



ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2022; SP-11(11): 2559-2561
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www.thepharmajournal.com
Received: 28-08-2022
Accepted: 30-09-2022

SS Chauhan
Department of Livestock
Production Management, C.V.Sc
& A.H., ANDUAT, Kumarganj,
Ayodhya, Uttar Pradesh, India

RK Sharma
Department of Livestock
Production Management, C.V.&
AS, GBPUAT, Pantnagar,
Uttarakhand, India

DV Singh
Department of Livestock
Production Management, C.V.&
AS, GBPUAT, Pantnagar,
Uttarakhand, India

J Palod
Department of Livestock
Production Management, C.V.&
AS, GBPUAT, Pantnagar,
Uttarakhand, India

Corresponding Author:
SS Chauhan
Department of Livestock
Production Management, C.V.Sc
& A.H., ANDUAT, Kumarganj,
Ayodhya, Uttar Pradesh, India

Effect of refined soybean oil on percentage weight loss, air cell diameter and sensory evaluation of white leghorn hen eggs at room and refrigeration temperatures

SS Chauhan, RK Sharma, DV Singh and J Palod

Abstract

The 164 Infertile Eggs of White Leghorn were procured from Central Avian Research Institute, Izatnagar, Bareilly, (U.P.). The birds were maintained on similar feed and environmental conditions. The 164 eggs were divided in four groups, each comprising of 41 eggs. These groups were categorized into two groups and were kept at room temperature and remaining two was kept in refrigerator. The percentage weight loss, air cell diameter and sensory evaluation were recorded. The experiment was designed in simple randomized block with four treatments and two temperatures. The result showed that the percentage weight loss, air cell diameter and sensory evaluation, were differ significantly in comparison to control. Refined Soyabean Oil prolonged the shelf-life of eggs to 35 and 90 days under room and refrigeration temperature while in control it was 14 days and 60 days under room and refrigeration condition.

Keywords: Percentage weight loss, air cell diameter, sensory evaluation

Introduction

Poultry production has emerged as an important and fastest growing sector of our livestock economy. Poultry farming has become very encouraging enterprise in modern India for small farmers, landless labours, educated un-employed youths as well as for big entrepreneurs. The gap between availability and the requirement shows a huge scope for further growth and development of poultry industry in India Egg is a rich source of high quality animal protein and is often used as standard for measuring the quality of the other food proteins. It is an important source of unsaturated fatty acid, minerals especially iron and phosphorus and almost all the vitamins. It is well balanced amino acid profile and easy digestibility makes it a valuable protective food in human diet. Egg is the wholesome food of animal origin, which cannot be adulterated by any human means till, it reaches to ultimate consumer in original form. It is the only source of high quality proteinous food and is very useful to fight malnutrition in India. Egg being very useful in human diet requires proper preservation to ensure its acceptability for a longer period. Eggs are highly perishable commodity and need fast movement from the point of production to the point of consumption, particularly during summer months. It starts deteriorating from the moment it is laid. Research indicated that one out of every four egg produced in India did not reach to the consumer in good conditions. Oil coating is one of the most important methods for preserving eggs. The oil seals the pores of the shell which prevents the evaporation of moisture, entry of microorganism, odours and escape of gases. This checks the weight loss of egg and maintains the good internal quality for longer period because some of the physiochemical changes in the egg contents are being retarded. Keeping aforesaid points in view, the present investigation on Refined Soyabean Oil was undertaken with following objectives: To evaluate the changes in percent weight loss, air cell diameter and sensory evaluation in oil coated and uncoated eggs held at room and refrigeration temperatures.

Materials and Methods

A total of 164 freshly laid, infertile eggs of a single strain of White Leghorn of same age and reared in cages under identical condition of feeding and management were procured from Central Avian Research Institute, Izatnagar, Bareilly, (U.P.).

The eggs of almost similar weight were selected for study. The candling was done at the time of procurement and before the start of experiment for selecting the sound egg. These 164 eggs were divided in four groups, each comprising of 41 eggs. These groups were categorized into two groups and were kept at room temperature and remaining two was kept in refrigerator. The following four treatments were done, and were designated as: T1- Untreated egg used at control at room temperature. T2 – Dipping in the Refined Soyabean Oil containing permitted antioxidant at room temperature. T3- Untreated eggs used control at refrigeration temperature. T4- Dipping in the Refined Soyabean Oil containing permitted antioxidant at refrigeration temperatures. Room temperature varied from 22 °C to 38 °C and relative humidity from 40 to 75 percent and refrigeration temperature was 8±1 °C and relative humidity 75 to 80 percent. Air cell diameter was measured with a Vernier Caliper. The sensory evaluation was measured with the help of hedonic scale. The data were analysed statistically as per methods given by Panse and Sukhatme (1957) [8].

Results and Discussion

Effect of Refined Soyabean Oil on percentage Loss in Weight of Egg at room and refrigeration temperature

At room temperature the minimum loss of egg weight during storage was found in T2 (0.391). The maximum loss in egg weight was observed in control group T1 (7.708) after 14 days of storage which was significantly higher than that of oil treated eggs. At refrigeration temperature the lowest weight loss was noted in T4 (0.558). The significantly highest loss in egg weight was recorded in untreated eggs T3 (9.111) after 60 days of storage. Similar trend in the loss of egg weight during storage was obtained by Singh *et al.* (1997) [5], Sachdeva and Verma (1979) [6] and Heath and Owens (1978) [7]. The difference in weight loss may be attributed to the difference in evaporative losses, which were considerably checked by oil dipping under different oil treatments.

Table 1: Percentage Weight Loss of eggs at weekly interval at room temperature

Treatments	Days of Storage		Overall mean
	D1 (7 days)	D2 (14 days)	
T1(Control)	4.290	7.708	5.999
T2	0.016	0.391	0.204

CD 5% = 1.9965, CD 0.1% = 4.8619

Table 2: Percentage Weight Loss of eggs in at fortnightly interval at refrigeration temperature

Treatments	Days of storage				Overall mean
	D1 (15 days)	D2 (30 days)	D3 (45 days)	D4 (60 days)	
T3 (Control)	1.381	3.084	5.372	9.111	4.737
T4	0.391	0.397	0.404	0.558	0.438

CD 5% = 1.8394, CD 0.1% = 3.4337

Effect of oil treatment on changes in air cell diameter (cm) of eggs at room and refrigeration temperature

At room temperature lowest air cell diameter was noticed in T2 (0.85cm). The maximum diameter of air cell was found in T1 (control) 2.15 cm after 14 days of storage. At refrigeration temperature the increase in air cell diameter was found slow in T4 (1.24 cm). The air cell diameter was also found significantly largest in T3 (2.23 cm) after 60 days of storage.

These findings are in conformity with the findings of Romanoff and Romanoff (1949) [1], Sachdeva and Verma (1979) [6] and Pandey *et al.* (1984) [4], Singh and Panda (1990) [3], Singh *et al.* (1997) [5]. More increase observed in air cell diameter at room temperature both oiled and un-oiled eggs could be accounted for by the faster evaporative weight loss of eggs at elevated temperature.

Table 3: Changes in air cell diameter (cm.) of eggs at room temperature

Treatments	Days of storage			Overall mean
	D1 (0 day)	D2 (7days)	D3(14 days)	
T1 (control)	0.46	1.72	2.15	1.443
T2	0.46	0.61	0.85	0.640

CD 5% = 0.435

Table 4: Changes in air cell diameter (cm.) of eggs at refrigeration temperature

Treatments	Days of storage					Overall mean
	D1 (0 day)	D2 (15 days)	D3 (30 days)	D4 (45 days)	D5 (60 days)	
T3 (control)	0.46	1.71	2.12	2.18	2.23	1.740
T4	0.46	0.62	0.81	1.22	1.24	0.870

CD 5% = 0.2568

CD 0.1% = 0.4659

Effect of oil treatment on changes in Sensory Evaluation of eggs at room and refrigeration temperatures

The table 5 and 6 indicates that eggs kept in T2 and T4 maintained the acceptable qualities for longest period of 35 days at room and 90 days at refrigeration temperatures whereas the untreated eggs remained in acceptable conditions for 14 and 60 days only at room and refrigeration temperature respectively. It is evident from the data that the treated eggs maintained better external, internal and organoleptically acceptable quality even after longer period of storage as compared to untreated eggs. The colour of albumen of untreated eggs at the junction of yolk changed first from white to light black colour and became somewhat leathery in texture and its flavor became slightly fishy after 14th and 60th day of storage at room and refrigeration temperatures respectively. These findings are in agreement with the findings of Pandey and Mohapatra (1982) [2] and Singh *et al.* (1997) [5]. Better organoleptic quality of refrigerated eggs could be due to less alteration in appearance, texture and flavor of eggs.

Table 5: Sensory evaluation of cooked eggs held at room temperature

Storage Period (days)	Treatments	
	T1(control)	T2
0	Excellent	Excellent
7	Good	Excellent
14	Fair	Excellent
16	Poor	Very good
20	-	Very good
24	-	Very good
28	-	Good
31	-	Good
35	-	Fair
37	-	Poor

Table 6: Sensory evaluation of cooked eggs held at refrigeration temperature

Storage Period (days)	Treatments	
	T3 (control)	T4
0	Excellent	Excellent
15	Very Good	Excellent
30	Good	Very good
45	Fair	Good
60	Fair	Good
67	Poor	Good
75	-	Good
82	-	Good
90	-	Fair
92	-	Poor

Conclusion

The inference of the above observations clearly indicates that T2 (Dipping in Refined Soyabean Oil at room temperature) and T4 (Dipping in Refined Soyabean Oil at refrigeration temperature) proved good and superior to control in all the parameters at both the atmospheric conditions under observations. These two treatments (T2 and T4) reduced the percentage weight loss and maintained the interior quality of eggs for longest duration in storage. The findings are recommended for general adoption to the people.

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