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INCIDENCE OF SALMONELLAE AND OTHER GRAM NEGATIVE ORGANISMS IN BALADY DUCKS AND INFERTILE EGGS

E.E.A. SAFWAT, S.WAHBA, N.METWALLY and M.REFAI

Animal Health Research Institute. Serum and Vaccine Research Institute and Faculty of Veterinary Medicine Cairo University.

SUMMARY : From 100 ducks, 19 Salmonella (S. lokstadt, S. newport and S. bovis-morbificans), 15 E. coli, 8 Pseudomonas and 5 Pasteurella multocida were isolated. From 150 ducklings, 30 Salmonella (S. newport, S. typhi-murium, S. fyris and S. muenchen), 25 E. coli and 18 Pseudomonas were isolated.

From 150 dead embryos, 40 Salmonella (S. senftenberg, S. typhimurium, S. muenchen and S. eastbourne), 29 Proteus spp., 28 E. coli, 20 Entrobacter spp., 20 Pseudomonas aeruginosa and 18 Citrobacter spp. were isolated.

From infertile eggs, 12 Salmonella (S. typhi-murium and S. newport) and all bacteria isolated from dead embryos were recovered in much lower rate.

INTRODUCTION

Salmonella infection in ducklings and ducks in Egypt has been reported by several authors (El-Agroudi, 1963, El-Akkad et al., 1967, El-Refaie, 1967, El-Agroudi and Sadek, 1968, Bahgat Moustafa et al., 1971, Sadek, 1974, Shouman and Moustafa, 1975, Safwat, 1976, El-Taher, 1977, and Safwat, 1979).

In the review article published by Ramadan and Sadek, (1971) on the parameter of salmonellosis in Egypt, the authors reported that eleven Salmonella serotypes were recorded in ducks, namely S. typhi-murium, S. pullorum, S. anatum, S. westhampton, S. enteritidis, S. meleagridis, S. stanley, S. newlands, S. newport, S. dublin and S. cholera-suis.

In the above mentioned references the breed of

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ducks was in most cases not mentioned and when it was specified the incidence of salmonellae in each breed was not clear. The present work is dealing with balady ducklings, ducks, dead-in-shell embryos and infertile eggs not only with regard to salmonella infection but other Gram negative organisms were considered.

MATERIALS AND METHODS

One hundred sick balady ducks (4 weeks old), one hundred and fifty balady ducklings (1-7 days old) were collected from markets in Cairo, Kaliub, El-Basatin and El-Matariah. Seventy five infertile ducks eggs, one hundred and fifty dead embryos in shell were collected from balady hatcheries. The internal organs of the ducks, ducklings and dead embryos as well as the yolk of the infertile eggs were plated directly on blood agar and MacConkey media and inoculated into tetrathionate broth for enrichment of salmonellae. After incubation for 18-24 hours at 43°C the broth was streaked on MacConkey and SS agar plates and incubated at 37°C for 24 hours. Lactose positive and negative colonies were subjected to biochemical tests for identification (Edwards and Ewing, 1972). The salmonella suspected colonies were identified serologically using poly- and monovalent specific salmonella antisera of Wellcome Laboratories.

RESULTS

1. Ducks

Of the 100 ducks examined, 19 yielded salmonellae, 15 *E. coli*, 8 *Pseudomonas* spp. and 5 *Pasteurella multocida* (Table 1). The isolated salmonellae were identified as *S. lokstadt*, *S. newport* and *S. bovis-morbificans* (Table 2).

2. Ducklings

150 ducklings were examined, of which 30 yielded

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salmonellae, namely *S. newport*, *S. typhi-murium*, *S. fyris* and *S. muenchen*. *E. coli* was recovered from 25 cases and *Pseudomonas aeruginosa* from 18.

3. Dead embryos

All the 150 dead embryos were positive bacteriologically. In 5 samples there were double infections with 2 species. 40 of the embryos yielded salmonella spp., 29 *Proteus* spp., 28 *E. coli*, 20 *Enterobacter* spp. and 18 *Citrobacter* species. The isolated salmonella were *S. senftenberg* (12 isolates), *S. typhi-murium* (19), *S. muenchen* (10) and *S. eastbourne* (8).

4. Infertile eggs

All bacteria isolated from dead embryos were also recovered

Table 1 : Incidence of salmonellae and other Gram negative bacteria in ducks, ducklings, dead embryos and infertile eggs.

Microorganism	Ducks 100	Ducklings 150	Dead embryos 150	Infertile eggs 75
<i>Salmonella</i> spp.	19 (19%)	30 (20%)	40 (26.6%)	12 (16.3%)
<i>E. coli</i>	15 (15%)	25 (16.6%)	28 (18.6%)	4 (5.3%)
<i>Pseudomonas aeruginosa</i>	8 (8%)	18 (12%)	20 (13.3%)	5 (6.6%)
<i>Pasteurella multocida</i>	5 (5%)	-	-	-
<i>Proteus</i> spp.	-	-	29 (19.3%)	4 (5.3%)
<i>Citrobacter</i> spp.	-	-	18 (12%)	2 (2.6%)
<i>Enterobacter</i> spp.	-	-	20 (13.3%)	4 (5.3%)
Total	47 (47%)	73 (48%)	155 (100%)	31 (41%)

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Table 2 : Salmonella serovars isolated from ducks, ducklings, dead embryos and infertile eggs.

	Salmonella serovars	Antigenic Somatic	structure Flagellar		No.
			phase	phase	
			I	II	
Ducks	S.lokstadt	3,19	L,z ₁₃ , z ₂₈	1,2	8
	S.newport	6, 8	e,h	1,2	6
	S.bovis-morbificans	6, 8	r	1,5	5
Ducklings	S.newport	6, 8	e,h	1,2	10
	S.typhi-murium	4	i	1,2	8
	S.fyris	4	,v	1,2	6
	S.muenchen	6, 8	d	1,2	6
Dead embryos	S.senftenberg	3,19	g,s,t	-	12
	S.typhi-murium	4	i	1,2	10
	S.muenchen	6, 8	d	1,2	10
	S.eastbourne	9,12	e,h	1,5	8
Infertile eggs	S.typhi-murium	4	i	1,2	8
	S.newport	6,8	e,h	1,2	4

from infertile eggs but the rate of isolation was much lower. Only two salmonella serovars were isolated, namely *S. typhi-murium* (8) and *S. newport* (4)

DISCUSSION

In the present work 8 different salmonella serovars were isolated, of which 4 serovars were recorded for the first time, namely *S. lokstadt*

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in ducks, *S. fyris* in ducklings and *S. senftenberg* as well as *S. eastbourne* in dead embryos. The other 4 salmonella serovars, *S. typhi-murium*, *S. newport*, *S. muenchen* and *S. bovis-morbificans* have been reported by other authors (Table 3).

The compilation of salmonella serovars isolated from ducks, ducklings, infertile eggs and dead embryos as recorded in 12 publications in the Egyptian literature revealed the recovery of 28 Salmonella serovars. The newly isolated 4 serotypes in the present work make them 32 (Table 3). It is clear from this table that *S. typhi-murium* is by far the most common serovar, followed by *S. anatum*, *S. gallinarum*, *S. newport*, *S. enteritidis*, *S. cholera-suis*, *S. dublin* and *S. muenchen*. On the other hand, *S. stanley*, *S. newlands*, *S. meleagridis*, *S. bovis-morbificans* were recorded by 2 authors, while the remaining serovars (59.4%) were reported each by only one author. It is evident from this compilation that apart from *S. typhi-murium*, *S. gallinarum* and *S. anatum*, almost all Salmonella serovars recovered from ducks are not host specific and ducks were accidentally infected with any of these serovars from a contact animal or bird.

It is interesting to note that the highest incidence of Salmonella spp. (25.6%) was recorded in dead embryos indicating an aetiological role in the death of these embryos. However, the recovery of other microorganisms, particularly *E. coli* and *Pseudomonas aeruginosa* should be considered. Awad et al., (1973) reported on the first record of coli-septicaemia among ducklings. They isolated *E. coli* serogroups 086::K16 (B₇) and 0119::K69 (B₁₄) from sick as well as dead ducklings.

Pseudomonas aeruginosa was recovered by Awaad et al. (1981) from an outbreak involving 6000 three-days old chicks.

Saad et al. (1981) reported that 7-days old embryonated chicken eggs showed 100% mortality within

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Table 3 : Salmonellae isolated from ducklings, ducks, duck's eggs and dead-in-shell embryos as reported by different authors.

Serovars	Number of References
<i>S. typhi-murium</i>	3, 4, 6, 8, 9, 10, 11, 14, 15, *
<i>S. stanley</i>	6, 11
<i>S. newlands</i>	6, 11
<i>S. newport</i>	6, 10, 11, 14, *
<i>S. gallinarum</i>	3, 7, 8, 9, 11, 15, 17
<i>S. thompson</i>	4
<i>S. westhampton</i>	11
<i>S. enteritidis</i>	3, 8, 9, 11
<i>S. anatum</i>	3, 4, 8, 9, 10, 11, 17
<i>S. cholera-suis</i>	3, 4, 9, 11
<i>S. dublin</i>	3, 9, 11
<i>S. meleagridis</i>	7, 11
<i>S. muenchen</i>	13, 17, *
<i>S. manhattan</i>	17
<i>S. tshiongwe</i>	14
<i>S. nchanga</i>	14
<i>S. tuebingen</i>	14
<i>S. bovis-morbificans</i>	14, *
<i>S. bialfra</i>	10
<i>S. paratyphi-B</i>	4, 10
<i>S. aminatu</i>	10
<i>S. clerkenwell</i>	10
<i>S. sterrenbos</i>	10
<i>S. labadi</i>	10
<i>S. arechavalata</i>	4
<i>S. paratyphi-A</i>	4
<i>S. glaiema</i>	4
<i>S. san-Juan</i>	4
<i>S. lokstadt</i>	*
<i>S. fyris</i>	*
<i>S. senftenberg</i>	*
<i>S. eastbourne</i>	*

* Recorded in the present work.

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24 hours after inoculation with *Pseudomonas aeruginosa*. Also Safwat et al. (1984) proved experimentally the pathogenicity of *Pseudomonas* spp. to ducklings.

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