and two out of 40 faecal samples from chicks tested positive. However, the overall prevalence rate of *Salmonella species* among the 160 screened poultry birds was 3.75 percent with cocks and chicks seen to be more susceptible (1.25%) than layers and broilers (See table 3). The observed

variations in the prevalence of *Salmonella species* amongst the birds are shown in table 4.

On the susceptibility pattern of *Salmonella species* to antimicrobials, Cefazidine and Gentamycin were the most effective, while a relatively higher resistance was observed for ampicillin (See table 5).

DISCUSSION

The observed prevalence rate of *Salmonella* (3.75%) suggests a low incidence of *Salmonella* infection in the poultry farms studied owing to the efforts of veterinary doctors engaged in the farms. The low incidence of fowl typhoid is also not unconnected to the hygienic practices observed within the poultry farms. Comparatively, the prevalence rate calculated for this study (3.75%) is far less than the 18.4% reported in Kaduna State by Mbuko *et al.* (2009) whose methodology was adopted in this study, and the 9.4% reported in Jos by Okwori *et al.* (2007).

It is important however, to highlight the fact that seasonal changes and age of the poultry birds also play key roles in the prevalence of fowl typhoid. In this study, fowl typhoid was observed to occur mainly between the months of July and December. The isolated monthly index (ISMI) shows that the disease has three peaks: one continuous peak from June to August, and then from October to December. In most parts of Nigeria, these months fall within the rainy season and as acknowledged by other workers, the months are characterized by weather changes and high egg production (Calnek, 1995). Roa (2000) also reported that outbreaks of fowl typhoid were seen in summer particularly when weather is wet and moisture is persistent in the air.

Furthermore, the findings of this study indicate that the most susceptible to fowl typhoid were the cockerels and chicks unlike the layers and broilers. This observation is similar to the findings by Calnek (1995) that fowl typhoid is a disease common among adult and growing chickens. The observed vaccination of layers against fowl typhoid at 6 weeks in the poultry farms visited, may explain the observed difference in the susceptibility patterns as vaccination protects the chicks throughout their growing age. It is important to note however that infected chicks remain carriers of the disease (Falade and Ehizokhale, 1981) and any stress can trigger an outbreak of fowl typhoid (Aiello, 1998).

Table 1: Number of samples examined with sites of collection

Poultry farm	Num. of samples examined				Total(No)	Percentage (%)
	Cockerel	Layers	Broilers	Chicks		
Ujoelen	10	10	10	10	40	25.0
Ujemen	10	10	10	10	40	25.0
Emaudo	10	10	10	10	40	25.0
Ebhokhuala	10	10	10	10	40	25.0
Total	40	40	40	40	160	100.00

Table 2: Distribution of organisms isolated from the samples collected

Poultry farm	Isolates	Specimens				Total No of Org Isolated	Percentage (%)
		Cockerels	Layers	Broilers	Chicks		
Ujoelen	<i>Salmonella species</i>	1	-	-	1	2	1.25
	<i>Escherichia coli</i>	9	7	5	8	34	21.25
	<i>Staphylococcus species</i>	2	1	-	1	4	2.50
Ujemen	<i>Salmonella species</i>	1	-	-	-	1	0.63
	<i>Escherichia coli</i>	8	7	6	5	36	22.5
	<i>Staphylococcus species</i>	1	-	1	1	3	1.88
Emaudo	<i>Salmonella species</i>	-	1	-	1	2	1.25
	<i>Escherichia coli</i>	5	7	8	9	35	21.88
	<i>Staphylococcus species</i>	-	1	2	1	3	1.88
Ebhoakhuala	<i>Salmonella species</i>	-	-	1	-	1	0.63
	<i>Escherichia coli</i>	8	7	6	5	37	23.13
	<i>Staphylococcus species</i>	1	-	3	2	2	1.25
Total		36	31	32	34	160	100.00

Table 3: Prevalence of Salmonella species in faecal samples in Ekpoma.

Breed	Number tested	Number positive	Percentage positive
Cocks	40	2	1.25
Layers	40	1	0.63
Broilers	40	1	0.63
Chicks	40	2	1.25
Total	160	6	3.75

Table 4: Prevalence of Salmonella species amongst poultry farms in Ekpoma.

Poultry farm	Number tested	Number positive	Percentage positive
Ujoelen	40	2	1.25
Ujemen	40	1	0.63
Emaudo	40	2	1.25
Ebhoakhuala	40	1	0.63
Total	160	6	3.75

Table 5: Susceptibility pattern of Salmonella species to antimicrobial drugs.

Antimicrobial drug	Disc potency (mg)	Zone of inhibition (AV.mm)	Number of isolates tested	Number of isolates sensitive
Cefazidime	30	36.6	6	6
Cefuroxime	30	17.0	6	3
Gentamycin	10	31.6	6	6
Ciprofloxacin	5	15.1	6	3
Ofloxacin	5	17.1	6	4
Augmentin	30	25.1	6	5
Ampicillin	10	12.5	6	1

KEY: AV: Average; Mcg: Microgram

Another factor which may explain the difference in the prevalence patterns among the birds is the fact that farmers keeping cockerels for meat, often do not vaccinate them against fowl typhoid and as such, chicks' immunity becomes low and makes them vulnerable to fowl typhoid disease.

Although, certain strains of *Salmonella species* in poultry birds have developed resistance to most of the widely used antimicrobial drugs, our findings suggests that among the seven antibiotics tested in vitro, Cefazidime and Gentamycin are most effective, while incidentally, most of the strains showed resistance to Ampicillin.

Above all, our findings reveal that though the prevalence of *Salmonella species* among poultry birds in Ekpoma is relatively low owing to routine vaccination, the susceptibility pattern vary with season, type of poultry bird, immunization status and level of hygiene. Therefore, prompt vaccination of poultry birds is important, while basic hygiene practices should be strengthened.

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AUTHOR'S CONTRIBUTIONS

All authors participated adequately towards the success of this study. No conflict of interest is declared.

