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## OCCURRENCE OF LISTERIA SPECIES IN LAYING HENS

(With 2 Tables)

By

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### تواجد ميكروب الليستيريا فى الدجاج البياض

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يعتبر البيض ومنتجاته من أهم مصادر العدوى للإنسان فى كثير من الميكروبات ويتعرض البيض للتلوث أما أثناء عملية الإنتاج أو من الجو المحيط بالبيضة بعد وضعها مباشرة أو أثناء التعامل مع البيضة لاستخدامها فى منتجات البيض . ومن أهم هذه الأمراض التى يلعب البيض دوراً فى انتقالها للآدميين هو داء الليستيريا. وبفحص ٣٠٠ بيضة (كل عينة مكونة من خمس بيضات) بعد وضعه مباشرة وجد أن نسبة الإصابة بميكروب الليستيريا مونوسيتوجين كانت ٨,٣% ونسبة الإصابة بالأنواع الأخرى من الليستيريا كانت ٣,٣% وذلك من محلول شطف البيض. ولم تسجل أى نتائج من فحص محتويات البيض فقط . ولكن فى بعض عينات البيض وجد ميكروب الليستيريا مونوسيتوجين فى كل من محلول شطف البيض ومكونات البيض من الداخل بنسبة ٣,٣% والأنواع الأخرى من الليستيريا سجلت ١,٧% . وبفحص عدد ٦٠ عينة من زرق الدواجن التى تم جمعها من نفس المزارع التى جمع منها البيض وجد أن ٢٥% من العينات كانت موجبة لميكروب الليستيريا (١٣,٣% لىستيريا مونوسيتوجين و ١١,٧% للأنواع الأخرى من الليستيريا على التوالى). وقد نوقشت المخاطر الصحية لوجود هذا الميكروب فى كل من البيض والزرق وكذلك الطرق المقترحة لمقاومة هذا الميكروب .

### SUMMARY

Eggs and droppings of laying hens were examined for the presence of listeria organisms. The recovery rates of *L. monocytogenes* and other listeria species of the egg shell rinses amounted to 8.3% and 3.3% respectively. Detection of *Listeria* failed in egg contents. The isolation rates of *L. monocytogenes* and other listeria species of egg shell rinses & egg contents were 3.3% (*L. monocytogenes*) and 1.6% (other listeria species). The overall recovery rate of listeria from the droppings amounted to 25% (13.3% for *L. monocytogenes* and 11.7% for other listeria species). The public health importance of listeria in eggs and droppings of layers was discussed.

*Key words: Lying hens - Listeria*

## INTRODUCTION

*Listeria* species are widely distributed in nature, having been isolated from soil, water, vegetation and many animal species (Watkins and Sleath, 1981). *Listeria monocytogenes* was implicated in cases of food poisoning in man (Cox, 1989). Human beings and animals are known fecal carriers and play a role in the transmission and spread of listeriosis (Ralovich, 1984; Blendon *et al.*, 1987 and Skovgaard & Morgen, 1988). *Listeria monocytogenes* has been recovered from commercially broken, raw and liquid whole eggs (Leasor and Foegeding, 1989).

Foegeding and Stanely (1990) stated that the presence of *Listeria monocytogenes* in egg most likely is due to contamination from the shells during the breaking process or from the environment. Contaminated eggs may pose a health threat to humans in some lightly cooked or uncooked egg-based products. Furthermore, *Listeria monocytogenes* survives freezing and may grow upon thawing of the eggs.

The aim of the present study is to assess the role of laying hens in the transmission of *Listeria* species by trying their isolation from eggs and droppings.

## MATERIAL and METHODS

### **Samples:**

Three hundred eggs (60 pooled samples) and 60 samples of fresh droppings were collected from three layer farms in Assiut governorate. Every 5 eggs (one sample) were placed in a sterile plastic bag and dispatched to the laboratory. Fresh faecal samples were taken and transported in sterile plastic bags to the laboratory where they were prepared and examined.

### **Media:**

The warm enrichment procedure (McClain and Lee, 1988) was carried out. Subculturing of the broth was made onto McBride *Listeria* agar (Biolife Code, 1602) and the suspected colonies were examined by the Herny method of oblique lighting (Herny, 1933).

### **Isolation and Identification:**

Egg shells were tested by surface rinse method (Moats, 1979). Each egg was immersed in 100 ml of peptone water in a jar and shaken for 15 minutes on a mechanical rotatory shaker. The rinse solution obtained from the five eggs of each group was considered as a sample. Each egg was washed with warm water using a brush and soap, immersed in 70% alcohol for 10 min, then flamed up (Speck, 1976). A hole was made in the blunt end



of the egg by a sterile scalpel. The contents of each group were removed aseptically and received into a sterile container, mixed until the sample becomes homogeneous. 1 ml of rinse solution as well as from the homogeneous egg contents was inoculated in the enrichment broth, then incubated at 30°C for 24-48 hours.

One gram of the faecal specimen was inoculated into 9 ml of tryptose broth. The enrichment broth held at 30°C was sampled after 24-48 hours by transferring 0.1 ml of it into 9 ml listeria enrichment broth.

A loopful of each enrichment broth was streaked on McBride Listeria agar and the plates were incubated at 37°C for 24-48 hours.

Identification of the suspected isolates was made according to Seeliger (1961), Seeliger and Jones (1986) and Lachica (1990).

## RESULTS

The obtained results are illustrated in Tables (1 and 2).

## DISCUSSION

Because *L. monocytogenes* grows and multiplies at + 4°C, refrigerated food such as meat, eggs, poultry, vegetables and milk are implicated as potential source of infection. Raw poultry (Kwantes and Isaae, 1975; Gitter, 1976) and red meat (Höhne et al., 1975 and Elischerova et al., 1979) are frequently contaminated with *L. monocytogenes*, and the usual preserving agents such as sodium chloride and sodium nitrite slightly inhibit the growth of this organism (Shahamat et al., 1980).

Table (1) illustrates the recovery rates of *L. monocytogenes* and the other Listeria species. *L. monocytogenes* was isolated from the egg shell at a rate of 8.3%, a finding which is lower than that reported by Petran and Swanson (1993) as well as Nagah and Enas (1995). This may be attributed to the fact that the examined eggs were floor eggs soiled with litter and dropping. On the other hand, the egg contents were negative to listeria isolation. This result is in accordance with the results of many investigators (Kampelmacher, 1962; Schleich, 1986; Nagah and Enas, 1995).

From both egg shell rinse and egg contents, *L. monocytogenes* and the other listeria species were isolated at rates of 3.3% and 1.7% respectively. The recovery rate of *L. monocytogenes* is comparable to that reported by Foegeding and Leasor (1989) who could isolate *Listeria monocytogenes* from raw, broken liquid whole eggs at a rate of 4.8%. Although the contents

of freshly laid egg from healthy hen are usually sterile, yet the shell soon becomes contaminated with microorganisms capable of growing and penetrating through its intact shell. The rate of penetration of these organisms is influenced by the humidity and storage temperature (Sharp and Stewart, 1936; Hains and Moran, 1940; Romanoff and Romanoff, 1949). Moreover, *L. monocytogenes* may gain access to the egg contents through the affection of the oviduct (Gray, 1963) or contamination from the shell during the breaking process (Foegeding and Leasor, 1989).

Table (2) presents the recovery rates of *L. monocytogenes* (13.3%) and the other listeria species (11.7%) from the droppings of laying hens. The presence of listeria organisms in the faeces of animals and humans is possibly a consequence of ingestion of contaminated food (Ralovich, 1984 and Skovgaard and Morgen, 1988).

Although the overall recovery rate of listeria species is relatively high (25%), Fenlon (1985) isolated *L. monocytogenes* and other listeria species from 40% and 30% of samples from chicken droppings respectively. However, Iida *et al.* (1991) gave an incidence of 4.7% of listeria species in chicken droppings. The discrepancy in the results might be attributed to the hygienic measures and to what extent they are implemented in poultry farms. The presence of listeria organisms in the droppings of laying hens has its public health importance, as when the litter is used as a fertilizer, it can contaminate the soil and consequently the vegetables and green plants which when consumed raw may result in listeriosis in man or animals (Schlech, 1984). In this respect, Sword (1966) claimed that the level of iron in the soil exerts a profound stimulating and enhancing effects on the growth and virulence of *Listeria monocytogenes*.

**Table 1: Occurrence of listeria species in hen's egg.**

Hen's egg (60) Sample	No. of +ve specimens	The recovered Listeria Species			
		<i>L.monocytogenes</i>		Other Listeria Species	
		No.	%	No.	%
Egg Shell	7	5	8.3	2	3.3
Egg contents	0	0	0	0	0
Both	3	2	3.3	1	1.7
Total	10	7	11.7	3	5



**Table 2:** Occurrence of *Listeria* species in hen's dropping:

No. of Samples collected	No. of Positive specimens		The recovered <i>Listeria</i> Species			
			<i>L. monocytogenes</i>		Other <i>Listeria</i> Species	
	No.	%	No.	%	No.	%
60	15	25	8	13.3	7	11.7

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