

## Hematological and productive Performance of male and female of three native geese in Kurdistan region of Iraq

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### Abstract

This study was conducted to determine the live weight, carcass weight, blood characterization and the effects of feather colours and sex on these traits of three native geese in Kurdistan/Iraq. A total of 36 geese of the three feather colours (12 geese for each) which were 10-11 months of age were used.

Results revealed that mean live weight, warm, cold carcass weights and cold dressing percentage were 2950, 2206, 2180 g and 73.87% respectively. The overall means of Hemoglobin (HB), Packed cell volume (PCV), Erythrocyte Sedimentation Rate (ESR), Heterophil (H), Lymphocyte (L), Monocyte (M), Eosinophil(E), Basophile (B) and H/L ratio were 15.41gm/100cm<sup>3</sup>, 46.27%, 1.89 ml/h, 40.56%, 55.44%, 1.78%, 1.72%, 0.5% and 0.73 respectively. Significant differences were found among Gray, White and Piebald geese strains in live weight, carcasses components and blood traits. Live weight (3091.66 g), cold carcass weight (2248.00 g), legs (514.166 g), wings (385.83 g), neck (386.67 g) and heart (27.5 g) weight were highest in White geese while higher cold dressing percentage (75.40 %), breast (622.50 g), back (228.33 g), gizzard (88.33 g), liver (49.167 g) and total giblets weight (160 g) were highest in Gray geese. Results also revealed that significant difference among strains in Lymphocyte, Monocyte and H/L ratio with highest value 56.67% in White geese, 2.17% and 0.77 in Gray geese, respectively. Males geese surpass females significantly in live weight, warm carcass weight, cold carcass weight as well as most carcasses components and blood traits. Significant correlation coefficients were found between live weight, warm and cold carcass weight and primary carcass components.

In conclusion, the results obtained in this study indicated that meat yield was good of the native Kurdish geese and that strains influenced live weight, carcass and blood traits and this study is the first paper on native geese in Kurdistan/Iraq; therefore, the data obtained can be used for the identification of native geese in this region.

الأداء الإنتاجي وصفات الدم لذكور وإناث لثلاثة أنواع من الوز المحلي في كردستان العراق

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### الخلاصة

أجريت هذه الدراسة لتقدير الوزن الحي، وزن الذبيحة وصفات الدم وتأثير لون الريش والجنس على هذه الصفات لثلاثة أنواع من الوز المحلي الموجود في كردستان العراق. أستخدمت 36 ذكر وأنثى من ثلاثة أنواع ( 12 وزه لكل نوع) من الأوز المحلي وكان أعمارهم 10-11 شهرا عند بدء التجربة. أظهرت النتائج بأن متوسط الوزن

الحي، وزن الذبيحة الحارة والباردة و نسبة التصافي كانت 2950 ، 2206 ، 2180 غم و 73.87% على التوالي. المتوسط العام لتركيز الهيموكلوبين ، وحجم الكريات المتراصة، ومعدل ترسيب الدم ، ونسبة الخلايا المتغايرة ، الخلايا اللمفية ، الخلايا أحادية النواة، الخلايا الحامضية ، الخلايا القاعدية و نسبة الخلايا المتغايرة/الخلايا اللمفية كانت 15.41 غم/100 سم<sup>3</sup> ، 46.27% ، 1.89 مل/ساعة ، 40.56% ، 55.44% ، 1.78% ، 1.72% ، 0.5% و 0.73 على التوالي. وجد فروقات معنوية بين الوز الرصاصي، الأبيض والمبقع اللون في كل من الوزن الحي، مكونات الذبيحة وصفات الدم. أذ تفوق الوز الأبيض في كل من الوزن الحي (3091.66 غم)، وزن الذبيحة الباردة (2248 غم)، وزن الأرجل (514.166 غم)، وزن الأجنحة (385.83 غم)، وزن الرقبة (386.67 غم) و وزن القلب (27.5 غم) في حين تفوق الوز الرصاصي اللون في كل من نسبة التصافي (75.4%)، وزن الصدر (622.5 غم)، وزن الظهر الخلفي (228.33 غم)، وزن القانصة (88.33 غم)، وزن الكبد (49.167 غم) و الوزن الكلي للأحشاء المأكولة (160 غم). كذلك اشارة النتائج الى وجود فروق معنوية بين الأنواع الثلاثة في كل من الخلايا اللمفية، الخلايا أحادية النواة و نسبة الخلايا المتغايرة/الخلايا اللمفية، اذ سجلت اعلى قيمة 56.67% في الوز الأبيض، 2.17% و 0.77 في الوز الرصاصي على التوالي. تفوقت الذكور على الإناث معنويا في وزن الحي، وزن الذبيحة الحارة والباردة، بالإضافة الى معظم مكونات الذبيحة وصفات الدم. وجد معامل ارتباط معنوي بين كل من وزن الحي، وزن الذبيحة الباردة والحارة مع الأجزاء الرئيسية للذبيحة.

ستنتج مما سبق، بان النتائج المتحصلة عليها في هذه الدراسة تشير الى ان كل من النوع والجنس اثرتا في وزن الحي، وزن الذبيحة و صفات الدم. بالإضافة الى ان هذه الدراسة هي الدراسة الأولى على الوز المحلي في منطقة كردستان العراق، لذلك النتائج المتحصلة عليها يمكن ان يستخدم لتعريف او توصيف أولي لهذه الانواع من الوز المحلي.

### Introduction:

Geese are important poultry commodity for Asian villagers since most of them are small farmers. The purpose of raising geese in Asian countries is not only to produce eggs and meat but also to use them as guard animals and to help control the growth of wild grass and weeds. For Indonesian farmers, keeping geese is more than just a way of increasing family income. The genetic capacity of Asian geese as either meat or egg producers is generally accepted as less than that of most modern breeds found in Europe (1). In addition, since most farmers cannot afford to buy commercial complete rations for their geese, goose raising is frequently done as a backyard farming activity using cheap and locally available feedstuffs, including grass. Even though Asian goose production technology is not well developed, goose production in Asia is increasingly popular and has become accepted as a recognized type of poultry production (1).

Although goose meat smells attractive and naturally with high fat proportion in it. The importance of goose breeding for meat production is increased as it is very appropriate for organic farming and supporting to rural developments (2; 3; 4 and 5). Live body weight was different among geese breeds were ranged from 3 to 7 kg (6, 7, 8, and 9).

In general, extensive goose rearing is a common widespread in Kurdistan region of Iraq, mainly in villages in Erbil, Duhok and Sulamania. Goose meat and eggs are the most important protein sources for feeding of population living in rural areas.

This paper is the first study to be carried out to investigate the body weight, carcass and blood traits of native geese in Kurdistan / Iraq. In Kurdistan region, especially in villages in Erbil and Sulamania geese are raised on grass from 3-4 weeks of age and fattened with only cereals before slaughter at around 10-11 months of age. This study was conducted to investigate live body weight, carcass, blood traits and the effects of strain and sex on these traits of native Kurdish geese reared in Erbil.

### Material and Methods

This study was performed at the farm of Grdarasha station, Agricultural College, University of Salahaddin during January to April, 2010. A total of 36 geese (6 males and 6 females for each feather colours) of three native geese (different feather colors: Leaden/Gray, White and Piebald Figure, 1). The age of geese were 10-11 months, obtained from a village in Erbil. The geese have been fed with agricultural waste like wheat and barley and extremely with pasture in winter and summer months respectively. The geese reared on wheat and barley grains for 4 weeks before the slaughter at 11-12 months age.

The geese were starved for 12 h with access to water and were weighted then slaughtered by severing the carotid artery and jugular veins. Blood samples (5 ml/bird) were tacked immediately (EDTA tube) after slaughter per bird for blood analyses. After plucking, the geese were eviscerated. Feet and shanks were removed at the tibio-tarsus joint and the head at the atlanto-occipital articulation. Sex was identified during evisceration after checking the genital organs (testes or ovaries). After plucking and eviscerating, carcasses were weighted to obtain warm carcass weight (with total weights of giblets) and stored for 24 h at +4 C° and dissected according to (10). Cold carcass weight with (empty skinned gizzards, heart, liver, spleen, and testis/ovarian) were weighed individually and their sum of weights giblets was taken. The percentage of the weight of organs was calculated as (weight of organ/ carcass weight) X 100. Carcass yield dressing percentage was obtained by expressing the dressed carcass weight (with giblets) as a percentage of live body weight. The carcasses were divided into neck, wings, legs, breast, and back. Data were obtained for each goose separately. The Haemoglobin concentration (HB), Packed cell volume (PCV), Erythrocyte Sedimentation Rate (ESR) and Differential Leucocyte Count estimated according to (11), (12), (13) and (14), respectively.

The PROC GLM (General Linear Model) procedure (15) was used to analyze the data and Employed for evaluation of slaughter traits, carcass and blood traits. Strain, sex and interaction between them were fitted in the following model:

$$Y_{ijk} = \mu + A_i + B_j + (AB)_{ij} + \epsilon_{ijk} \quad i = 1, \dots, 3; j = 1, \dots, 2; k = 1, \dots, 6$$

Where:

$Y_{ijk}$  = observation k in level i of factor A (Strain) and level j of factor B (Sex)

$\mu$  = the overall mean

$A_i$  = the effect of level i of factor A (1= Gray, 2= White and 3= Piebald)

$B_j$  = the effect of level  $j$  of factor B (1= Female and 2= Male)

$(AB)_{ij}$  = the effect of the interaction of level  $i$  of factor A with level  $j$  of factor B

$e_{ijk}$  = random error with mean 0 and variance  $\sigma^2_e$

Differences between the strain, sex and interaction between strain and sex were tested by the LSD test and the coefficient of simple correlation between the live weights, carcass weight with all carcass traits were measured by PROG CORR in SAS (15).



Leaden/Gray strain

Piebald strain

White strain

**Figure 1. Photos of the three native geese in Kurdistan region of Iraq.**

### Results and Discussion:

The overall mean, minimum and maximum values of the live weights, carcass weights, carcass components and blood traits were presented in Table (1). Mean live weight was 2950 (g) while warm, cold carcass weights and cold dressing percentage were 2206, 2180 (g) and 73.87%, respectively. The live weight in this study was lower than reported on different geese breeds at the same age (6) 5534 g, (7) 6730 g, (8) 3972 g, (16) 3657 g, and (9) 3470 g. Similar results found for warm, cold carcass weight and carcasses components except neck weight (341.67 g). On the other hand, the cold dressing percentage (73.87%) in this study was higher than reported by (16) and (9) were averaged (67.16%) and (67.45%) respectively. This result may be due to smallest loss after slaughter in native geese due to smallest weight for native geese compare with another geese breed under selection system in world.

The higher live weight, warm and cold carcass weight, legs, wings, neck and heart weight were recorded in White geese while higher warm and cold dressing percentage, breast, back, gizzard, liver and total giblets weight were observed in Gray geese (Table, 2). These results show good variation in carcasses components for native geese due to phenotypic and genotypic variation between native geese and selection for above traits within native geese can speed up the performance in native geese in Kurdistan. Tables 2 present the differences among native geese in blood traits. The overall means of Hemoglobin (HB), Packed cell volume (PCV), Erythrocyte Sedimentation Rate (ESR), Heterophil (H), Lymphocyte (L), Monocyte (M), Eosinophil(E), Basophile (B) and H/L ratio were 15.41gm/100cm<sup>3</sup>, 46.27%, 1.89 ml/h, 40.56%, 55.44%, 1.78%, 1.72%, 0.5% and 0.73, respectively in native geese. The results show significant differences among

strains in Lymphocyte, Monocyte and H/L ratio being higher value 56.67% in White geese, (2.17% and 0.77) in Gray geese, respectively (Table 2).

The effects of sex on the traits were presented in table, 3. The sex had significant effect on the traits studied. Males geese at 11-12 months of age produced significantly ( $P \leq 0.01$ ) heavier live weight, warm/cold carcass, legs, wings, neck and heart weights than females geese at same age, while there were no significant differences between both sex in other carcasses components. The results of this study indicated that males geese surpassed live weight and most carcasses components, which in agreements with that reported by (6); (17); (8) and (9) on different geese breeds. Also significant differences were found between both sexes for blood traits. Males geese have significantly higher values for Hemoglobin, Heterophil, Eosinophil and H/L ratio, while females geese have higher value for Lymphocyte. This result may be due to the males hormone effect, which testes male product testosterone hormone which have positive role to increasing the body weight and carcass components.

A table (4) presents the interaction of strains with whereas sexes. Significance interaction were found between feather colours and sexes in most traits in this study, being higher in warm carcass weight, cold carcass weight, warm dressing percentage, cold dressing percentage, back weight, Monocyte and Eosinophil recorded in Gray males geese, and in live, legs, wings, neck and Heart weights were recorded in White males geese. Moreover, Piebald males geese surpassed in Hemoglobin, Packed cell volume and Heterophil, while Gray females geese produced higher Breast weight and H/L ratio. Piebald females geese surpassed in Gizzard weight, liver weight and total weights of giblets (Table, 5). These results indicated that white and Gray males geese have better characterization for carcasses components, while piebald females geese had better characterization for giblets specially for liver and spleen weights.

The relationships between the live weights, carcass weight and carcasses components with the correlation coefficients are presented in Table (6). Live weight, warm and cold carcass weight were significantly closely correlated with carcasses components except gizzard weight and weights of giblets (Table 6) the positive and significant correlation between live weight and most carcass components gave good indicates to make selection for any part of carcass depended on live body weight in this type of geese. The coefficient of simple correlation between the primary carcasses components were generally high and statistically significant ( $P \leq 0.01$ ). Thus, they can be used as selection criteria for improving meatiness of the geese. (6) reported that Italian white geese strain and (17) in three Turkish geese founds similar correlation between live and carcass weights with carcasses components. Heart weight was correlated significantly with all carcasses components except back, gizzard and liver weights. Liver was have significant correlation with Live weight ( $P \leq 0.01$ ), warm and cold carcass weights ( $P \leq 0.05$ ), this results show that the increase/selection for live weight was increased in liver weight was have an economical importance in geese production. The results in Table (5) also showed that gizzard weight had a low, negative and non significant correlation with live weight (-0.024), legs weight (-0.043) and neck weight (-0.243).

**Table 1. Overall mean  $\pm$  S.D, minimum and maximum values for studied traits.**

Traits	Number	Mean $\pm$ SD	Minimum	Maximum
Live weight (g)	36	2950 $\pm$ 279.79	2500	3500
Warm carcass weight (g)	36	2206 $\pm$ 240.71	1800	2700
Cold carcass weight (g)	36	2180 $\pm$ 231.34	1775	2680
Warm Dressing percentage (%)	36	74.75 $\pm$ 2.91	70.68	80
Cold Dressing percentage (%)	36	73.86 $\pm$ 2.44	70	77.66
Breast weight (g)	36	586.94 $\pm$ 75.51	460	750
Legs weight (g)	36	487.5 $\pm$ 50.43	400	590
Wings weight (g)	36	375 $\pm$ 51.51	290	510
Neck weight (g)	36	363.33 $\pm$ 48.55	290	485
Back weight (g)	36	209.33 $\pm$ 36.98	160	315
Gizzard weight (g)	36	85.55 $\pm$ 10.54	55	100
Liver and Spleen weights (g)	36	47.77 $\pm$ 6.14	35	60
Heart weight (g)	36	24.72 $\pm$ 4.3	20	35
weights of giblets (g)	36	158.05 $\pm$ 15.31	125	185
Hemoglobin (gm/100cm <sup>3</sup> )	36	15.41 $\pm$ 0.66	14.2	16.6
Packed cell volume (%)	36	46.27 $\pm$ 1.96	43	50
Erythrocyte Sedimentation Rate (ml/h)	36	1.88 $\pm$ 0.88	1	4
Heterophil (%)	36	40.55 $\pm$ 3.54	32	47
Lymphocyte (%)	36	55.44 $\pm$ 3.26	51	62
Monocyte (%)	36	1.77 $\pm$ 0.72	1	3
Eosinophil (%)	36	1.72 $\pm$ 0.65	1	3
Basophile (%)	36	0.50 $\pm$ 0.10	0	1
H/L ratio	36	0.73 $\pm$ 0.10	0.51	0.92

**Table 2. Effect of feather color on live weight, carcass weight component and blood traits in native geese in Kurdistan region of Iraq.**

Traits	Strain (feather colours)			LSD value
	Gray (n=12) Mean $\pm$ S.D	White (n=12) Mean $\pm$ S.D	Piebald (n=12) Mean $\pm$ S.D	
Live weight (g)	2933.33 $\pm$ 280.69 ab	3091.66 $\pm$ 330.86 a*	2825.00 $\pm$ 146.938 b	201.78
Warm carcass weight (g)	2258.33 $\pm$ 241.99 ab	2271.66 $\pm$ 295.69 a*	2089.16 $\pm$ 125.67 b	179.46
Cold carcass weight (g)	2211.66 $\pm$ 221.61 a	2248.00 $\pm$ 296.82 a	2080.83 $\pm$ 127.29 a	178.33
Warm Dressing percentage (%)	76.98 $\pm$ 2.99 a**	73.32 $\pm$ 2.25 b	73.947 $\pm$ 2.13 b	1.5678
Cold Dressing percentage (%)	75.40 $\pm$ 1.99 a**	72.55 $\pm$ 2.41 b	73.64 $\pm$ 2.15 b	1.6448
Breast weight (g)	622.50 $\pm$ 57.26 a*	598.33 $\pm$ 98.38 ab	540.00 $\pm$ 35.54 b	58.527
Legs weight (g)	488.33 $\pm$ 58.20 ab	514.166 $\pm$ 45.16 a*	460.00 $\pm$ 32.61 b	35.08
Wings weight (g)	370.83 $\pm$ 42.47 a	385.83 $\pm$ 71.75 a	368.33 $\pm$ 36.01 a	34.891
Neck weight (g)	341.67 $\pm$ 31.57 b	386.67 $\pm$ 64.64 a*	361.66 $\pm$ 34.66 ab	32.171
Back weight (g)	228.33 $\pm$ 48.39 a*	205.50 $\pm$ 29.37 ab	194.167 $\pm$ 22.03 b	30.211
Gizzard weight (g)	88.333 $\pm$ 4.92 a	85.00 $\pm$ 6.74 a	83.33 $\pm$ 16.42 a	7.9826
Liver and Spleen weights (g)	49.167 $\pm$ 5.57 a	45.00 $\pm$ 5.22 a	49.166 $\pm$ 7.017 a	4.1688
Heart weight (g)	22.50 $\pm$ 2.61 b	27.50 $\pm$ 5.83 a**	24.166 $\pm$ 1.94 b	2.7442
weights of giblets (g)	160.0 $\pm$ 9.53 a	157.50 $\pm$ 11.57 a	156.67 $\pm$ 22.69 a	12.01
Blood Traits				
Hemoglobin (gm/100cm <sup>3</sup> )	15.43 $\pm$ 0.37 a	15.23 $\pm$ 0.75 a	15.58 $\pm$ 0.78 a	0.5138
Packed cell volume (%)	46.00 $\pm$ 1.20 a	45.83 $\pm$ 2.28 a	47.00 $\pm$ 2.17 a	1.5832
Erythrocyte Sedimentation Rate (ml/h)	1.67 $\pm$ 0.49 a	2.33 $\pm$ 1.15 a	1.67 $\pm$ 0.77 a	0.6808
Heterophil (%)	41.50 $\pm$ 2.46 a	39.33 $\pm$ 5.14 a	40.83 $\pm$ 2.20 a	2.2294
Lymphocyte (%)	53.83 $\pm$ 2.51 b	56.67 $\pm$ 3.98 a**	55.83 $\pm$ 2.65 a	1.9769
Monocyte (%)	2.17 $\pm$ 0.71 a*	1.67 $\pm$ 0.77 ab	1.50 $\pm$ 0.52 b	0.5125
Eosinophil (%)	1.83 $\pm$ 0.71 a	1.83 $\pm$ 0.71 a	1.50 $\pm$ 0.52 a	0.4893
Basophile (%)	0.67 $\pm$ 0.49 a	0.50 $\pm$ 0.52 a	0.33 $\pm$ 0.49 a	0.3979
H/L ratio	0.77 $\pm$ 0.07 a*	0.70 $\pm$ 0.14 b	0.73 $\pm$ 0.07 ab	0.0662

Means having different letters within each row differ significantly; \* (p<0.05); \*\* (p<0.01)

**Table 3. Effect of sex on live weight, carcass weight component and blood traits in native Kurdish geese**

Traits	Sex		LSD
	Female (n=18) Mean $\pm$ SD	Male (N=18) Mean $\pm$ SD	
Live weight (g)	2812.50 $\pm$ 215.63 b	3060 $\pm$ 280.78 a**	165.78
Warm carcass weight (g)	2085.62 $\pm$ 185.46 b	2303 $\pm$ 239.74 a**	147.44
Cold carcass weight (g)	2071.00 $\pm$ 187.74 b	2267.50 $\pm$ 229.55 a*	146.51
Warm Dressing percentage (%)	74.10 $\pm$ 1.70 a	75.27 $\pm$ 3.56 a	1.2881
Cold Dressing percentage (%)	73.57 $\pm$ 1.81 a	74.10 $\pm$ 2.87 a	1.3513
Breast weight	573.75 $\pm$ 75.75 a	597.50 $\pm$ 75.57 a	48.085
Legs weight (g)	459.38 $\pm$ 44.00 b	510.00 $\pm$ 44.24 a**	28.821
Wings weight (g)	340.00 $\pm$ 31.09 b	403.00 $\pm$ 47.63 a**	28.666
Neck weight (g)	331.88 $\pm$ 34.24 b	388.50 $\pm$ 43.77 a**	26.431
Back weight (g)	206.00 $\pm$ 32.48 a	212.00 $\pm$ 40.85 a	24.821
Gizzard weight (g)	90.00 $\pm$ 8.16 a*	82.00 $\pm$ 11.05 b	6.5584
Liver and Spleen weights (g)	47.50 $\pm$ 7.74 a	48.00 $\pm$ 4.70 a	3.425
Heart weight (g)	22.50 $\pm$ 2.58 b	26.50 $\pm$ 4.61 a**	2.2546
weights of giblets (g)	160.00 $\pm$ 16.73 a	156.50 $\pm$ 14.33 a	9.867
Blood Traits			
Hemoglobin (gm/100cm <sup>3</sup> )	15.14 $\pm$ 0.56 b	15.64 $\pm$ 0.66 a*	0.4221
Packed cell volume (%)	45.63 $\pm$ 1.78 a	46.80 $\pm$ 1.98 a	1.3007
Erythrocyte Sedimentation Rate (ml/h)	2.13 $\pm$ 0.80 a	1.70 $\pm$ 0.92 a	0.5593
Heterophil (%)	39.25 $\pm$ 3.92 b	41.60 $\pm$ 2.90 a**	1.8317
Lymphocyte (%)	57.00 $\pm$ 3.68 a**	54.20 $\pm$ 2.28 b	1.6242
Monocyte (%)	1.75 $\pm$ 0.68 a	1.80 $\pm$ 0.76 a	0.421
Eosinophil (%)	1.37 $\pm$ 0.50 b	2.00 $\pm$ 0.64 a**	0.402
Basophile (%)	0.63 $\pm$ 0.50 a	0.40 $\pm$ 0.50 a	0.3269
H/L ratio	0.69 $\pm$ 0.11 b	0.77 $\pm$ 0.08 a**	0.0544

Means having different letters within each row differ significantly; \* (p<0.05); \*\* (p<0.01)



**Table 4. Effects of interaction between feather color and sex on live weight and carcass weight component in native geese in Kurdistan/Iraq.**

Traits	Gray		White		Piebald		LSD value
	Female Mean $\pm$ S.D	Male Mean $\pm$ S.D	Female Mean $\pm$ S.D	Male Mean $\pm$ S.D	Female Mean $\pm$ S.D	Male Mean $\pm$ S.D	
Live weight (g)	2900 $\pm$ 89.44 ab	2966.66 $\pm$ 403.31 ab	2850 $\pm$ 404.14 b	3212.50 $\pm$ 227.95 a**	2700 $\pm$ 89.44 b	2950 $\pm$ 44.72 ab	311.96
Warm carcass weight (g)	2150 $\pm$ 44.72 a	2366.66 $\pm$ 314.11 a	2100 $\pm$ 346.41 a	2357.50 $\pm$ 246.38 a	2011.67 $\pm$ 132.23 a	2166.67 $\pm$ 53.35 a	268.63
Cold carcass weight (g)	2133.33 $\pm$ 50.85 ab	2290 $\pm$ 301.23 a	2081.50 $\pm$ 353.91 ab	2331.25 $\pm$ 246.99 a*	2001.67 $\pm$ 132.23 b	2160 $\pm$ 55.85 ab	265.91
Warm Dressing percentage (%)	74.16 $\pm$ 0.74 b	79.80 $\pm$ 0.30 a**	73.50 $\pm$ 1.73 b	73.24 $\pm$ 2.57 b	74.44 $\pm$ 2.43 b	73.45 $\pm$ 1.88 b	1.9629
Cold Dressing percentage (%)	73.57 $\pm$ 0.71 b	77.22 $\pm$ 0.48 a*	72.81 $\pm$ 2.09 b	72.42 $\pm$ 2.69 b	74.06 $\pm$ 2.44 b	73.22 $\pm$ 1.96 b	2.0383
Breast weight	626.67 $\pm$ 6.83 a*	618.33 $\pm$ 84.41 a	567.50 $\pm$ 124 ab	613.75 $\pm$ 88.26 a	525 $\pm$ 40.98 b	555 $\pm$ 23.66 ab	81.331
Legs weight (g)	463.33 $\pm$ 20.65 bc	513.33 $\pm$ 74.34 ab	487.50 $\pm$ 72.16 ab	527.50 $\pm$ 19.08 a*	436.67 $\pm$ 31.41 c	483.33 $\pm$ 6.83 abc	51.381
Wings weight (g)	338.33 $\pm$ 11.25 bc	403.33 $\pm$ 36.14 a	325.00 $\pm$ 40.41 c	416.250 $\pm$ 64.95 a*	351.67 $\pm$ 38.03 bc	385.00 $\pm$ 27.20 ab	58.85
Neck weight (g)	323.33 $\pm$ 20.16 c	360.0 $\pm$ 31.3 abc	340.0 $\pm$ 57.73 bc	410.0 $\pm$ 57.19 a*	335.0 $\pm$ 30.98 c	388.33 $\pm$ 2.58 ab	51.71
Back weight (g)	225.0 $\pm$ 15.49 a	231.67 $\pm$ 69.9 a	209.0 $\pm$ 45.03 a	203.75 $\pm$ 21.83 a	185.0 $\pm$ 27.20 a	203.33 $\pm$ 11.25 a	42.429
Gizzard weight (g)	88.33 $\pm$ 2.58 a	88.33 $\pm$ 6.83 a	90.00 $\pm$ 5.77 a*	82.50 $\pm$ 5.97 ab	91.67 $\pm$ 12.90 a	75.00 $\pm$ 16.12 b	11.526
Liver and Spleen weights (g)	46.67 $\pm$ 5.16 ab	51.67 $\pm$ 5.16 a	40.00 $\pm$ 5.77 C	47.50 $\pm$ 2.67 ab	53.33 $\pm$ 6.83 a**	45.00 $\pm$ 4.47 bc	6.3375
Heart weight (g)	21.67 $\pm$ 2.58 b	23.33 $\pm$ 2.58 b	22.50 $\pm$ 2.88 B	30.00 $\pm$ 5.34 a	23.33 $\pm$ 2.58 B	25.00 $\pm$ 1.58 b	4.6505
Weights of giblets (g)	156.67 $\pm$ 9.3 ab	163.33 $\pm$ 9.31 a	152.5 $\pm$ 14.43 Ab	160.0 $\pm$ 10.01 a	168.33 $\pm$ 22.06 a*	145.0 $\pm$ 17.88 b	17.177

Means having different letters within each row differ significantly; \* (p&lt;0.05); \*\* (p&lt;0.01).

**Table 5. Effects of interaction between feather color and sex on blood traits in native geese in Kurdistan/Iraq.**

Traits							LSD value
	Gray		White		Piebald		
	Female Mean $\pm$ S.D	Male Mean $\pm$ S.D	Female Mean $\pm$ S.D	Male Mean $\pm$ S.D	Female Mean $\pm$ S.D	Male Mean $\pm$ S.D	
Hemoglobin (gm/100cm <sup>3</sup> )	15.23 $\pm$ 0.28 b	15.63 $\pm$ 0.37 ab	15.00 $\pm$ 0.23 B	15.35 $\pm$ 0.91 b	15.13 $\pm$ 0.90 B	16.03 $\pm$ 0.22 a*	0.6357
Pocket cell volume (%)	45.67 $\pm$ 1.03 b	46.33 $\pm$ 1.36 ab	45.00 $\pm$ 1.15 B	46.25 $\pm$ 2.65 ab	46.00 $\pm$ 2.68 B	48.00 $\pm$ 0.89 a*	1.9886
Erythrocyte Sedimentation Rate (ml/h)	1.67 $\pm$ 0.51 b	1.67 $\pm$ 0.51 b	3.00 $\pm$ 0.10 a*	2.00 $\pm$ 1.30 b	2.00 $\pm$ 0.89 B	1.33 $\pm$ 0.51 b	0.7031
Heterophil (%)	42.67 $\pm$ 2.87 a*	40.33 $\pm$ 1.36 a	34.50 $\pm$ 2.88 B	41.75 $\pm$ 4.23 a	39.00 $\pm$ 0.89 A	42.66 $\pm$ 1.36 a	3.2027
Lymphocyte (%)	53.67 $\pm$ 3.38 c	54.00 $\pm$ 1.54 bc	61.00 $\pm$ 1.15 a **	54.50 $\pm$ 2.87 bc	57.67 $\pm$ 1.36 Ab	54.00 $\pm$ 2.36 bc	3.0138
Monocyte (%)	1.67 $\pm$ 0.51 b	2.67 $\pm$ 0.51 a*	2.00 $\pm$ 1.15 Ab	1.50 $\pm$ 0.53 b	1.67 $\pm$ 0.51 B	1.33 $\pm$ 0.51 b	0.7031
Eusophil (%)	1.33 $\pm$ 0.51 b	2.33 $\pm$ 0.51 a*	1.50 $\pm$ 0.57 B	2.00 $\pm$ 0.75 ab	1.33 $\pm$ 0.51 B	1.67 $\pm$ 0.51 ab	0.7031
Basophile (%)	0.67 $\pm$ 0.51 ab	0.67 $\pm$ 0.51 ab	1.00 $\pm$ 0.05 a*	0.25 $\pm$ 0.11 b	0.33 $\pm$ 0.51 B	0.33 $\pm$ 0.51 b	0.4972
H/L ratio	0.80 $\pm$ 0.10 a**	0.75 $\pm$ 0.04 b	0.56 $\pm$ 0.05 C	0.77 $\pm$ 0.11 b	0.67 $\pm$ 0.02 B	0.79 $\pm$ 0.05 b	0.0955

Means having different letters within each row differ significantly; \* (p&lt;0.05); \*\* (p&lt;0.01).

**Table 6. Correlation coefficients between live weight, warm, cold carcass and carcass components in native geese in Kurdistan/Iraq.**

	<b>Live weight (g)</b>	<b>Warm carcass weight (g)</b>	<b>Cold carcass weight (g)</b>	<b>Breast weight (g)</b>	<b>Legs weight (g)</b>	<b>Wings weight (g)</b>	<b>Neck weight (g)</b>	<b>Back weight (g)</b>	<b>Gizzard weight (g)</b>	<b>Liver and Spleen weights (g)</b>	<b>Heart weight (g)</b>	<b>weights of giblets (g)</b>
<b>Live weight (g)</b>	1.00000	0.93687 **	0.95211 **	0.82888 **	0.91721 **	0.78192 **	0.84552 **	0.69166 **	-0.0242 NS	0.26582 **	0.72427 **	0.29329 NS
<b>Warm carcass weight (g)</b>		1.00000	0.99503 **	0.90364 **	0.90472 **	0.86393 **	0.80586 **	0.72372 **	0.08583 NS	0.38450 *	0.0206 **	0.38660 *
<b>Cold carcass weight (g)</b>			1.00000	0.91070 **	0.89792 **	0.86745 **	0.83452 **	0.71184 **	0.07038 NS	0.36637 *	0.64050 **	0.37521 *
<b>Breast weight (g)</b>				1.00000	0.74621 **	0.69432 **	0.61691 **	0.71594 **	0.13858 NS	0.29580 NS	0.47680 **	0.34787 *
<b>Legs weight (g)</b>					1.00000	0.69660 **	0.75612 **	0.66710 **	-0.0430 NS	0.28573 NS	0.55001 **	0.23945 NS
<b>Wings weight (g)</b>						1.00000	0.85041 **	0.37053 *	0.07892 NS	0.43309 **	0.72219 **	0.43079 **
<b>Neck weight (g)</b>							1.00000	0.38444 *	-0.2437 NS	0.18351 NS	0.74355 **	0.11460 NS
<b>Back weight (g)</b>								1.00000	0.07134 NS	0.14036 NS	0.14252 NS	0.14541 0.3975
<b>Gizzard weight (g)</b>									1.00000	0.41650 **	0.00350 NS	0.85617 **
<b>Liver and Spleen weights (g)</b>										1.00000	0.24623 NS	0.75692 **
<b>Heart weight (g)</b>											1.00000	0.38191 *
<b>weights of giblets (g)</b>												1.00000

\* (p&lt;0.05); \*\* (p&lt;0.01) and NS: Non significant.

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