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Impact of diet type on some productive and egg qualitative traits of Iraqi local chicken

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Abstract:

This experiment was conducted at the Agricultural Research and Experiment Station, College of Agriculture, Al-Muthanna University, from September 7, 2025, to November 16, 2025. A total of 45 local hens were used, collected from local markets in Al-Muthanna Governorate, Ages of uniformity: 10-12 months. Randomly distributed into three treatments with three replicates (five birds per replicate): T1 (protein percentage 17.153%, energy 2787.452 kcal/kg feed), T2 (protein percentage 17.092%, energy 2784.719 kcal/kg feed), and T3 (protein percentage 17.065%, energy 2892.345 kcal/kg feed). The results indicated that T1 led to an improvement in the production and quality characteristics of the hens' eggs Iraqi Local Currency, compared to T2 and T3 treatments.

Keywords: diet type, productive, egg qualitative, Iraqi local chicken.

تاثير نوع العليقة في بعض الصفات الانتاجية والنوعية لبيض الدجاج المحلي العراقي

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الخلاصة:

اجريت هذه التجربة في محطة الابحاث والتجارب الزراعية، كلية الزراعة، جامعة المثنى للمدة من 2025/9/7 لغاية 2025/11/16 باستخدام 45 دجاجة محلية جمعت من الاسواق المحلية في محافظة المثنى وبأعمار متجانسة 10-12 شهر وزعت عشوائيا على ثلاث معاملات وبثلاث مكررات (خمسة طيور لكل مكرر)، وكانت المعاملات المعاملة T1 (نسبة البروتين 17.153% والطاقة 2787.452 كيلوكالوري/ كغم علف)، T2 (نسبة البروتين 17.092% والطاقة 2784.719 كيلوكالوري/ كغم علف) وT3 (نسبة البروتين 17.065% والطاقة 2892.345 كيلوكالوري/ كغم علف)، واشارت النتائج الى ان المعاملة T1 ادت الى تحسن الصفات الانتاجية والنوعية لبيض الدجاج المحلي العراقي مقارنة بالمعاملات T2 وT3.

كلمات افتتاحية: نوع العليقة، انتاج البيض، النوعية، الدجاج المحلي العراقي.

Introduction:

Rearing local Iraqi chickens is widespread in Iraqi villages and rural areas (Dhiab, 1980). These birds feed on agricultural crop residues (wheat, barley, and rice), in addition to leftover food scraps provided inside the houses. Local Iraqi chickens are dual-purpose (egg and meat production). It is believed that their origin traces back to Indian breeds (Al-Jaryan, 2016).

Humans have raised chickens for thousands of years, benefiting from their meat, eggs, and other produce. These chickens adapt well to changes in temperature, climate, and humidity, both in summer and winter. They are resistant to diseases (Al-Hasab, 1996; Al-Libawi, 2015; Al Salman and Al-Gharawi, 2019). They reach maturity at 5-6 months. Their egg production is low, ranging from 50-80 eggs per year. The fertility rate of local chickens is low, around 45-50%. The hatching rate is low, reaching less than 60% of fertilized eggs (Omer *et al*., 2016; Tawfeq and Al-Neemy, 2022).

Nutritional requirements are defined as the minimum nutrient concentration needed to achieve maximum productive performance. Therefore, chicken productivity requires balanced diets, in terms of energy and protein, as well as feed conversion efficiency (Al-Athari *et al*., 2002; Samawal, 2011).

Materials and Methods:

This experiment was conducted at the Agricultural Research and Experiment Station, College of Agriculture, Al-Muthanna University, from September 7, 2025, to November 16, 2025. A total of 45 local chickens collected from local markets in Al-Muthanna Governorate, ages of uniformity: 10-12 months. Randomly distributed into three treatments, with three replicates (five birds per replicate). Raised in 1 x 1 meter pens for 60 days. The treatments were as shown in Table (1).

Table (1) Composition of production rations according to the treatments provided to local chickens.

Items	T1	T2	T3
Maize	37.50	50.93	30.73
Wheat	10.00	10.00	10.00
Barley	10.00	6.50	10.00
Soybean Meal	23.00	23.00	25.00
Wheat bran	6.00	8.00	7.00
Premix*	2.50	2.50	2.50
Oil	2.50	2.00	2.00
Limestone**	8.00	8.00	5.70
Salt	0.50	0.50	0.50
Total	100.00	100.00	100.00
Chemical Analysis***			
Crude Protein (%)	17.153	17.092	17.065
Metabolazaible energy (kilocalories/kg diet)	2787.452	2784.719	2892.345
Lysine (%)	0.799	0.822	0.965
Methionine (%)	0.327	0.39	0.372
Crude fiber (%)	2.82	2.86	2.87
Calcium (%)	3.33	3.59	3.21
Available phosphorus (%)	0.410	0.48	0.53

* Nuscience brand premix (made in the Netherlands). Each kilogram contains 20% protein, 4188 kcal/kg metabolizable energy, phosphorus 9.08%, calcium 9.77%, arginine 1.35%, valine 1.93%, threonine 2.65%, methionine 6.46%, lysine 3.00%, vitamin E 1.200 mg/kg, vitamin D3 100.00 IU, vitamin A 400 IU, sodium 6.00%, available vitamin K3, vitamin B1 80 mg/kg, vitamin B2 200 mg/kg, vitamin B3 480 mg/kg, vitamin B6 120 mg/kg, vitamin B12 600 mg/kg, niacin 800.1 mg/kg, and folic acid. 40 mg/kg, Biotin 000.4 mg/kg, Iron 600.1 mg/kg, Zinc 200.3 mg/kg, Copper 600 mg/kg, Manganese 000.4 mg/kg, Iodine 40 mg/kg, Selenium 12 mg/kg, Cysteine + Methionine 30.7%.

** Limestone used in the experiment is sourced from Erbil quarries and contains 74.5% SiO2%, 92.0% Al2O3%, 55.0% Fe2O3, Cl 0.03%, K2O 0.10%, SO3 0.04%, MgO2.75%, CaO 48.19%.

***The chemical composition values of the feed materials included in the ration were calculated according to the reports of the US National Research Council (NRC, 1994).

diet), and T3 (protein percentage 17.065% and energy 2892.345 kcal/kg diet), which reached 41.65% and 41.36%, respectively, and did not differ significantly between them.

The results also indicate that treatment T1 gave the highest significant average ($P \leq 0.05$) of eggs per hen, at an average of 26.29 eggs/hen, compared to treatments T2 and T3, which amounted to 24.99 and 24.82 eggs/hen, respectively.

Regarding the weight of the first egg produced, the results also showed that treatment T2 was significantly superior ($P \leq 0.05$) with an average weight of

Results and Discussion:

Table (2) shows the effect of different types of diet on egg production in local chickens raised in Al-Muthanna Governorate. The results indicate a significant effect of feed on the productive performance of local chickens. It was observed that treatment T1 (protein percentage 17.153% and energy 2787.452 kcal/kg diet), significantly outperformed ($P \leq 0.05$) on egg production (Hen Day Egg Production) by 43.82%, compared to treatments T2 (protein percentage 17.092% and energy 2784.719 kcal/kg

Regarding the feed consumed, the results in the same table indicated a significant increase (P≤0.05) for treatments T2 and T3, with averages of 3362.89 and 3384.27 gm, compared to treatment T1, which had an average of 3042.92 gm.

Regarding the feed conversion ratio, a significant improvement (P≤0.05) was observed for treatment T1, which averaged 2.74 gm of feed consumed/gm of egg mass, compared to treatments T2 and T3, which averaged 2.96 and 3.02 gm of feed consumed/gm of egg mass, respectively.

31.69 g compared to treatments T2 and T3 with averages of 30.96 and 30.72 g respectively.

It was also observed in the same direction that the average weight of the eggs throughout the duration of the experiment (60 days) was significantly superior to treatment T1 (P≤0.05), with an average weight of 46.86 gm, compared to treatments T2 and T3, with averages of 45.49 and 45.15 gm respectively.

Treatment T1 also significantly outperformed (P≤0.05) in egg mass, averaging 1231.95 gm, compared to treatments T2 and T3, averaging 1136.79 and 1120.62 gm respectively.

Table (2) Effect of different types of feed on some egg production characteristics of local chickens.

Traits	Treatments			Sig.
	T1	T2	T3	
Hen Day Egg Production (%)	43.82±0.84 a	41.65±2.18 b	41.36±1.98 b	*
Egg Number/ Hen	26.29±0.11 a	24.99±0.32 b	24.82±0.29 b	*
First Egg Weight (gm)	31.69±0.45 a	30.96±1.09 b	30.72±1.23 b	*
Egg Weight (gm)	46.86±0.77 a	45.49±0.81 b	45.15±0.92 b	*
Egg Mass (gm)	1231.95±39.62 a	1136.79±52.18 b	1120.62±47.32 b	*
Feed Intake (gm)	3042.92±69.87 b	3362.89±101.58 a	3384.27±127.33 a	*
Feed Conversion (gm FI/ gm EM)	2.47±0.02 a	2.96±0.01 b	3.02±0.02 b	*

While no significant differences were observed between all experimental treatments in the relative weight of whiteness, which amounted to 67.69, 67.57 and 67.54% for treatments T1, T2 and T3 respectively.

The weight of the yolk, treatment T1 was significantly superior (P≤0.05) with an average weight of 9.94g

Table (3) shows the effect of different types of diets on some characteristics of eggs produced by local chickens. A significant increase in egg weight (P≤0.05) was observed in treatment T1, with an average weight of 31.72 gm, compared to treatments T2 and T3, where the average egg weight was 30.74 gm and 30.49 g, respectively.

amounted to 21.21%, 21.16% and 21.15% for treatments T1, T2 and T3 respectively.

The weight of the shell, treatment T1 gave the highest average shell weight (P≤0.05) at an average of 5.20 gm, compared to treatments T2 and T3, which amounted to 5.12 and 5.11 gm respectively.

compared to treatment T2, which had an average weight of 9.63gm, and which showed a significant increase (P≤0.05) compared to treatment T3, which had an average weight of 9.55gm.

The relative weight of the yolk, no significant differences were observed between all treatments, which

Table (3) Effect of different types of feed on some characteristics of eggs produced by local chickens.

Traits	Treatments			Sig.
	T1	T2	T3	
Albumin Weight (gm)	31.72±0.06 a	30.74±0.08 b	30.49±0.05 b	*
Albumin Relative Weight (%)	67.69±0.09	67.57±0.15	67.54±0.06	N.S
Yolk Weight (gm)	9.94±0.02 a	9.63±0.03 b	9.55±0.02 c	*
Yolk Relative Weight (%)	21.21±0.07	21.16±0.11	21.15±0.12	N.S
Shell Weight (gm)	5.20±0.01 a	5.12±0.02 b	5.11±0.02 b	*
Shell Relative Weight (%)	11.09±0.04 b	11.26±0.08 a	11.31±0.08 a	*

levels of immunity (Magothe *et al*., 2012).

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Our study results indicate that feeding local chickens a diet containing 17.153% protein and 2787.452 kcal/kg of feed, gave the best results compared to diets containing 17.092% and 17.065% protein and 2784.719 and 2892.345 kcal/kg of feed, respectively. It improved production performance and egg quality.

This indicates the ability of local chickens to respond to the provided feed, with the potential for improving the productivity of local chickens if suitable conditions are provided. Iraqi local chickens possess diverse genetic traits. Their importance lies in preserving and maintaining genetic resources amidst varying environmental conditions (Bett *et al*., 2011). Their breeding can be successful, due to their high tolerance to harsh conditions, through their high

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