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COMPARATIVE STUDY AMONG LOCAL CHICKEN WITH TWO STRAINS FOR SOME PERFORMANCE TRAITS

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Abstract

Performance of local breed, Iranian chickens, and Ross 308 were compared in this study. A total of 300 one-day old chicks were assigned to fifteen pens. The results showed that local breed had a body weight (BW) at 7 weeks of 0.180 kg, while Iranian chicken and Ross had BWs of 0.291, 2.763 kg respectively. The average weekly weight gain of local breed was 21 grams, compared to 36 and 338 grams for Iranian and Ross chickens, respectively. Ross 0.704 and Iranian chickens 0.199 both had higher average feed intake (FI) than local breed 0.132. Feed conversion ratio (FCR) of local breed was relatively high 6.327 compared to Ross 1.834 and Iranian chickens 5.327, respectively. As for mortality, Iranian chicken recorded a high rate 10% compared to local breed 9% and Ross chickens 6%. Moreover, there were no significant differences in the weights of the primary, secondary carcass parts and edible internal organs between local breed and Iranian chickens under the same conditions.

Keywords: Local breed, Ross strain, Iranian chicken traits.

دراسة مقارنة بين الدجاج المحلي مع سلالتين لبعض الصفات الإنتاجية

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الخلاصة

تم مقارنة اداء دجاج كل من سلالة الروس 308 والدجاج المحلي والإيراني في هذه الدراسة. استخدمت خمسة عشر قفص ارضي في هذه التجربة، وكل قفص احتوى على 20 فرخ، اي ما مجموعه 300 فرخ بعمر يوم واحد. وكانت مدة التربية 49 يومًا، تمت خلالها تربية المجاميع الوراثية في نفس بيئات التربية والتغذية. أظهرت النتائج أن وزن الجسم (BW) للدجاج المحلي قد بلغ في 7 أسابيع 0.180 كغم، بينما بلغ وزن الدجاج الإيراني والروس 0.291 و2.763 كغم على التوالي، وكان متوسط الزيادة الوزنية الأسبوعية للدجاج المحلي 21 غم مقابل 36 و338 غم للدجاج الإيراني والروس على التوالي. اشارت النتائج الى ان استهلاك العلف (FI) كل من الروس 0.704 والدجاج الإيراني 0.199 كان أعلى من الدجاج المحلي 0.132. كانت نسبة تحويل العلف (FCR) للدجاج المحلي مرتفعة نسبيًا 6.327 بالمقارنة مع الروس 1.834 والدجاج الإيراني 5.327 على التوالي. أما بالنسبة للنفوق، فقد سجلت مجموعة الدجاج الإيراني نسبة عالية 10% مقارنة بالدجاج المحلي 9% والروس 6%، ولم تكن هناك فروق معنوية في أوزان أجزاء الذبيحة الأولية والثانوية والأعضاء الداخلية الصالحة للأكل بين الدجاج المحلي والايراني.

كلمات مفتاحية: الدجاج المحلي، الدجاج الايراني، سلالة الروس 308، الصفات الإنتاجية.

Introduction

Chicken (*Gallus gallus*) is one of the most common widely domesticated poultry species (35), providing a large proportion of animal protein in the human diet (17). It has evolved from the wild form to the modern multi-layer broilers, game, and luxury breeds, as well as the original village chickens (5). Local chickens in different regions of Iraq are a heterogeneous group that differ in their morphological and quantitative characteristics (1, 3, 25 and 38). They are characterized by the relatively high prices of its products compared to the prices of commercial fowl, small body size, grow slowly, more efficient in feed intake (FI) and feed conversation ratio (FCR) (22, 23 and 24). Furthermore, their genetic background makes them to have high ability to resist harsh environmental conditions, and tolerance for endemic diseases (36, 39 and 41).

Iran has several chicken breeds that are adapted to the local environment (45). The performance of native breeds in Iran, in terms of growth rate, feed conversion, egg

production, and meat quality, may not match that of commercial breeds (2, 18 and 44).

The Ross 308 is a widely used broiler chicken breed known for its exceptional performance in commercial poultry farming. It is a product of genetic selection and breeding by (8 and 30). The Ross 308 was one of the most popular broilers breeds globally due to its impressive growth rate, feed efficiency, and overall meat production characteristics (11 and 21). It's important to note that the performance of any chicken breed, can be influenced by factors such as nutrition, housing conditions, biosecurity, and overall management practices (28). The main aim of this study was to discover the performance of local breed.

Materials and Methods

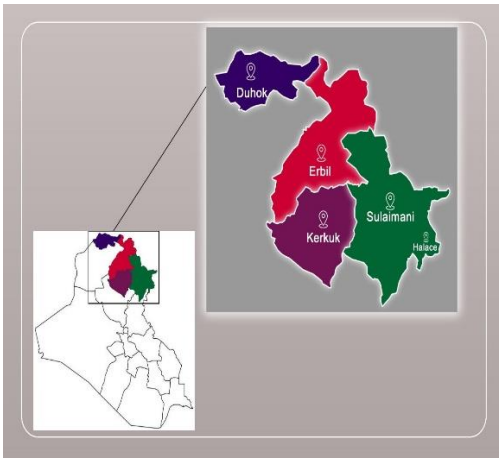

Figure 1 shows the location where the eggs collected.

To perform this research, eggs were collected from local breed farms, depending on some morphology characteristics which is presented in Figure 2 (Frizzle, light brown, Black, Naked Neck, white, and Feathered leg). Then local chickens collected were reared in various provinces (Sulaymaniyah, Erbil, Kirkuk, Dohuk and Halabja) in Kurdistan Region (Figure 1). Furthermore, in this study another 4 types of chicken, which were imported from Iran to Kurdistan Region, known as Iranian chicken which is presented in Figure 3 (Black and white, red henna color, red, and Crested chickens). In addition, eggs from Ross 308 chickens were purchased from Serko Hatchery in Sulaymaniyah. This hatchery specifically imports eggs from the Dutch company “Angel Eggs” (https://angeleggs.eu/en/) to the Kurdistan region.

Figure 2 Local breeds (A: Frizzle, B: light brown, C: Black, D: Naked Neck, E: white, F: Feathered leg).

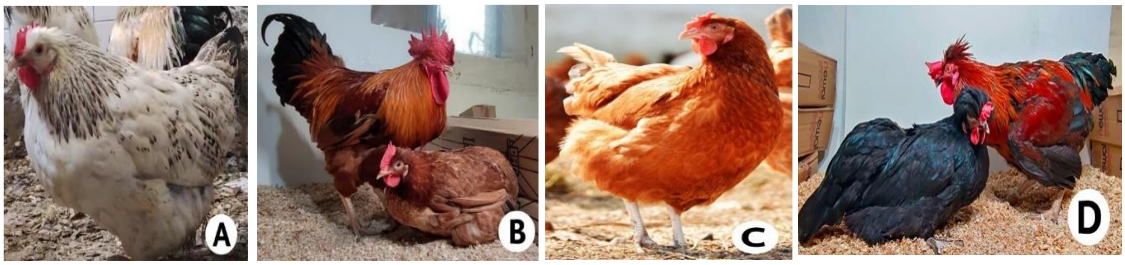

Figure 3 Iranian chickens (A: Black and white, B: red henna color, C: red, D: Crested chickens).

Statistical Analysis: Three hundred one-day old chickens of the three genetic groups were housed in 15 pens each with 20 chickens. All data were statistically analyzed using the (29) method (37) and the differences between the means of groups were separated using the Duncan Multiple Range Test (15). Statistical significance will be determined using ($P \leq 0.05$), with five replicates of each genetic group for an experimental period of 7 weeks. The chicks were given feed and water *ad libitum* throughout the experimental period via individual drinkers and feeders. Three different levels of diets, starter diet for first 2 weeks, grower diet for 2 weeks, and finisher diet were used for 3 weeks (Table 1) (7 and 10).

Table 1 Composition (kg) and chemical analysis (%) of experimental diets in starter, grower, and finisher periods.

Ingredients	Starter %	Grower %	Finisher %
Wheat	5	10	15
Soybean	36	31.2	25.5
Corn yellow	53.4	53	53.4
Miavit premix	2.5	2.5	2.5
Oil	1.5	2	2.5
Limestone	1.5	1.2	1
Salt	0.1	0.1	0.1
Nutrient chemical composition			
Energy Kcal/kg	3000	3100	3150
Crude Protein %	22	20	19
Phosphorus %	50	42	36
Lysin %	1.40	1.26	1.17
Methionine %	0.54	0.50	0.47
Meth+ Cyst. %	1.05	0.97	0.91
Sodium %	0.16	0.16	0.16
Chloride %	0.16	0.16	0.16
Calcium %	0.96	0.84	0.78

The medication and vaccination schedule used is shown in Table 2. Furthermore, after each vaccination session, the chicks were given vitamin C through water over a 24-hour period to help reduce the stress from the vaccines. Additionally, throughout the trial, all other vitamins and antibiotics that were given were through water (7 and 10).

Table 2 Vaccination program.

Age	Vaccine	Rout of Vaccination	Type of Vace strain (s)
1 day	NDV	Eye drops	B1
7 days	Influenza & ND	Injection	H9N2 & clone 30
12 days	ND	Eye drops	B1
15 days	IBD	Eye drops	D78
21 days	IBD	Eye drops	D78
22 days	NDV & IB	Eye drops	Las. & Mass
25 days	Influenza & ND	S/C	H9N2 & clone 30
32 days	NDV & IB	Eye drops	Las. & 4/91
35 days	Influenza & ND	S/C injection	H9N2 & clone 30
42 days	NDV	S/C	Las.

Data collection: Based on research (9, 32 and 43) collecting and analyzing information on genetic breeds performance measurement: Live body weight: Chick weight was recorded daily weekly with a 0.01 g precision scale (CGOLDENWALL, Germany) and weekly body weights (WBW) were determined individually with a 1 g precision scale 7, 14, 21, 28, 35, 42 and 49 days of age.

Feed Intake (FI) and Feed Conversion Ratio (FCR) were also determined on a weekly basis. The FCR was calculated using following equation based on average pen.

Feed conversion ratio (FCR) = (Average feed intake) / (Average body weight)

Mortality: Throughout the experiment, the mortality rate percentage was calculated based on the total number of dead birds for each replication.

Mortality = (The number of dead birds) / (Total number of birds).

Carcasses trait: At the age of 49 days, 10 birds were selected at random from each genetic group (local breed, Iranian chickens and Ross) and were weighed using a precise scale 0.01 g (CGOLDENWALL, Germany). Carcasses were weighed both with and without the internal entrails. The main body parts: breast, thigh, back, neck, and wings were then removed from the carcasses as well as the edible parts, heart, liver, and gizzard.

Results and Discussion

Body Weight (BW): Results for the BW of the three genetic groups revealed that Ross chicks were superior to Iranian and local breeds at one-day old 0.045, 0.040, and 0.036 kg respectively, and they continue to be superior through experimental periods (Table 3). Nevertheless, Iranian chickens and local breeds did not differ significantly at the seventh week 0.291, 0.180 kg respectively however, Ross hybrids did differ significantly 2.763 kg.

Table 3 Body weights (kg) of the three genetic groups (mean ± standard error).

Type	One-day	Week 1	Week 2	week 3	Week 4	Week 5	Week 6	Week 7
Local breeds	0.036^{a} ±0.001	0.059^{a} ± 0.001	0.075^{a} ± 0.001	0.097^{a} ± 0.001	0.118^{a} ± 0.001	0.138^{a} ± 0.002	0.159^{a} ± 0.003	0.180^{a} ± 0.004
Iranian	0.040^{b} ± 0.001	0.076^{b} ± 0.001	0.111^{b} ± 0.002	0.145^{b} ± 0.002	0.186^{b} ± 0.005	0.221^{b} ± 0.009	0.255^{b} ± 0.010	0.291^{a} ± 0.012
Ross	0.045^{c} ± 0.001	0.155^{c} ± 0.001	0.357^{c} ± 0.001	0.571^{c} ± 0.011	1.073^{c} ± 0.021	1.588^{c} ± 0.010	2.167^{c} ± 0.043	2.763^{b} ± 0.089

The different letters (a,b,c) within the same column indicate significant differences between the genetic groups at the probability level ($p \leq 0.05$).

These findings were consistent with the research that found that native chickens are used as dual purposes in Iran (49) and that the dual-purpose chickens grow more slowly than Ross (4). Because there is a negative correlation between BW and egg production in Iraqi genetic strains, this could be the cause of the low BW in local breeds (3, 14 and 33). The slow growth of local breeds is due to no genetic improvement program was carried out. These results are agreed with what was reported by (12) that there was significant difference between broiler and local breeds in BW trait (47). The results of this study on body weight did not agree to what was found (16) where local fowl koekoek and Sasso chicken BW at eight weeks reach to 601.5, 970.4 gm respectively. (40) showed the BW at seven weeks in local fowl Sinai in Egypt reach to 507.5 grams.

The performance of production in chickens depend on breed (40). Genetic selection of broilers for rapid growth (32) makes broilers have the genetic capacity to grow quickly. Commercial broilers hybrids have evolved to perform better and gain a lot of weight quickly (32).

Feed intake (FI): The results in Table 4 shows that the genetic background had a significant impact on the amount of feed consumed. Ross consumed more feed in the first and second weeks 0.188, 0.398 kg, than Iranian 0.157, 0.198 kg, and local breeds 0.138, 0.103 kg respectively. There are noticeable differences in the amount of feed consumed throughout the raising period between Ross hybrid, Iranian chickens, and local breeds, where the Ross hybrids outperforming the others for weeks 3, 4, 5, 6, and 7 0.139, 0.209, and 0.985 kg, 0.150, 0.204, and 0.891 kg, 0.139, 0.209, and 0.985 kg, and 0.142,0.219,1.049 kg.

Table 4 weekly feed intake (kg) of the three genetic groups (mean ± standard error).

Type	Week 1	Week 2	week 3	Week 4	Week 5	Week 6	Week 7
Local breeds	0.138^{a} ± 0.003	0.103^{a} ± 0.003	0.139^{a} ± 0.005	0.112^{a} ± 0.004	0.150^{a} ± 0.005	0.139^{a} ± 0.003	0.142^{a} ± 0.003
Iranian	0.157^{b} ± 0.002	0.198^{b} ± 0.003	0.196^{b} ± 0.002	0.209^{b} ± 0.003	0.204^{b} ± 0.003	0.209^{b} ± 0.004	0.219^{b} ±.003
Ross	0.188^{c} ± 0.005	0.398^{c} ± 0.003	0.428^{c} ± 0.004	0.986^{c} ± 0.006	0.891^{c} ± 0.005	0.985^{c} ± 0.006	1.049^{c} ± 0.005

The different letters (a,b,c) within the same column indicate significant differences between the genetic groups at the probability level ($p \leq 0.05$).

Iranian chicken and local breeds consumed less feed than to Ross (34 and 44). In addition, (22) reported that the average FI in dual-purpose breeds from one day old to the sixth week was 33.3 gram/day/bird. Furthermore, (40) found average FI in indigenous chicken from the Boschveld, which was 85.50 gram/bird/day. According to (51), commercial breed chickens grew more quickly and consumed more feed when compared to local fowl under the same conditions. Also, (27) differentiated between the genotype of chickens when chicken body weight increases, the more FI increases too because there is a direct correlation between them (32 and 50).

Feed Conversion Ratio (FCR): The result in Table 5 explains that there were significant differences in FCR between indigenous chicks and hybrids Ross 308. Ross hybrids outperformed Iranian chickens and Kurdish fowl for the seven weeks, with FCRs of 1.709, 4.359, 5.988 and 1.968, 5.655, 6.438 and 1.997, 5.759, 6.317 and 1.961, 5.098, 5.333 and 1.730, 5.826, 6.438.

Table 5 weekly Feed Conversion Ratio (FCR) of the three genetic groups (mean ± standard error).

Type	Week 1	Week 2	3eek 3	Week 4	Week 5	Week 6	Week 7	Total 1-42 days
Local breeds	5.988^{a} ± 0.010	6.438^{a} ± 0.001	6.317^{a} ± 0.001	5.333^{a} ± 0.002	6.817^{a} ± 0.001	6.616^{a} ± 0.002	6.760^{a} ± 0.002	6.327^{a} ± 0.197
Iranian	4.359^{b} ± 0.002	5.655^{b} ± 0.001	5.759^{b} ± 0.005	5.098^{b} ± 0.001	5.826^{b} ± 0.003	6.145^{b} ± 0.001	6.082^{b} ± 0.001	5.563^{b} ± 0.239
Ross	1.709^{c} ± 0.002	1.968^{c} ± 0.003	1.997^{c} ± 0.002	1.961^{c} ± 0.001	1.730^{c} ± 0.001	1.702^{c} ± 0.001	1.759^{c} ± 0.001	1.834^{c} ± 0.052

The different letters within the same column indicate that there are significant differences between treatments at the probability level ($p \leq 0.05$).

The results found in the current study, regarding FCR among genetic groups agreed with research which was reported by (20 and 34) that FCR in Nigerian chickens was 4.28, in Fayoumi 5.75 (26). Furthermore, the result was close in Rhode Island Red chicken 6.45 (26).

The genetic propensity for rapid growth and the outcome of selection processes accounts for the difference in FCR between Ross, local breeds, and Iranian chicken (44). According to (18, 31, 34 and 44) local breeds is less efficient in FI and FCR than commercial broilers. FCR was caused by variations in body weights and feed intake (48).

Mortality: Figure 4 shows mortality between genetic groups. According to the results of this study, no mortality was recorded from the first day of rearing chickens until the fourth week. From the fourth to the seventh week, the lowest death rate was in Ross hybrid, which was 6%, local fowl 9% and Iranian chicken 10%.

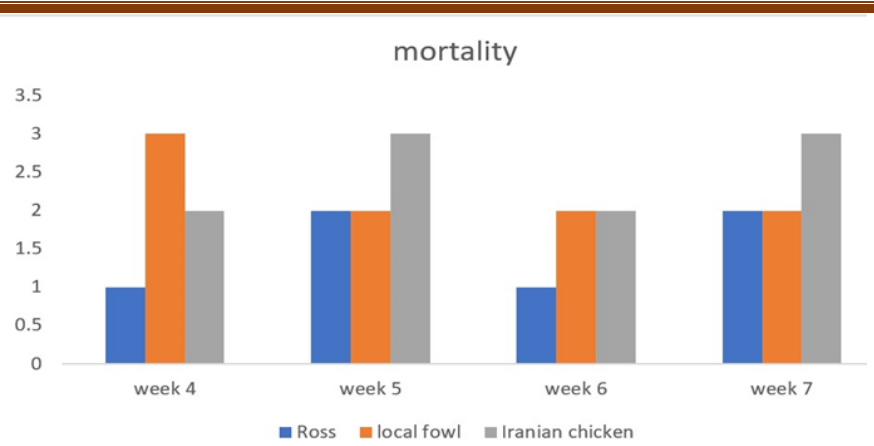

Figure 4 Shows Mortality of the three genetic groups.

According to the results of this study, breeders can significantly reduce the mortality of local breeds by improving management and implementing a vaccine system that is active against diseases in the area (7, 10, 19 and 46). In addition, for Ross hybrid the results of this study are within the standard mortality, being between 2 and 7% (7, 10 and 27). The results obtained in this research about mortality did not agree with what previously reported (27) who reported that 41% chicks belonging to the local breed, died in the first three months of life (13). Average weekly mortality in small-scale chicken flocks was 2.6% and (48) reported there were not different genetic strains of broiler

Carcass Traits: According to the results in Table 6, Ross hybrid live body weights and main carcass cuts at 49 days of age significantly outweighed Iranian and local breeds in terms of live body weight 2,927, 0,584, and 0,410 kg respectively. The carcass weight 2.030, 0.343, 0.280 kg and breast weight 0.698 kg both followed the same pattern 0.069, 0.055 kg. Iranian and local breeds that scored 0.533, 0.102, and 0.084 were significantly lower than Ross thigh hybrid. There are no appreciable differences in wing weight between the local breeds and the Iranian chicks 0.040 and 0.052 kg respectively, but there are appreciable differences with the Ross 0.241 kg. Back and neck weight 0.435, 0.108 and 0.080 kg, respectively. Giblets cuts: the weights of various organs, such as the heart, gizzard, and liver, as influenced by genetic groups. When compared to other local breeds and Iranian chickens, Ross hybrid liver recorded the highest values 0.068, 0.012 and 0.012 kg respectively. Ross, Iranian, and local breeds, respectively, had hearts and gizzards weighing 0.029, 0.004 and 0.003 kg and 0.028, 0.017 and 0.016 kg.

Table 6 Carcass traits at marketing of the three genetic groups (mean ± standard error).

Type	Live B.W	Carcass weight	Breast	Thigh	Wings	Back neck	liver	Heart	Gizzard
Local breeds	0.410[a] ± 0.024	0.280[a] ± 0.020	0.055[a] ± 0.006	0.084[a] ± 0.005	0.040[a] ± 0.003	0.080[a] ± 0.007	0.012[a] ± 0.001	0.003[a] ± 0.001	0.016[a] ± 0.001
Iranian	0.584[a] ± 0.044	0.343[a] ± 0.031	0.069[a] ± 0.006	0.102[a] ± 0.009	0.052[a] ± 0.004	0.108[a] ± 0.011	0.012[a] ± 0.001	0.004[a] ± 0.001	0.017[a] ± 0.001
Ross	2.927[b] ± 0.097	2.030[b] ± 0.075	0.698[b] ± 0.029	0.533[b] ± 0.020	0.241[b] ± 0.013	0.435[b] ± 0.021	0.068[b] ± 0.005	0.029[b] ± 0.011	0.028[b] ± 0.002

The different letters within the same column indicate that there are significant differences between treatments at the probability level ($p \leq 0.05$).

Local breeds and Iranian chickens performed less well in terms of growth than Ross hybrid, which directly affects body weight as well as main cuts, economic cuts, and giblets cuts. While local breeds of poultry have desirable traits, broilers have higher production efficiencies (6). (37) Commercial broilers had superior carcass traits than those of regional breeds at market age. (42) Carcass composition was significantly influenced by the genetic background of the chicken.

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