



Effect of blood group types on live body weight of unimproved Awassi sheep

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Abstract

The current study was conducted to determine the effect of blood groups on live body weight from birth to 9th month of age in Awassi sheep. Two hundred and twenty five ewes and 110 rams of unimproved Awassi sheep reared in private farm at AL-Dewanya province (middle of Iraq) during the breeding season of 2015-2016 were used. Results revealed a significant differences ($P < 0.01$) according to the blood groups for both rams and ewes. The highest number of rams had D blood group observed as compared with the lowest number had R blood group, namely 44 (40%) and 13 heads (11.82%) respectively. The highest number of ewes had D blood group noticed as compared with the lowest number had R blood group, namely 91 (40.44%) and 27 heads (12.00%) respectively. Moreover, the results showed absence of other blood groups like C, M and X in both rams and ewes in the current study. Significant effect ($P < 0.05$) of blood groups on ram's live body weight was also investigated, being highest at birth, weaning, sixth and ninth months of age with blood group B namely, 3.88, 20.53, 25.83 and 26.69 kg respectively. Non significant effect of blood group on birth weight in ewes while blood group B had the highest weight ($P < 0.05$) for other ages namely 19.95, 23.80 and 25.99 kg respectively.

Introduction

Awassi is one of the dual-purpose, fat-tailed sheep breeds which can be accepted as a sheep-milk resource in south-west Asia. The breed is well adapted to harsh conditions and capable of producing and reproducing under these circumstances [1]. Awassi is contribute of 58.2% from Iraqi sheep and the productive performance is faced many difficulties under the classical breeding systems [2] and [3]. This breed is an important source of meat and plays other socio-economic roles especially in the lives of rural and nomadic dwellers in Iraq.

Due to blood groups in sheep, there were seven types or systems (A, B, C, D, M, R and X) which are exactly identical with those found in goats, so we can use the same reagents for detecting blood groups for both species [4].

Several studies in sheep have already linked these blood groups as markers for the productive traits and environmental adaptations [5]. Similarly, [6] found a significant effect of blood group on daily weight gain, fertility percentage and prolificacy of Awassi ewes.

The aim of this study is to focus on the genetic diversity among Awassi breed individuals in blood groups and attempt to use the mass genetic markers or indicators for selection programs to improve the performance of this breed under farming conditions.

Materials and methods:

Experimental animals and management

Data were collected from 225 ewes and 110 rams of unimproved Awassi sheep reared in private farm at Al-Dewanya province (middle of Iraq) during the breeding season of 2015-2016. The experimental animals were housed under semi-open sheds and fed on the concentrate ration consuming approximately 500–600 gm/head/day. Green roughages such as alfalfa and clover were added throughout the season. Annual routine operations on sheep such as dipping and washing for control of ectoparasites and other management operations.

Blood samples analysis

Blood samples from each animal were taken using jugular vein puncture into tubes containing anticoagulant (EDTA) to determine the blood groups using special kits manufactured by Randox company depending on antigen–antibody reaction.

Statistical analysis:

Data were statistically analyzed using SAS[7] software program. Allele frequencies of blood groups polymorphisms were determined by direct counting from phenotypes and Chi-square test was used to determine the significant differences among phenotypes:

$$\chi^2 = \sum \frac{(\text{Observed No.} - \text{Expected No.})^2}{\text{Expected No.}}$$

Significant differences among groups were detected by general linear model (GLM) according to the linear model:

$$Y_{ijk} = \mu + T_i + e_{ijk}$$

where:

μ : overall mean.

B_j : effect of blood group (A , B , D and R)

e_{ijk} : residual error.

Duncan's multiple range test [8] was used to compare differences among means.

All animals were weighted at birth, weaning, as well as 6 and 9 months of age.

Results and discussions:

Results represented in Table (1) showed significant differences ($P < 0.01$) according to blood groups for both rams and ewes. The highest number of rams had D blood group was observed as compared with the lowest number had R blood group, namely 44 and 13 heads respectively with significant ratio namely 40 and 11.82% respectively. Ewes numbers were also differed significantly ($P < 0.01$) according to the blood group with similar trend for rams distribution. Moreover, the highest number was of ewes had D blood group was noticed while the lowest number was of R blood group, namely 91 (40.44%) and 27 heads (12.00%) respectively. Results showed absence of other blood groups like C, M and X for both rams and ewes.

Table- 1. Chi square values of blood groups distribution in rams and ewes of Awassi sheep.

Blood groups	Rams		Ewes	
	<i>No.</i>	<i>%</i>	<i>No.</i>	<i>%</i>
A	21	19.09	43	19.11
B	32	29.09	64	28.44
D	44	40.00	91	40.44
R	13	11.82	27	12.00
Total	110	100%	225	100%
Chi-square		**		**

** P<0.01

Results showed a significant effect (P<0.05) of blood groups on ram's live body weight in different stages of age (Table 2). The highest body weight at birth, weaning, sixth and ninth month age were found in rams with B blood group being, 3.88, 20.53, 25.83 and 26.69 kg respectively. The lowest birth and weaning weight as well as weight at sixth month of age were found in rams with D blood group, namely 3.27, 18.79 and 21.14 kg respectively while lowest body weight at nine months age was found in rams with R blood group (23.00kg).

Total weight gain from birth to nine month of age also differed significantly (P<0.05) according blood groups in Awassi rams (Table 2). The highest value was in rams with B blood group (22.81 kg) in comparison with the lowest value found in rams with R blood group (19.71 kg).

Table- 2. Effect of blood groups on live body weight of Awassi rams

Blood groups	Body weight means (kg) ± S.D				
	<i>Birth</i>	<i>Weaning</i>	<i>6months</i>	<i>9months</i>	<i>Total weight gain</i>
A	3.42±0.061 ^b	19.04±0.25 ^b	22.27±1.55 ^b	23.77±1.41 ^{ab}	20.35±1.10 ^b
B	3.88±0.012 ^a	20.53±0.34 ^a	25.83±1.41 ^a	26.69±1.80 ^a	22.81±1.19 ^a
D	3.27±0.013 ^c	18.97±0.21 ^b	21.14±1.43 ^b	24.07±1.01 ^{ab}	20.8±1.00 ^{ab}
R	3.29±0.047 ^f	19.17±0.56 ^b	22.35±1.09 ^b	23.00 ±1.33 ^b	19.71±0.79 ^b

Means with different superscripts within each column differ significantly (P< 0.05).

Results represented in Table (3) showed non- significant effect of blood group in ewe's birth weight, while significant effects of blood group on weaning weight, six month weight and body weight at nine months age were observed. Ewes with B blood group were the highest weight for three stages namely, 19.95, 23.80 and 25.99 kg respectively. The lowest body weight at weaning, six and nine months of age were found in ewes with R blood group namely, 15.27, 19.38 and 20.50 respectively.

Total weight gain from birth to nine month of age also differed significantly (P<0.05) according blood groups in Awassi ewes (Table 3). The highest value was found in ewes with B blood group (22.80 kg) compared with the lowest value which found in males with blood group R (17.51 kg).

The current data were in accordance with those of [6] who stated that birth weight of Turkish Awassi ewes did not affected by blood groups

Table- 3: Effect of blood groups on live body weight of Awassi ewes.

<i>Blood groups</i>	<i>Body weight(kg) ± S.D</i>				
	<i>Birth</i>	<i>Weaning</i>	<i>6months</i>	<i>9months</i>	<i>Total weight gain</i>
<i>A</i>	3.01±0.11 ^a	17.63±0.75 ^b	21.51±1.15 ^{ab}	22.47±1.71 ^b	19.46±0.92 ^b
<i>B</i>	3.19±0.32 ^a	19.95±0.76 ^a	23.80±1.74 ^a	25.99±1.07 ^a	22.8±0.98 ^a
<i>D</i>	3.15±0.23 ^a	16.47±0.51 ^b	19.64±1.44 ^b	22.18±1.62 ^b	19.03±0.95 ^{bc}
<i>R</i>	2.99±0.14 ^a	15.27±0.36 ^c	19.38±1.06 ^b	20.50 ±1.70 ^b	17.51±0.82 ^c

Means with different superscripts within each column differ significantly (P < 0.05).

In fact, some studies focused on the effect of blood groups on growth traits in sheep such as [9] who referred to the large differences among pure breed sheep and their crossbreeds resulted from blood groups diversity. [10] and [4] reported about genetic relationship among blood groups and some productive traits in domestic animals and they suggested that this relationship is resulted from linkage or pleiotropy. [11] reported that blood groups represented in special and limited antigens in human but multiple or varied antigens in others species such as sheep breeds. [12] reported that the differences among blood types leads to change of hemoglobin content which reflex positively or negatively on animal performance. [13] referred that the similarity among blood groups in sheep with those in cattle and pointed that blood group R in sheep is identical with blood group J in cattle while the M blood system is identical with L system in cattle. Similar studies noticed that M blood system is related strongly with erythrocytes efficiency for potassium transport.

In other species, studies referred that blood groups affected significantly (P<0.05) on milk production in cattle [14] and meat quality [4].

Conclusion

In conclusion, the developments over the last decades in molecular genetics and rapid progress in biotechnologies have created the potential for the applications of animal breeding. Blood groups are inherited traits (not environmentally), therefore we can exploit the diversity of blood system in genetic selection for choosing the suitable animals to improve domestic animals performance.

References

- [1] Salman, M. and Abdallah, J. "Evaluation of performance and estimation of genetic parameters for milk yield and some reproductive traits in sheep breeds and crosses in the West Bank", Tropentag, Prague, Czech. Republic, pp. 17-19 . (2014).
- [2] Al-Barzinji, Y.M.S. and Othman, G.U. "Genetic polymorphism in FecB gene in Iraq sheep breeds using RFLP-PCR technique", IOSR J. Agri. Vet. Sci., Vol.(2), pp. 46–48.(2013).
- [3] Ishaq, M.A. and Ajeel, H. M. "Reproductive traits of local and Turkish Awassi sheep in semi intensive breeding circumstances", J. Iraqi Agri. Sci. (5): 615 – 623. (2013).
- [4] Rocha, T. G., Franciosi, C., Nociti, R. P., Nogueira, C. A. and Fagliari. "Hemogramaproteinas do soro sanguine de vida .Arq.Bras. Med" Vet. Zoote, Vol.(62),No.5, pp.1250-1254. (2010).

- [5] Templeton, J.W., Donald, P. and Ralph, B. "Frequency of hemoglobin type in five breeds of sheep". www.diaglap.vet.cornell.edu/clipath/modules/coag.(2010)
- [6] Al-Haboby, H. A. "Effect of blood groups and hemoglobin type in some prediction traits in Turkish Awassi sheep", M.Sc. Thesis. College of Agriculture, University of Baghdad. (2012).
- [7] SAS. SAS / STAT `Users` Guide for Personal Computers. Release 6.12 . SAS Institute Inc., Cary , NC., USA. . (2012)
- [8] Duncan, D. B. "Multiple range and Multiply F.tests", Biometrics.11: 1-42.(1955).
- [9] Rasmusen, B.A., Hall, J. G., Hayter, S. and Iener, G. "Effects of crossbreeding and inbreeding on the frequencies of blood groups in three breeds of sheep", J. Anim. Sci., Vol.(18), pp.141-152. (2010).
- [10] Dally, M. R., Hohenboken, W., Thomas, D. L. and Craig, A. M. "Relationship between hemoglobin type and reproduction, lamb, wool and milk production and health-related traits in crossbred ewes", J. Anim. Sci., Vol.(50), pp.418-427.(1980).
- [11] Pieragostini, E., Rubino, G. and Petazzi, F. "Highlights of a 15-year experience on sheep hematology in TBD endemic area", ProcX.III Congress FeMeSPRum.Bari.Italy.1-3. (2005).
- [12] Osterhoff , D. R. "Research on animal blood groups and biochemical polymorphisms at Onderstepoort (1956–1990)", Journal of the South African Veterinary Association., Vol.(81), No.3, pp. 136–138.(2010).
- [13] Bashwari, A.S. "Blood system and blood transformation", Saudi Medical Journal, Vol.(22), No.11, pp.1008 – 1012 .(2010).
- [14] Gonyon, D.S., Mather, R.E., Hines, H.C., Haenlein, G.F.W., Aravi, C.W. and Gaunt, S.N. "Association of bovine blood and milk polymorphism with lactation traits in Holstien", .J.Dairy Sci., Vol.(70), pp. 2585 – 2598. (1987).

