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EXHIBITED GROSS ANATOMY AND CLINICAL SIGNS BY PULLET CHICKS EXPERIMENTALLY INFECTED WITH *SALMONELLA GALLINARUM*

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Abstract

Salmonella gallinarum is a vertically transmitted through eggs leads to high mortality or production of weak chicks. This study was undertaken to observe the gross anatomy and clinical signs in 12 weeks old pullet chicks experimentally infected through oral route with *Salmonella gallinarum*. Isolates from five different farms in Ibadan/Ibarapa zone of Oyo State cultured on Trypton soy broth (TSB) and incubated for 18 hours at 37°C, and then inoculated on to MacConkey agar and nutrient agar. Each isolate of *Salmonella gallinarum* from the five farms was drenched at rate of 0.5ml into 10 chicks constituting treatments A - E while treatment F (the control group) was drenched with 0.5ml sterile (TSB). Observations were made on clinical signs and gross anatomy. The clinical signs observed were dullness, depression, anorexia, sleeping, listlessness, ruffled feathers, watery diarrhea, whitish diarrhea, yellowish diarrhea, greenish diarrhea, pasted vent, mortality. The results revealed that all the groups experimentally infected with *Salmonella gallinarum* showed depression, droopy wings, pasted vent and mortality with values ranged between 1 - 2; 1 - 3; 1 - 4 and 2 - 4 birds per ten in the group, respectively. Groups inoculated with isolates from farms A, B, C, D and E showed signs of ruffled feather, dullness and were also sleeping. The intestines of birds in all the groups that showed greenish diarrhea were hemorrhaged. This control group (group F) did not show any clinical sign and pathological lesion. Conclusively, this study demonstrated that *Salmonella gallinarum* inoculation caused clinical signs and pathological lesions characterized by inflammation, congestion and enlargement of various organs in pullet chicks.

Key words: Inoculum, Histopathology, Pullet chicks, *Salmonella gallinarum*,

Introduction

The poultry production settings have been frequently implicated as a major reservoir of *Salmonella* species and is a major zoonosis resulting in significant morbidity in both human and animals worldwide (Yhikler *et al.*, 2015; Akonde *et al.*, 2012). Zoonotic *Salmonella* are the most frequently identified agents causing gastroenteritis in human and animals worldwide and are responsible for significant morbidity and mortality in human and animal resulting in an estimated 1.3 billion cases with approximately 3 million deaths (Yhiler *et al.*, 2015; Voetsch *et al.*, 2004). Human salmonellosis cases have been frequently traced to be due to the consumption of contaminated foods of animal origin especially poultry and poultry products (Pui *et al.*, 2011; Velge and Barrow, 2005).

Out of different serovar, *Salmonella gallinarum* produces fowl typhoid; a septicemia disease in poultry which may be characterized by anorexia, greenish yellowish diarrhea with considerable mortality, also causes drop in egg production. Avian salmonellosis in Nigeria is one of the most devastating bacterial diseases in the poultry industry (Muhammed, 2008) resulting in retarded growth, decreased meat production, increased cost of treatment and mortality (Kabir, 2010). *Salmonella gallinarum* vertical transmission through eggs leads to high mortality or producing weak chicks. Previous research works (Taddele *et al.*, 2012; Mir *et al.*, 2010) reported isolation of *Salmonella gallinarum* strains showing multiple drug resistance patterns in poultry.

Avian salmonellosis represents a group of acute or chronic disease caused by one or more member of genus *Salmonella* (Lutfulkabir, 2010). The most important pathogenic member of avian salmonellosis includes the non-motile *Salmonella enterica* subsp. *enterica* serovar *gallinarum* and *Salmonella enterica* subsp.

Enterovaserovarpolurum, these serotypes can be responsible for disease outbreak leading to severe economic losses however, *Salmonella gallinarum* also present in a rear risk of zoonotic transmission to man (Wrigley *et al.*, 2005).

With the continuous expansion of poultry farming in Nigeria, FT had become endemic in poultry resulting in heavy economic losses through morbidity, mortality and pathological lesions (Agbaje *et al.*, 2010). In order therefore to prevent and ultimately eliminate food borne salmonellosis, it would be of great importance to put in a place surveillance and monitoring programs for food safety. This study response of twelve weeks old pullet to orally infected with *Salmonella gallinarum*

Materials and methods

The experiment was carried out at the Teaching and Research Farm, Oyo State College of Agriculture and Technology Igboora, while the microbiology analysis was carried out at the Microbiology unit of the Central Laboratory of the College.

Sixty (60) pullet chicks were used for the experiment. The birds were obtained from a reputable hatchery located in Ibadan, south west, Oyo State Nigerian at day old and reared to 12 weeks of age before randomly allotted into 6 groups A- F, comprising of ten (10) birds per treatment.

The experimental culture comprised five (5) isolates of *Salmonella gallinarum* earlier isolated from five (5) different poultry farms in Ibadan/Ibarapa zone of Oyo State. The isolates were subculture on Trypton Soy Broth (TSB) and incubated for 18 hours at 37°C. All media were prepared according to the manufacturer's specification. The inocula were prepared by inoculating discrete colonies of each isolate into sterile TSB and incubated at 37°C for 6 hours. This was estimated to produce colonies of 1.3×10^8 CFU/ml (colony forming units).

The isolates from five (5) different poultry farms were inoculated each to a group thus comprising treatments A- E. Birds in group F, which served as the control were drenched with 0.5ml of sterile TSB while each of the birds in groups A- E were drenched with 0.5ml of the corresponding prepared inoculum of *Salmonella gallinarum* isolates and housed differently from treatment F. The clinical signs of inoculated birds and post mortem lesions of all dead birds were observed daily up to day 21. The parameters observed were, dullness, depression, anorexia, listlessness, sleeping, droopy wings and ruffled feathers. Other clinical signs observed were greenish diarrhea, watery diarrhea whitish diarrhea, yellowish diarrhea, pasted vent and mortality. On day 21, all remaining birds in each group were sacrificed and post mortem examination carried out on them. The liver, intestine, spleen and kidney tissue samples were harvested for pathological examination.

Results and discussion

Observations made on clinical signs on 12 weeks old pullet chicks experimentally infected with *Salmonella gallinarum* are shown on Table I. The results revealed that all the groups experimentally infected with *Salmonella gallinarum* showed depression, droopy wings, pasted vent and mortality with values ranged between 1 - 2; 1 - 3; 1 - 4 and 2 - 4 birds per ten in the group, respectively. Groups inoculated with isolates from farms A, B, C, D and E showed signs of ruffled feather, dullness and were also sleeping.

Other clinical signs observed were greenish diarrhea, watery diarrhea, whitish diarrhea and yellowish diarrhea, all the groups showed at least two of these clinical signs except group D that showed only watery diarrhea, and birds in group D showed all the above clinical signs. However, birds in group F (which served as the control and drenched with 0.5ml of sterile TSB) did not showed any of the clinical sign except only one out of the ten in group that was sleeping, although this did not result in mortality as none of the birds in the group died. The results obtained revealed that all the isolates from all the five farms were potent enough to cause clinical signs in infected pullets. This agreed with previous findings (Khan *et al.*, 1988; Bhattachary *et al.*, 2012).

The gross lesions observed from pullet chicks experimentally infected with *Salmonella gallinarum* are shown on Table 2. The intestines of birds in all the groups that showed greenish diarrhea were hemorrhaged. Spleen and liver of birds in group B were hemorrhaged and inflamed, respectively while spleen of birds in group E was enlarged in addition to their hemorrhaged spleen. Groups D and F did not record any lesion on the examined organs. Inflammation, enlargement, and congestion of the spleen and hemorrhage, thickened and yellowish wall of the liver, including congestion of the intestine are known with salmonellosis (Muhammadi *et al.*, 1976; Nazir *et al.*, 2012).

Conclusion

This study demonstrated that *Salmonella gallinarum* infection cause clinical signs and pathological changes in all inoculated birds characterized by inflammation, congestion and enlargement of various organs in pullet chicks. The results revealed that isolates from another farms can cause salmonellosis in another farms.

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Table I: clinical signs observed in pullet chicks experimentally infected with *S.gallinarum*

Clinical signs	A	B	C	D	E	F
Depression	+	++	+	+	++	-
Anorexia	-	-	+	++	-	-
Listlessness	+	+	+	-	-	-
Sleeping	+	+	+	+	-	+
Droopy wings	+	++++	+	++	++++	-
Ruffled feathers	++	++	+	+	-	-
Pasted vent	++	++++	+	+	+	-
Greenish diarrhea	+	++++	+	-	+	-
Watery diarrhea	-	+	++	+	+	-
Yellowish diarrhea	-	-	-	-	+	-
Whitish diarrhea	+	-	-	-	+	-
Dullness	+	++	+	++	-	-
Mortality (%)	++++	++++	+++	++	++	-

+ Number per ten birds in the treatment

Table 2: Gross pathological changes observed in birds experimentally infected with *Salmonella gallinarum*

Sample	Organs affected	Observations
A	Intestine	Hemorrhage
B	Intestine	Hemorrhage, thickened wall, yellowish wall
C	Intestine Liver Spleen	Hemorrhage Hemorrhage Inflammation, enlargement, congestion
D	-	-
E	Intestine Spleen	Congestion, hemorrhage Enlargement
F	-	-