

## Isolation Of *Salmonella Gallinarum* From Poultry Droppings In Jos Metropolis, Plateau State, Nigeria

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**Abstract:** Fowl typhoid is host adapted to avian species and is considered to pose a minimal zoonotic risk throughout the world. This work is aimed at isolating *Salmonella gallinarum* from poultry droppings used for manure in Jos metropolis. One hundred and fifty samples of poultry droppings from fifty poultry houses in Vom, Kuru, Bukuru and Jos towns of Plateau State were sampled for the presence of *Salmonella gallinarum* using cultural, biochemical and biological properties to identify the isolates. Two isolates (1.3%) from two poultry farms were positive for *Salmonella gallinarum*. Other bacteria concurrently isolated included: *Proteus* species, *Escherichia coli*, *Staphylococcus* species, *Klebsiella* species, *Pseudomonas* species and *Lactobacilli*. The presence of *Salmonella gallinarum* calls for improved poultry farm hygiene and the use of effective broad spectrum antibiotics. Detection of *Salmonella gallinarum* in poultry droppings in this study poses health hazards to other uninfected birds especially those at free range.

**Key words:** Poultry droppings, *Salmonella gallinarum*, Jos, Nigeria

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### I. Introduction

Fowl typhoid caused by *Salmonella gallinarum* is recognized worldwide as a disease of social and economic significance (Shivaprasad, 1997). In Africa it has been reported in many countries including Tanzania, Uganda (Okoj, 1993), Senegal (Arbelot *et al.*, 1997), Nigeria (Sa'idu *et al.*, 1994) and Morocco (Bouzoubaa *et al.*, 1987).

It is a septicaemic disease that affects primarily chicken and turkey, although natural infections in many other avian species have been reported (Shivaprasad, 1997., Wray *et al.*, 1996). Although *Salmonella gallinarum* infection is frequently considered as a problem of adult and grower chicken, chicks are often affected. Efforts at controlling fowl typhoid through the application of a co-ordinated policy of hygienic measures, together with serological testing and slaughter of positive reactors, have led to the seemingly eradication of *Salmonella gallinarum* in many developing countries (Barrow, 1999), however, fowl typhoid which is caused by *this pathogen* remains a leading disease of the poultry industry in many areas of the world. Acute disease conditions of *Salmonella gallinarum* infection in chickens include respiratory distress and depression with a characteristic clinical sign of mucoid yellow diarrhea. In sub-acute outbreaks, sporadic mortality over a long period is experienced while in chronic disease condition, loss of appetite and severe anaemia is observed. The transmission of *Salmonella gallinarum* can be through bird droppings of infected birds, bird carcasses and laid eggs. It could be introduced by importation of live infected chicken and hatched eggs. Mechanical spread may be by humans, wild birds, mammals, flies, ticks, feedsacks, etc (Steigh and Duguid, 1989).

For the past few decades, poultry production has become increasingly organized, specialized and integrated into an industry of major national and international importance (Mai *et al.*, 2004; Khan *et al.*, 2007). As a result, poultry diseases are every poultry farmer's nightmare. The economic losses attributed to this infection are enormous and in most cases unquantifiable. Early detection of the disease in any locality can help reduce/eliminate the losses that may occur in the event of the disease outbreak. These prompted the current research which was targeted at the sampling of poultry droppings from farms in the study area for the presence of *Salmonella gallinarum*.

*Salmonella gallinarum* biovars Pullorum and Gallinarum have been eradicated in commercial poultry productions in the developed world, but are still important in backyard flocks as well as the developing world (Woodward *et al.*, 1997). This study is aimed at isolating *Salmonella gallinarum* from poultry droppings used for manure. This is intended to help elucidate some of the environmental sources of *Salmonella* infections in Jos metropolis, Nigeria.

## II. Materials And Methods

All the samples were collected within the Jos Metropolis, the capital of Plateau State in Nigeria. Poultry droppings were collected from poultry farms once every week for six months. Sterile spatulas were used to collect samples of freshly passed poultry droppings in sterile universal sampling bottles. The droppings were collected from litter at random points and transported to the laboratory where they were analysed within one hour from the time of collection as adopted by Orji *et al.*, 2005.

### Study Area and Sampling

150 samples of poultry droppings were collected from farms within Vom, Kuru, Bukuru and Jos areas. Samples were collected at 3 points in each poultry farm once in a week. This was done to have a good representation and distribution of the organisms in question.

### Sample Processing

The isolation of Salmonella from poultry droppings was carried out according to the method described by Barrell, 1980 and Orji *et al.*, 2005.

### IDENTIFICATION OF ISOLATES

Salmonella-typical colonies on the plates (pale or colorless with or without black centers on deoxycholate citrate agar (DCA) and a bright red color on propylene glycol deoxycholate agar (PGDA) were cultured onto triple sugar iron agar (TSIA) slants, urea agar lysine broth and incubated at 37 °C for 24 hrs. Suspected Salmonella colonies were further subjected to phenotypic test using API 20E strips (Sharma *et al.*, 1990 ).

### SEROLOGICAL TEST

Serological typing was carried out by rapid plate agglutination test as described by O.I.E.(1996). The antigen used for both methods was locally produced as described by O.I.E. (1996) using a local *Salmonella gallinarum* strain (Mdegela *et al.*, 2000).

### STATISTICAL ANALYSIS

Statistical analysis was precluded due to inadequate data settings.

## III. Results

The distribution of samples from different sources and the different isolates are shown in Table 1. *Salmonella gallinarum* was isolated from two farms. These farms are located in Vom and Bukuru. Other organisms consistently isolated included; *Escherichia coli*, *Klebsiella species*, *Proteus species*, *Pseudomonas species*, *Streptococcus species*, *Staphylococcus species* and *Lactobacillus species*.

**Table 1: Distribution of samples and isolates from different locations**

Sources	Vom	Kuru	Bukuru	Jos town	Total	Percentage
No of Poultry	20	15	13	2	50	
Nos of samples	60	45	39	6	150	
<b>Isolates</b>						
<i>Salmonella gallinarum</i>	1	0	1	0	2	1.3
<i>Escherichia coli</i>	18	11	12	2	43	28.6
<i>Klebsiella species</i>	15	13	9	1	38	25.3
<i>Pseudomonas species</i>	13	9	6	1	29	19.3
<i>Proteus species</i>	14	8	7	0	29	19.3
<i>Staphylococcus species</i>	4	2	5	0	11	7.3
<i>Lactobacilli species</i>	9	4	2	0	15	10

## IV. Discussion

Fowl typhoid is a poultry disease that has decreased in incidence over the years by application of basic management procedures (Saif *et al.*, 2003).

In Nigeria, especially in many parts of Plateau state, poultry droppings serves as a good source of manure for the cultivation of crops and vegetables and are sold to farmers at the rate of about N150 (1\$) per bag of 10–15 kg (Orji *et al.*, 2005). The farmers use poultry droppings for the dual purposes of enriching the soil for

improved crop yields and economically disposing of the droppings. However, the addition of the poultry droppings directly into soils without any form of treatment poses some public health problems since they contain pathogenic microorganisms. Poor sanitary habits have been reported to be contributing to the persistence of the disease (Jordan and Pattison, 1999) and have led to enteric disease endemicity. Sanitary awareness has been found below average from our findings while interacting with the farmers in the study area. This is similar to the findings of Orji *et al.*, 2005 in Awka, Anambra state, Nigeria. The pathogenic microorganisms can contaminate the surrounding crops and vegetables and become a source of infection, especially when such crops or vegetables are eaten raw or brought home where they can contaminate other materials.

Our findings showed the presence of *Salmonella gallinarum* in some poultry droppings in the study area. This is similar to the serological prevalence of *Salmonella gallinarum* infection in scavenging local chickens reported from Mauritania (Bell *et al.*, 1990), Morocco (Bouzoubaa *et al.*, 1992), Benin (Chrysostome *et al.*, 1995) and Senegal (Arbelot *et al.*, 1997). It is evident that the infection rate in scavenging local chickens is normally low. Irrespective of the low prevalence, it should be regarded as significant owing to its devastating effect on infected birds and the poultry industry at large. Fowl typhoid is transmitted both vertically and horizontally (Wray *et al.*, 1996). In cases where the disease is transmitted horizontally, contaminated feed and drinking water are the main sources of infection and, under extensive systems of management, as in village poultry production, the chances of chickens eating and drinking contaminated materials are minimal. Much higher prevalence rates of 33.8% in individual birds and 71.2% on a flock level have previously been reported in Tanzanian scavenging local chickens (Minga *et al.*, 1987) using the same methods. Apparently, the infection rate can vary considerably with time, but the reason for this remains unknown (Mdegela *et al.*, 2000). The possibility that the serological positivity was due to infection with other Group D *Salmonella*, such as *Salmonella enteritidis* or *Salmonella pullorum* cannot be excluded.

It is possible that, under poor biosecurity systems, commercial chickens may act as one of the sources of *Salmonella gallinarum* for scavenging local chickens.

Poultry droppings have been known to be constant sources of circulating poultry diseases, previous studies performed in Tanzania and Senegal have reported higher serological prevalences in commercial layers than those observed here in Nigeria (Orji *et al.*, 2005). Generally, *Salmonella gallinarum* - infected chickens are not efficient excretors, unlike birds infected with motile *Salmonella*, that cause enteric rather than systemic infections (Smith and Tucker, 1980).

Owing to the indiscriminate use of antibiotics, many pathogens have developed resistance to antibiotics. The continued use of these pathogen resistant drugs could lead to development of highly resistant strains of the pathogen which can spread in the environment causing major disease outbreaks of an enormous magnitude in future.

## V. Conclusion

Having identified the presence of *Salmonella gallinarum* in poultry droppings in the study area, these poultry wastes could pose a health hazards to other uninfected birds especially free range . In commercial chickens, regulations have to be enforced to ensure that there is an effective flock monitoring system at all levels of production, aimed at detecting *Salmonella gallinarum* infection and instituting appropriate control measures, as recommended by Shivaprasad (1997).

Further studies on the antibiotic susceptibility testing of bacterial pathogens of poultry origin is highly recommended.

## Acknowledgements

The authors thank the Management and the Provost, Federal College of Veterinary and Medical Laboratory Technology, Vom, Nigeria for permission to publish this paper.

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