



## The effect of partial or total substitution of raw or roasted domestic sesame seeds in laying hens on the qualitative qualities of eggs

Ali Hadi Mohammad al-Qaisi<sup>1</sup>  
[www.alialqasiy1991@gmail.com](mailto:www.alialqasiy1991@gmail.com)

Qana Hussein Amin al-Jabari<sup>2</sup>  
[dr\\_qanaameen@uokirkuk.edu.iq](mailto:dr_qanaameen@uokirkuk.edu.iq)

<sup>1</sup> Agricultural Research Office, Ministry Of Agriculture, Iraq.

<sup>2</sup> Department of Animal production, College of Agriculture, University of Kirkuk, Kirkuk, Iraq.

- Part of PH.D. Dissertation for the first author.
- Date of research received 31/05/2023 and accepted 07/08/2023.

### Abstract

A study was conducted in the poultry field of the Department of Animal Production, College of Agriculture at the University of Kirkuk. The study involved seven treatments, each with 24 chickens, and six replicates per treatment, with four chickens in each replicate. The experimental period lasted for 20 weeks. The birds were fed different diets: the control diet contained 100% soybean meal, the second treatment replaced 33% of the soybean meal with raw local sesame seed meal, the third treatment replaced 66% of the soybean meal with raw local sesame seed meal, the fourth treatment replaced 100% of the soybean meal with raw local sesame seed meal, the fifth treatment replaced 33% of the soybean meal with roasted sesame seed meal, the sixth treatment replaced 66% of the soybean meal with roasted sesame seed meal, and the seventh treatment replaced 100% of the soybean meal with roasted sesame seed meal.

The results of the statistical analysis revealed that there were no significant differences ( $P \leq 0.05$ ) between any of the experimental treatments and the control treatment in most of the qualitative characteristics of the eggs. These characteristics included the egg shape index, percentage of white weight, whiteness index rate and air unit. It was found that there were significant differences during the second, third and fifth period in the average thickness of the cortex. However, when considering the total amount of protein in the eggs, all of the experimental treatments showed superiority compared to the control treatment.

**Key words:** sesame seed meal, laying hens diet, qualitative characteristics of eggs

**Citation:** Al-Qaisi, A., & Ameen, Q. (2023). The effect of partial or total substitution of raw or roasted domestic sesame seeds in laying hens on the qualitative qualities of eggs. *Kirkuk University Journal For Agricultural Sciences*, 14(3), 113-122. doi: 10.58928/ku23.14312

**Correspondence Author:** Ali Hadi Mohammad Al-Qaisi- [www.alialqasiy1991@gmail.com](mailto:www.alialqasiy1991@gmail.com)

**Copyright:** This is an open access article distributed under the terms of the creative common's attribution License, which permits unrestricted use, distribution and reproduction in any medium, provided the original author and source are credited.

## **Introduction**

In recent years, the poultry industry worldwide has experienced significant growth in egg and meat production. Poultry products, being rich sources of protein, are considered essential components of a healthy diet for people across the globe. The industry has witnessed an increase in production volume, with table eggs being particularly important as a source of animal protein for humans [1]. To support and further develop this industry, it is crucial to provide appropriate feed that ensures optimal growth and productivity for birds while minimizing costs [2]. However, the prices of feed ingredients used in specialized poultry diets have risen due to increased demand, accounting for two-thirds of the product's cost [3]. Therefore, there is a growing focus on finding suitable alternative feeds that meet the essential nutritional requirements of poultry and reduce feeding expenses to the greatest extent possible. One such alternative is sesame seed meal, a by-product obtained from the extraction of oil from sesame seeds. It serves as a valuable feed ingredient due to its high protein content and its ability to complement other protein sources such as soybean meal [4]. The aim was to investigate the effect of partially or fully substituting raw or roasted local sesame seed meal in the diets of laying hens on the qualitative characteristics of eggs.

## **Materials and research method**

This study was conducted in the poultry field of the Department of Animal

Production, College of Agriculture / University of Kirkuk for the period from 1/3/2022 to 16/7/2022 and for a period of 20 weeks. The chickens were randomly distributed, 168 laying hens, type Lohmann, 52 weeks old, into 7 treatments, 24 chickens per treatment, and 6 replications for each treatment. (4 chickens / repeat). The daily lighting was 7 hours of darkness compared to 17 hours of lighting, according to the company's guide, and the temperature was controlled during the experiment period. The birds were fed experimental diets, control 100% soybean meal, the second treatment replaced 33% From soybean meal with raw local sesame seed meal The third treatment is the replacement of 66% of the soybean meal with raw local sesame seed meal, the fourth treatment is the replacement of 100% of the soybean meal with raw local sesame seed meal, the fifth treatment is the replacement of 33% of the soybean meal with roasted sesame seed meal, and the sixth treatment is the replacement of 66% of the meal Soybean meal with roasted sesame seed meal The seventh treatment is to replace 100% of the soybean meal with toasted sesame seed meal. The qualitative characteristics of eggs were studied, which included (egg shape index, shell thickness rate, white weight ratio, whiteness index rate, air unit, yolk index rate, yolk weight ratio, and total egg protein quantity). The ready-made statistical program [5] was used in the statistical analysis, and the averages were compared using Duncan's multinomial test [6].

Table (1) shows the proportions of feed materials included in the composition of the experimental diets with the calculated chemical analysis

Feed materials % of	Experimental treatments						
	1	2	3	4	5	6	7
wheat	16.3	21.00	23.00	30.42	21.00	23.00	30.42
Corn	47.07	37.00	33.98	27.1	37.00	33.98	27.1
Oil	0.6	1.7	2.20	2.8	1.7	2.20	2.8
Barley	4.00	7.53	7.03	5.00	7.53	7.03	5.00
Soybean meal (48%)	20.00	13.2	6.66	0.00	13.2	6.66	0.00
Sesame meal	---	7.40	14.88	22.30	7.40	14.88	22.30
Premix (a)	2.50	2.50	2.50	2.50	2.50	2.50	2.50
Lysine	0.01	0.15	0.29	0.42	0.15	0.29	0.42
Methionine	0.07	0.07	0.01	0.01	0.07	0.01	0.01
Limestone	9.00	9.00	9.00	9.00	9.00	9.00	9.00
table salt	0.20	0.20	0.20	0.20	0.20	0.20	0.20
Colin	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Total %	100	100	100	100	100	100	100
Calculated chemical composition							
Represented energy (kcal/kg)	2753	2752	2751	2754	2752	2751	2754
Crude protein %	16.08	16.07	16.00	16.01	16.07	16.00	16.01
lysine %	0.81	0.83	0.869	0.864	0.83	0.869	0.864
methionine + cysteine %	0.69	0.65	0.65	0.69	0.65	0.65	0.69
Calcium %	3.76	3.76	3.76	3.76	3.76	3.76	3.76
phosphorus %	0.41	0.49	0.515	0.515	0.49	0.515	0.515

- (a) wafi protein complex (Dutch origin), containing 40% crude protein, 2100 kcal / kg, 5% crude fat, 3.85% lysine, 3.70% methionine, 4.12% methionine + cysteine, 5% calcium, 4.68% phosphorus

The chemical composition of the feed materials for each feed material was adopted using tables (NRC, 1994).

## Results and discussion

Table 2 reveals that there are no significant differences ( $P \leq 0.05$ ) between the experimental and control treatments in the average egg shape index throughout the entire duration of the experiment. These findings align with the results reported by [7], who observed no significant differences in the average egg shape index when substituting sesame seed meal for soybean meal at varying percentages (0, 10, 20, 30%) in

the diets of Japanese quails during their production phase. Similarly, [8] found no significant difference ( $P \leq 0.05$ ) in the average egg shape index when substituting different levels (0, 25, 50, 75, and 100%) of soybean meal with sesame seed meal in the diets of Japanese quails during the egg production stage. These results were consistent throughout the experimental period compared to the control group.

Table (2): The effect of partial or total substitution of raw or roasted salted sesame seed meal in laying hens diets on the egg shape index (mean  $\pm$  standard error)

Transacti ons	Periods					General Average
	The first period (52-55 weeks)	the second period (56-59 weeks)	the third period (60-63 weeks)	the fourth period (64-67 weeks)	the fifth period (68-71 weeks)	
T1	89.15 $\pm$ 11.72	75.20 $\pm$ 1.21	74.72 $\pm$ 1.40	1.40 $\pm$ 74.72	1.69 $\pm$ 75.64	2.16 $\pm$ 77.88
T2	75.08 $\pm$ 0.62	75.49 $\pm$ 0.28	75.84 $\pm$ 1.15	1.15 $\pm$ 75.84	1.36 $\pm$ 76.76	0.44 $\pm$ 75.81
T3	76.18 $\pm$ 0.74	76.54 $\pm$ 0.98	74.72 $\pm$ 0.52	0.52 $\pm$ 74.72	0.80 $\pm$ 74.83	0.53 $\pm$ 75.40
T4	78.12 $\pm$ 1.07	75.87 $\pm$ 1.21	75.53 $\pm$ 0.53	0.53 $\pm$ 75.53	1.29 $\pm$ 74.82	0.71 $\pm$ 75.97
T5	76.76 $\pm$ 0.89	74.44 $\pm$ 0.59	73.73 $\pm$ 0.93	0.93 $\pm$ 73.73	1.19 $\pm$ 75.78	0.43 $\pm$ 74.89
T6	76.89 $\pm$ 1.83	76.64 $\pm$ 0.37	75.57 $\pm$ 0.89	0.89 $\pm$ 75.57	0.66 $\pm$ 74.35	0.54 $\pm$ 75.80
T7	78.35 $\pm$ 1.84	74.64 $\pm$ 1.40	76.33 $\pm$ 1.23	1.23 $\pm$ 76.33	0.93 $\pm$ 76.35	0.47 $\pm$ 76.47
Moral Level	N S	N S	N S	N S	N S	N S

N S - no significant differences at the probability level ( $P \leq 0.05$ ).

\*- There are significant differences at the probability level ( $P \leq 0.05$ ).

T1 100% soybean meal, T2 replace 33% of the soybean meal with raw local sesame seed meal, T3 replace 66% of the soybean meal with raw local sesame seed meal, T4 replace 100% of the soybean meal with raw local sesame seed meal T5 Substitute 33% of the soybean meal with roasted sesame seed meal, T6 Substitute 66% of the soybean meal with toasted sesame seed meal, T7 Substitute 100% of the soybean meal with toasted sesame seed meal

Table 3 indicates significant differences ( $P \leq 0.05$ ) in the percentage of cortex weight between the experimental treatments and the control treatment during the first, third, and fourth periods. However, no significant differences were observed ( $P \leq 0.05$ ) in the average cortex thickness between the experimental treatments and the control treatment. In the fifth period, significant differences ( $P \leq 0.05$ ) were recorded, with the first, second, and sixth treatments outperforming the fifth treatment. Additionally, significant differences

were observed in the overall analysis of the experiment. The percentage of cortex weight was recorded as 11.30%, 11.26%, 10.67%, 10.95%, 10.45%, 11.37%, and 10.82% for the first, second, third, fourth, fifth, sixth, and seventh treatments, respectively. The significant decrease in some of the experimental treatments can be attributed to the increase in egg weight in those treatments. This is because the shell weight ratio is determined by dividing the average shell thickness by the weight of the eggs.

Table (3): Effect of partial or total substitution of raw or roasted salted sesame seed meal in laying hens diets on shell weight percentage (mean  $\pm$  standard error)

Transactions	Periods					General Average
	The first period (52-55 weeks)	the second period (56-59 weeks)	the third period (60-63 weeks)	the fourth period (64-67 weeks)	the fifth period (68-71 weeks)	
T1	12.07 $\pm$ 0.37 a	11.50 $\pm$ 0.46	11.24 $\pm$ 0.44	10.70 $\pm$ 0.14	10.97 $\pm$ 0.18 a	11.30 $\pm$ 0.15 a
T2	11.85 $\pm$ 0.48 a	11.53 $\pm$ 0.15	10.97 $\pm$ 0.12	10.99 $\pm$ 0.27	10.98 $\pm$ 0.19 a	11.26 0.14 ab
T3	10.13 $\pm$ 0.13 b	11.49 $\pm$ 0.39	10.51 $\pm$ 0.39	10.65 $\pm$ 0.31	10.53 $\pm$ 0.23 ab	10.6 $\pm$ 0.19 abc
T4	11.20 $\pm$ 0.28 ab	11.41 $\pm$ 0.42	10.99 $\pm$ 0.17	10.31 $\pm$ 0.50	10.72 $\pm$ 0.24 ab	10.95 $\pm$ 0.19 abc
T5	10.66 $\pm$ 0.92 ab	11.42 $\pm$ 0.32	9.44 $\pm$ 0.39	10.68 $\pm$ 0.42	10.06 $\pm$ 0.37 b	10.45 $\pm$ 0.27 c
T6	11.50 $\pm$ 0.36 ab	11.08 $\pm$ 0.21	11.39 $\pm$ 0.36	10.93 $\pm$ 0.45	11.16 $\pm$ 0.26 a	11.37 $\pm$ 0.13 a
T7	11.50 $\pm$ 0.16 ab	11.36 $\pm$ 0.46	10.71 $\pm$ 0.25	10.39 $\pm$ 0.41	10.55 $\pm$ 0.31 ab	10.82 $\pm$ 0.23 abc
Moral Level	*	N S	N S	N S	*	*

N S - no significant differences at the probability level ( $P \leq 0.05$ ).

\*- There are significant differences at the probability level ( $P \leq 0.05$ ).

T1 100% soybean meal, T2 replace 33% of the soybean meal with raw local sesame seed meal, T3 replace 66% of the soybean meal with raw local sesame seed meal, T4 replace 100% of the soybean meal with raw local sesame seed meal T5 Substitute 33% of the soybean meal with roasted sesame seed meal, T6 Substitute 66% of the soybean meal with toasted sesame seed meal, T7 Substitute 100% of the soybean meal with toasted sesame seed meal

We note from Table 4 that there are no significant differences at the level ( $P \leq 0.05$ ) in the mean of the cortex thickness between the experimental treatments and the control treatment during the first period, but at the second and third periods, we notice a significant decrease in the second treatment compared with the rest of the treatments, but in the fourth period it was not observed Any significant differences between the experimental and control treatments. In the fifth period, a significant decrease was observed in the second treatment compared with the rest

of the experimental and control treatments. This decrease in the second treatment may be due to the presence of anti-nutritional substances in the sesame meal, including oxalates and phytic acid, which hinder the absorption of Minerals, especially calcium and potassium in the gastrointestinal tract, which are considered among the main components of the egg shell [9], and with regard to the general average of the average thickness of the shell, we did not notice any significant differences between the experimental and control treatments.

Table (4): The effect of partial or total substitution of raw or roasted salted sesame seed meal in laying hens diets on the mean crust thickness (mm) (mean ± standard error)

Transact ions	Periods					General Average
	The first period (52-55 weeks)	the second period (56-59 weeks)	the third period (60-63 weeks)	the fourth period (64-67 weeks)	the fifth period (68-71 weeks)	
T1	0.35±0.01	0.33±0.01 ab	0.32±0.01 ab	0.34±0.01	0.32±0.01 ab	0.33±0.01
T2	0.35±0.01	0.32±0.01 b	0.30±0.01 b	0.33±0.01	0.31±0.01 b	0.32±0.01
T3	0.35±0.01	0.36±0.01 a	0.35±0.01 a	0.35±0.01	0.35±0.01 a	0.35±0.01
T4	0.33±0.01	0.34±0.01 ab	0.32±0.01 ab	0.35±0.01	0.32±0.01 ab	0.33±0.01
T5	0.36±0.01	0.35±0.01 ab	0.31±0.01 ab	0.35±0.01	0.32±0.01 ab	0.34±0.01
T6	0.36±0.16	0.35±0.01 ab	0.32±0.01 ab	0.35±0.01	0.33±0.01 ab	0.34±0.01
T7	0.35±0.01	0.34±0.01 ab	0.30±0.02 ab	0.35±0.1	0.32±0.01 ab	0.33±0.01
Moral Level	N S	*	*	N S	*	N S

N S - no significant differences at the probability level ( $P \leq 0.05$ ).

\*- There are significant differences at the probability level ( $P \leq 0.05$ ).

T1 100% soybean meal, T2 replace 33% of the soybean meal with raw local sesame seed meal, T3 replace 66% of the soybean meal with raw local sesame seed meal, T4 replace 100% of the soybean meal with raw local sesame seed meal T5 Substitute 33% of the soybean meal with roasted sesame seed meal, T6 Substitute 66% of the soybean meal with toasted sesame seed meal, T7 Substitute 100% of the soybean meal with toasted sesame seed meal

We note from Table 5 that there were no significant differences at the level ( $P \leq 0.05$ ) in the percentage of whiteness weight between the experimental and control treatments during all periods of the experiment as well as in the general average of the percentage of laying weight. This result is consistent with [8], who indicated that substituting sesame

seed meal at levels (0, 25, 50, 75, 100)% of soybean meal in the diets of Japanese quail birds during the egg production stage led to no significant difference at the level of ( $P \leq 0.05$ ) in the relative weight of whiteness in the replacement treatments compared with the control during the experimental period.

Table (5): The effect of partial or total substitution of raw or roasted salted sesame seed meal in laying hens diets on the percentage of laying weight % (mean ± standard error)

Transact ions	Periods					General Average
	The first period (52-55 weeks)	the second period (56-59 weeks)	the third period (60-63 weeks)	the fourth period (64-67 weeks)	the fifth period (68-71 weeks)	
T1	60.24±1.88	64.32±0.69	63.55±1.24	64.66±1.33	64.10±0.49	63.37±0.68
T2	60.71±1.48	62.09±0.96	63.24±1.14	63.56±0.71	63.40±0.52	62.60±0.52
T3	62.57±0.70	62.19±1.12	64.44±1.04	64.70±1.32	64.57±0.72	63.69±0.32
T4	62.45±1.07	63.14±1.39	63.42±1.20	63.45±0.59	63.44±0.57	63.18±0.57
T5	62.66±1.87	63.31±1.29	65.69±0.99	64.69±0.99	65.19±0.84	64.31±0.80
T6	61.61±0.69	63.57±0.52	63.95±1.05	63.80±1.08	63.88±0.60	63.36±0.44
T7	62.15±0.85	64.11±0.77	64.13±0.68	64.89±1.10	64.51±0.72	63.96±0.55
Moral Level	N S	N S	N S	N S	N S	N S

N S - no significant differences at the probability level ( $P \leq 0.05$ ).

T1 100% soybean meal, T2 replace 33% of the soybean meal with raw local sesame seed meal, T3 replace 66% of the soybean meal with raw local sesame seed meal, T4 replace 100% of the soybean meal with raw local sesame seed meal T5 Substitute 33% of the soybean meal with roasted sesame seed meal, T6 Substitute 66% of the soybean meal with toasted sesame seed meal, T7 Substitute 100% of the soybean meal with toasted sesame seed meal

Table 6 indicates no significant differences ( $P \leq 0.05$ ) in the whiteness index rate between the experimental treatments and the control treatment throughout the experimental periods, as well as in the overall analysis. There were no noticeable significant differences between the experimental treatments and the control treatment.

These results align with the findings of

[7], who demonstrated that substituting varying percentages (10, 20, 30) of sesame seed meal for soybean meal in Japanese quail diets during the egg production stage did not result in significant differences ( $P \leq 0.05$ ) in the whiteness index rate compared to the control treatment.

Table (6): The effect of partial or total substitution of raw or roasted salted sesame seed meal in laying hens diets on the average laying index (mean  $\pm$  standard error)

Transactions	Periods					General Average
	The first period (52-55 weeks)	the second period (56-59 weeks)	the third period (60-63 weeks)	the fourth period (64-67 weeks)	the fifth period (68-71 weeks)	
T1	11.14 $\pm$ 0.68 ab	8.28 $\pm$ 1.23	12.38 $\pm$ 1.50	10.83 $\pm$ 1.58	11.60 $\pm$ 0.84	10.85 $\pm$ 0.62
T2	9.98 $\pm$ 0.85 ab	8.76 $\pm$ 0.42	13.10 $\pm$ 0.77	11.93 $\pm$ 1.62	12.51 $\pm$ 1.14	11.26 $\pm$ 0.60
T3	8.64 $\pm$ 1.01 b	8.18 $\pm$ 1.13	13.24 $\pm$ 0.90	11.52 $\pm$ 1.06	12.38 $\pm$ 0.85	10.79 $\pm$ 0.77
T4	12.16 $\pm$ 0.70 a	7.21 $\pm$ 0.70	11.57 $\pm$ 0.81	11.14 $\pm$ 0.96	11.35 $\pm$ 0.33	10.69 $\pm$ 0.25
T5	10.17 $\pm$ 0.75 ab	7.14 $\pm$ 0.66	11.84 $\pm$ 0.99	10.36 $\pm$ 0.89	10.67 $\pm$ 0.65	10.37 $\pm$ 0.54
T6	10.41 $\pm$ 0.61 ab	7.66 $\pm$ 0.58	10.80 $\pm$ 0.66	10.29 $\pm$ 0.80	10.55 $\pm$ 0.56	9.94 $\pm$ 0.38
T7	10.54 $\pm$ 0.96 ab	7.81 $\pm$ 0.90	12.94 $\pm$ 0.91	11.64 $\pm$ 1.02	12.29 $\pm$ 0.81	11.04 $\pm$ 0.65
Moral Level	*	N S	N S	N S	N S	N S

N S - no significant differences at the probability level ( $P \leq 0.05$ ).

\*- There are significant differences at the probability level ( $P \leq 0.05$ ).

T1 100% soybean meal, T2 replace 33% of the soybean meal with raw local sesame seed meal, T3 replace 66% of the soybean meal with raw local sesame seed meal, T4 replace 100% of the soybean meal with raw local sesame seed meal T5 Substitute 33% of the soybean meal with roasted sesame seed meal, T6 Substitute 66% of the soybean meal with toasted sesame seed meal, T7 Substitute 100% of the soybean meal with toasted sesame seed meal

We note from Table 7 that there are significant differences at the level ( $P \leq 0.05$ ) in the unit of ambiance between the experimental and control treatments in the first period, as it recorded 96.59, 92.30, 84.81, 95.96, 96.22, 96.15, and 93.63, respectively, but during the second and third periods,

and The fourth and fifth, as well as in the general average of the id unit, we did not notice any significant differences between the experimental treatments and the control treatment. The results of this study agree with [7], who showed that replacing (10, 20, 30) percent of the diet components, sesame seed meal, with

soybean meal in Japanese quail diets during the egg production stage, led to no significant differences at the level of

( $P \leq 0.05$ ) in the air unit rate in the substitution treatments compared with the control.

Table (7): The effect of partial or total substitution of raw or roasted salted sesame seed meal in laying hens diets on the air unit (mean  $\pm$  standard error)

Transact ions	Periods					General Average
	The first period (52-55 weeks)	the second period (56-59 weeks)	the third period (60-63 weeks)	the fourth period (64-67 weeks)	the fifth period (68-71 weeks)	
T1	96.59 $\pm$ 1.97 a	80.30 $\pm$ 5.71	91.68 $\pm$ 5.11	99.21 $\pm$ 3.80	91.24 $\pm$ 6.89	91.80 $\pm$ 2.64
T2	92.30 $\pm$ 2.53 ab	82.63 $\pm$ 1.43	87.47 $\pm$ 1.64	102.32 $\pm$ 1.78	93.20 $\pm$ 6.69	91.59 $\pm$ 1.49
T3	84.81 $\pm$ 3.77 b	78.12 $\pm$ 5.60	81.46 $\pm$ 4.01	103.40 $\pm$ 1.92	96.07 $\pm$ 3.00	88.77 $\pm$ 2.94
T4	95.96 $\pm$ 2.25 a	76.78 $\pm$ 4.07	86.37 $\pm$ 2.03	100.06 $\pm$ 2.12	96.73 $\pm$ 3.08	91.18 $\pm$ 1.21
T5	92.22 $\pm$ 4.41 ab	75.97 $\pm$ 3.80	84.10 $\pm$ 3.47	99.50 $\pm$ 3.62	92.94 $\pm$ 3.06	88.94 $\pm$ 2.00
T6	96.15 $\pm$ 1.96 a	78.76 $\pm$ 3.07	87.46 $\pm$ 1.09	96.50 $\pm$ 2.42	90.14 $\pm$ 4.19	89.80 $\pm$ 1.05
T7	93.63 $\pm$ 2.90 ab	79.37 $\pm$ 2.42	85.56 $\pm$ 4.48	102.43 $\pm$ 1.95	97.18 $\pm$ 3.05	91.63 $\pm$ 1.75
Moral Level	*	N S	N S	N S	N S	N S

N S - no significant differences at the probability level ( $P \leq 0.05$ ).

\*- There are significant differences at the probability level ( $P \leq 0.05$ ).

T1 100% soybean meal, T2 replace 33% of the soybean meal with raw local sesame seed meal, T3 replace 66% of the soybean meal with raw local sesame seed meal, T4 replace 100% of the soybean meal with raw local sesame seed meal T5 Substitute 33% of the soybean meal with roasted sesame seed meal, T6 Substitute 66% of the soybean meal with toasted sesame seed meal, T7 Substitute 100% of the soybean meal with toasted sesame seed meal

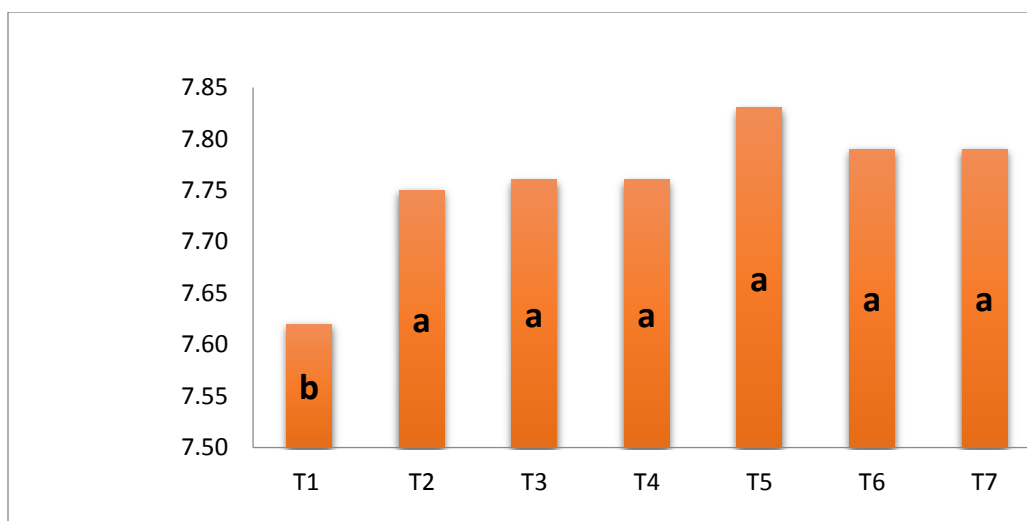


Figure (1) shows the percentage of protein in an egg

T1 100% soybean meal, T2 replace 33% of the soybean meal with raw local

sesame seed meal, T3 replace 66% of the soybean meal with raw local sesame



seed meal, T4 replace 100% of the soybean meal with raw local sesame seed meal T5 Substitute 33% of the soybean meal with roasted sesame seed

**Chart (1): shows the effect of partial or total substitution of raw or roasted salted sesame seed meal in laying hens diets on the total protein quantity of the egg (gm)**

We note from chart (2) that there are significant differences at the level ( $P \leq 0.05$ ) in the amount of total protein of the egg at the end of the 20-week experiment between the experimental and control treatments, as they amounted to 7.62, 7.75, 7.76, 7.76, 7.83, 7.79, and 7.79 g for each. From the first, second, third, fourth, fifth, sixth and seventh transactions, respectively. The increase in the proportion of protein in the experimental treatments may come as a result of the increase in the proportion of protein in the sesame seed meal used in the experimental diets compared with the control treatment, or the reason may be attributed to the mutual complementary effects when using more than one protein source in the experimental diets. [11]

**References**

- [1] Banson, K.E.; Muthusamy, G. and Kondo, E. 2015. The import substituted poultry industry; Evidence from Ghana. *Inter J Agric Forestry*, 5: 166-175.
- [2] Saad Abdul-Sada Ghani Musa(2014). The use of scientific research for the purpose of determining the optimal primitive diet used to feed chickens intended for meat production, *Journal of the University of Babylon / Pure and Applied Sciences / Issue (8) / Volume 22: 2014*.
- [3] Al-Tami, Nawaf Ghazi Abboud (2019). The effect of density, ration protein level, and the probiotic mixture with enzymes on the productive and physiological performance of quails and their resulting offspring. PhD thesis, College of Agriculture and Forestry, University of Mosul.
- [4] Olaiya, O. David and 2Makinde, O. John.(2015). Response of Broiler Chickens fed Diets Containing Differently Processed Sesame (*Sesame indicum* L.) Seed Meal . *Academic Research Journal of Agricultural Science and Research* .
- [5] SAS Institute. (2003). SAS User's guide statistic. SAS Inc. Cary NC.
- [6] Duncan, D. B. (1955). Multiple range and multiple F tests. *Biometrics*, 11(1), 1-42.
- [7] Al-Shabib, Ahmed Ibrahim Hamoudi (2017). A study of the partial substitution of local sesame meal as a substitute for soybean meal in the diet and its effect on the productive performance of quail. Master Thesis, College of Agriculture and Forestry, University of Mosul.
- [8] Al-Soufi, Khaled Hadi Mustafa (2021). The effect of partially or completely replacing soybean meal with sesame meal with the addition of the phytase enzyme on the productive and physiological performance and offspring of quails. PhD thesis, College of Agriculture and Forestry, University of Mosul.
- [9] Al-Yassin, Ali Abdel-Khaleq and Mohamed Hassan Abdel-Abbas (2010). Poultry feeding. College of Agriculture, University of Baghdad, Ministry of Higher Education and Scientific Research.
- [10] Diarra, S. S., & Usman, B. A. (2008). Performance of laying hens fed graded levels of soaked sesame (*Sesamum indicum*) seed meal as a source of methionine. *International Journal of Poultry Science*, 7(4), 323-327.
- [11] Onunkwo, D. N., Agusi, D. O., & Okoro, I. C. (2015). The effects of hydraulic extracted sesame seed cake on the performance and egg quality characteristics of laying hens. *International journal of livestock Research*, 5(5),38-46.
- [12] Abuzaid , Nuha Ahmed Ali (2004). The Feeding Value of Groundnut and Sesame Meals in Broiler Diets. Master Thesis, Department of Poultry Production, University of Khartou.



## تأثير الاحلال الجزئي او الكلي لكسبة بذور السمسم المحلية الخام او المحمصة في علائق الدجاج البياض على الصفات النوعية للبيض

قانع حسين أمين الجباري<sup>2</sup>

[dr\\_qanaameen@uokirkuk.edu.iq](mailto:dr_qanaameen@uokirkuk.edu.iq)

علي هادي محمد القيسي<sup>1</sup>

[www.alialqasiy1991@gmail.com](mailto:www.alialqasiy1991@gmail.com)

<sup>1</sup> دائرة البحوث الزراعية، وزارة الزراعة، العراق

<sup>2</sup> قسم الانتاج الحيواني، كلية الزراعة، جامعة كركوك، كركوك، العراق.

- تاريخ استلام البحث 31/5/2023 وتاريخ قبوله 2023/08/07
- البحث مستل من اطروحة دكتوراه للباحث الاول.

### المستخلص

اجريت هذه الدراسة في حقل الطيور الداجنة التابع لقسم الانتاج الحيواني كلية الزراعة/ جامعة كركوك. تم توزيع الدجاج عشوائيا بواقع 168 دجاجة بياضة نوع لوهمان بعمر 52 اسبوع الى 7 معاملات بواقع 24 دجاجة لكل معاملة و6 مكررات لكل معاملة (4 دجاجة / مكرراً) لمدة 20 اسبوع غذيت الطيور بالعلائق التجريبية السيطرة 100% كسبة فول الصويا، المعاملة الثانية استبدال 33% من كسبة فول الصويا بكسبة بذور السمسم المحلية الخام والمعاملة الثالثة استبدال 66% من كسبة فول الصويا بكسبة بذور السمسم المحلية الخام والمعاملة الرابعة استبدال 100% من كسبة فول الصويا بكسبة بذور السمسم المحلية الخام والمعاملة الخامسة استبدال 33% من كسبة فول الصويا بكسبة بذور السمسم المحمصة والمعاملة السادسة استبدال 66% من كسبة فول الصويا بكسبة بذور السمسم المحمصة والمعاملة السابعة استبدال 100% من كسبة فول الصويا بكسبة بذور السمسم المحمصة. تبين نتائج التحليل الاحصائي عدم وجود فروقات معنوية عند مستوى ( $P \leq 0.05$ ) بين جميع معاملات التجربة ومعاملة السيطرة في اغلب الصفات النوعية للبيض التي تشمل دليل شكل البيضة ونسبة وزن البياض ومعدل دليل البياض ووحدة الهو وجد أن هناك اختلافات معنوية خلال الفترة الثانية والثالثة والخامسة في متوسط سمك القشرة. وفيما يخص كمية البروتين الكلية للبيض نلاحظ تفوق جميع معاملات التجربة مقارنة مع السيطرة.

**الكلمات المفتاحية:** كسبة بذور السمسم، علائق الدجاج البياض، الصفات النوعية للبيض