THE EFFECT OF COATING MATERIALS AND STORAGE TIME ON INTERNAL QUALITY OF CHICKEN AND QUAIL EGGS UNDER REFRIGERATED STORAGE: 1 – BLACK SEED OIL

Journal

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ABSTRACT

The functional properties of foods can be preserved when they are coated with edible films , especially when the moisture and the transport of O_2 and Co_2 are reduced . the objective of this work was to study the effect of coating chicken and quail eggs with black seed oil and storage time (0,10,20 and 30 days) on internal quality of chicken and quail eggs. In this research, 360 fresh chicken ad quail eggs were usd. The eggs were divided into 4 groups (two coated - with back seed oil - groups and two control groups for chicken an quail, respectively)

The percentage of weight loss and pH increased when storage period increased, but it was decreased for coated eggs (T_2) comparable with non-coated (T_1). Hu decreased when the storage increased for two kind of eggs, and it was a lower decreased for coated eggs. Quail eggs coated had good internal quality during storage comparable with chicken eggs.

Black seed oil had any effect on flavor and overall acceptance of coated chicken & quail eggs during storage periods.

These results suggest that black seed oil coatings can be used to reduce changes in eggs during storage .

Key words : Egg quality, Black seed oil, coating, chicken, quail, Haugh unit, weight loss.

INTRODUCTION

Eggs have been classified as natures original function of food (Hasler, 2000). In the last years, it has been observed in the poultry breeding that the quails were benefited as much as hens both for their meat and eggs, therefore, commercial quail breeding have became widespread (Altinel et.al, 1996). In the egg processing enterprises, the weight of egg shell, albumen and the yolk that form the egg as well as their rats affect the amount and price of the product (Altan, et al., 1998).

In Iraq, especially in the recent years, the increasing number of quail breeding activates led the need for examining some issues such as internal and external quality traits of the quail eggs and their storage time. The advantages of edible film and coating utilization can be justified since they maintain the functional properties of foods by decreasing moisture loss and gas transport (O_2 and Co_2), and, also, by delaying volatilization of aromatic components (Kester and Fennema, 1986). The application of coatings an eggs reduces weight loss and maintains their internal measured such as Haugh units , Yolk index and egg white pH.

Early studies examined chicken eggs coated with Zein–based, egg albumen, soybean protein isolate, wheat gluten and mineral oil and a crylonitril (Li, et al., 1985) and whey protein concentrate (Wong, et al., 1996).

Considering two new egg storage alternatives are essential to maintain the internal quality of egg coated with black seed oil and evaluate the application of this type means of preserving the desirable qualities of this product.

The objective of this work was to study the application of black seed oil coating fresh eggs on weight loss, internal quality like as Haugh units and albumen pH, sensory evaluation and another adjectives during 30 days of storage in refrigerator.

MATERIALS AND METHODS

Three hundred and sixty fresh chicken eggs and quail eggs were used in this study. 20 eggs were selected, from each group, and separated from the rest of the group for Haugh unit and albumen pH determination, eggs were sanitized with a 1% sodium hypochlorite solution for 30s (Aileoni and Antunes, 2004). The eggs were divided into four groups, each chicken eggs and quail eggs were coated with

black seed oil, while the another two did not coated (control). Egg weight loss calculated by subtracting the final weight from the initial weight, and express percentage.

Egg internal quality measured with a high precision micrometer that determines albumen height system uses the Haugh unit formula (Haugh , 1937) as follows:

$$Hu= 100 \text{ Log } (H+ 7.57 – 1.7 \text{ } w^{0.037})$$

Where: Hu= Haugh units; H= thick egg white height (mm); w= egg weight (g) using calculator program (Roush, 1981) .

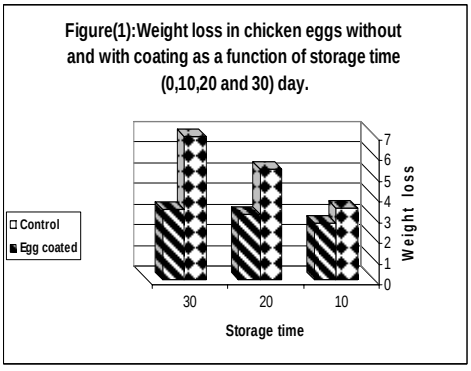
The eggs were broken on table with a glass coer in order to measure the yolk height, yolk diameter, albumen length and the albumen height. The yolk departed from the albumen part was weighted together with the membrane and the yolk weight was obtained, the shells were washed under slightly flowing water so that the albumen remains are obtained. The washed shells were left to dry in the open air for 24 hours. Then they were balanced together with the shell membrane. Finally samples were taken from sharp, blunt and equatorial part were measured, and the average shell thickness was obtained from the average values of these three parts (Tyler, 1961).

Sensory evaluation: The degree of sensory evaluation of flavor and overall acceptance of cooked egg by boiling determined according to Levie (1970). A 7-point hedonic scale (7-like extremely, 1-dislike extremely) was used to evaluate the following attributes. Ten staff members of the college of agriculture and graduate students most of whom had participated in previous consumer panels work as panelists, were given the details about this panel and we do a primary panel before the essential test which we adapted in this study. We depending the standard point to control on varieties which may effect the degree of panel: Time of the test in 11 O'clock (A.M.), degree of cooking temperature, time between cooking and test , drinking water in 25̊C between the test and other, finally the size of the pieces which we tested (Lee, et al., 1997).

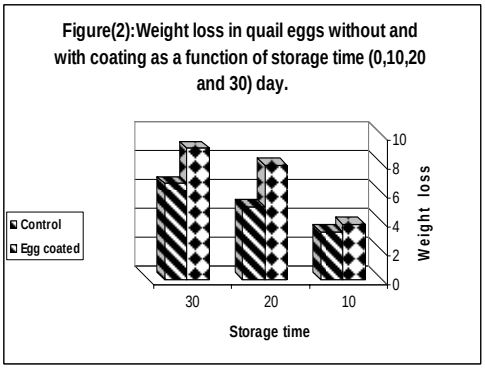
Statistical analysis: The data were analyzed using Complete Randomized Design. the calculation was preformed by the SAS package programmers (SAS, 2001). LSD test was used to determine significant differences

RESULTS AND DISCUSSION

The percentage of weight loss was affected by black seed oil coated and by storage time. In chicken eggs (Figure, 1) the percentage of weight loss was affected by black seed oil, it was 6.88 and 3.39 respectively for non-coated and coated egg. Both coated and non-coated increased during storage (Figure, 2) for quail eggs. A greatest weight losses in both non-coated and coated eggs occurred on the 30 days of storage, their values was 9.02% and 6.60% respectively. Wong, et al., (1996) measured a 4.2, 6.5 and 9.2% weight loss in egg coated with wheat gluten, soybean protein isolate and minerd oil respectively after 28 days of storage. Alleoni and Antunes (2004) notice that the weight loss was decreased for coated eggs with whey protein concentrate for 3, 7, 10, 14, 21 and 28 days at 25 °C.



Figure(1):Weight loss in chicken eggs without and with coating as a function of storage time (0,10,20 and 30) day.



Figure(2):Weight loss in quail eggs without and with coating as a function of storage time (0,10,20 and 30) day.

The albumen pH (Table, 1) in coated chicken and quail eggs was lower than in non-coated eggs , for all storage periods . pH for non-coated chicken eggs ranged from 8.06 (one day old eggs) to 9.32

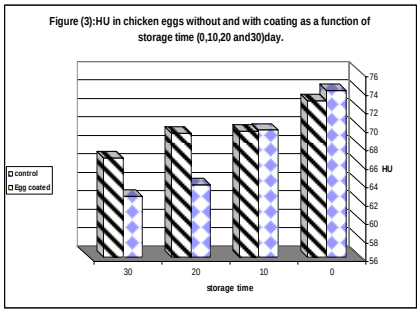
(30–day old eggs). Ahn, *et al.,* (1999) found that the albumen pH was increased after seven days (to be pH 9.36) of storage, but remained unchanged until 21 days of storage (pH 9.27) at refrigeration temperature. Allenoni and Antunes (2004) reported that Albumen pH increased unit values for non-coated and coated eggs .

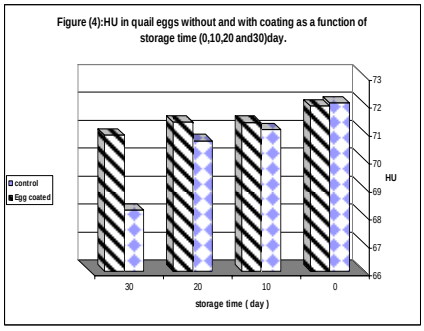
Table (1) the effect of coating and storage (0,10,20 and 30) days on pH of chicken and quail eggs .

Kind of birds	Storage treatment	0	10	20	30
chicken	Control	Ad 8.06 ± 0.02	Ac 8.33 ± 0.05	Ab 8.90 ± 0.02	Aa 9.32 ± 0.06
	Coated	Ad 8.08 ± 0.01	Ac 8.27 ± 0.03	Bb 8.54 ± 0.03	Ba 8.80 ± 0.05
Quail	Control	Ac 8.52 ± 0.09	Acb 8.68 ± 0. 40	Aab 8.85 ± 0.02	Aa 8.98 ± 0.06
	Coated	Ac 8.60 ± 0.01	Abc 8.65 ± 0.01	Bb 8.70 ± 0.01	Ba 8.80 ± 0.04

- Dissimilar superscripts at he same row means significant (P<0.01, capital letters, P<0.05, small letters).

pH for coated chicken eggs ranged from 8.08 (one day old eggs) to 8.80 (30 day old eggs), while quail eggs (Figure, 3) in non-coated eggs ranged from 8.52 (one day old eggs) to 8.98 (30 day old eggs) and in coated egg ranged from 8.60 (one day old eggs) to 8.80 (30 day old eggs), and thus because of the albumen increases as the egg losses Co_2 (Burley and Vadehra, 1989) and as the fine layer of albumin could be a primary barrier for gas diffusion and it also have albumen quality, which could prevent the free diffusion of Co_2 under long storage periods (Silversides and Scott, 2001). Silversides and Scott (2001) suggested that albumen pH should be considered of quality because it is not affected by the age or by the line of the hens. The black seed oil coating had an important effect controlling the pH of eggs , its reduced Co_2 loss during storage. Figures (3 and 4) showed a decreased in egg internal quality of Hu in both non-coated (control) and coated for chicken and quail eggs. The variation of in Hu in coated chicken eggs ranged from 72.74 to 65.76, while the non-coated chicken eggs was raged from 74.03 to 62.60, while the variation in coated quail eggs (Figure, 4) ranged from 71.91 to 69.74, however, non-coated (control) was ranged from 72.02 to 68.18.





Excellent quality eggs, according to the North–American standard, present a Hu value of 72 (Morais, *et al.*, 1997; Li, *et al.,* 1995) obtained 60 Hu for eggs coated with mineral oil and stored at refrigeration temperature, during storage period .

We notice from this figure that quail eggs coated have a higher degree of Hu from chicken eggs for all the periods of storage.

Table (2) showed the effect of coating and storage (0, 10, 20 and 30) days on chicken and quail eggs overall acceptance, the acceptance of non-coated eggs (chicken and quail eggs) decreased significantly ($P<0.01$) in 30 days storage but there is no significant differences ($P>0.05$) in the overall acceptance in coated eggs (chicken and quail).

Flavour (Table, 3) showed a significant differences ($P<0.01$) in non-coated chicken and quail eggs, it decreased in 30 days storage, while treatment coaled chicken and quail eggs had no significant differences ($P>0.05$) during storage period, and this means that black seed oil had any effect on the flavor and overall acceptance.

Finally, it could be concluded that these results suggest that black seed oil coatings can be used to reduce changes in eggs during storage up to 30 days in refrigerated conditions.

Table (2) the effect of coating and storage (0,10,20 and 30) days on chicken and quail egg overall acceptance .

Kind of birds	Storage treatment	0	10	20	30
chicken	Control	A 6.57 ± 0. 20	A 6.57 ± 0. 20	A 5.14 ± 0.31	B 3.29 ± 0.18
	Coated	A 6.57 ± 0. 20	A 6.57 ± 0. 20	A 5.91 ± 0.29	A 5.43 ± 0.30
Quail	Control	A 6.67 ± 0. 20	A 6.67 ± 0. 20	A 6.58 ± 0. 20	B 3.43 ± 0. 20
	Coated	A 6.67 ± 0. 20	A 6.67 ± 0. 20	A 6.44 ± 0.14	A 6.14 ± 0.14

- Dissimilar superscripts at he same row means significant (P<0.01, capital letters, P<0.05, small letters).

Table 3 the effect of coating and storage (0,10,20 and 30) days on chicken and quail eggs flavor .

Kind of birds	Storage treatment	0	10	20	30
chicken	Control	A 6.58 ± 0. 20	A 6.57 ± 0. 20	A 5.00 ± 0. 31	B 3.21 ± 0.20
	Coated	A 6.58 ± 0. 20	A 6.57 ± 0. 20	A 5.00 ± 0. 31	A 5.07 ± 0.20
Quail	Control	A 6.68 ± 0. 32	A 6.69 ± 0. 30	A 6.57 ± 0. 20	B 3.71 ± 0. 18
	Coated	A 6.68 ± 0. 30	A 6.69 ± 0. 30	A 6.27 ± 0. 24	A 5. 86 ± 0.14

- Dissimilar superscripts at he same row means significant (P<0.01, capital letters, P<0.05, small letters).

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تأثير التغليف و فترة الخزن على النوعية الداخلية لبيض الدجاج و السمان عند الخزن بالثلاجة: 1– استعمال زيت الحبة السوداء

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أجريت التجربة في حقل الطيور الداجنة التابع لقسم الثروة الحيوانية – كلية الزراعة – جامعة بغداد - العراق، وتهدف التجربة إلى معرفة تأثير التغليف بزيت الحبة السوداء و فترة الخزن على النوعية الداخلية لبيض الدجاج و السمان عند الخزن بالثلاجة على فترات صفر ، 10 ، 20 ، 30 يوم ، حيث بالامكان المحافظة على النوعية الداخلية للغذاء عندما يغلف بأنواع من الأغلفة المأكولة، إذ تعمل الأغلفة على تقليل فقد كمية الرطوبة و الأوكسجين و ثاني اوكسيد الكاربون من البيضة. حيث تم تقسيم 360 بيضة طازجة من بيض الدجاج و السمان بالتساوى (180 بيضة من كل نوع) الى اربعة مجموعات متساوية: المجموعتان الأولى و الثالثة للمقارنة و المجموعتان الثانية و الرابعة للمعاملة (التغليف بزيت الحبة السوداء) من بيض الدجاج و السمان على التوالى.

لوحظ من النتائج : ازدياد نسبة الفقدان بالوزن و درجة الـpH بزيادة فترة الخزن، وقد انخفضت للبيض المغلف (المعاملة) مقارنة بالبيض الغير مغلف (المقارنة). وقد انخفضت أيضا وحدة الهو (Hu) بزيادة فترة الخزن لنوعي البيض (الدجاج و السمان) بصورة معنوية على مستوى 1% وقد كان الانخفاض اقل للبيض المغلف و بصورة غير معنوية ، وقد حافظ بيض السمان المغلف على نوعيته الداخلية الجيدة .

ولم يلاحظ هنالك تأثير لزيت الحبة السوداء على النكهة أو درجة التقبل لبيض الدجاج و السمان المغلف به خلال فترة الخزن .

يستنتج من البحث إمكانية استخدام زيت الحبة السوداء لتقليل التغييرات بنوعية البيض خلال فترة الخزن .