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THE EFFECTS OF BREED AND AGE ON THE CHANGES IN WEIGHT DURING AND AFTER GESTATION IN NATIVE IRAQI SHEEP

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SUMMARY

Ninety seven Iraqi ewes representing the three major Iraqi breeds (Karadi, Awassi, and Arabi) were used to study the effects of breed and age on the rhythm of weight parameter and its components during gestation. Body weight of ewes was recorded monthly throughout gestation and weekly during the suckling period. The weights of newborns were also recorded immediately after birth. The ewes were kept in semi-closed barn and had free access to green food plus a daily allowance of concentrates (0.5Kg). The results indicated the dominance of the Karadi over the Awassi and Arabi in weights during the entire experimental period. The gain in weight for the three breeds averaged 9.0, 9.1, and 8.6 Kg, and constituted 19.6, 21.6, and 22.5% of weights at time of service respectively.

Of the total gain, the newborn, fetal membranes and fluids, and net gain constituted 47.64, 39.55, and 12.81% respectively. However, the Arabi in general performed better since it used the weight gained more efficiently. The weights of fetal membranes and fluids were affected by breed but not by age of ewes. On the

other hand, younger ewes had higher weight gains during pregnancy than older ones.

INTRODUCTION

Body weight during the successive periods of life is considered to be an important criteria for determining the health status and productivity of livestock. Careful monitoring of weights could provide essential information on unnecessary excessive fattening of animals, which has a drawback effect on potentiality of production in meat animals. On the other hand, reduction in body weight may signal the existence of some problems that may urge professional investigation to probe for the cause and determine the solutions. The erliear to detect the abnormal changes in body weight, the greater the chance of reducing economic losses. Furthermore, the use of body weight criteria during the critical period of pregnancy does not require an exceptional intelligence to visualize its importance in determining the wellbeing of the mother and fetus. However, it is crucial to have a standardized scale as the pre- and post-natal changes are great and take different rhythms and can be very much influenced by food, management, productivity, and hormonal states.

Very limited information is available to local breeders and researchers on the relationship of body weight and gestation in native Iraqi breeds of sheep.

This study was undertaken to elaborate on the magnitude of the increase in weight during gestation in the three major breeds of Iraqi sheep, namely the Karadi, Awassi, and Arabi together with the effect of age of ewe on this change.

Furthermore, it considers the loss in body weight which is associated with parturition and the time

required to recover it in precedence of the next efficient breeding.

MATERIALS AND METHODS

Experimental animals were divided into three age groups namely, A(1-3 years), B (3-4 years), and C (older ewes) of 31, 35, and 31 ewes respectively.

The animals were kept in a semi-closed byre and allowed daily for 4 hours on alfalfa or alfalfa-barley pastures. During gestation and lactation each ewe received additional 0.5 Kg/day of a concentrate mixture (14% crude protein). Over one month,namely late june to early july, fertile rams were allowed to join the ewes and lambing occurred during November and December 1985. The ewes were in a good health and no mortality was recorded among them.

Statistical analyses were performed by applying the ANOVA technique (Ananlyses of Variance) and Duncan test to determine the significance of differences between means.

RESULTS

The results reveal that the Karadi was significantly heavier ($p < 0.01$) than both the Awassi and Arabi throughout the experimental period, while the former was heavier than the Arabi (Table 1).

Weight of ewes differed significantly ($P < 0.01$) with age (Table 2). Ewes in group C were the heaviest followed by those in groups B and A in the descending order.

The overall gain in weight by the end of gestation was 8.9 Kg, and the differences between the breeds or groups lacked significance. This gain in weight in the Karadi, Awassi, and Arabi constituted 19.6, 21.6,

Table 1: Changes in body weight during gestation and the total weight gain

Weight at service			Month of gestation					Wt. before parturition	Wt. gain % (gain/wt. at service)
			1st month	2nd month	3rd month	4th month	5th month		
	all ewes	42.0±0.8	42.5±0.8	43.4±0.8	44.7±0.8	47.7±0.9	50.5±0.9	50.9±1.0	8.9 (21.2)
BREED	Karadi	45.9±1.1A	46.6±1.0A	47.6±1.0A	49.0±1.0A	52.0±1.0A	54.5±1.1A	54.9±1.1A	9.0 (19.6)
	Awasi	42.2±0.7B	42.6±0.7B	43.3±0.7B	44.6±0.8B	47.8±0.9B	50.9±0.9B	51.3±0.9B	9.1 (21.6)
	Arabi	38.2±0.7C	38.7±0.6C	39.8±0.6C	40.9±0.6C	43.7±0.7C	46.4±0.7C	46.8±0.7C	8.6 (22.5)
AGE	Group A	38.8±0.8a	39.2±0.8b	40.120.7b	41.6±0.7a	44.2±0.8a	47.0±0.9a	47.5±0.9a	8.7 (22.4)
	Group B	42.2±0.8b	42.9±0.8b	43.8±0.8b	44.9±0.9b	48.0±0.9b	50.6±1.0b	50.9±1.0b	8.7 (20.6)
	Group C	44.9±0.8c	45.5±0.8c	46.4±0.8c	47.5±0.8c	50.8±0.8c	53.8±0.8c	54.2±0.8c	9.3 (20.7)

*1: All weights are represented in Kg as Mean ± S.E.

*2: The different lowercase superscripts indicate differences at 0.01 level, (vertical comparisons only)

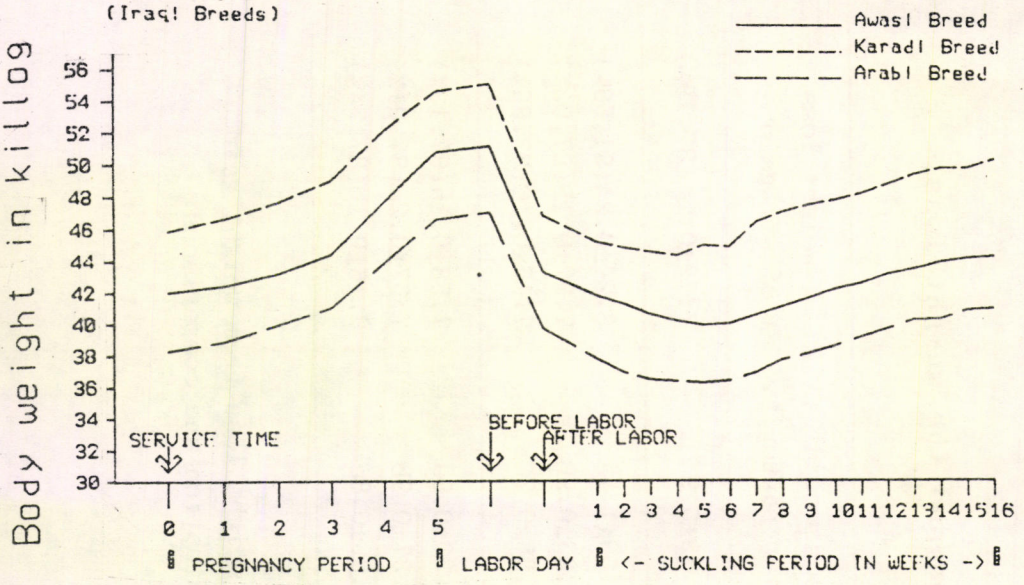
*3: The different upercase superscripts indicate differences at 0.01 level, (vertical comparisons only)

Table 2: Ewes weight at time of parturition and the weight loss.

		No.of ewes	Wt. immdiat. before parturit.	Wt. immediat . after parturit.	Weight loss % of wt. gain
	all ewes	97	50.89±1.1A	43.13±0.9	7.79±0.1 (87.19%)
BREED	Karadi breed	29	54.93±1.1A	46.69±1.1A	8.24±0.2A(91.56%)
	Awasi breed	36	51.25±0.9B	43.33±0.9B	7.92±0.1B(87.03%)
	Arabl breed	32	46.81±0.7C	39.65±0.7C	7.16±0.1C(83.26%)
AGE	Group A	31	47.48±0.9a	39.30±0.9a	7.58±0.1a(87.13%)
	Group B	35	50.94±1.0b	43.37±0.9b	7.57±0.2a(87.01%)
	Group C	31	54.22±0.8c	46.06±0.8c	8.16±0.1b(87.74%)

*1: Numbers within parantheses represent percent weight loss from weight gain

*2: See footnote on table 1 for superscript explaination and comparisons


(Iraqi Breeds)
Awasi Breed
Karadi Breed
Arabi Breed
Body weight in kilog
56
54
52
50
48
46
44
42
40
38
36
34
32
30
SERVICE TIME
BEFORE LABOR
AFTER LABOR
0 1 2 3 4 5
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
PREGNANCY PERIOD
LABOR DAY
<- SUCKLING PERIOD IN WEEKS ->
Fig.1: The change in body wieght of the ewes before and during pregnancy and for 16 weeks after labor.
(Age categorization)
Age group A
Age group B
Age group C
Body weight kg
54
52
50
48
46
44
42
40
38
36
34
32
30
SERVICE TIME
BEFORE LABOR
AFTER LABOR
0 1 2 3 4 5
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
PREGNANCY PERIOD
LABOR DAY
<- SUCKLING PERIOD IN WEEKS ->
Fig.2: The change in body wieght of the ewes before and during pregnanacy and for 16 weeks after labor.

and 22.5% respectively of their weights at the time of service. The increase in body weight for groups A,B, and C was 22.4, 20.6, and 20.7% respectively.

As it can be seen from table 2, differences in weights due to breed and age at parturition as well as in loss in weight immediately after parturition were significant. The Karadi weighed the most immediately before and after parturition ($p < 0.01$) and its loss in weight due to parturition was the highest (8.24Kg) ($P < 0.01$).

Group C weighed the most ($P < 0.01$) immediately before and after parturition and displayed the greatest weight loss (8.16 Kg) due to parturition ($P < 0.01$). The overall loss in weight was 7.7 Kg which constituted 87% of the total weight gain (8.9 Kg) during pregnancy. The corresponding weight losses for the Karadi, Awassi, and Arabi were 92, 87, and 83% and for groups A, B, and C were 87, 87, and 88% respectively.

It is obvious that weight loss during parturition represents the weight of newborn plus the weight of fetal membranes and fluids (Table 3 and figure 3). The lamb birth weights of Karadi and Awassi (4.30 Kg and 4.38 Kg) were significantly higher than that of Arabi (4.03 Kg). However, age differences reveal no effect on birth weights. On the other hand, it seems that weights of fetal membranes and fluids were highest in the Karadi (3.94 Kg) and lowest in the Arabi (3.13 Kg). As for the effect of age on weights of fetal membranes and fluids, group C recorded the highest (3.83 Kg) ($P < 0.01$).

Of the total weight loss the percentage of birth, fetal membrane and fluids weights are given in table 4. The percentage of birth weight is higher in comparison with those of the latter two. However, the percentage of birth weight was highest in the Arabi (56.28%) followed

Table 3: The components of weight gain during pregnancy and the average contribution of each component

		No. of ewes	Lambs weight	Fetal mem. & fluid wt.	Net gain after parturit	Lamb wt.+ net wt. gain
	all ewes	97	4.2420.1 (47.64%)	3.52±0.1 (39.55%)	1.14±0.1 (12.81)	5.38±0.1 (60.45%)
BREED	Karadi breed	29	4.30±0.1A (47.78%)	3.94±0.2A (43.78%)	0.70±0.1A (8.44%)	5.0±0.1A (55.56%)
	Awasi breed	36	4.38±0.1B (48.13%)	3.54±0.2B (38.90%)	1.18±0.1B (12.97%)	5.5±0.1B (61.10%)
	Arabi breed	32	4.03±0.1C (46.86%)	3.13±0.1C (36.40%)	1.44±0.1C (16.74%)	5.47±0.1C (63.60%)
AGE	Group A	31	4.19±0.1a (48.16%)	3.39±0.2a (38.97%)	1.12±0.1a (12.87%)	5.31±0.1a 61.03%)
	Group B	35	4.21±0.1a (48.39%)	3.36±0.1a (38.62%)	1.13±0.1a (12.99%)	5.34±0.1a (61.38%)
	Group C	31	4.33±0.1a (46.56%)	3.83±0.1b (41.18%)	1.14±0.1a (12.26%)	5.47±0.1a (58.82%)

*1: all numbers in paranthesis represents percent of weight gain

*2: see footnote on table 1 for superscript explaination and comparisons.

Table 4: Lamb birth weight, fetal membranes and fluid weights (% of weight loss).

		No. of ewes	% Lamb Wt. to weight loss	% Fetal mem. & fluid wt. loss
	all ewes	97	54.64±1.4	45.36±1.4
Breed	Karadi breed	29	52.18±1.5A	47.82±1.5A
	Awasi breed	36	55.30±1.5AB	44.70±1.5AB
	Arabi breed	32	56.28±1.3B	43.72±1.3B
AGE	Group A	31	55.28±1.7a	44.72±1.7a
	Group B	35	55.61±1.2ab	44.39±1.2a
	Group C	31	53.06±1.3b	46.94±1.3a

*1: see footnote on table 1 for superscript explanation and comparisons.

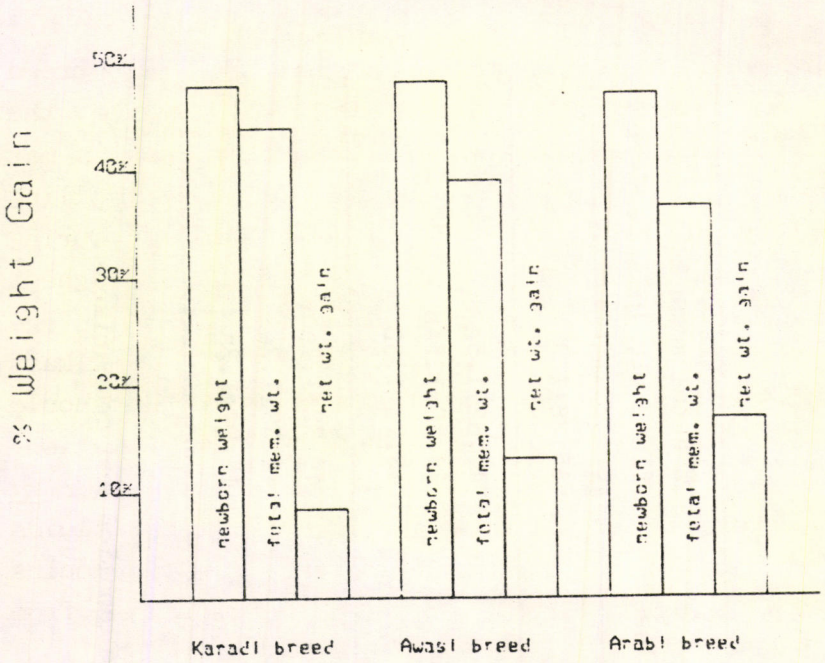


Fig.3: The average contribution of each component from the total weight gain in percent values.

by the Awassi (55.30%) and the Karadi (52.28%) in the descending order with a significant difference between the Arabi and Karadi. Whereas the percentage of the fetal membranes and fluids weights were 43.77% in the Arabi and 47.82% in the Karadi.

DISCUSSION

Results obtained reveal great potentials in the native breeds studied during the most demanding period, namely gestation. Al.jalili and Alkass (1984) reported that the Karadi is the heaviest of Iraqi sheep. This may explain the dominance of the Karadi in weight over the other two breeds throughout the whole period of this study (Table 1). However, weight gain during gestation

when expressed in percent indicated that the light breed (Arabi) had the highest increase (22.5%) while the heaviest (Karadi) had the least (19.6%). Such results may be attributed to the role of genetic factors controlling the ability of pregnant ewes to gain weight. During gestation, younger ewes (group A) attained the highest increase in body weight (22.4%) in comparison with age groups B (20.6%) and C (20.7%). Al.jalili and Alkass (1984) stated that the percent increase in weight should be around 10% for the latter two months of gestation. Biomeasurments analysis of fetus as reported by Arthur *et al.*, (1985) had indicated that the amount of fetal fluids increased from 735 to 1203 ml during the last two months of gestation, and the length of the tibia increased from 32 to 107 mm.

The results of this study indicated that the three Iraqi breeds started to gain weight rapidly after the third month of gestation, which could be due to rapid increase in weight of fetus and fetal fluids.

The average weight gain reported for the Awassi fluctuated from 6.8 (Louca *et al.*, 1974) in Cyprus to 13.4 Kg in Iraq (Al.jubory 1977) while in the present study it is 9.1 Kg. Such differences may be attributed primarily to the plane of feeding (Louca *et al.*, 1974).

It can be seen from table 2 that the Arabi has a better performance than the other two breeds because the weight it lost was equivalent to 83% of its gain. The corresponding values for the karadi and the Awassi were 92 and 87% respectively. These findings are new as far as Iraqi sheep are concerned. However, the average loss in weight after parturition in this study coincide with those reported by Louca *et al.*, (1974) and Al.jubory (1977).

It has been reported that newborns mortality rate is highly correlated with their weights (Al.jubory 1977; Juma & Faraj 1966). Hence it is very essential to adopt the proper feeding system that would assure the necessary increment in weight of ewes during gestation. Our results indicated the efficiency of the semi-closed system in rearing ewes and feeding them moderate amounts of concentrates during pregnancy.

Eventhough some studies suggested that the increment should reach 25% of the weight at the time of service (Al.jubory 1977), others suggested that the weight gain should equal that lost during parturition (Spedding, 1970). However, from the results of this experiment we believe that weight gain during gestation should reach a level that would compensate for weight loss by parturition and for that which would occur during the first month post partum.

It is evident from table 3 that lamb birth weight constitutes the largest percentage of the total weight gain (47.64%). In viewing data from another aspect it shows that heavy breed benefited from only 55.60% of the weight gain which represents the weight of the newborn plus the net weight increment of the ewe itself. However,the Arabi ewes used 63.60% of the gained weight for the same purpose. These results confirm such interpretation regarding the better performance of the Arabi breed.

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تأثير اختلاف السلالة والعمر على اوزان النعاج، اجنتها واوزان السوائل والاغشية الجنينية في ثلاثة من سلالات الاغنام العراقية

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الخلاصـــة

اختيرت (٩٧) نعجة محلية تمثل السلالات الرئيسية الثلاثة للنعاج العراقية (الكرادية، العواسية، العرابية) لدراسة تاثير السلالة وعمر النعجة على التغيرات الحاصلة في معدلات الوزن ومكونات هذا التغيير خلال فترة الحمل. وقد تم تسجيل وزن النعاج مرة شهريا خلال فترة الحمل واسبوعيا خلال فترة الرضاعة. وتم كذلك تسجيل وزن المواليد حال ولادتها. وضعت النعاج في حضائر شبه مفتوحة وتوفر العلف الاخضر بشكل حر مع نصف كيلوغرام من العلف المركز يوميا. اوضحت النتائج تغلب النعاج الكرادية في الوزن على اوزان سلالات العواسي والعرابي وخلال فترة التجربة باكملها. كان معدل الزيادة الوزنية خلال فترة الحمل للسلالات الثلاثة هي ٩ كغم، ١ر٩ كغم، ٦ر٨ كغم على التوالي والتي مثلت ٦ر١٩٪، ٦ر٢١٪، ٥ر٢٢٪ على التوالي من وزن النعجة في وقت التسفيد. كانت المكونات الثلاثة للزيادة الوزنية هي الجنين، الاغشية والسوائل الجنينية، والزيادة الوزنية في جسم النعجة نفسها حيث وجد بان كل من هذه المكونات تؤلف ٦٤ر٤٧٪، ٥٥ر٣٩٪، ٨١ر١٢٪ من الزيادة الوزنية على التوالي، ووجد ان اداء النعاج العرابية هو الافضل بشكل عام بسبب استغلالها الافضل للزيادة الوزنية.

لقد تباشر وزن الاغشية الحشيشة والسوائل بنوع السلالة ولكنه لم يتباشر بعمر النعجة، في حين وجد بان النعاج الصغيرة العمر حملت على زيادة وزنية خلال فترة الحمل اكثر من النعاج الكبيرة العمر، واشارت النتائج ايضا بان نسبة وزن المولود من فقدان الوزن الناتج عند الولادة كان دائما اكبر من نسبة وزن الاغشية والسوائل الجنينية الى فقدان الوزن.