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The effects on Awassi lambs body weight and carcass characters sheared at different times

Khalid. H. Sultan* **and Muthanna. A. Al-Taeb**

University of Mosul, Department of Animal Production, College of Agriculture & Forestry, Mosul, Iraq
**Corresponding author:* dr.khalid.h@uomosul.edu.iq

Abstract

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In order to estimate the effect of lamb's wool shearing in the end of spring and in beginning of summer seasons on the productive and carcass traits of fattening lambs. The study was conducted on 24 Awassi lambs with an average weight of 32.34 ±0.05 Kg and aged 6–8 months. Lambs were randomly divided into 3 groups (8 lambs/group). The 1st group lambs were not sheared (control), the 2nd group lambs were sheared at the end of spring (15/6/2022), the 3rd group lambs were sheared at the beginning of summer (15/10/2022), and the study lasted four months. Lambs were reared on a ration consisting of barley, wheat bran, wheat straw, and soybean meal at a rate of 1 kg / lamb / day. Statistical analysis of the data revealed a significant superiority in body weight in 3rd group lambs in all study months, total weight gain, and relative growth mean in the 1st, 2nd, and 3rd study months of the study as compared with other treatments at $P \leq 0.05$. Also, results of the third group showed a significant increase in carcass weight, empty dressing percentage, full dressing percentage, wide tail weight. The results related to the physical dissection of three ribs revealed a significant increase in the weight of the three ribs, lean weight, and rib eye area as compared with other treatments. On the other hand, 3rd group results revealed a significant decrease in fat thickness and empty digestive cannel weight. In conclusion, shearing lambs may reduce heat stress, which was reflected in improved productive performance and carcass characteristics of Awassi lambs.

Keywords: Awassi sheep; carcass traits; shearing; productively

Introduction

Awassi sheep are recorded as the main source of meat production in Iraq. (Noori & Sultan, 2020); also, they adapt to high temperatures and have endurance for nutritional fluctuation. (Galal et al., 2008). When sheep are exposed to heat stress (HS), the dissipation of their body heat will increase. (El Amiri *et al*., 2019). Adaptation to HS has a complex interaction between genetic factors and thermoregulation mechanisms. (Ricardo, *et al.,* 2020). Shearing is a management practice that can reduce heat stress and maintain thermal balance within a certain limit of relative humidity through the skin and breathing (Aguilar et al., 2020); also, it has been noted that wool reduces exposure to solar radiation (Moslemipur & Golzar-Adabi, 2017). Shearing results in an enhanced energy exchange between the animal's and its surroundings, which will affect the production and welfare of the sheep. (Aleksiev, 2008). Kenyon et al. (2006) indicated in their study the effect of ewe shearing in mid pregnancy on the lambing weight of lambs and lambing percentage at weaning in commercial breeding conditions. Many studies have been done to study the impact of shearing on the homeostasis of sheep (Pennisi et al., 2004; Suhair & Abdalla, 2013), also, the impact of shearing on the productive traits of meat and wool has been studied by many researchers. Shearing pregnant ewes at late or mid pregnancy increased lamb birth weights (Kenyon et al., 2002). Noori & Sultan (2020), reported a significant increase in body weight, body

gain, carcass weight, relative mean growth percentage, and three rib weight in the study of fattening Awassi lambs, when sheared at the beginning of the study. This study aimed to confirm the process of shearing during fattening Awassi lambs and to evaluate its effects on body weight, body gain and characteristics of the carcass.

Materials and Methods

A total of 24 Awassi male lambs with average weight 32.34 ±0.08 Kg (6–8 months aged) were selected randomly. The investigation was conducted in a private field in the Baibukht village, northeast of Mosul, Iraq, during the time 15/6/2022 (at the end of spring) to 15/10/2022 (at the beginning of summer), to study the effects of shearing on the productive parameters and characteristics of carcass of Awassi lambs. All lambs in the study were healthy. Experimental lambs (24) were randomly divided into three treatments (8 lamb/group). The first treatment was the control treatment (T_1): lambs were fed on the standard ration only, the second treatment (T_2): lambs were fed standard ration and shorn at day 1 of the study at the end of spring season, and the third treatment (T_3): lambs were fed standard ration and shorn at day 60 of the study at the beginning of summer season. The lambs were bred in semi-open barns, and the study lasted 16 weeks at the beginning of May to the end of August). All lambs were fed 1.100 kg/lamb/day on the standard diet which consists of 78% barley, 9% wheat bran, 10% soybean meal, 3% wheat straw and 1% urea (Table 1).

Table 1. Ingredients and nutritive composition standard ration

Ingredients of DM	%
Barley	78
Wheat bran	9
Soybean meal	10
Wheat straw	2
Common Salt	0.5
$CaCo_3$	0.5
Crude protein, %	13.96
Ca, %	0.41
P, %	0.35

ME (Kcal /kg/DM): 2624,
Note: Calculated as a dry matter (Al-Khawaja et al., 1978)

Productive Traits

The lambs were weighed at the beginning of the experiment, and the weight was continued every two weeks until the end of the study, to identify the body weight (BW), weight gain (BG) and monitor the growth. The weighing process was carried out using a special scale with a capacity of 150 kg and in divisions of 0.5 kg, and the difference in weight gain was calculated according to the following equation: Weight gain (within a period) kg = subsequent weight – previous weight. Relative growth mean (RGM) was obtained according to Gazal & Alsayegh (1980).

Carcass Traits Measurements

At the end of the 120-day study, 3 lambs from each group were fasted for 12 hrs., weighted then slaughtered. After the slaughter process, the weights of the head, skin and filled and empty alimentary canal were recorded. The weights of the livers, kidneys, fat of the kidneys, legs and wide tail were taken, and finally the carcass was weighed, the thickness measurements of the subcutaneous fat layer on the 11^{th} rib (using Vernier) were recorded, and the dressing ratio was calculated based on the weight of the hot carcass relative to the final live weight × 100. The rib eye area was taken by using a placom digital planimeter at rib 12.

Physical Dissection of Ribs

The carcass was separated into two halves equally, and ribs 9, 10, and 11 were taken from the left half to obtain the physical dissection of ribs (Duckett et al., 2007), as they were weighed and frozen at a temperature of -20°C for the purpose of conducting a physical dissection. The frozen pieces were successively thawed at room temperature and a sharp knife was used to separate the muscle, fat and bone tissues from each other. Then the three tissues were individually weighed using a scale with a sensitivity of 5 gm, the percentage of the three tissues was calculated according to the weight of the three ribs piece. Also, rib eye area muscle and the thickness of the subcutaneous fat between ribs 12 and 13 were measured, as reported by Jacob & Calnan (2018).

Statistical Analysis

The obtained data of study were expressed as means ±SEM and were analyzed by using Statistical Analysis (SAS, 2003). Differences within means were obtained by using Duncan test (Steel & Torrie, 1984).

Results and Discussion

The analyzed data of body weight (BW), total weight gain (TWG) and relative mean growth (RMG) explained in (Table 2), which show a significant increase ($P \leq 0.05$) in BW of shorn lambs group which were sheared at the middle of the study (T_3) at 2^{nd}, 3^{rd} and 4^{th} months of study, which has a values of 36.10±0.06, 38.65±0.23, 42.03±0.24 and 45.26±0.72 kg respectively, as compared with other treat-

ments, while BW in T_2 increased significantly ($P \leq 0.05$) at 2nd month (35.44±0.15 kg) as compared with control. As for the results of the weight gain of lambs, no significant differences were achieved during the first three months of the study in all treatments, while a total significant ($P \leq 0.05$) increase was recorded in T_3 at the end of study and its value was 13.05 Kg as compared with T_1 and T_2 treatments (10.65 and 10.64 Kg) respectively. The results related to the relative growth mean% of lambs (Table 3) indicate the superiority ($P \leq 0.05$) of the 3rd group lambs at the three months of study (1st, 2nd and 4th months) as compared with other groups, while the control treatment increased significantly ($P \leq 0.05$) at the 3rd month of the study as compared with the two sheared groups.

The results of carcass traits showed a significant ($P \leq 0.05$) increase in carcass weight, empty dressing% and full dressing% in T_3, (24.13 Kg, 53.14 and 56% respectively as compared with other treatments, while empty digestive cannel weight increased significantly in T_1 (5.10 Kg) as compared with T_3 (4.29 Kg) (Table 4). Statistical analysis of samples showed a significant effect of mid shearing in wide tail weight and abdominal fat weights (kg) in T_3, which reached 4.16 Kg and 0.39 kg respectively, in the other hand, kidneys fat increased significantly ($P \leq 0.05$) in T_2 (0.22 kg) (Table 5). The results of physical dissection of three ribs showed in Table 6, mid shearing of lambs (summer season) causes a significant increase ($P \leq 0.05$) in three ribs weight, lean weight and rib eye area (0.47, 0.23 Kg), respectively, fat thickness decreased significantly in T_3 (0.43 cm) as compared with other treatments.

Results of the current study were in agreement with results of Al-Zabie & Sultan (2020), and with the results of Mclean et al. (2015), who reported that shorn lambs grew 12 grams/day faster than unshorn lambs, also Herrig *et al.* (2006) reported a significant increase in BG in shorn Hampshire and Columbia rams in summer months, while Sultan (2016) did not noticed any effect of shearing in the study on 20 Awassi rams. Silva Filho *et al*. (2013) indicated that there is a nega-

Table 2. Mean (±SEM) values of body weight (kg) in treated Awassi lambs

Groups	Months				
	Initial B.W	M_1	M_2	M_3	M_4
T_1	32.45±0.14 a	34.90±0.15 c	36.22±0.24 b	40.03±0.28 b	43.10±0.26 b
T_2	32.37±0.12 a	35.44±0.15 b	36.76±0.20 b	39.80±0.45 b	43.02±0.39 b
T_3	32.21±0.16 a	36.10±0.06 a	38.65±0.23 a	42.03±0.24 a	45.26±0.27 a

Note: Values columns with different superscripts significantly differ at ($P \leq 0.05$). M_1, M_2, M_3 and M_4: months of study

Table 3. Mean (±SEM) values of body gain (kg) and relative mean growing% in treated Awassi lambs

Groups	Months			
	M_1	M_2	M_3	Total
T_1	1.32±0.19 b	3.61±0.24 a	3.07±0.31 a	10.65±0.32 b
T_2	1.31±0.17 b	3.04±0.42 a	3.21±0.41 a	10.64±0.38 b
T_3	2.55±0.26 a	3.37±0.25 a	3.23±0.23 a	13.05±0.24 a
Groups	Relative growth mean, %			
	M_1	M_2	M_3	M_4
T_1	7.55±0.12 c	3.77±0.09 b	10.51±0.25 a	7.66±0.43 a
T_2	9.48±0.58 b	3.72±0.19 b	8.25±0.40 b	8.08±0.18 a
T_3	12.07±0.33 a	7.06±0.12 a	8.74±0.31 b	7.66±0.34 a

Note: Values columns with different superscripts significantly differ at ($P \leq 0.05$). M_1, M_2, M_3 and M_4: months of study

Table 4. Mean (±SEM) effect of shearing time on carcass traits of Awassi lambs

Groups	Carcass weight, kg	Full digestive cannel, kg	Empty digestive cannel, kg	Empty Dressing, %	Full Dressing, %
T_1	21.93±0.36 b	2.95±0.11 a	5.10±0.28 a	51.17±0.44 b	0.52±0.01 b
T_2	22.14±0.20 b	2.94±0.09 a	4.60±0.23 ab	51.28±0.75 b	0.52±0.02 b
T_3	24.13±0.24 a	3.17±0.08 a	4.29±0.13 b	53.14 ±0.45 a	0.56±0.05 a

Note: Values columns with different superscripts significantly differ at ($P \leq 0.05$). M_1, M_2, M_3 and M_4: months of study

Table 5. Mean (±SEM) effect of shearing time on fat carcass traits of Awassi lambs

Groups	Wide tail, kg	Abdominal fat, kg	Kidneys fat, kg	Heart fat, kg
T_1	3.25±0.10 c	0.34±0.01 ab	0.18±0.04 b	0.35±0.01 a
T_2	3.69±0.10 b	0.28±0.03 b	0.22±0.01 a	0.33±0.08 a
T_3	4.16±0.13 a	0.39±0.01 a	0.18±0.04 b	0.33±0.01 a

Note: Values columns with different superscripts significantly differ at ($P \leq 0.05$). M_1, M_2, M_3 and M_4: months of study

Table 6. Mean (±SEM) effect of shearing time on physical dissection of three ribs in Awassi lambs

Groups	Three ribs weight, kg	Lean, kg	Bone, kg	Fat, kg	Rib eye area, cm^2	Fat thickness, cm
T_1	0.44±0.01 ab	0.19±0.08 b	0.10±0.06 a	0.12±0.06 a	12.02±0.09 c	1.19±0.23 a
T_2	0.42±0.06 b	0.20±0.04 b	0.10±0.03 a	0.11±0.06 a	12.33±0.02 b	1.50±0.11 a
T_3	0.47±0.01 a	0.23±0.09 a	0.10±0.08 a	0.12±0.09 a	13.04±0.03 a	0.43±0.04 b

Note: Values columns with different superscripts significantly differ at ($P \leq 0.05$). M_1, M_2, M_3 and M_4: months of study

tive correlation between the environmental temperature and the rate of growth due to the low rate of feed consumption, which follows the effect of heat stress and unsuitable conditions for breeding. Carcass weights, empty dressing and full dressing% increased significantly in slaughtered lambs of T_3, they agreed with the results Al-Zabie & Sultan (2020) in a study to fatten 24 Awassi lambs, as it showed a significant superiority in the ratio of dressing and carcass weight of sheared lambs, also the results were in agreement with Marai et al., (1987), whose reported an increase in slaughter weight, empty body weight, carcass weight, rib eye muscle, lean and dressing percentage, in Ossami shorn lambs. The results are contrary to those of Mclean et al., (2015), whom not reported any significant increases in carcass weight and meat produced from shorn lambs. Mohammad et al. (2015), reported similar results of three rib weight, while they did not report any significant effect on lean, bone, fat thickness and rib eye area in Awassi shorn lambs reared at summer months. Due to the effect of wool on sheep**,** in addition to high temperatures, shearing can stimulate sheep to adapt high temperatures (Pennisi et al., 2004), It was also found that heat stress has an effect on carcass characteristics and meat quality in sheep (Rana et al., 2014).

The sheared lambs at the beginning of the study (spring season) did not show any significant effects on body weight, weight gain, relative mean growing, carcass weight and dressing percentage, due to stress resulting from low temperatures in the spring season. Sheep and non-sheared sheep as they differ between breeds and between individuals of the same breed (Alexander et al., 1974). The critical temperature of lambs depends on the length of the wool, the critical temperature in the sheared sheep is 25°C for sheep with a wool length of 10 mm, while it reaches -5°C when the length of wool is 5 mm, and sheep with a wool length of 70 mm is -18°C (Dabiri et al., 1995) and for this reason lambs exposed for cold stress due to wind and humidity ((Ekesbo & Gunnarsson*,* 2018). The summer season in Iraq is hot and temperatures reach to 48°C, which causes heat stress for animals, therefore, shearing lambs, especially those subject to fattening, leads to a reduction in heat stress, which in turn leads to an improvement in the productive performance of lambs.

Conclusion

Shearing in mid-summer and at high temperatures when fattening Awassi lambs, leads to an improvement in the productive characteristics represented by body weight, total weight gain, relative mean growing and carcass traits represented by carcass weight, dressing percentage, wide tail fat weight, abdominal fat, three ribs weight and rib eye area, which leads to increase the productivity of lambs of meat during the fattening period.

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Conflict to interest

Authors declare no conflicts of interest regarding the publication of this study.

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