Studies on Quail's Egg of North Sinai and Cairo Governorates

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Abstract

A total of forty quail egg samples were randomly collected from North Sinai and Cairo Governorates (twenty each) and examined microbiologically. The obtained results revealed that the mean value of Aerobic Plate Count (APC), Coliform, Enterococci and Fungi count in egg shell were $1.4x10^3 \pm 2.6x\ 10^2$; $3x10\pm$ 1..2x10; $4.1x10^{\pm} \pm$ 5x10; $1.1x10^2 \pm$3.1x10 and egg content were $2.5x10^2 \pm$ 1.0x10; 4x10 ± 1.3x10 ; 0 ; 0 respectively for Sinai quail's eggs and $1.7x10^4 \pm 6.6x10^3$; $3.7x10^3 \pm 2.6x10^2$; $1.3x10^{3}\pm 2.3x10^2$; $2.3x10^2 \pm$ 1.3x10 in egg shell and $1.4x10^2 \pm 1.1x10^2$; $5x10^4 \pm$ 2.1x10; $6.4x10^{\pm} \pm$ 2.3x10 and 3.5x10 ±1.0x10 in egg content respectively for Cairo quail's eggs. Both Salmonella species and *Bacillus cereus* organisms could be isolated from Cairo quail's eggs shell and content in an incidence of 5% and 10% respectively. While *S. auerus* could be detected in 10% of the content of Sinai quail's eggs. Aspergillus spp, could be detected in both Cairo quail's eggs shell and content, also from Sinai quail's eggs shell in an incidence of 35%, 15% and 25% respectively.

An experiment was conducted to investigate the effects of feeding blends of laying quail ration contaminated with aflatoxin for their residual transmission into their eggs. The dietary treatments were zero (control), 20, 50 and 100 ug aflatoxins /kg feed. It was concluded that laying quail's egg samples were contaminated with 0.033 µg aflatoxins as a maximum value and 0.004 µg aflatoxins as a minimum value respectively for100 ug aflatoxins /kg feed. The public health importance of isolated organisms and mycotoxin as well as the suggested measures for improving the quail's egg quality were discussed.

Introduction

Quail is a small type of bird which is breed for meat and egg production, its meat and egg promotes body and brain development in children, best balanced feed for pregnant mothers. Quail lays 100 – 250 eggs a year, the quail's egg is roughly one-fifth the size of a chicken's egg and weight around 10 g, the egg shells are spotted, with colors ranging from white to brown, they contain less cholesterol and less fat content but more phospholipids. The proportion of yolk to albumen, at 39: 61, is higher compared to chicken eggs. Quail's egg homogenate is devoid of any side effects and proved

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efficient against allergic asthma, seasonal hay fever and allergic rhinitis to dust mites (**25**). In spite of its high nutritive value, eggs were responsible for several outbreaks and were a vehicle for transmission of certain human pathogens (**30**). Coliforms are intestinal and non intestinal inhabitants, so their presence in food gives an index of poor sanitation as well as possible presence of enteric pathogen, render egg of inferior quality and unfit for human consumption leading to economic losses (**1**). (**2**) revealed that Enterococci have been used as indicators of poor hygienic measures for production and handling because they can grow at wide range of temperature, resist drying and disinfectants as well as indicator of faecal pollution. While *Bacillus cereus* is an important cause of toxin- mediated food poisoning of two distinct types, a diarrheal illness with abdominal pain and watery diarrhea occurring about 8-16 hrs after consumption of contaminated food (**12**).

Salmonella may pass through the ovaries, via blood and contaminate egg during its formation, as Salmonella organisms penetrated epithelial cells-villi of small intestine entering the connective tissue below, where they stay and multiply (**23**).

The ingestion of staphylococcal toxin from contaminated food leads to rapid appearance of poisoning symptoms which are vomiting, diarrhea within (2-6 hrs), the enterotoxins of *Staphylococcus aureus* are recognized as the causative agent of staphylococcal food poisoning (**4**).

The growth of molds on the surface of egg shells were enhanced by humid conditions during storage causing spoilage of egg, furthermore some strains of molds are capable of forming toxins that cause mycotoxicosis and cancers among consumers. Moreover, Aspergillus species may induce pulmonary aspergillosis, skin infection, nasal infection as well as nail and external ear infections. Molds are recognized as major contaminant of many grains used for poultry diets. They contaminate crops before harvest or invade feedstuffs of laying hen during processing, transport or storage particularly in tropic areas. They produce a variety of mycotoxins having biological and toxicological effects on laying hens and human (**32**).

In Egypt, quail's egg are now being marketed through many supermarkets, therefore the number of consumers has greatly increased. So, the purpose of

such work was to assess the quality of quail's egg in North Sinai and Cairo governorates by microbiological and aflatoxin examination.

Material and Methods

1- Samples collection: A total of forty samples, twenty quail's eggs from North Sinai Governorate and twenty quail eggs from Cairo Governorate.
2- Samples preparation: for both egg shells and egg content according to (**3**)
3- Microbiological examination for:
- Aerobic Plate Count according to (**3**).
- Coliform count (**21**).
- Enterococci count according to (**35**).
- Fungi count were adopted by the technique described by (**18**).

4- Pathogens isolation:
- Isolation of Salmonela according to (**24**).
- Isolation of *Bacilus cereus* (**35**).
- Isolation of *Staphylococcus aureus* (**24**).
- Isolation of and identification of *Aspergilus flavus* and *Aspergilus parasiticus* according to (**38**).

5- Experimental determination of *aflatoxin transmission to q*uail's eggs. Forty laying quails were assigned into four experimental groups. Initially the quails were maintained a week for adaptation and they were fed a conventional meal basal diet previously screened for aflatoxins and formulated to meet or exceed all the nutritional requirement of laying quails. The dietary treatments were: zero (control), 20, 50 and 100 ug/kg aflatoxins /kg feed for 60 days. Each treatment group consisted of three replicates. Eggs per experiment were collected and recorded on days 1, 10, 20, 30, 40, 50 and 60 of the intoxication period and aflatoxin in quail eggs and feed were submitted to *q*uantification analysis by the method recommended by (**5**). Data were analyzed with the Analysis of Variance (ANOVA) according to (**40**) using Mstatc program. When significant differences ($P<0.05$) were detected.

Results

Table (1): Statistical and analytical results of microbiological examination of North Sinai quail's egg samples.

Count	North Sinai quail's egg shell			North Sinai quail's egg content		
	No. of positive samples	%	Mean ± S.E.	No. of positive samples	%	Mean ± S.E.
APC	20	100	$1.4 \times 10^3 \pm 2.6 \times 10^2$	12	60	$2.5 \times 10^2 \pm 1.0 \times 10$
Coliforms	11	55	$3 \times 10 \pm 1.2 \times 10$	9	45	$4 \times 10 \pm 1.3 \times 10$
Enterococci	5	25	$4.1 \times 10^2 \pm 5 \times 10$	0	0	0
Fungi	8	40	$1.1 \times 10^2 \pm 3.1 \times 10$	0	0	0

Table (2): Statistical and analytical results of microbiological examination of Cairo quail's egg samples.

Count	Cairo quail's egg shell			Cairo quail's egg content		
	No. of positive samples	%	Mean ± S.E.	No. of positive samples	%	Mean ± S.E.
APC	20	100	$1.7 \times 10^4 \pm 6.6 \times 10^3$	15	75	$1.4 \times 10^2 \pm 1.1 \times 10^2$
Coliforms	15	75	$3.7 \times 10^3 \pm 2.6 \times 10^2$	13	65	$5 \times 10^4 \pm 2.1 \times 10$
Enterococci	10	50	$1.3 \times 10^3 \pm 2.3 \times 10^2$	4	20	$6.4 \times 10^2 \pm 2.3 \times 10$
Fungi	13	65	$2.3 \times 10^2 \pm 1.3 \times 10$	7	35	$3.5 \times 10 \pm 1.0 \times 10$

Table (3): Incidence of isolated organisms from quail's egg.

Microorganism	North Sinai quail's eggs				Cairo quail's eggs			
	Egg shell		Egg content		Egg shell		Egg content	
	No.	%	No.	%	No.	%	No.	%
Salmonella	0	0	0	0	0	0	1	5
Bacilus cereus	0	0	0	0	2	10	0	0
Staph. aureus	0	0	2	10	0	0	0	0
Aspergilus spp	5	25	0	0	7	35	3	15

Table (4): Aflatoxins transmission in quail's egg during 60 days of the experiment (µg/kg).

Aflatoxin in quail's ration	1st Day quail's egg	10th day quail's egg	20th Day quail's egg	30th day quail's egg	40th day quail's egg	50th day quail's egg	60th day quail's egg
Zero (control)	ND	ND	ND	ND	ND	ND	ND
20 ug/kg	ND	ND	ND	ND	ND	0.002	0.004
50 ug/kg	ND	0.005	0.006	0.008	0.009	0.011	0.013
100 ug/kg	ND	0.015	0.019	0.024	0.028	0.030	0.033

ND: not detected

Discussion

As far as we know, little available literatures dealing with the microbial examination of quail's eggs, it was hard to discuss the aforementioned results but generally several authors in Egypt and all over the world reported on the microbiological contamination of birds eggs. 90 % of newly laid eggs were free from microorganisms as conalbumin, one of the inhibitory substance present in egg white plays a major role for preventing the growth of Gram-negative spoilage bacteria (**20**).Sources of egg contamination are numerous such as after laying, the shells soon become contaminated with a variety of organisms by faecal matter from bird, through nest, dust, handling and perhaps by the material in which the eggs are backed, the faecal material enhances contamination of eggs immediately following the ovipostion (**9** and **44**).

Data obtained from tables (1,2) showed that microorganisms count ranged from $1.4x10^3 \pm 2.6x\ 10^2$; $3x10\pm\ 1.2x10$; $4.1x10^2 \pm\ 5x10$; $1.1x10^2 \pm\ 3.1x10$; $1.7x10^4 \pm 6.6x10^3$; $3.7x10^3 \pm 2.6x10^2$; $1.3x10^3\pm\ 2.3x10^2$ and $2.3x10^2 \pm 1.3x10$ of North Sinai and Cairo quail's eggs shell respectively were nearly similar to those reported by (**22**) for Cairo quail eggs, but higher than recorded by Sinai quail's eggs, while the higher results were summarized by Moats (1979) who found that the level of bacterial contamination ranged from $2.1x10^3$ to $5.11x10^6$/shell, while Coliforms and Enterococci count were, 5-2.0 $x10^5$ and 25 -22 $x10^3$/shell. respectively. (**41**)

reported that fresh eggs usually contain less than 10 microorganisms /g and seldom 100 /g. 95% relative humidity surrounding an egg increases mold and bacterial growth on the shell followed by microbial penetration through the shell pores, so water either as vapor or liquid appeared to be essential for microbial penetration of the egg shell, although the protection provided by cuticle last at least up to 96 hours after the egg laid (**43 and 8**).

The data in tables (1,2) showed that the mean values for APC, *Coliforms*, *Enterobacterace* and Fungi for North Sinai and Cairo quail's egg content were $2.5x10^2 \pm 1.0x10$; $4x10 \pm 1.3x10$; 0; 0; $1.4x10^2 \pm 1.1x10^2$; $5x10^4 \pm 2.1x10$; $6.4x10^2 \pm 2.3x10$ and $3.5x10 \pm 1.0$ x10 respectively. The presence of these microorganisms in egg content explained by (**27**) and (**10**) who mentioned that the infection of eggs occur during egg formation by Staphylococci, while Salmonella and molds penetrated through egg shells during storage also; egg yolk provided an excellent medium for microbial growth and considered as sporadic vehicle of food borne diseases.

From the obtained data in table (3)fungi were predominate on the quail's egg shell and egg content of Cairo quail's egg this may be due to the prevalence of Aspergillus spp, and other fungi were dominating at Cairo atmosphere (**16**), giving the chance for molds penetrate the shell during storage. Thin some of the isolated molds induce certain undesirable changes in the egg content while others may constitute a public health hazard (**27**). Fungi absence in North Sinai quail's egg content agree with that reported by (**29**) who found that no mold and yeast were recovered from the egg contents. *Staphylococcus aureus* isolated from quail's egg content in percentage of 10%, in similar result with (**15**), the presence of *Staphylococcus aureus* in eggs, particularly liquid eggs, is due to re-infection by human (**6**).

Salmonella can be detected from Cairo quail's egg content in percentage of 5 % as the contamination of egg with salmonella can occur in several ways: faeces contaminate egg shell, cracked shell, may be also internally, prior shell formation via transovarian transmission, also Salmonella can not invade the shell surface unless the relative humidity is low 97% (**11** and **17**).

The results achieved allow concluding that Cairo quail's eggs proved to be highly contaminated with many organisms than Sinai quail's eggs,

these bacteria under bad storage and mishandling may lead to economic losses through spoilage of quail eggs, as well as constitute a public health hazard.

Liver was the major organ that could be damaged by aflatoxin exposure; such damages affect the cell metabolism and lead to a decline in the bird productivity and economic loss. Aflatoxins could withstand both boiling and gastric acid.

During the experimental period, laying quails were healthy, and the aflatoxins had no apparent effect on feed intake or egg production. Although effects such as decrease or stopping of egg production have been demonstrated in previous studies involving diets with aflatoxins levels above 600 ug / kg of ration (**26**).

From table (4) aflatoxins were detected in the eggs of laying quails given 100 ug /kg feed, at levels that ranged from 0.010 to 0.032 ug aflatoxin (average: 0.020 ug aflatoxin) during 60 days of experiment compared with controls. The percentage of aflatoxins was higher in egg samples from groups receiving 100 ug of aflatoxin. A decrease in aflatoxins were observed only in birds fed 20 ug/kg of aflatoxin, the same results obtained by (**14**). The results indicate that the feed to eggs aflatoxin transmission ratio was approximately 5000:1, emphasizing the importance of controlling aflatoxin levels in rations for laying hens. This finding was consistent with (**34**) as aflatoxin residues were detected in the eggs of hens given 500 ug/kg feed, at levels that ranged from 0.05 to 0.16 microgram/kg. Also, egg production and average egg weights were not affected in the groups receiving aflatoxin -contaminated rations. (**45**) also found that quails fed a diet containing 3310 ug of aflatoxin B_1 and 1680 ug of aflatoxin B_2 / kg feed, aflatoxins transfer to the eggs reaching maximum levels after 4-5 days. The mean values for combined residue levels in eggs were less than 0.5 ug aflatoxins. These results explain why we did not find aflatoxin residue in examined egg samples in 1st day of experiment. Our finding were consistent also with (**46**) who reported that aflatoxins can be carried over from feed to eggs in ratios ranging from 5.000 : 1 to 66,200 : 1 and even to 125, 000 : 1.

These contrasting results may be ascribed to the administration of contaminated feeds containing aflatoxin with different level of toxicity. The variation of aflatoxin residue in eggs of laying quails confirm that only

small quantities of aflatoxins are likely to be deposited, while the majority were detoxicated and /or stored in liver and other tissues such as ovary, kidney, muscles and excreted in excreta in agreement with (**42**), (**28**), (**26**), (**7**), (**39**) and (**37**). Also, aflatoxin may cause relevant lesions such as pathoanatomical and histopathological changes in liver, kidney and ovaries. The ovaries showed follicular atresia which has a detrimental effect on egg production (**19**, **14** and **36**).

Aflatoxin can be localized in the body especially the oviduct and descend in the egg content which then consumed by human beings leading to dangerous diseases (**27**).The prolonged administration of aflatoxins in egg even in small amounts may cause public health problems due to its accumulative effects for egg consumers as concluded by (**13**) and (**33**).

To promote safety, egg quality assurance programs, which stimulate actions for all aspects of egg production to reduce the risk of egg becoming contaminated with aflatoxins. These actions include making efforts to ensure that quail feeds are mycotoxin free, as will as strict hygienic measures should be adopted during handling of quail eggs especially in Sinai Governorates area as was promised to Egypt by the Prophet in an excellent manner for a long time.

References

1. **Ahlam, A. E. and Hanaa, H. A. (2006):** Microbiological evaluation of table eggs with special reference to enteric pathogens in Alexandria governorate. J. Egypt. Vet. Med. Assoc., 66 (1): 141 – 153.
2. **Angelotti, K.; Lewis, H. and Foster, M. (1993):** Faecal streptococci in foods. J. Milk Food Technol., 26 (9): 296 – 301.
3. **American Public Health Association " APHA" (1985):** Standard methods for examination of dairy products. 15rd Ed. Washington, D.C. USA.
4. **Arbuthnott, J. P.; Colman, D.C. and Deaza vedo, J. S. (1990):** Staphylococcal toxins in human diseases. Appl. Bact. Symposium Supplement. 101s-107s.
5. **Association Official Analytical Chemists. "A.O.A.C."(1990):** Official Methods of Analysis of the Association of Analytical Chemists .Washington D.C. 15th Ed. USA.
6. **Baker, R. C. (1974):** Microbiology of eggs. A review, Milk Food Technol. J., 7 (5): 265-268.
7. **Bintvihok, A.; Thiengnin, S.; Doi, K. and Kumagai, S. (2002):** Residues of aflatoxins in the liver, muscle and eggs of domestic fowls. J. Vet. Med. Sci., 64 (11): 1037- 9.
8. **Board, R. G.; Loseby, S. and Miles, V. R. (1979):** A note on microbial growth on hen egg shells. Brit. Poult. Sci., J., 20: 413-420.
9. **Bruce, J. and Drysdale, F. (1991):** Egg hygiene; routes of infection. Tullett S. (F.D.) Avian Incubation, 275-268.(London, Butter Worth Heinemann Ltd).
10. **Bryan, F.L. (1988):** Risk associated with vehicle of food borne pathogenic toxins. Food protection. J., 51 (6): 498-509-8.
11. **Chang- Lee, M. R.; Katz, A. R.; Sasaki, D.M. and Minette, H.P. (1991):** Salmonella egg survey in Hawaii. Amer. Public. Health, J., 81 (6): 764-766.
12. **Collee, J.; Frazer, A.; Marmion, B. and Simmons, A. (1996):** Practical medical microbiology. 14th Ed. New York, Edinburgh, London, Madrid, San Francisco and Tokyo.
13. **Chowdhury, S.R. and Smith, T.K. (2004):** Effects of feeding blends of grains naturally contaminated with Fusarium mycotoxins on performance and metabolism of laying hens. Poultry Science, Vol. 83, Issue 11, 1849-1856.
14. **Del Bianchi, M.; Oliveira, C.; Albuquerque, R.; Guerra, J and Correa, B. (2005):** Effects of prolonged oral administration of aflatoxin B_1 and fumonisin B_1 in broiler chickens. Poult. Sci., 84, (12), 1835-1840.
15. **El-Essawy, H A; Saudi, A M. and Sallam, S.S (1989):** Microbiological studies on market hen eggs. Alex. Vet. Sci. J., 5 (2): 219 – 225.
16. **El-Sayed, T.I. (1991):** Studies on mycoflora of poultry farms in Qalubia district. Ph.D. Thesis. Fac. Sci., Zagazig Univ.
17. **Elson, L.; Little, C. and Mitchell, T. (2005):** Salmonella and raw shell eggs. J. Food Prot., 68 (2): 256 – 264.
18. **Finegold,S.M. and Martin,W.J.(1982):** Baily and Scott diagnostic microbiology, 6th

Ed., C.V. Mosby Co., St. Louis, Toronto, London.
19. Hafez, A.H.; Megalla, S.E.; Abdel-Fattah, H.M.and Kamel, Y.Y.(1982): Aflatoxin and aflatoxicosis. II. Effects of aflatoxin on ovaries and testicles in mature domestic fowls. Mycopathologia., 77 (3): 137-9.
20. Hassan, S.A. (1995): Microbial evaluation of table egg. M.V.Sc. Thesis, Fac. Vet. Med., Zagazig Univ.,
21. International Committee on Microbiological Specifications for Foods "ICMSF" (1982): Microorganisms in food, their significance and enumeration. 2nd Ed., Univ. Toronto Press, Toronto, London.
22. Jehan, M. and Shabana, E. (2003): Microbial aspects of fresh and canned quail eggs. J. Egypt. Vet. Med., Assoc., 63 (1): 357 – 366.
23. Jhon, G. (1997): Essential Food Microbiology. Arnold, a member of the Hodder Heading Group, 338 Euston Road, London.
24. Krieg, N.R. and Holt, J.G. (1984): Bergey's Manual of Systematic Bacteriology. Vol. I. Williams and Wilkins, Baltimore, U.S.A.
25. Kwan,S.C.(2004): Introduction to quail farming.
http://www.gss.nus.edu.sg/bird/quail/soochin.htm.
26. Malden, U.A. and Stahr, H.M. (1995): Retention and distribution of aflatoxin in tissues of chicks fed aflatoxin-contaminated poultry rations amended with soil. Vet. Hum. Toxicol., 37 (1): 24 - 9.
27. Matthes, S. (1984): Diminution of egg quality caused by an avian diseases and microbial contamination. World's Poult. Sci.J., 40 (1): 81.
28. Micco, C.; Miraglia, M.; Onori, R.; Brera, C.; Mantovani, A.; Ioppolo, A. and Stasolla, D.(1988): Long-term administration of low doses of mycotoxins to poultry. Food Addit Contam., 5 (3): 303 - 8.
29. Mohamed, E.E. (1988): Microbiological quality of hen's eggs. M.V.Sc. Thesis Fac. Vet. Med., Assiut Univ.
30. Miyamota, T.; Horie, T.; Babo, E.; Sasai, K.; Fukata, T. and Arakawa, A. (1998): Salmonella penetration through eggs shell associated with freshness of laid eggs and refrigeration. J. Food Prot., 61(3):350 – 353.
31. Monts, W .A. (1979): The effect of washing eggs under commercial conditions on bacterial loads on egg shells. Poult. Sci. J., 58: 1228-1233.
32. Moussel, (1982): Microbiology of Food. 3rd Ed. The Univ. of Utrecht. The Netherlands ISBN.
33. Ogido, R.; Oliveira, C.; Ledoux, D.; Rottinghaus, G.; Correa, B.; Butkeraitis, T.; Reis, F.; Goncales, E and Albuquerque, R. (2004): Effects of prolonged administration of aflatoxin B_1 and fumonisin B_1 in laying Japanese quail. Poult. Sci., 83, (12), 1953-1958.
34. Oliveira, C.; Kobashigawa, E.; Reis, T.; Mestieri, L.; Albuquerque, R. and Corrêa, B. (2000): Aflatoxin B_1 residues in eggs of laying hens fed a diet containing different levels of the mycotoxin. Food Addit. Contam., 17(6): 459- 62.

35. Oxoid manual (1990): the Oxoid Manual (Culture media, Ingredients & other Laboratory Services). 6th Ed. Unippath. Ltd., United Kingdom.

36. Pandey, I. and Chauhan, S. (2007): Studies on production performance and toxin residues in tissues and eggs of layer chickens fed on diets with various concentrations of aflatoxin B_1. Br Poult Sci., 48(6):713-23.

37. Raaber, R.; Dilkin, P.; Giacomini, L.; Araújo de Almeida, C. and Mallmann, C. (2007): Performance of Turkey poults fed different doses of aflatoxins in the diet. Poult Sci., 86: 1620 -1624.

38. Refai, M.K. (1987): Isolation and identification of fungi. Fac. of Vet. Med. Cairo Univ., Egypt.

39. Rizzi, L.; Simioli, M.; Roncada, P. and Zaghini, A.(2003): Aflatoxin B_1 and clinoptilolite in feed for laying hens: effects on egg quality, mycotoxin residues in livers, and hepatic mixed-function oxygenase activities. J Food Prot., 66 (5): 860 -5.

40. Snedecor, G. W. and Cochran, W. G. (1980): Statistical methods 6th Ed. The Iowa State Univ. Press, Amer. Iowa, USA, pp. 593.

41. Speck, M.L. (1976): Compendium of methods for microbiological examination of food. American Public Health Association Washington, Dc.

42. Trucksess, M.; Stoloff, L.; Young, K.; Wyatt, R. and Miller, B. (1983): Aflatoxicol and aflatoxins B_1 and M_1 in eggs and tissues of laying hens consuming aflatoxin-contaminated feed. Poult Sci., 62 (11): 2176-82.

43. Vadehra, D.V.; Baker, R.C. and Naylor, H.B. (1970): Infection routes of bacteria into chicken eggs. Food Sci., J., 35:61-62.

44. Van Duynhoven,Y.; De jager, C.;Vennema, H.; Koopman,M. and Van Der poel, (2005): A one – year intensified study of outbreaks of gastroenteritis in the Netherlands. Epidemiol. Infect., 13 (1): 9 – 21.

45. Wolzak, A.; Pearson. A.; Coleman, T.; Pestka, J. and Gray, J. (1985): Aflatoxin deposition and clearance in the eggs of laying hens. Food Chem. Toxicol., 23 (12): 1057-61.

46. Zaghini, A.; Martelli, G.; Roncada, P.; Simioli, M. and Rizzi, L. (2005): Mannanoligosaccharides and aflatoxin B_1 in feed for laying hens: effects on egg quality, aflatoxins residues in eggs, and aflatoxin B_1 levels in liver. Poult. Sci., 84, (6): 825-832.

دراسات على بيض السمان بمحافظتي شمال سيناء والقاهرة

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معهد بحوث صحة الحيوان - مركز البحوث الزراعية

الملخص العربي

تم جمع عدد أربعون بيضة من بيض السمان من محافظتي شمال سيناء والقاهرة (عشرون من كل منها) وفحصها ميكروبيولوجيا. وكان متوسط العد البكتيري الكلى، والميكروب الانولوني، والسبحي، والعفن من علي القشرة ومن داخل البيضة هو ١,٤ x ١٠ ^{٣} ± ٢,٦ x ١٠ ^{٢} ، ٣ x ١٠ ± ١,٢ x ١٠ ، ٤,١ x ١٠ ^{٢} ± ٥ x ١٠، ١,١ x ١٠ ^{٢} ± ٣ x ١٠ ، ٢,٥ x ١٠ ^{٢} ± ١ x ١٠ ، ٤ x ١٠ ± ١,٣ x ١٠، صفر، صفر على التوالي لبيض سمان سيناء، ثم ١,٧ x ١٠ ^{٤} ± ٦,٦ x ١٠ ^{٣}، ٣,٧ x ١٠ ^{٣} ± ٢,٦ x ١٠ ^{٢}، ١,٣ x ١٠ ^{٣} ± ٢,٣ x ١٠ ^{٢}، ٢,٣ x ١٠ ^{٢} ± ١,٣ x ١٠، ١,٤ x ١٠ ^{٢} ± ١,١ x ١٠ ^{٢}، ٥ x ١٠ ± ٤١ x ١٠، ٢,١ x ١٠ ± ٦,٤ x ١٠ ^{٢} ± ٢,٣ x ١٠ ، ٣,٥ x ١٠ ± ١,٠ x ١٠البيض سمان القاهرة على التوالي. تم عزل ميكروب الباسيلس سيرس، والسالمونيلا من على القشرة ومن داخل البيضة بنسبة ١٠%، ٥% على التوالي لبيض سمان القاهرة، بينما المكور العنقودي تواجد بنسبة ١٠% من داخل بيض سمان سيناء. وأيضا تم عزل عفن الاسبرجيلس من على القشرة ومن داخل بيض سمان القاهرة ، وأيضا من على القشرة لبيض سمان سيناء وذلك بنسبة ٣٥%، ١٥%، ٢٥% على التوالي. وفى تجربة عملية تم تقديم عليقة بها ٢٠،٥٠،١٠٠ug /kg من الافلاتوكسين لسمان بياض ولمدة ٦٠ يوم. وتبين من فحص البيض الناتج انه احتوى على 0.004 µg/kg من الافلاتوكسين كحد أدنى، 0.033µg/kg كحد أقصى من الافلاتوكسين. وقد تم مناقشة الدلالة الصحية والإجراءات الواجب إتباعها لحماية بيض السمان نظيفا وأمنا لجموع المستهلكين.