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EFFECT OF BODY CONDITION SCORE AND WEANING AGE IN SOME PRODUCTIVE TRAITS OF AWASSI SHEEP

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ABSTRACT

To study the impact of the body condition score (BCS) of ewes on body weight (BW) and body weight gain (BWG) of ewes and lambs and the effect of weaning age on BW and BWG of lambs, thirty Awassi ewes (2–3 years old) with their borne male lambs were used in the study. Ewes condition-scored and assigned to three groups, 1st, 2nd and 3rd groups were with BCS 2.5, 3 and 3.5 respectively. Lambs weaned neither 60 or 90 days (5 lambs for each), the study lasted 90 days. The analyzed data showed significant (P≤0.05) differences in high BCS ewes; also, lambs BW increased significantly by 3 and 3.5 compared with 2.5 BCS at the 4th, 6th, and 8th weeks of the study. Total BWG was higher significantly for BCS- 3 and 3.5 ewe's lambs. While body weight increased significantly for BCS- 3 and 3.5 ewe lambs at the 10th and 12th weeks of study. Ewes were significantly heavier whose weaned her lambs at 60 days, while lambs weaned at 90 days had higher BW at the 10th and 12th weeks of the study. BWG was better significantly (P≤0.05) for BCS- 2.5 and 3 in lambs at 12th week. In conclusion, this means that BCS-3 lambs had a higher BW, while 2.5 and 3 BCS lambs had a better BWG at the end of the study.

INTRODUCTION

The concept of a body condition score for sheep was first developed in the 1960s. In contrast to live weight, it is unaffected by gut fullness, the length and moisture of the fleece, or the variables of skeletal size, breed, and physiological status. (Kenyon *et al.*, 2014; Russel 1969; Gonzalez *et al.*, 1997; Esmailizadeh *et al.*, 2009). One of the variables that influences how productive and receptive ewes are is their body weight. It is too difficult to use weight as a basic criterion to determine the appropriate situation due to the expensive costs of weighting sheep, especially in large flocks (Pattison, 2002).

The study's findings suggest that proactive flock management of sheep will help to maintain an ideal BCS and provide an economically sustainable production system. (Veerasamy *et al.*, 2015). Many management decisions are made to enhance flock performance, such as changing light animals from the mob or managing multiple- and single-bearing ewes differently, but frequently farmers do not gather the physical data necessary to support those decisions, such as ewe live weight and condition score. (Casey *et al.*, 2013). A crucial step in increasing the productivity

and profitability of an intensive sheep production system is the early weaning of lambs. (Tamer, 2017). In situations where ewes have inadequate milk production, early weaning is also very helpful in preventing malnutrition and lamb death from birth to weaning. Also, when sheep milk is used to make cheese, early weaning is beneficial. In terms of the possibility of producing meat, early weaning enables ewes to return to estrous quickly, which results in a brief breeding season that is necessary for fast lambing programs. (Abdel-Fattah *et al.,* 2013). The perfect weaning age must be obtained due to the gastrointestinal tract's underdevelopment and fast growth in order to reduce weaning stress and support the lambs' healthy growth after weaning. The practice of weaning lambs on milk replacer (MR) as opposed to solid meals has been gaining popularity. However, due to the large variety of feeding and management techniques used as well as the diverse genotypes of lambs, weaning age outcomes for lambs vary significantly (Lanza *et al.,* 2006). Early weaning is a common practice in the modern lamb industry, which shortens the breeding cycle of ewes and improves the flock productivity by increasing the frequency of lambing (Wing *et al.,* 2019)

The current investigation aims to identify and assess the effects of body condition score and weaning age on the productive characteristics of Awassi sheep.

MATERIALS AND METHODS

Site of study and animals

The study was conducted in a private field in the Iraqi village of Baibukht, which is northeast of Mosul. Thirty Awassi ewes (2-3 years aged) with their male lambs were reared in 3 pens (n = 10/pen) in semi-open barns. Animals fed concentrate rations (Table 1). The study ewes with her lambs were divided into three groups (10/group): T1, T2 and T3: ewes with 2.5, 3, 3.5 body condition score (BCS). Lambs for each group weaned at 60 or 90 days (5 for each). The study lasted 90 days.

Body condition scoring

The experimental animals were condition-scored using the BCS method published by Russel *et al.* in 1969, and the results were divided into three groups, namely, 2.5, 3.0, and 3.5 points. By carefully palpating the spinous and transverse processes in the loin region, directly beyond the last rib, BCS was evaluated. Every

Table (1): Components and nutritional content of the standard ration as calculated using dry matter*.

Ingredients of dry mater %		**Chemical compound%**	
Soybean meal	5	Organic matter	94.55
Crushed barley	65	Dry matter	92.11
Wheat bran	29	Ether Extract	2.05
Limestone	0.5	Crude protein	14.10
$CaCo_3$	0.5	Crude fiber	8.25
		Ash	5.58
		ME (Kcal /Kg/DM)	2215

*(Al-Khawaja 1978)

month, the BCS was evaluated to make sure the participants were in the appropriate BCS for the trial.

Measurements:

Up to the completion of the trial, the ewes and lambs were weighed every two weeks to determine body weight (BW) and weight gain (BG). A customized scale with a capacity of 100 kg and divisions of 0.10 kg was used for the weighing process, and the difference in weight gain was computed using the formula below: Weight gain (over time) kg = new weight minus old weight.

Data analysis:

Data were analyzed using SAS software (version 9.1), utilizing One-way ANOVA protocols for the data of ewes and lambs up to the eighth week and the General Linear Model (GLM) procedure for the tenth and twelfth weeks of study. The Duncan test was performed to determine differences between means (Steel and Torrie, 1984).

RESULTS AND DISCUSSION

Table 2 demonstrated that the BW significantly increased as the BCS increased; the BW of ewes with BCS- 3.5 and BCS- 3 were significantly higher than the BW of ewes with BCS- 2.5 at all times during the experiment, at (P≤0.05); similarly, the BW

Table (2): Mean ±S.E Impact of BCS on BW (kg) of Awassi ewes to 8th week of lambing.

Traits	**Period (weeks)**				
	At lambing	2	4	6	8
BCS 2.5	44.62 c ± 0.25	41.52 c ±0.37	40.24 c ± 0.46	39.96 c ± 0.57	38.74 c ± 0.64
BCS 3.0	46.43 b ± 0.24	43.76 b ± 0.33	42.62 b ±0.21	42.07 b ± 0.25	41.26 b ± 0.20
BCS 3.5	48.61 a ± 0.50	45.19 a ±0.45	44.03 a ± 0.42	45.20 a ± 0.41	44.45 a ± 0.52

Different letters vertically means, significant difference at (P≤0.05).

Table (3): Mean ±S.E Impact of BCS on BW (kg) of Awassi lambs to 8th week of lambing.

Traits	**Period (weeks)**			
	2	4	6	8
BCS 2.5	6.28 b ±0.09	9.15 c ± 0.08	11.69 b ± 0.14	13.15 c ± 0.15
BCS 3.0	8.07 a ± 0.08	10.14 b ± 0.12	11.86 b ± 0.06	13.74 b ± 0.14
BCS 3.5	8.31 a ± 0.11	10.61 a ± 0.09	12.99 a ± 0.16	14.38 a ± 0.19

Different letters vertically means, significant difference at (P≤0.05).

of ewes with BCS- 3.5 was significantly greater than the BW of ewes with BCS- 3 at all times during the study, at (P≤0.05).

Table 3 showed that, at (P≤0.05), the lambs of ewes with BCS- 3.5 and 3 had significantly higher BW at the second week than the lambs of ewes with BCS 2.5. At (P≤0.05), the lambs of ewes with BCS- 3.5 also had significantly higher BW than lambs of ewes with BCS- 3 and 2.5 at the fourth, sixth, and eighth weeks of the experiment. In contrast, at the fourth and eighth weeks of therapy (P≤0.05), the lamb's BW of ewes with BCS- 3 were considerably higher than the lamb's BW of ewes with BCS- 2.5.

Table (4): Mean ±S.E Impact of BCS on BWG (kg) of Awassi lambs to 8th week of lambing.

Traits	**Period (weeks)**			Total
	4	6	8	
BCS 2.5	2.87 a ± 0.10	2.54 a ± 0.17	1.46 a ± 0.23	6.87a ± 0.13
BCS 3.0	2.54 a ± 0.12	2.38 a ± 0.12	1.39 a ± 0.40	6.31 b ± 0.14
BCS 3.5	1.83 b ± 0.13	1.72 b ± 0.10	1.88 a ± 0.11	5.43 c ± 0.17

Different letters vertically means, significant difference at (P≤0.05).

Table 4 revealed that lambs of ewes with BCS- 2.5 and 3 had significantly higher BWG than those of ewes with BCS- 3.5 at the 4th week of the experiment, and the lambs total BWG decreased significantly and linearly as the BCS was increased at P≤0.05. Table 5 showed the impact of the ewe's BCS, weaning age, and interaction on the ewe's and lamb's BW at the 10th and 12th weeks of treatment. In regard to the effect of BCS, the ewes body weight significantly increased as the BCS increased at P≤0.05 at both the 10th and 12th weeks among the treatment groups. For lamb's BW, a significantly higher BW was recorded in the groups with ewes 3.5 and 3 compared with BCS- 2.5 at the 10th week, whereas lambs of the ewes with BCS-3 showed a significantly higher lamb's BW as compared with groups BCS- 2.5 and 3.5, while lamb's BW of group BCS- 3.5 was significantly higher than group BCS- 2.5 at P≤0.05.For the effect of weaning, the ewes that weaned their lambs at 60 days have significantly higher BW than ewes that weaned their lambs at 90 days, at P≤0.05 at both the 10th and 12th weeks. On the other hand, lambs that weaned at 90 days of age have significantly higher BW than lambs weaned at 60 days of age at P≤0.05 at both 10th and 12th weeks. The interaction effects revealed that significantly highest ewe's BW was showed at groups BCS- 3.5 that weaned their lambs at 60 days (P≤0.05) at both 10th and 12th weeks.

Figure 1 (A, B, and C) demonstrated the impact of ewes BCS, weaning age, and the interaction of lambs BCS on lambs BWG at the 12th week of the study, which revealed that BWG increased significantly in BCS- 3.5 ewe's lambs in comparison to BCS- 2.5 and 3. No significant differences were shown between lambs weaned at 60 or 90 days, while better interaction was recorded for BWG in the treatments of BCS- 2.5 and 3 ewe's lambs weaned at 60 and 90 days compared with BCS- 3.5

lambs. In accordance with the findings of Sejian *et al.* (2009), who found that lambs born to Malpura ewes with a BCS of 2.5 at fattening were lighter at weaning than those born to ewes with a BCS of 3.0 and 3.5. the results shown in Tables 2 and 3 explain the effect of BCS on BW of ewes and lambs; higher BW was in BCS- 3 and 3.5. The pre-breeding BCS had no impact on the weight at weaning or the growth of the lambs in Awassi ewes, whereas the pre-lambing BCS had a favorable impact on both results (Hossamo *et al.,* 1986).

Table (5): Mean ±S.E Effect of ewes BCS, weaning age and interaction on ewes and lamb's BW.

Traits	**Ewes BW (kg)**		**Lambs BW(kg)**	
Treatments	**weeks**			
	10th week	**12th week**	**10th week**	**12th week**
Effect of BCS				
2.5	39.11 c ± 0.15	39.94 c ± 0.24	16.98 b ± 0.28	20.28 c ± 0.29
3.0	41.59 b ± 0.14	43.09 b ± 0.20	18.78 a ± 0.17	22.06 a ± 0.25
3.5	44.44 a ± 0.14	45.20 a ± 0.34	18.43 a ± 0.08	21.08 b ± 0.19
Effect of weaning				
60days	42.05 a ± 0.59	43.29 a ± 0.61	17.84 b ± 0.33	20.79 b ± 0.30
90 days	41.37 b ± 0.58	42.19 b ± 0.57	18.28 a ± 0.14	21.50 a ± 0.20
Interaction				
2.5/60 days	39.42 e ± 0.22	40.57 b ± 0.16	16.24 c ± 0.19	19.49 c ± 0.17
2.5/90days	38.80 f ± 0.12	39.31 e ± 0.18	17.72 b ± 0.22	21.08 b ± 0.16
3.0/60 days	41.94 c ± 0.13	43.31 c ± 0.29	18.89 a ± 0.33	22.07 a ± 0.33
3.0/90days	41.24 d ± 0.09	42.88 c ± 0.28	18.67 a ± 0.13	22.08 a ± 0.43
3.5/60 days	44.81 a ± 0.12	46 01 a ± 0.46	18.41 a ± 0.07	22.84 b ± 0.22
3.5/90days	44.08 b ± 0.13	44.39 b ± 0.08	18.46 a ± 0.15	21.83 ab ± 0.31

Different letters vertically mean, significant difference at (P≤0.05).

Sejian *et al.,* (2015), stated that the ewes with a BCS of 3 performed better than lower and higher BCS ewes for most parameters tested, concur with the findings in the current study that lambs born from ewes with a BCS of 3 had a higher BCS at the end of the study. According to Ali (2021), lambs in BCS- 3 had considerably greater BW and BWG values than lambs in BCS- 2. The influence of BCS on the ewes, which provide their lambs with more milk when they have a high score, may account for the

considerable advantage in BW (AL-Berwari, 2006). Our findings with agreement with Dikmen, (2007) and Mohamed, (2011) are in agreement. Lambs weaned at 60 days had superior BWG than those weaned later, according to the results of the influence of weaning age, which showed that lambs weaned at 90 days were heavier than lambs weaned at 60 days (Abdel-Fattah *et al.*, 2013). According to Khoury *et al.*, (1967), early weaned calves had poorer gains than late weaned calves at weaning and at ages up to six months later.

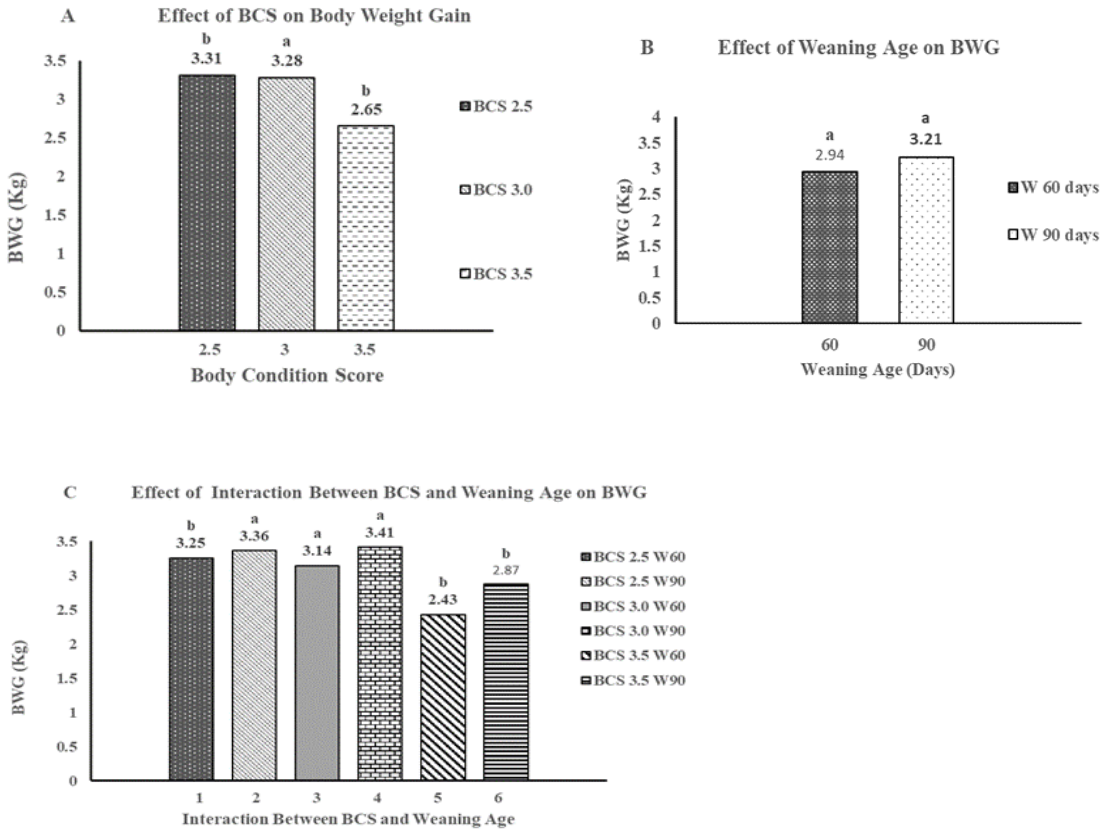

Figure (1): Impact of BCS and weaning age and interaction on BWG of Awassi lambs at 12th week of study.

CONCLUSIONS

The current study revealed that ewes and their lambs with high BCS had a linearly higher BW to the 8th week of study compared with those with low BCS, while ewe's lambs with BCS 3 had a BW and BWG at the 12th week of study. Lambs weaned at 90 days showed a significant increase in BW at the 10th and 12th weeks of study. On the other hand, we recorded better interaction for BWG in the treatments of BCS 2.5 and 3, in which their lambs weaned at 60 and 90 days, respectively, as compared with the BCS 3.5 lambs.

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CONFLICT OF INTEREST

With relation to the publication of this article, the author hereby states that there is no conflict of interest.

تأثير حالة الجسم وعمر الفطام في بعض الصفات الإنتاجية للأغنام العواسية

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الخلاصة

لدراسة تأثير درجة حالة الجسم للنعاج العواسية وعمر الفطام على وزن الجسم والزيادة الوزنية للنعاج والحملان، استخدم ثلاثون نعجة عواسية بعمر 2−3 سنوات مع مواليدها الذكرية. تم تقدير حالة الجسم للنعاج وقسمت الى ثلاثة مجاميع، المجموعة الأولى والثانية والثالثة ذات مقياس حالة جسم 2،5 و3 و3،5 على التعاقب. فطمت الحملان بعمر 60 او 90 يوم (5 حمل/ مجموعة) واستغرقت الدراسة تسعون يوما. تبين من نتائج التحليل الاحصائي للبيانات وجود اختلافات معنوية ($p\leq0.05$) لصالح النعاج ذات حالة الجسم العالية، كما ارتفع معنويا وزن الجسم للحملان المولودة من نعاج ذات حالة جسم 3 و3،5 مقارنة بالحملان ذات حالة الجسم 2،5 في الأسبوع الرابع والسادس والثامن من الدراسة، في حين ارتفع معنويا وزن الجسم في الحملان المولودة من نعاج ذات حالة جسم 3 و3،5 في الأسبوع العاشر والثاني عشر من الدراسة. وكانت النعاج التي فطمت مواليدها بعمر 60 يوم أثقل معنويا من النعاج التي فطمت مواليدها بعمر 90 يوم، كما تبين من النتائج ان الحملان المفطومة بعمر 90 يوم اعلى وزنا معنويا في الأسبوع العاشر والثاني عشر من الدراسة، كما تحققت اعلى زيادة وزنية للحملان المولودة من نعاج ذات حالة جسم 2،5 و3 في الأسبوع الثاني عشر من الدراسة. بشكل عام تبين من الدراسة ان أفضل حملان حققت زيادات وزنية المولودة من نعاج ذات حالة جسم 3، وتحققت أفضل زيادات وزنية للحملان المولودة من نعاج ذات حالة جسم 2،5 و3.

الكلمات الدالة: الأغنام، حالة الجسم، نظام الفطام، وزن الجسم.

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