

EFFECTS OF SOME STORAGE METHODS AND DURATIONS ON SOME QUALITY PARAMETERS OF JAPANESE QUAIL (*COTURNIX JAPONICA*) EGGS

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ABSTRACT

The study determined the effects of storage methods and durations on some quality parameters of Japanese Quail eggs. The study was conducted at the laboratory of the Federal Polytechnic Daura, Daura, Katsina state, Nigeria. A total of 100 freshly laid eggs of Japanese quails were used for the experiment, the eggs were obtained from the poultry farm of Federal Polytechnic Daura, Daura, Katsina state. The experiment was laid in a 4 by 4 factorial arrangement in a completely randomized design (C.R.D) consisting of 4 storage methods namely oiling or shell coating, Room temperature, Earthen pot and covering with leaves and 4 durations of storage i.e 0, 7, 14, and 21 days and 4 replicates respectively. 100 freshly laid eggs of almost equal size from Coturnix japonica breed of layers in poultry farm of Federal Polytechnic Daura were obtained and divided it into 4 equal part which comprising of 25 eggs and were stored under 4 different storage methods. The quality parameters was determined using AOAC (2012). Moisture content was determined by drying in hot air oven at 100 °C-102°C for 16-18 hours. Crude protein was estimated by multiplying 6.25 by nitrogen content obtained through kjeldal method. Ether extract and ash was analysed by soxhlet extraction and 550°C furnace respectively. The data collection was subjected to analysis of variance (ANOVA) and significantly different means were separated using least significant difference (L.S.D) with the aid of statistical package , SPSS version 23 , (2015). All the proximate values for all the storage methods and durations were all significantly ($p < 0.05$) different, values for moisture under oiling method ranged from 2.00 – 3.00%. Values for crude protein under storage duration ranged from 27.20 - 35.00%. Values for haugh unit for clay storage varied from 56.00 – 58.20%, while that for yolk index for oiling method ranged from 0.20 to 0.40. it was concluded that oiling method best preserved the egg of the four methods used. Oiling storage method was recommended for storing and preserving Japanese Quail eggs

Key Words: Storage, Duration, Quality Parameters, Japanese Quail, Eggs

1.0 INTRODUCTION

The market for Japanese quails (*coturnix japonica*) has long provided developing countries with a stable

vitamin-rich source of alternative animal proteins that are low in fat content, plus eggs that contain 2.47 percent less fat than chicken eggs, all working together to boost the human immune system. High level of phosphorus, iron, and vitamin A, B1, and B2 all mean that quail fit nicely into society's definition of what constitutes a healthy diet and lifestyle. Bruce (2019).

All foods have limited shelf life which vary on the type of food, place of the storage and storage condition. Eggs deteriorates rapidly between the period of storage and consumption. Egg quality can be affected by the environmental condition as well as it nutritional properties and values such as temperature, relative humidity of storage as well as gaseous environment storage time. Storage can modify some characteristics of eggs including loss of water, carbon dioxide, and subsequent increase in pH of the albumen Ducupere,(2001). Quality parameters are factors or limits which affect the way that eggs can be stored. Any given food have an influence on the acceptance and rejection of this food by the consumers, this is as a result of either internal or external quality problems. External quality parameters of egg is focused on shell cleanliness, texture, and shape where as internal quality parameters refers to egg white(albumen)cleanliness and viscosity, size of the air cell, Yolk shape and yolk strength Kul and Seker (2004).

The objective of this study therefore was to determine the effects of some storage methods and durations on some quality parameters of Japanese quails eggs, with a view to advising farmers , Quail egg sellers and consumers appropriately

2.0 MATERIALS AND METHODS

2.1 Experimental Location

The study was conducted at the laboratory of the Federal Polytechnic Daura, Daura, Katsina state. Daura is local government of Katsina state and lies on the geographical coordinates of 13° 2'11"N, and 8° 19'4"E, or latitude of 13° 1'53.38"N, and a longitude of 8.19'21.12"E or 13.031495 and 8.322533 respectively. Daura has an area of 217.3KM² and population of around 224,884 persons in 2006 census. The area has two distinct climate, rainy season approximately from May to October and dry season from November to April with an average annual rainfall or aggregates up to 190mm (7.48) of

precipitation. National Geospatial Intelligence Agency (2012).

2.2 Experimental Eggs

A total of 100 freshly laid eggs of Japanese quails were used for the experiment, the eggs were obtained from the poultry farm of Federal Polytechnic Daura, Daura, Katsina state.

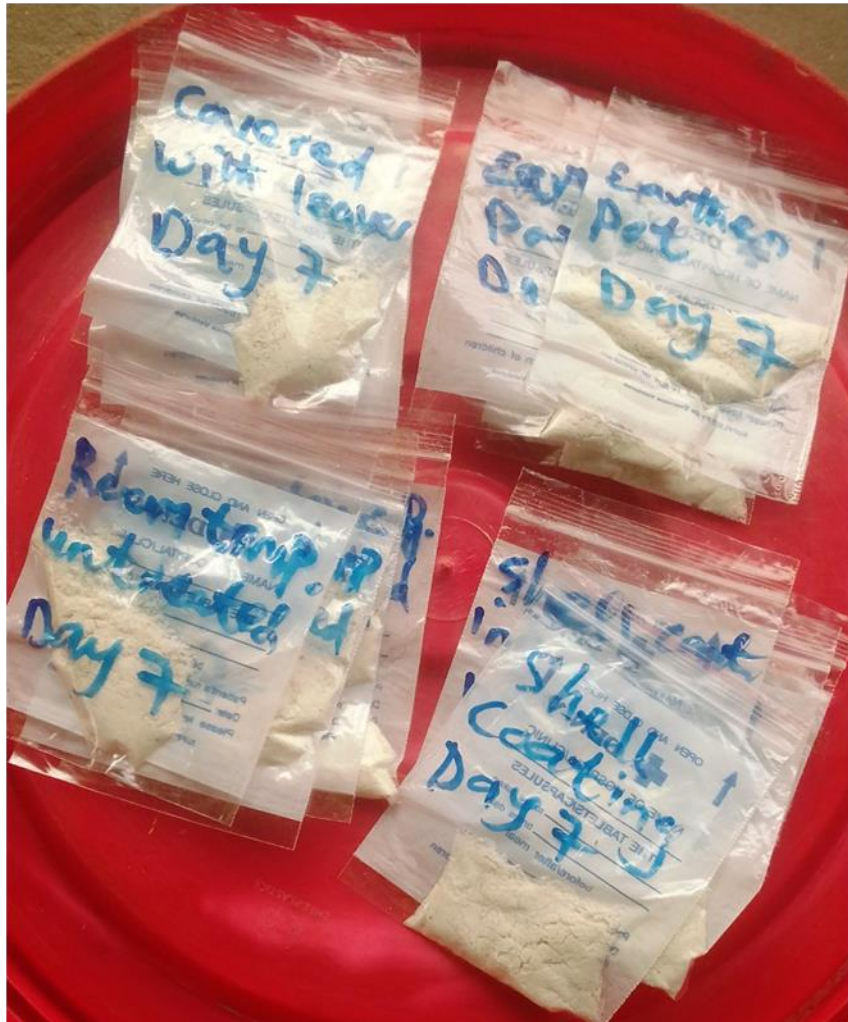
2.3 Experimental Design

The experiment was laid in a 4 by 4 factorial arrangement in completely randomized design (C.R.D) consisting 4 storage methods namely oiling

or shell coating, Room temperature, Earthen pot and covered with leaves and 4 durations of storage i.e 0, 7, 14, and 21 days and 4 replicates respectively.

2.4 Experimental Procedure

100 freshly laid eggs of almost equal size from *Coturnix japonica* breed of layers in poultry farm of Federal Polytechnic Daura were obtained and divided it into 4 equal part which comprising of 25 eggs were stored in each 4 different storage methods as shown beneath.



Deshelled, mealed and packed eggs for carrying out research

1. Oiling (shell coating)= In this method the eggs was immersed into odourless ground nut oil, allowed to drained for at least 1 minute and stored at room temperature on a flat surface.



Eggs coated with groundnut oil and stored under room temperature

2. Room temperature (Untreated)= In this method the eggs was placed in egg tray or crate untreated and store at room temperature.



Eggs stored under room temperature (Untreated)

3. Earthen pot=In this method the eggs was kept in a wide-mouthed earthen pot and stored at room temperature.



Eggs stored in earthen pot under room temperature

4. Covered with leaves=In this method the eggs was kept at room temperature and covered them with fresh mango leaves. The leaves was changed every 48 hours.



Eggs stored under room temperature and covered with mango leaves²

2.5 Determination of Quality Parameters of Eggs

The quality parameters was determined using AOAC (2012). Moisture content was determined by drying in hot air oven at 100 °C-102°C for 16-18 hours. Crude protein was estimated by multiplying 6.25 to nitrogen content obtained through kjeldal method.

Ether extract and ash was analysed by soxhlet extraction and 550°C furnace respectively.

2.6 Data Analysis

The data collection was subjected to analysis of variance (ANOVA) and significantly different means were separated using least significant

difference (L.S.D) with the aid of statistical package , SPSS version 23 , (2015)

3.0 RESULTS AND DISCUSSION

3.1 Effects of Different Storage Methods on the Proximate Composition of Quail Eggs

The effects of different storage methods on the proximate composition of Japanese Quail Eggs is presented in Table 1. All the values for the different storage methods were significantly (p<0.05) different, the values did not follow any definite trend, values for moisture ranged from 2.00 to 3.00%. this result was similar to that reported by Dudusola (2009) for Japanese Quail eggs.

The parameters for determining quality of eggs are at maximum when the eggs are freshly laid and decrease with increase in storage tme (Panigraphi *et al.*,1989) . Storage conditions are chosen with regard to to the retension of these quality characteristics . Temperature , relative humidity and air flow or moisture are considered as the main factore in determining the technological conditions foe egg storage (Orji *et al* .,1981)) The low weight loss of oiled eggs may be due to blockage of the sell pores by thin film of oil thus preventing water and gaseous escape. (Dudusola ,2009).

Table 1: Effects of Different Storage Methods on the Proximate Composition of Quail Eggs

Storage Method	Proximate Values (%)			
	Moisture	Ash	Crude Protein	Ether Extracts
Oiling	3.20 ^a	32.80 ^a	29.80 ^a	13.30 ^a
Room temperature	2.00 ^b	28.60 ^b	20.80 ^a	10.40 ^b
Clay pot	2.90 ^a	32.30 ^a	28.40 ^a	12.80 ^a
Covered with leaves	2.30 ^b	32.50 ^a	22.00 ^b	11.50 ^b
SEM	0.65	1.51	1.61	1.02

a,b, Treatment Means with Different Superscripts along the columns are Significantly (P <0.05) Different SEM Standard Error of Means

3.2: Effect of Storage Duration on Proximate Composition of Quail Eggs

The effects of storage duration on the proximate composition of Japanese Quail eggs is presented in Table 2

The proximate values for all the storage durations showed significant (P<0.05) difference. The values for crude protein ranged from 27.00 % - 35.00%. The values all showed that the longer the storage duration

the more the deteororation of the eggs. This was in agreement with the report of Dudusola , (2009) with Japanese { Quail eggs). With increase in storage length egg weights decreased as a result of increase in weight losses . the losses may be due to loss of carbon dioxide , ammonia, nitrogen, hydrogen sulphide , gas and water from the eggs (Haugh, 1993)

Table 2: Effect of Storage Duration on Proximate Composition of Quail Eggs

Storage Duration (Days)	Proximate Values (%)			
	Moisture	Ash	Crude Protein	Ether Extracts
0	15.50 ^a	3.40 ^a	35.00 ^a	32.00 ^a
7	12.90 ^b	2.70 ^b	30.50 ^b	25.30 ^b
14	5.00 ^c	2.00 ^c	28.30 ^c	22.10 ^c
21	4.60 ^d	1.80 ^d	27.20 ^c	20.20 ^d
SEM	1.21	0.75	1.05	1.01

a,b,c,d Treatment Means with Different Superscripts along the columns are Significantly (P <0.05) Different SEM Standard Error of Means

3.3 Effects of Different Storage Methods and Storage Duration on Quality Parameters of Quail Eggs

Effects of Different Storage Methods and Storage Duration on Quality Parameters of Japanese Quail Eggs is presented in Table 3.

All the values for the quality parameters viz-a-viz the storage methods and storage duration were significantly (p<0.05) different except oiling , clay pot

and covering with leaves under haugh unit. The values generally showed lower quality parameters with longer storage days. Values for clay pot storage for haugh unit ranged from 56.00 to 58.20% , while values for oiling method for yolk index ranged from 0.20 – 0.40. oiling method provided the best preservation method of all the 4 methods determined. Dudusola (2009) in his work reported refrigeration , followed by oiling as the two best storage methods.

Haugh unit and yolk indices are generally considered as good indicators to evaluate egg quality (Chang et al.,(2000)) . The higher the yolk index (Ayorinde, 1987)) and the haugh unit (Haugh, 1993) the more desirable the egg quality . The variations observed in eggs stored under different methods and different storage durations indicates chemical degradation and

favourable environment for bacterial activity . Haugh units are 75% and above for excellent quality eggs and 50% and below for stale eggs. The haugh unit of 56.60 – 58.30 % were far below 75% and above for excellent eggs. These values were also lower than 58.60 - 62.10 % reported by Dudusola (2009)-

Table 3: Effect of Different Storage Methods and Storage Duration on Quality Parameters of Japanese Quail Eggs

Quality Parameters/ Storage Methods	Storage duration				SEM
	0	7	14	21	
YOLK INDEX					
Oiling	0.40 ^a	0.30 ^b	0.20 ^c	0.20 ^c	0.04
Untreated	0.40 ^a	0.20 ^b	0.10 ^c	0.10 ^c	0.20
Clay pot	0.40 ^a	0.30 ^b	0.10 ^c	0.10 ^c	0.03
Cover with leaves	0.04 ^a	0.30 ^b	0.20 ^c	0.20 ^c	0.04
HAUGH UNIT(%)					
Oiling	56.60	58.30	55.70	55.70	2.10
Untreated	57.40 ^a	54.50 ^b	54.00 ^b	52.60 ^b	2.75
Clay pot	58.20	57.70	56.00	53.80	3.10
Covered with leaves	58.60	58.10	57.20	54.80	2.80
EGG WEIGHT(g)					
Oiling	11.40	11.10	11.40	11.20	0.09
Untreated	11.70 ^b	13.00 ^a	12.40 ^a	12.10 ^a	0.03
Clay pot	11.40 ^b	11.20 ^b	12.00 ^a	12.10 ^a	0.04
Covered with leaves	11.40 ^c	11.20 ^c	12.00 ^b	13.10 ^a	0.02
EGG WEIGHT LOSS(g)					
Oiling	0.00 ^d	0.10 ^c	0.20 ^b	0.40 ^a	0.04
Untreated	0.00 ^d	2.80 ^c	3.80 ^b	5.40 ^a	0.06
Clay pot	0.00 ^d	0.30 ^c	1.30 ^b	2.60 ^a	0.06
Covered with leaves	0.00 ^d	0.70 ^c	1.80 ^b	3.10 ^a	0.05

a,b,c,d Treatment means with Different Superscripts across the rows are Significantly (P<0.05) Different SEM Standard Error of Means

4.0 CONCLUSION AND RECOMMENDATIONS.

4.1 Conclusion

This study showed that oiling method best preserved quail eggs.

The shelf life of Japanese Quail eggs is short ,just like other eggs, no matter the storage method deterioration will set in,

4.2 Recommendations

Japanese quail eggs should not be stored for more than twenty one (21) days

Oiling method is recommended for storing and preservation of Japanese Quail eggs

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