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MICROBIOLOGICAL QUALITY OF POULTRY FARM TABLE EGGS IN BENI-SUEF CITY, EGYPT

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ABSTRACT

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This study was carried out to evaluate the microbiological quality of poultry farms eggs in Beni-Suef city, 170 eggs representing 34 groups (each of 5) of poultry farm eggs which were collected randomly from groceries and supermarkets in Beni-suef city. The Aerobic plate, coliform, fecal coliform, *E.coli* and yeasts and molds counts were $8x10^3 \pm 3.8\times10^3$ and$1.1x10^3 \pm 3\times10^2$,$1.5x10^3 \pm 8.4\times10^2$ and $2x10 \pm 0.8$, $9.8x10 \pm 6.1x10$ and 2.85 ± 1.15, $1.1x10 \pm 6.68$ and 0.85 ± 0.42 and $5.9x10^2 \pm 2.5\times10^2$ and $2.6x10^2 \pm 1.7\times10^2$ cfu / shell or ml for the shell and egg content respectively, Salmonella and Pseudomonas could not be detected.

Keywords: *Table Eggs, Microbiological quality, Poultry farms.*

INTRODUCTION

Eggs are easy to use, convenient, nutritious food for people and they can kept in the refrigerator for several weeks, it provides a broad range of nutritional requirements as high quality dietary proteins that provide all of the essential amino acids needed to support life and growth, fat and minerals. The shell and egg contents at the time of oviposition are generally sterile or harbor very few microorganisms, contamination of the shell occurs from nest material, floor litter, avian fecal matter, collectors hands, packing materials and improper washing (Moats, 1980). On the other hand, egg may become contaminated with pathogens through ovarian infection before it is laid or after laying through entry of microorganisms into the whole eggs which is favored by high humidity and temperature leading to spoilage and cause economic losses or constitute a public health hazard (Board and Fuller, 1994).

E.coli is a normal inhabitant of the intestinal tract of both man and animals and can penetrate the shell contaminating the egg contents (Mayes and Takeballi, 1983).

Salmonella human infection resulting from the consumption of contaminated eggs is still a major public health problem (Koen *et al.,* 2006), while Pseudomonas spp. are among the genera of bacteria commonly found in rotten eggs (Board and Tranter, 1995). Eggs are susceptible to fungal contamination at different stages till consumption (Fajardo *et al.,* 1995). Some species of yeasts constitutes a public health hazard and may cause nail affections, skin lesions, vaginitis as well as gastrointestinal disturbance (Wilson and Plunkett, 1965), also certain types of moulds produce mycotoxins which were implicated in human cases of food poisoning and neoplastic diseases including leukemia and other cancers as liver cancer (Foster *et al.,* 1983).

This work was planned to determine the microbiological quality of commercial poultry farms table eggs collected from groceries and supermarkets located in Beni- suef city.

MATERIALS and METHODS

A) Collection of samples:
170 poultry farm eggs samples were collected randomly from groceries and supermarkets in Beni-Suef city, representing 34 groups (each of 5). Each sample was placed in a sterile plastic bag and carried to the laboratory without delay where they prepared and examined microbiologically.

B) Preparation of samples (APHA, 1992):
1. Egg shells:
Egg shell was washed by a surface rinse method as described by Moats (1980) and APHA (1992) where each egg sample was immersed In 100 ml of 0.1 sterile peptone water in a jar and shaken for 15 min on a mechanical rotary shaker. The obtained rinse solution from the five eggs of each group was combined.

2. Egg content:
The egg was prepared for evacuation of its content according to Speck (1976) and APHA (1992). Each

egg was washed with warm water (32ºC) using a brush and soap, the egg was drained and immersed in 70% Alcohol for 10 min, then flamed after it has been removed from alcohol. A hole was made in the blunt end of the egg by using sterile scalpel. The contents of each group (sample) were removed aseptically and received into a sterile mixer until the sample becomes homogenous.

C) Preparation of serial dilutions (APHA, 1992):
Ten-fold serial dilutions up to 10^6 were aseptically prepared from the rinse solutions, as well as from the homogenous egg contents using 0.1% sterile peptone water.

D- Microbiological examination:

1- Aerobic Plate Count (APC) (MPN/ml or shell): (APHA, 1992).
2- Coliform counts (MPN/ml or shell): (AOAC, 1980).
3. Fecal coliform count (MPN/ml or shell): (AOAC, 1980).
4. E- coli count (MPN/ml or shell): (AOAC, 1980).
5. Total yeast and mold count (cfu/ml or shell): (Harrigan and MacCance, 1976).
6. Isolation of Salmonella: (Quinn *et al.*, 1994).
7. Pseudomonas count: (Kielwin, 1969).

RESULTS

Table 1: Statistical analytical results of Aerobic Plate Counts (APC) in the examined samples of eggs shells and contents of poultry farms.

Egg samples	Number of samples	Positive samples		Counts / shell or ml		
		No.	%	Minimum	Maximum	Mean ± SEM
Egg shells	34	20	58.82	<10	1.0×10^5	$8.0\times10^3 \pm 3.8\times10^3$
Egg ontents	34	17	50	<10	$8.0x10^3$	$1.1\times10^3\pm3\times10^2$

Table 2: Statistical analytical results of the examined samples of eggs shells and contents of poultry farms based on their coliform counts by using (MPN/ml or shell).

Egg samples	Number of samples	Positive samples		Counts / shell or ml		
		No.	%	Minimum	Maximum	Mean ± SEM
Egg shells	34	16	47.06	<3	$2.1x10^4$	$1.5\times10^3\pm8.4\times10^2$
Egg contents	34	16	47.06	<3	2.3x10	$2.0\times10 \pm 0.8$

Table 3: Statistical analytical results of the examined samples of eggs shells and contents of poultry farms based on their fecal coliform counts (MPN /ml or shell).

Egg samples	Number of samples	Positive samples		Counts / shell or ml		
		No.	%	Minimum	Maximum	Mean ± SEM
Egg shells	34	7	20.59	<3	$1.5x10^3$	$9.8\times10\pm6.1\times10$
Egg contents	34	7	20.59	<3	2.3x10	2.85 ± 1.15

Table 4: Statistical analytical results of *E.coli* counts in the examined samples of eggs shells and contents of poultry farms.

Egg samples	Number of samples	Positive samples		Counts / shell or ml		
		No.	%	Minimum	Maximum	Mean ± SEM
Egg shells	34	5	14.71	<3	$2.1x10^2$	$1.1\times10 \pm 6.68$
Egg contents	34	4	11.76	<3	9.0	0.85 ± 0.42

Table 5: Statistical analytical results of total yeasts and molds counts in the examined samples of eggs shells and contents of poultry farms.

Egg samples	Number of examined samples	Positive samples		Counts / shell or ml		
		No.	%	Minimum	Maximum	Mean ± SEM
Egg shells	34	15	44.12	<10	$7x10^3$	$5.9\times10^2 \pm 2.5\times10^2$
Egg contents	34	8	23.53	<10	$5.6x10^3$	$2.6\times10^2 \pm 1.7\times10^2$

DISCUSSION

According to the results reported in Table 1 it was found that Aerobic bacteria were present in 58.82% and 50% of egg shell and contents samples with mean counts of $8\times10^3 \pm 3.8\times 10^3$ and $1.1 \times10^3 \pm 3\times10^2$ cfu/shell and ml, respectively.

These results were lower than those of Refaat (2009) for egg shell and content but higher than those obtained by Anand *et al.* (1994).

The reported results in Table 2 revealed that coliforms were present in 47.06 % in both egg shell and content with mean values of $1.5\times10^3 \pm 8.4\times 10^2$ and 2x10 ± 0.8 cfu/shell and ml, respectively.

These results were lower than those obtained by Suba *et al.* (2005*)* for egg shell in summer and winter, while higher than those of EL- Prince (1988) for egg content in summer and EL-Leboudy and EL-Mossalami (2006) in egg shell and content.

The high counts of coliforms may be due to bad sanitary conditions and/or delay in eggs collection from nests which were contaminated with fecal matters, Jull (1984).

The summarized results in Table 3 revealed that fecal coliforms were present in 20.59% in both egg shell and content, respectively with mean values of $9.8\times10 \pm 6.1\times10$ and 2.85 ± 1.15 cfu/shell and ml.

These results were lower than those obtained by Anand *et al.* (1994), while higher than those of Refaat (2009) for egg shell.

From Table 4 *E.coli* could be detected in 14.71% of poultry farm egg shell and 11.76% of contents with mean counts of $1.1\times10\pm6.68$ and 0.85±0.42 cfu/shell or ml.

These results were lower than those recorded by Petrak *et al.* (2000) for egg content and Akhtar *et al.* (1982) for egg shell and content, while, the obtained results were higher than those of Refaat (2009) for egg shell and EL-Leboudy and EL-Mossalami (2006) for egg shell and content.

From the obtained results it is apparent that the counts of Fecal coliforms and E-*coli* isolated from egg shells were higher than those from egg contents because the shells are more liable to be contaminated.

E.coli is one of the major problems in chicken production influencing heavier losses and sever drop in egg production, about 5.5 % mortality and 10-20% drop in eggs was observed with *E.coli* infections Qu *et al.* (1997).

The reported results in Table 5 revealed that total yeast and mold were present in 44.13% of egg shell and 23.53 % of content samples with a mean value of $5.9 \times10^2 \pm 2.5 \times 10^2$ and $2.6\times10^2 \pm 1.7\times10^2$ cfu/shell and ml, respectively.

These results were lower than those of EL-Prince (1988) for egg shell and content, while, higher than Naves *et al.* (2007).

The high results may be due to bad storage of eggs in rooms with high temperature specially in summer months and under humid conditions (Chapman *et al.,* 1983).

On the other side, Pseudomonas and Salmonella couldn't be detected in poultry farm eggs shells or contents.

In conclusion, we can recommended that strict hygienic measures to safe guard eggs from being deteriorated should be adopted in the farms and during handling and processing of eggs.

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أجريت هذه الدراسة علي عدد ١٧٠ بيضة ممثلة ب٣٤ مجموعة جمعت بطريقة عشوائية من بيض المائدة لمزارع الدواجن من محلات البقالة والسوبر ماركت بمدينة بني سويف وشملت الدراسة القشرة الخارجية والمحتوي الداخلي وذلك لفحصها وتقييمها ميكروبيولوجيا من حيث العدد الكلي للبكتريا الهوائية والميكروبات القولونية والميكروبات القولونية البرازية والايشيريشيا كولاي والخمائر والفطريات والسالمونيلا والسيدوموناس وقد تمت مناقشة الأهمية الصحية والاقتصادية للميكروبات المعزولة والاشتراطات الصحية الواجب إتباعها عند إنتاج وتداول واستهلاك بيض المائدة.