

# The Effect of Awassi Ewes Body Condition Scores on Milk Production, Composition and Lambs Growth

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**Abstract.** This study was performed to evaluate the efficacy of body condition scores (BCS) and Sex of lamb on Awassi ewes milk production, composition and lambs growth. The experiment conducted at one of the Awassi sheep breeders in Baibokht area (8km north of Mosul city ) for three months. Ewes were fed concentrate 500g/ewe/day, 60% barley, 38% wheat bran, 1% salt and 1% limestone, with grazing. ewes were divided in to three groups. First group body condition score (BCS 2), the second group (BCS 3) and the third group (BCS 4). The results revealed BCS3 had a significant effect ( $P<0.05$ ) on weekly milk yield, total milk yield, fat percentage and lambs weight at different ages and no significant effects of BCS on milk Lactose, Protein, total solid and solid non-fat percentage. Sex of lamb had a significant effect ( $P<0.05$ ) on weekly milk yield and total milk yield and lambs weight from birth until weaning. And no significant effects on milk composition. In general this means that BCS led to significant improvement in the studied traits for behalf highly BCS compared to low. Male lambs had a significant effect on ewes milk yield and lambs weight.

**Keywords.** Awassi ewes, BCS, Milk production, Growth of lambs.

## I. INTRODUCTION

In Iraq, sheep are bred basically for meat, milk and wool [1]. The animal productivity depends on the percentage of animals that are able to produce among the flock. Milk and meat demand are increased daily. This increment is due to the increase in population as well as the high standard living. The sheep production in Iraq decreased due to the changing circumstances in the country for many year [2]. In addition, local Iraqi sheep productive efficiency is low [3]. The body weight considered one of the factors that affects the productive and the reproductive traits of ewes. The high costs of weighting sheep particularly in large flock as well as the large variety in sheep size which make it too hard to use the weight as a simple restrict to identify the right case[4]. This could lead to find another way to predict body status such as body condition score (BCS) [5,6]. Body condition score (BCS) is considered a simple and good technique to predict the nutritional status and fat storage of the sheep [7]. Therefore, certain external body scales have been found to express the body status among sheep (BCS) which is from 1-5 [8,9]. It is considered one of the significant tools to evaluate the efficiency of nutrition programs especially in the systems where feed availability is unstable [10]. It gives a better expectation of body structure compared to the live weight [11]. This study was designed to determine the effect of (BCS) and sex of lamb on milk production, composition and Lambs growth until weaning in the Awassi ewes.

## II. MATERIALS AND METHODS

This study was conducted at one of Awassi sheep flock in the Baibokht area (8 km north of Mosul city). Ewes were fed concentration 500 g- /- ewe- /- day, 60% barley, 38% wheat bran, 1% salt and 1% limestone, The chemical composition of the concentrate : crude protein 13%, metabolism energy 2723 (kcal/Kg), Calculated by [12], with grazing, water and mineral blokes. Fifty pregnant Awassi ewes used in this study. Following parturition, body condition score (BCS) were measured for all ewes [13], and divided them into three groups based on the degree of the body condition: BCS2 (n=14 ), BCS3 (n=19) and BCS4 (n=17). Milk samples were started collected manually from each ewe 15 days following parturition of lambs were isolated from their mothers at evening and were milked after 12 hours until waning. To get the daily milk production, by the morning milk yield multiplied by [14], the fat, protein, total solids, the solids nonfat and lactose percentage were using Eko-Milk Analyzer (Canada/Bulgaria Website: [www.ekomilk.eu](http://www.ekomilk.eu)) deducted. (BCS) method described by. Lamb weights were recorded for all lambs from each ewe and

two weeks apart until weaning (three month). The mean  $\pm$  S.E lamb and weaning weight were calculated for each group Daily and total weight gain were calculated for each lamb in each group.

• **Statistical analysis**

Data were analyzed by General Linear Model (GLM), statistical program SAS [15], Duncan's multiple range test was used to compare between the means [16]. Significant was defined as  $P < 0.05$ . The following statistical model was used:

$$Y_{ijk} = \mu + B_i + S_j + e_{ijk}$$

$\mu$  = the total mean.

$B_i$  = The effect of the BCS ewes as 1(BCS2), 2 (BCS3) and 3(BCS4).

$S_j$  = The effect of the sex as (1,2) .male and female.

$e_{ijk}$  = the random error effect.

### III. RESULTS AND DISCUSSION

• **Milk production**

In this study, the milk yield was significantly greater ( $P < 0.05$ ) in BSC3 and BSC4 groups compared to BSC2 group for all weeks Table (1). In addition, daily and total milk production were significantly greater ( $P < 0.05$ ) in BSC3 and BSC4 respectively. These results was agreed with [17,18, 19]. They found a significant increase in BSC3 and BSC4 on milk production of Awassi ewes. However [2].The significant increase in milk production, daily and total milk production may be due to the weak score of the ewes following parturition. The prolactin hormone secretions from the pituitary gland might be low, which have an important role in developing the mammary gland rather than its direct effect on milk production in contrast to the ideal scores (3,4), furthermore the sheep with good scores have good body structure which is regarded as a reflection of the development of glandular organs [17]. It is important to mentioned that the sex of lamb has a significant effect ( $P < 0.05$ ) on milk production, daily and total milk production Table (1).It was greater in male lamb ( $P < 0.05$ ) compared to female lamb ( $P < 0.05$ ) these results was supported by [20,21].However [22] . This result might be due to the fact that the large and heavier male lambs are usually consumed more milk which results in stimulating their mothers to produce more milk [20].

**TABLE 1.** Mean  $\pm$  S.E Effect of body condition scores and sex of lamb on milk yield, daily and total milk yield in Awassi ewes.

Characteristics groups	n	Milk yield(kg)							Daily milk yield	Total milk yield
		Week 2	Week 4	Week 6	Week 8	Week 10	Week 12			
BCS2	14	0.12 $\pm$ 0.47 b	0.44 $\pm$ 0.01 b	0.57 $\pm$ 0.21 b	0.57 $\pm$ 0.53 b	0.51 $\pm$ 0.71 b	0.50 $\pm$ 0.51 b	0.41 $\pm$ 0.51 b	0.11 $\pm$ 42.84 b	
BCS3	19	0.62 $\pm$ 0.32 a	0.67 $\pm$ 0.04 a	0.81 $\pm$ 0.31 a	0.77 $\pm$ 0.31 a	0.63 $\pm$ 0.38 a	0.68 $\pm$ 0.41 a	0.21 $\pm$ 0.69 a	0.21 $\pm$ 57.96 a	
BCS4	17	0.52 $\pm$ 0.21 a	0.56 $\pm$ 0.08 a	0.68 $\pm$ 0.41 a	0.60 $\pm$ 0.41 ab	0.61 $\pm$ 0.32 a	0.60 $\pm$ 0.09 a	0.31 $\pm$ 0.62 a	0.31 $\pm$ 52.08 a	
Sex of lamb										
male	23	0.72 $\pm$ 0.23 a	0.69 $\pm$ 0.41 a	0.74 $\pm$ 0.11 a	0.73 $\pm$ 0.31 a	0.67 $\pm$ 0.41 a	0.62 $\pm$ 0.21 a	0.21 $\pm$ 0.67 a	0.24 $\pm$ 56.28 a	
female	27	0.57 $\pm$ 0.61 b	0.64 $\pm$ 0.32 b	0.60 $\pm$ 0.23 b	0.65 $\pm$ 0.52 b	0.55 $\pm$ 0.23 b	0.48 $\pm$ 0.32 b	0.23 $\pm$ 0.56 b	0.35 $\pm$ 47.04 b	

Within each column, means with different letters are significantly different ( $P < 0.05$ ).

• **Milk compositions**

In this study, the percentage of milk fat was significantly greater ( $P < 0.05$ ) in BSC3 and BSC4 groups compared to BSC2 group Table (2), that is due to ewes with low BCS the largest part of their food is used to utilized to supply the body needs and to build the body tissue [7]. These results are agreed with [17]. that there is no significant effect for BCS on milk compositions(milk protein, milk lactose, milk solids non-fat and milk Total solids percentage), The

results were agreed with [2]. Table 2 indicate that there is no significant effect of the sex of lamb on milk compositions(milk fat, milk protein, milk lactose, milk solids non-fat and milk Total solids percentage), results were agreed with the findings [23,24].

**TABLE 2.** Mean  $\pm$  S.E. Effect of body condition scores and sex of lamb on milk compositions in Awassi ewes.

Characteristics groups	n	Milk fat%	Milk protein%	Milk lactose%	solid non-Fat %	Total solid%
BCS2	12	0.11 $\pm$ 4.98 b	0.12 $\pm$ 5.47	0.13 $\pm$ 4.41	0.15 $\pm$ 10.70	0.15 $\pm$ 16.41
BCS3	12	0.16 $\pm$ 6.63 a	0.14 $\pm$ 5.41	0.11 $\pm$ 4.42	0.12 $\pm$ 10.72	0.18 $\pm$ 17.36
BCS4	12	0.19 $\pm$ 6.25 a	0.22 $\pm$ 5.50	0.18 $\pm$ 4.48	0.14 $\pm$ 10.73	0.16 $\pm$ 17.08
Sex of lamb						
male	17	0.18 $\pm$ 6.25	0.18 $\pm$ 5.46	0.18 $\pm$ 4.41	0.19 $\pm$ 10.60	0.11 $\pm$ 16.86
female	19	0.19 $\pm$ 6.18	0.15 $\pm$ 5.36	0.14 $\pm$ 4.44	0.16 $\pm$ 10.51	0.15 $\pm$ 16.70

Within each column, means with different letters are significantly different ( $P < 0.05$ ).

• **Lamb weights:**

Table (3) shows no significant effect for BCS on weight of lambs at birth. The body weight of lambs was significantly greater ( $P < 0.05$ ) in BSC3 and BSC4 groups compared to BSC2 group for all weeks. In addition, daily weight gain and total weight gain were significantly greater ( $P < 0.05$ ) in BSC3 and BSC4 compared with BSC2 group for all weeks respectively. The reason of significant superiority of the second and third groups lambs in body weight and growth ability from birth until weaning may due to the effect of the BCS of the ewes which have the high score supply their lambs with more quantity of milk [18]. These results are agreed with [18,2]. Table (3) shows that the sex of lamb had a significant effect ( $P < 0.05$ ) on body weights of lambs. Males were heavier ( $P < 0.05$ ) than females in daily and total weight gain. The male superiority of females in body weights and body gain may due to the role of male androgen hormone, which is secreted early in the pregnancy stage (nearly at 35 day), which stimulates growth that reflects positively on their weight at birth and this weight is positively associated with the subsequent weights with the continued positive effect of androgen hormone after birth with increasing in dams milk production that bear males compared to the dams bear females [25]. This result was agreed with [26,27].

**TABLE 3.** Mean  $\pm$  S.E. Effect of body condition scores and sex of lamb on body weight in Awassi lambs.

Characteristic groups	n	Birth weight	Body weight (kg)							
			Week 2	Week 4	Week 6	Week 8	Week 10	Week 12	Daily gain	Total gain
BCS2	12	3.80 $\pm$ 0.06a	6.12 $\pm$ 0.07 b	9.10 $\pm$ 0.12b	11.86 $\pm$ 0.06b	13.21 $\pm$ 0.05b	15.21 $\pm$ 0.03b	17.33 $\pm$ 0.06b	0.150 $\pm$ 0.05b	13.53 $\pm$ 0.03b
BCS3	18	4.21 $\pm$ 0.04a	8.56 $\pm$ 0.03a	10.31 $\pm$ 0.03 a	12.92 $\pm$ 0.05 a	14.45 $\pm$ 0.03 a	17.71 $\pm$ 0.07 a	20.31 $\pm$ 0.09a	0.178 $\pm$ 0.08a	16.10 $\pm$ 0.09a
BCS4	15	4.16 $\pm$ 0.03a	8.21 $\pm$ 0.06 a	10.68 $\pm$ 0.09a	12.30 $\pm$ 0.03a	13.92 $\pm$ 0.02 ab	16.98 $\pm$ 0.08 a	19.32 $\pm$ 0.03a	0.168 $\pm$ 0.04a	15.16 $\pm$ 0.07a
Sex of lamb										

male	20	±4.12 0.12a	±7.78 0.02a	±10.47 0.01a	±12.78 0.06a	±14.93 0.08a	±16.96 0.07a	±19.31 0.03a	±0.169 0.07a	±15.19 0.06a
female	25	±3.31 0.12b	±6.21 0.03b	±9.34 0.05b	±11.31 0.03b	±13.79 0.06b	±14.87 0.04b	±17.43 0.09b	±0.156 0.03b	±14.12 0.07b

Within each column, means with different letters are significantly different ( $P < 0.05$ ).

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