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Detection of Listeria Monocytogenes In Faeces From Cattle, Sheep, Goat And Chicken In Owerri Municipality

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Abstract

600 samples were collected from cattle, sheep, goat and chicken faeces and were investigated for the presence of *Listeria monocytogenes*. The occurrence of *Listeria monocytogenes* was 13.33% in cattle, 4% in sheep, 5% in goat and 5% in chicken. These findings indicate that animal feces could be a source of contamination of carcasses with *L. monocytogenes* and may lead to foodborne listeriosis. Also, cattle represented a potentially important reservoir for *L. moncytogenes*. Though the occurrence of *L. monocytogenes* was low in the farms investigated, the study highlighted the complexity of pathogen control at the farm level.

Keywords: cattle, sheep, goat, chicken, animal faeces, *L. monocytogenes*

1.0 Introduction

Listeria monocytogenes is part of the normal intestinal flora of the distal portion of the intestinal tract of numerous animal species including domestic livestock such as cattle, pigs and chickens and also exists as a plant saprophyte (Weber *et al*., 1995, Cooper and Walker, 1998). Clinical symptoms of listeriosis in humans are usually flu-like symptoms, however, encephalitis, abortion and stillbirth can be associated with infection (Cooper and Walker, 1998).

Animal manure is a relevant source of contamination of the general environment. Animal manure has been used for thousands of years as soil fertilizer. Aging of the manure inactivates pathogens in manure with the rate of pathogen decline in stored manure depending on management and storage conditions such as temperature, aeration, pH, and slurry dry matter content (Nicholson *et al.*, 2005). However, it has been noted that farmers in intensive farming tend to spread improperly aged manures either because of insufficient storage space or simply for convenience (Smith *et al.*, 2001). Spreading fresh or minimally treated manure straight onto land presents a higher risk of *L. monocytogenes* transfer to the food chain. For example, an outbreak of human Listeriosis involving 41 cases was linked to consumption of coleslaw that had been produced from cabbage harvested from fields fertilized with untreated sheep manure obtained from a farm with a history of Ovine Listeriosis (Schlech, 1983). In humans, outbreaks of Listeriosis have been foodborne, linked to contaminated cheeses and processed meats (Cooper & Walker, 1998; Donnelly, 2001; Faber *et al*., 1996). *Listeria monocytogenes* can be found in or on a wide variety of foods including fresh produce (Farber and Peterkin, 1991; Norrung *et al*., 1999; Thunberg *et al*., 2002).

The survival of *Listeria* in manure has been the focus of a few research studies. Nicholson *et al*. (2005) reported *Listeria* survival for up to 6 months in dairy manure spread on land. In solid pig and sheep manure and in broiler litter, *Listeria* survived more than a month after manure spreading, particularly on a clay loam grassland soil (Nicholson *et al*., 2005). A study by Jiang *et al*. (2004) reported the survival of *L. monocytogenes* in manure – amended soil for up to 7 weeks. In litter, soil and feces, *L. monocytogenes* could survive 6 to 8 months (Mitscherlich and Marth, 1984).

Virtually all species of domestic animals are susceptible to infection by *L. moncytogenes* (Low and Donachie, 1997). Most Listeriosis in North

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America occurs in cattle (82%), with a smaller percentage in sheep (17%) and pigs (Wesley, 1999). Based on the literature, Listeriosis seems to be the biggest problem in Domestic ruminants (cattle, sheep, and goats) with silage feeding as an important risk factor (Fenlon 1986; Fenlon *et al.*, 1996; Wiedmann *et al.*, 1996).

The purpose of this study was to investigate the frequency of *L. monocygenes* in the faecal samples of cattle, sheep, goat and chickens in selected farms in Owerri Municipality.

2.0 Materials and Methods

2.1 *Listeria* Culture

Fecal samples (0.1g) were transferred into 10 ml *Listeria* Primary Selective Enrichment Medium (UVMI, Oxoid), and incubated at 30°C for 24 h, then 0.1 ml of the UVMI broth was incubated into *Listeria* Secondary Selective Enrichment Medium (UVMII), incubated at 30°C for 24 h. This was then sub-cultured (10µl) onto an Oxford (Oxoid) plate and Palcam (Oxiod) plate which were incubated aerobically at 37°C for 48 h.

2.2 Identification of *Listeria monocytogenes*

Up to five colonies were sub cultured onto 5% sheep Columbia blood agar (Oxoid). After 24 h of incubation at 35°C, plates were examined for the presence of a zone of hemolysis. â-haemolytic colonies that were gram – positive short rods with rounded ends were further tested and identified as *Listeria monocytogenes* according to Barrow *et al.,* (1993). Each isolate was tested for Gram staining Umbrella Shaped motility at 20°C, catalase reaction (positive), fermentation of glucose (positive), mannitol (negative), rhamnose (positive) and esculin hydrolysis.

3.0 Results

All results are shown in Table 1 and Figure 1 *Listeria monocytogenes* was isolated from cattle 20(13.33%), 6(4%) of sheep, 5(3.33%)of goat and 5(3.33) of chicken. Cattle had the highest level of bacterial contamination with *L. monocytogenes* followed by sheep.

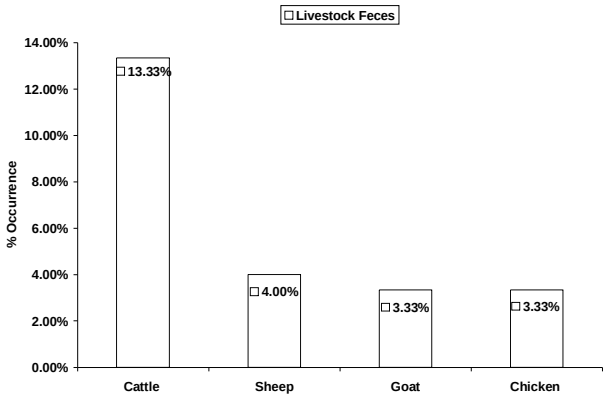

Figure 1: Percentage Occurrence of *L. monocytogenes* in livestock feces

Table 1: Presence of *Listeria monocytogenes* in animal feces.

Livestock Faeces	No. Sampled	No. of Positive Samples	% Occurrence
cattle	150	20	13.33%
Sheep	150	6	4.00%
Goat	150	5	3.33%
chicken	150	5	3.33%
Total	600	36	6.00%

4.0 Discussion

In this study, the frequency of *L. monocytogenes* in fecal samples from cattle, sheep, goat and chicken was 13.33%, 4%, 3.33% and 3.33% respectively. Higher rates from cattle have been reported in Denmark, Sweden and Yugoslavia (Buncic, 1991; Skovgaard *and Morgan,* 1988; Unnerstad *et al.*, 2000). In Germany, a rate of 33%, 8% and 8% for cattle, sheep and chickens respectively has been reported (Weber *et al.*, 1995). Silage feeding has been related to increased incidence of Listeriosis. The contamination of animal feces by *L. monocytogenes* has been linked to feeding practice such as feeding with spoilage silage (Skovgaard and Morgen, 1988). Silage was not used for feeding cattle and sheep in the area where the present study was conducted. Therefore, the lower rates found in the present study were probably due to feeding with dry feed. Difference between sampling and isolation methods should also be considered in the context of discrepancies between results. Some researchers used the cold enrichment method at 4°C for six to eight weeks for isolation but in the present study,

Listeria spp. were isolated from fecal samples using the heat enrichment method at 30°C for 48 h as reported previously (Buncic, 1991; Skovgaard *and Morgan,* 1988; Unnerstad *et al.,* 2000).

The results of this study indicate that animal feces can represent a source of *L. monocytogenes* contamination of carcasses at abbatoirs. This constitutes a serious hazard to human health as it may lead to outbreaks of human listeriosis. Good Manufacturing practice, HACCP and finished product analysis with faster detection and typing methods remain pins for controlling listeriosis.

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