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BODY CONDITION SCORING OF LOCAL OSSIMI EWES AT MATING AND ITS IMPACT ON FERTILITY AND PROLIFICACY

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ABSTRACT

The aim of this work was to study how body condition score (BCS) of Ossimi ewes (no.=362) at mating could be reflected on fertility, fecundity and prolificacy traits. Ewes were scored for body condition which employs a 1 to 5 score scale with an interval range of 0.5 point. Ewes were synchronized for estrus with $PGF_{2\alpha}$ and were introduced to fertile rams to be hand-mated. Breeding season of ewes extended from the 1st of September to the end of December 2007.

BCS of Ossimi ewes at mating was significantly ($P < 0.05$) affected both fertility and fecundity measurements. Half of ewes that scored very low (1.5) and quarter of those scored high (3.5-4) did not show estrus. Through 2 estrous cycles, 82 – 84 % of moderate BCS (2.5 - 3) ewes were conceived, while only 17% of very low BCS ewes were conceived. Also, the estimates of lambs born per ewes joined (LB/EJ) and kilograms born per ewes joined (KgB/EJ) were the highest in ewes that had moderate BCS (2.5 – 3) at mating. BCS did not affect both lambs born per ewe lambing (LB/EL) and pregnancy period. Therefore, its recommended to maintain the body score of ewes at mating in a moderate condition (2.5 or 3 BCS) to optimize profitability of commercial sheep flocks.

Key words: ***sheep – body condition – fertility – prolificacy - profitability***

INTRODUCTION

Body weight of the ewe at mating has been shown to influence subsequent litter size **(Gordan, 1997)**. The body weight of the ewe has two components, basic skeletal size of the sheep on one hand and the degree of fatness (body condition, BC) on the other hand. Moreover, body condition score (BCS) is a better predictor than live weight for the weight of both total body fat and the individual fat depots **(Teixeira *et al.*, 1989)**. The concept of BCS has been described as the relationship between fat and non-fat tissues in the living animal **(Caldeira *et al.*, 2007a)**.

Subjective estimates of body condition are used widely by farmers and technicians for describing body condition in sheep, based on five-point scale assessed by palpation of the lumbar region **(Teixeira *et al.*, 1989)**. This method assesses mainly subcutaneous fat cover with some indications of muscle thickness.

A subjective body condition scoring system can be useful in assessing the nutritional status of ewes **(Thompson and Cheeke, 2005 and Naziha *et al.*, 2001)**. Also, the general metabolic status of ewes may be monitored by body condition on a

regular basis **(Caldeira *et al.*, 2007b)**. BCS provides not only a reliable prediction of the reserves available to comply with the animal's need, but its way of changing can also offer a broad picture of the predominant orientation of metabolism.

Merrell (1990) emphasized that, ewes should be scored 6-8 weeks prior to the start of mating, so that appropriate action may be taken to get as many sheep as possible to the optimum condition (scores 2.5-3) at the time rams are introduced. BCS should be monitored on a quarterly basis by someone from outside the herd as recommended by **Mosenfechtel (2004)**.

Ova wastage rates are increased and reproductive performance is reduced in ewes in very high levels of body condition **(Gunn et al., 1983 and Rhind *et al.*, 1984)**. While **Rhind *et al.* (1990)** reported that thare are non significant effects of ewe BCS on its ovulation rate, pregnancy rate and ova wastage. On the other hand, poor body condition was associated with a suppression of estrus **(Gunn and Doney, 1975)**.

Effect of body condition score on reproductive performance of local sheep was not studied, so it is the aim of this work.

MATERIALS AND METHODS

The present study was carried out on a commercial sheep flock located in Sharqia Governorate. Ossimi ewes (n = 362) of the age 1-5 years with average body weight 40 kg were permitted to breed in Autumn 2007 to study the impact of body condition score of ewes at mating on their fertility, fecundity and prolificacy traits.

Management of the flock:-

A day before the onset of breeding season, ewes were weighed and scored to BC. The BCS was measured by using the technique of **Russel *et al.* (1969)** which employs a 1 to 5 score scale, in addition to an interval range of 0.5 point.

Ewes were kept loose in semi-shade pens, where drinking water was available all day time. Egyptian clover (*Trifolium Alexendrinum*), clover hay, concentrate mixture and wheat straw were used for ration formulation according to season of the year.

During dry, early and mid pregnancy periods maintenance requirements were offered to ewes, while through pre-mating season (2 weeks), late pregnancy and lactation periods feed offered was increased by about 50%.

Estrus synchronization and mating:-

Ewes were estrus-synchronized with intramascular dose of 0.5 ml $PGF_{2\alpha}$ (Estrumate, 125µg Cloprostenol, Coopers Company, England). After 11 days of

the 1st injection, ewes did not show estrus were injected with another 0.5 ml dose.

Simultaneously, with the 1st and the 2nd injections of Estrumate, ewes came in heat were introduced to fertile rams to be hand-mated. Breeding season extended from 1st October to the end of December. The production system of the flock was based on three breeding seasons per 2 years.

Measured traits:

Fertility traits: ewes did not show estrus per ewes joined to rams (EDSE/EJ), ewes conceived per ewes joined (EC/EJ), ewes aborted per ewes joined (EA/EJ) and ewes lambed per ewes joined (EL/EJ).

Fecundity traits: lambs born per ewes joined (LB/EJ) and kilograms born per ewes joined (KgB/EJ).

Prolificacy traits: lambs born per ewe lambing (LB/EL) and kilograms born per ewe lambing (KgB/EL).

Other traits: birth weight of lambs and pregnancy period.

Statistical analysis:-

Data were subjected to one-way analysis of variance to determine statistical significant differences among different body condition scores using Duncan Multiple Range Test of **SPSS (2007)**.

RESULTS AND DISCUSSIONS:

Fertility and fecundity traits:-

All fertility and fecundity traits were significantly ($P < 0.05$) affected by BCS of ewes, as presented in tables 1 and 2.

Table 1 shows that half of ewes given very low BCS (1.5) and about quarter of those given the highest BCS (3.5 – 4) did not exhibit estrus despite extending the breeding season for three months, which reinforces the importance of BCS of ewes for their estrous activity as previously reported by **Rhind *et al.* (1984)** and **Gordon (1997)**. Where BCS of a ewe directly related to hypothalamic activity and GnRH secretion and that affects the reproductive performance **(Gordon, 1997)**.

Table 1: Means ± SE for ewes did not show estrus per ewes joined (EDSE/EJ) and ewes conceived per ewes joined (EC/EJ) according to body condition score (BCS) of ewes at mating.

BCS	No.	EDSE/EJ	EC_1/EJ	EC_2/EJ	EC_{1+2}/EJ	$EC_{\geq 3}$/EJ
1.5	12	$0.50^{d} \pm 0.15$	$0.17^{b} \pm 0.11$	$0.00^{b} \pm 0.00$	$0.17^{d} \pm 0.11$	$0.33^{ab} \pm 0.14$
2	104	$0.10^{ab} \pm 0.03$	$0.17^{b} \pm 0.04$	$0.29^{a} \pm 0.04$	$0.46^{c} \pm 0.05$	$0.44^{a} \pm 0.05$
2.5	98	$0.00^{a} \pm 0.00$	$0.31^{ab} \pm 0.05$	$0.53^{a} \pm 0.05$	$0.82^{ab} \pm 0.04$	$0.18^{b} \pm 0.04$
3	86	$0.00^{a} \pm 0.00$	$0.44^{a} \pm 0.05$	$0.40^{a} \pm 0.05$	$0.84^{a} \pm 0.04$	$0.16^{b} \pm 0.04$
3.5	42	$0.24^{c} \pm 0.07$	$0.24^{ab} \pm 0.07$	$0.33^{a} \pm 0.07$	$0.57^{c} \pm 0.08$	$0.19^{b} \pm 0.06$
4	20	$0.20b^{c} \pm 0.09$	$0.10^{b} \pm 0.07$	$0.50^{a} \pm 0.11$	$0.60^{cd} \pm 0.11$	$0.20^{b} \pm 0.09$
Total	362	0.08 ± 0.01	0.28 ± 0.02	0.39 ± 0.02	0.66 ± 0.02	0.26 ± 0.02

Means within columns with different superscripts are significantly different at 5% level.
EC_1: ewes conceived in the 1st estrus
EC_2: ewes conceived in the 2nd estrus
EC_{1+2}/EJ: ewes conceived in the 1st two estruses
$EC_{\geq 3}$: ewes need 3 estruses or more to be conceived

Rhind *et al.* (1984) recorded 20% reduction in ewes showing estrus of Greyface sheep had very fat BCS (3.5) compared to intermediate fat ones (BCS = 2.75) which is consistent with the results of the present study, suggesting a problem of ewes in very fat condition during the breeding season.

The highest estimate (0.44) for EC/EJ in the mating of the 1st estrus was recorded by ewes that had BCS of 3, while lower estimates 0.17, 0.17 and 0.10 were recorded in ewes of BCS 1.5, 2 and 4, respectively. Which means that ewes had very low or very high BCS were conceived in the 1st estrus, that led to increase the lambing interval of sheep flock; particularly for ewes had very low BCS where no ones of 1.5 BCS were conceived by mating of the 2nd estrus. Anyway, ewes that had score below 2 may need to be drawn out of the flock and given access to the best available grazing as recommended by **Gordan (1997)**.

The succeeded commercial sheep flock depends on only 2 estrous cycles (about 35 days) in its breeding season and culling individuals that are not conceived. In this regard, 82 – 84 % of ewes that had moderate BCS (2.5 and 3) were conceived through 2 estrous cycles, while only 17 - 46 % of ewes that had BCS of 1.5 - 2 and 57 – 60 % of ewes that had BCS of 3.5 - 4 were conceived.

About two fifths of the low BCS ewes and fifth of the high BCS ones needed more than 2 estruses to be conceived, and reached to five estruses in some ewes. Any way, a BCS below 1.5 and above 3.5 must be avoided to prevent metabolic disturbances and to save the cost of excessive fattening in ewes **(Caldeira *et al.*, 2007b)**.

Ewes had the lowest and the highest BCS recorded (Table 2) considerable estimates (10 – 17 %) of abortion than moderate BCS ones (0 – 2 %). Also, 98% of 2.5 and 3 BCS ewes were lambed compared to only 17% among 1.5 BCS ewes. It could be concluded that hormones and metabolite concentrations during the chronology of changes in BCS clearly show that ewes easily managed their body reserves when BCS was between2 and 3.5 **(Caldeira *et al.*, 2007b)**.

Table 2: Means ± SE for ewes aborted per ewes joined (EA/EJ), ewes lambed per ewes joined (EL/EJ), lambs born per ewes joined (LB/EJ) and kilograms born per ewes joined (KgB/EJ) according to body condition score (BCS) of ewes at mating.

BCS	No.	EA/EJ	EL/EJ	LB/EJ	KgB/EJ
1.5	12	$0.17^{c} \pm 0.11$	$0.17^{c} \pm 0.11$	$0.17^{d} \pm 0.11$	$1.07^{b} \pm 0.46$
2	104	$0.02^{ab} \pm 0.01$	$0.75^{b} \pm 0.04$	$0.82^{bc} \pm 0.05$	$2.76^{a} \pm 0.21$
2.5	98	$0.02^{ab} \pm 0.01$	$0.98^{a} \pm 0.01$	$1.06^{a} \pm 0.03$	$3.38^{a} \pm 0.15$
3	86	$0.02^{ab} \pm 0.02$	$0.98^{a} \pm 0.02$	$1.12^{a} \pm 0.03$	$3.30^{a} \pm 0.15$
3.5	42	$0.00^{a} \pm 0.00$	$0.76^{b} \pm 0.07$	$0.95^{ab} \pm 0.10$	$2.39^{a} \pm 0.33$
4	20	$0.10^{b}c \pm 0.07$	$0.60^{b} \pm 0.11$	$0.70^{c} \pm 0.15$	$2.63^{a} \pm 0.52$
Total	362	0.03 ± 0.01	0.84 ± 0.02	0.94 ± 0.03	2.95 ± 0.10

Means within columns with different superscripts are significantly different at 5% level.

The highest estimates for LB/EJ and KgB/EJ (Table 2) were attained with moderate BCS ewes, that corresponds with that mentioned before by **Caldeira *et al.* (2007b).** That evident metabolic welfare is observed for ewes between BCS of 2.5 and 3. The results of LB/EJ confirm previous findings that variation in BCS of ewes at mating reflected on lamb crop of sheep flocks. **Rhind *et al.* (1984)** recorded about 23% increase for potential lambing rate (LB/EJ) for moderate BCS ewes (2.75) than the very fat ones (BCS = 3.5).

An insignificant increase was attained in LB/EL of ewes concomitant with increasing their BCS (Table 3), that agreed with the results of **Naziha *et al.* (2001)** working on fat-tailed Barbarine ewes where the highest prolificacy was attained between BCS of 3.5 and 4. Birth weight of lambs was significantly affected by BCS of their dams, while pregnancy period was not affected by it.

Table 3: Means ± SE for lambs born per ewes lambing (LB/EL), kilograms born per ewes lambing (KgB/EL), birth weight of lambs and pregnancy period (PP) according to body condition score (BCS) of ewes at mating.

BCS	LB/EL	KgB/EL	Birth weight (kg)		PP (d)
			Singles	Twins	
1.5	1.00 ± 0.00 (2)	3.10^{b} ± 0.00 (2)	1.07^{b} ± 0.46 (2)	- (0)	152.00± 0.00 (2)
2	1.08 ± 0.03 (78)	3.86^{ab} ± 0.17 (76)	3.43^{ab} ± 0.08 (66)	3.80^{a} ± 0.19 (16)	152.00± 0.35 (52)
2.5	1.08 ± 0.03 (96)	3.68^{ab} ± 0.12 (90)	3.41^{ab} ± 0.08 (82)	3.18^{c} ± 0.09 (16)	151.14 ± 0.38 (72)
3	1.12± 0.04 (84)	3.64^{ab} ± 0.11 (78)	3.47^{ab} ± 0.07 (74)	3.40^{b} ± 0.04 (8)	151.39 ± 0.32 (66)
3.5	1.25 ± 0.08 (32)	3.87^{ab} ± 0.23 (26)	3.31^{ab} ± 0.14 (20)	2.87^{c} ± 0.07 (12)	151.00± 0.38 (26)
4	1.17 ± 0.11 (12)	4.38^{a} ± 0.31 (12)	4.00^{a} ± 0.20 (10)	3.40^{b} ± 0.03 (6)	152.00± 1.10 (6)
Total	1.11 ± 0.02 (304)	3.76 ± 0.07 (284)	3.44 ± 0.04 (254)	3.34 ± 0.08 (58)	151.30 ± 0.18 (224)

Means within columns with different superscripts are significantly different at 5% level.
Numbers between parentheses represent number of observations.

Therefore, it is recommended to maintain the body score of ewes at mating in a moderate condition (2.5 or 3 BCS) to optimize profitability of commercial sheep flocks.

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العلاقة بين تصنيف جسم النعاج الأوسيمى عند التلقيح وخصوبتها ونسبة التوأميه بها

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أجري هذا البحث بهدف دراسة تأثير حالة جسم نعاج الأوسيمى (٣٦٢ نعجة) عند التلقيح على صفات الخصوبة و التوأمية. حيث تم تقدير حالة الجسم من ١ الى ٥ درجات بفاصل ٠,٥ درجة.

تم استحداث الشياع للنعاج باستخدام البروستجلاندين (الاستروميت) مع تقديم النعاج التى استجابت لتنظيم الشياع للكباش ليتم تلقيحها.

وقد وجد أن حالة جسم النعاج عند التلقيح قد أثرت معنوياً على معظم مقاييس الخصوبة و التوأمية للنعاج. حيث وجد أن حوالى نصف النعاج التى لها حالة جسم ضعيفة (١,٥ درجة) وأيضاً ربع النعاج ذات حالة الجسم الزائدة (٣,٥ – ٤ درجة) لم تستجيب لتنظيم الشياع. وجد أيضاً أن ٨٢ – ٨٤ % من النعاج المعتدلة فى حالة الجسم (٢,٥ – ٣ درجة) قد تم إخصابها خلال دورتي شبق متعاقبتين، بينما ١٧% فقط من النعاج الضعيفة فى حالة الجسم (١,٥ درجة) قد نجح اخصابها. كذلك وجد أن عدد الحملان المولودة و عدد الكيلوجرامات المولودة نسبة للنعاج الموضوعة مع الكبش كانت الأفضل فى النعاج المعتدلة فى حالة الجسم. ومن ناحية أخرى ، وجد أن حالة جسم النعاج عند التلقيح لم تؤثر معنوياً على كل من عدد الحملان المولودة / النعاج الوالدة وأيضاً على مدة الحمل. ومن ثم فإنه ينصح بالحفاظ على النعاج عند التلقيح فى حالة جسم بين درجة ٢,٥ و ٣ حتى يمكن تحقيق أفضل أربحية من القطعان التجارية للأغنام.