

Effect of sex on some growth performance and blood parameters of Hamdani lambs

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Abstract

This study was undertaken to explore the effect of sex on growth performance and some blood parameters (hematological and biochemical) of Hamdani lambs. The correlation among productive traits and blood parameters were also investigated. Ten Hamdani ram lambs and ewe lambs of 29.9 ± 1.7 kg average body weight and 3.5- 4.5 months old were used in this study. The lambs were divided into two groups; the first group included 5 ram lambs, while the second group included 5 ewe lambs. Results showed significant ($P < 0.05$) increase of average daily weight gain and total weight gain in ram lambs as compared with ewe lambs. Higher ($P < 0.05$) feed consumption was observed in ram lambs as compared with ewe lambs. A significant correlations ($P < 0.05$) were noticed between final weight and MCH, MCHC, cholesterol and albumin (0.71, 0.7, 0.65, and 0.71 resp.). The same pattern was noted between average daily weight gain and MCHC (0.73) and total weight gain with ALT enzyme (0.67). It was concluded that the productive performance and blood parameters were superior in Hamdani ram lambs as compared with ewe lambs.

تأثير الجنس على بعض الاداء الانتاجي والمؤشرات الدم في الحملان الحمدانية

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الخلاصة

اجريت هذه الدراسة لمعرفة تأثير الجنس على الاداء الانتاجي وبعض المؤشرات الدم (الدمية والكيميائية) في الحملان الحمدانية. ولدراسة معامل ارتباط بين الصفات الانتاجية والمؤشرات الدمية. شملت الدراسة 10 حملان ذكور وإناث ومعدل أوزانها 29.9 ± 1.7 كغم و تراوحت اعمارها (3.5 – 4.5) اشهر. وزعت الحملان إلى مجموعتين المجموعة الأولى شملت 5 حملان ذكور في حين شملت المجموعة الثانية 5 حملان اناث. اظهرت النتائج وجود زيادة معنوية ($P < 0.05$) في معدل الزيادة الوزنية اليومية والكلية بين الجنسين حيث حققت الذكور افضل معدل زيادة وزنية يومية الكلية مقارنة بالاناث التي كانت اقل وزناً. كانت هنالك زيادة ($P < 0.05$) في معدل استهلاك العلف في ذكور مقارنة بالاناث. وجد معامل ارتباط معنوي ($P < 0.05$) بين الوزن النهائي وكل من MCH، MCHC، الكولسترول والألبومين (0.71، 0.7، 0.65 و 0.73) على التوالي. كان هنالك ارتباط معنوياً ($P < 0.01$) بين معدل الزيادة الوزنية اليومية و MCHC (0.73) وزيادة الوزنية الكلية مع انزيم ALT (0.67). يستنتج من خلال الدراسة ان الاداء الانتاجي والمؤشرات الدمية في الحملان الذكور كان متفوقاً على الحملان الانثوية.

Introduction

Sheep and goat population in Kurdistan region had been estimated of about 3,500,000 with livestock population of over 316,000 head (1). Hamdani sheep is an important strain of Karadi sheep breeds. It has large body size. In Iraq, Karadi sheep constitute about 18-20% of the total sheep population (2). Conventional production of sheep in Iraq depends primarily on feeding of grass in pasture. At age 12 weeks, the grazing lambs can digest roughage efficiently, that lead to the fast growth rate. Therefore, heavier lambs grow up faster to weaning or later ages, daily and weekly weight gains from lambs are direct function of their growth performance. Growth of lambs is defined by birth weight, live weights at various ages and average daily gain (3). Hematology is becoming an increasingly important diagnostic and management tool in veterinary medicine globally. The blood picture of an animal provides an opportunity to clinically investigate the presence of different metabolites and other constituents in the body of the animal and it plays a vital role in the assessment of physiological, nutritional and pathological status of an organism (4). It is well known that a variety of factors such as species, breed, sex, age, nutrition, illness, stress, exercise, transport, and seasonal variations can affect the profile of these values (5). Data pertaining the effect of sex on blood parameters in Hamdani sheep were not available yet. The aims of the current study were: 1) to evaluate growth performance as well as some hematological and biochemical values as influenced by sex in Hamdani lambs, 2) to estimate correlation coefficient among growth performance traits and blood parameters.

Materials and Methods

Ten Hamdani lambs were used in this study, 5 ram lambs and 5 ewe lambs, with initial body weights of 29.9 ± 1.7 kg, and 3.5- 4.5 months old. Clinical examination revealed the good health status for these animals was carried out. Lambs were kept in clean and hygienic environment in a private farm. Before beginning of the experiment, statistical analysis was conducted to avoid significant difference of initial body weight between lambs (male and female) which were 29.0 and 28.8 kg for males and females respectively. One week adaptation period to the diet was allowed before applying for the experimental diet (Table 1). The study was continuous for 30 day. Diet was introduced *ad libitum* as 3% of live body weights twice a daily. The following day, before offering the morning meal, refusal and wastage were weighted to evaluate the daily feed intake. Lambs were weighed at the beginning of the study and weekly thereafter before the morning meal. Blood samples were collected via jugular vein puncture using two vacutainer tubes, one containing EDTA, which hematological studies including total erythrocyte count (TEC); hemoglobin concentration (Hb); mean corpuscular hemoglobin (MCH); mean corpuscular hemoglobin concentration (MCHC) and total leukocyte count (TLC) were carried out on blood samples following the methods described by (6). The other tube without EDTA was used for blood biochemical analysis. Blood samples were centrifuged at 3,000 rpm for 20 min, and the serum was harvested and stored until assayed for blood glucose (BG) by method building by (7); total cholesterol (T. CHOL) was estimated by colorimetry following the method described by (8); total protein (T.P) were measured by method described by (9); serum albumin (SAL) was determined as method described by (10); serum globulin (SGL); aspartate transaminase (AST) and alanine transaminase (ALT) were measured as method described by (11); and alkaline phosphatase (ALP) was determined by method described by (12).

Table (1) Ingredients and chemical composition of the diet

Ingredients %	
Barley	70
Wheat bran	20
Soybean meal	9
Salt	0.5
Limestone	0.5
Chemical Composition	
Protein% *	14.8
Metabolized energy (MJ/ kg) *	10.8
Dry matter% *	90.1

* calculated mathematically by using NRC 1994 (13)

- **Statistical analyses:** Data was statistically analyzed using the complete randomized design (CRD) procedure by SAS (14). Duncan's multiple range tests was used to determine the significance of differences between treatments means (15). And calculated simple correlation coefficient between growth performance and hematological and biochemical parameters.

Results and Discussion

- **Growth performance:** The significant ($p < 0.05$) differences in growth rate were observed between ram lambs and ewe lambs (Table 2). The animal sex had not significant effect on initial, final and weekly body weight gain of animals. The average daily weight gain (0.34 ± 0.24 kg/day) and total weight gain (11.0 ± 0.41 kg) in ram lambs were significantly ($p < 0.05$) higher than those of ewe lambs (0.26 ± 0.02 kg/day and 8.0 ± 0.70 kg) for average daily and total gain respectively). This observation is consistent with the study of (16) who noticed a significant increase of the final and total weight gain of ram lambs as compared with ewe lambs. The results showed in Table (2) revealed that the feed consumption in ram lambs (1.14 ± 0.00 kg) was significantly ($P < 0.05$) higher than those of ewe lambs (1.07 ± 0.00).

Table (2) Effect of sex on growth performance in Hamdani lambs (Mean \pm SE)

Growth traits	Sex	
	Ram lambs	Ewe lambs
Initial body weight (IBW) kg	29.00 ± 3.25^a	28.8 ± 1.57^a
Final weight (FW) kg	39.40 ± 3.82^a	36.8 ± 1.46^a
Average daily gain (ADWG) kg/day	0.34 ± 0.24^a	0.26 ± 0.02^b
Total weight gain (TWG) kg	11.0 ± 0.41^a	8.00 ± 0.70^b
ADG for 1-7 day period kg/day	31.6 ± 3.60^a	31.8 ± 1.31^a
ADG for 8-14 day period kg/day	33.4 ± 3.58^a	32.8 ± 1.49^a
ADG for 15-21day period kg/day	36.3 ± 3.97^a	34.8 ± 1.91^a
feed consumption kg/day	1.14 ± 0.00^a	1.07 ± 0.00^b
Feed conversion ratio (FCR; kg feed/kg BW)	3.37 ± 0.26^a	4.03 ± 0.15^a

Means having different letters at the same raw are significantly different ($P < 0.05$)

- **Hematological parameters:** Data present in Table (3) illustrate the effect of lamb's sex on hematological parameters. Total erythrocyte count ($\times 10^6 \mu\text{l}$) in all samples used in this study had reached (8.30 ± 0.14). This minor difference may returns to breed. Results showed that the total erythrocyte ($\times 10^6 \mu\text{l}$) and hemoglobin concentration (g/dl) in both sexes did not differ significantly (8.32 ± 0.25 , 8.29 ± 0.20 and 11.12 ± 0.43 , 11.04 ± 0.24 for ram lambs and ewe lambs

respectively). The values of MCV (fl), MCH (Pg) and MCHC (mg/dl) in ram lambs were 27.87 ± 0.28 , 13.40 ± 0.55 and 48.15 ± 2.28 in comparison to 27.88 ± 0.27 , 13.30 ± 0.24 and 47.80 ± 1.20 in ewe lambs. These values of MCV, MCH and MCHC are slightly non significant higher in ram lambs. These results were consistent with those obtained by [16]. Total leukocyte count ($10^3/\mu\text{l}$) in ram lambs was 11.90 ± 1.26 and for ewe lambs was 10.66 ± 0.88 without any statistical differences between them. Leucocytes show the same pattern in both the sexes. Therefore, values proved that sex effect on the platelet count ($\times 10^3\mu\text{l}$) revealed a significant increase ($P < 0.05$) in ram lambs (506.75 ± 20.94) as compared with ewe lambs (404.60 ± 30.40) (Table 3).

Table (3) Effect of sex on Hematological parameters in Hamdani lambs (Mean \pm SE)

Parameters	Sex		
	Overall	Ram lambs	Ewe lambs
Total Erythrocyte ($\times 10^6\mu\text{l}$)	8.30 ± 0.14	8.32 ± 0.25^a	8.29 ± 0.20^a
Hemoglobin (g/dl)	11.07 ± 0.22	11.12 ± 0.43^a	11.04 ± 0.24^a
MCV (fl)	27.87 ± 0.18	27.87 ± 0.28^a	27.88 ± 0.27^a
MCH (Pg)	13.34 ± 0.26	13.40 ± 0.55^a	13.30 ± 0.24^a
MCHC (mg/dl)	47.95 ± 1.13	48.15 ± 2.28^a	47.80 ± 1.20^a
Total Leucocyte ($\times 10^3\mu\text{l}$)	11.21 ± 0.72	11.90 ± 1.26^a	10.66 ± 0.88^a
Platelets ($\times 10^3\mu\text{l}$)	450.0 ± 57.50	506.75 ± 20.94^a	404.60 ± 30.40^b

Means with different superscripts within each row differ significantly ($P < 0.05$)

- **Blood biochemical parameters:** The effect of sex on biochemical attributes were showed in Table (4). There overall Serum glucose concentrations of the lambs used in this study were 72.35 ± 2.55 mg/dl. The sex seems to have no significant effect on the present findings in comparison with results obtained during the analysis of ram lambs and ewe lambs serum. Serum glucose (mg/dl) did not significantly different between ram lambs (71.6 ± 4.91) and ewe lambs (73.1 ± 2.23). This result disagree to the result obtained by (10) which showed the higher ($P < 0.05$) serum glucose concentrations in Ked female as compared with male goat. The overall mean of serum total protein was 8.25 ± 0.25 g/dl. These values were slightly greater in ram lambs (8.32 ± 0.38 g/dl) than those of ewe lambs (8.18 ± 0.37 g/dl). Serum cholesterol concentrations obtained presently were 68.04 ± 7.13 mg/dl and 61.54 ± 5.07 mg/dl in both ram lams and ewe lambs respectively. The activity of aspartate transaminase, alanine transaminase and alkaline phosphatase were not significantly influenced by the sex.

Table (4) Effect of sex on Blood biochemical parameters in Hamdani lambs (Mean \pm SE)

Parameters	Sex		
	Overall	Ram lambs	Ewe lambs
Blood Glucose (mg/dl)	72.35 ± 2.55	71.6 ± 4.91^a	73.1 ± 2.23^a
Total protein (g/dl)	8.25 ± 0.25	8.32 ± 0.38^a	8.18 ± 0.37^a
Serum Albumin (g/dl)	3.21 ± 0.10	3.24 ± 0.16^a	3.18 ± 0.15^a
Serum Globulin (g/dl)	5.03 ± 0.15	5.07 ± 0.22^a	5.0 ± 0.23^a
Total Cholesterol (mg/dl)	64.79 ± 4.26	68.04 ± 7.13^a	61.54 ± 5.07^a
Aspartate Transaminase (U/L)	103.8 ± 5.33	113.6 ± 7.06^a	94.0 ± 5.49^a
Alanine Transaminase (U/L)	28.1 ± 1.88	29.6 ± 3.20^a	26.60 ± 2.13^a
Alkaline Phosphatase (U/L)	492.1 ± 49.06	551.0 ± 56.54^a	433.20 ± 76.77^a

Means with different superscripts within each row differ significantly ($P < 0.05$)

- **Simple correlation coefficient:** The correlation coefficient results, showed that there was a significant correlation between FW with MCH, MCHC, T. CHOL and S. AL, and non-significant with other traits. The results also dedicated that the TWG and ADWG was only significant with ALT and MCHC respectively.

Table (5) Correlation coefficient between growth performance and blood parameters of Hamdani lambs

Trait	ADWG	TWG	FW	FCR
TEC	-0.38	-0.00	-0.36	-.045
Hb	0.38	0.56	0.36	-0.45
MCV	-.49	-0.10	-0.47	-0.39
MCH	0.74	0.58	0.71*	0.52
MCHC	0.73*	0.49	0.70*	0.53
TLC	0.40	0.47	0.56	-0.32
B.G	0.31	0.54	0.14	0.06
T.CHOL	0.65	0.43	0.65*	0.52
T.P	0.25	0.38	0.22	-0.24
S. AL	0.68	0.90	0.71*	0.12
S. GL	0.31	0.54	0.25	0.06
AST	0.44	0.54	0.46	0.18
ALT	0.56	0.67*	0.55	0.38
ALP	-0.01	0.26	0.09	-0.55

* Significant at (P<0.05)

It was concluded that the productive performance and blood parameters were superior in Hamdani ram lambs as compared with ewe lambs.

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