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PROLIFICACY IN SAIDI AND OSSIMI EWES AND ITS RELATION TO THEIR PARITY, AGE, BODY CONDITION SCORE AND BODY WEIGHT

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ABSTRACT

A retrospective study was undertaken in Sheep Experimental Unit, Experimental Station of Sids belonging to Animal Production Research Institute on a total of 150 Saidi and 200 Ossimi ewes over a period from January 2006 to June 2010 to estimate influence of breed, parity, age, body condition score (BCS) and body weight of ewes at breeding time on prolificacy of indigenous Saidi and Ossimi sheep. Saidi ewes were more ($p< 0.001$) prolific than Ossimi ones. Prolificacy was found to be positively correlated with parity (r=0.14, $p< 0.01$), age (r=0.36, $p< 0.01$), body condition score (r=0.44, $p< 0.01$) and body weight (r=0.40, $p< 0.05$) in Saidi ewes as well as with parity (r=0.12, $p< 0.05$), age (r=0.18, $p< 0.01$) and body weight (r=0.28, $p< 0.05$) in Ossimi ewes. The results indicated that prolificacy can be improved through breed selection and improved management. Increasing age, body condition score and body weight at breeding can increase prolificacy in Saidi ewes and to some extent in Ossimi ewes. Improved management of sheep flocks through good nutrition and control of diseases, internal and external parasites can increase BCS and body weight of ewes at breeding which could increase their prolificacy. The economic feasibility of applying these management practices will vary among production systems.

Key words: Prolificacy, Saidi, Ossimi, sheep, BCS, body weight

INTRODUCTION

Sheep contribute to about 6% of the total red meat produced in Egypt and the total sheep population in Egypt is about 4 200 000 heads **(El Nahas et al., 2008).** Sheep in Egypt are belonging to wooled fatty tailed breeds. Rahmany, Barki, Ossimi and Saidi are the most common sheep breeds in Egypt **(Mahfouz et al., 2008)** which are characterized by extended breeding seasons, high fertility, and low prolificacy **(Almahdy et al., 2000).** Increasing the Egyptian sheep population by means of improving

reproductive performance and by increasing the number of lambs born is considered an important demand in the development of sheep production in Egypt.

In sheep the number of ova released can range from one to many depending upon the breed **(Driancourt et al., 1986; Hunter et al., 2004).** Marked genetic differences in ovulation and prolificacy rates have been found in different breeds of sheep **(Packham and Triffit, 1966; Aboul-Naga and Aboul-Ela, 1985; Philipon and Driancourt, 1987; Hunter et al., 2004; Lassoued et al., 2004; Gaskins et al.,2005; Salah et al., 2005; Kareta et al., 2006).** In many studies, prolificacy, being strongly dependent on maternal age and parity. Prolificacy can be increased with advance in parity **(Galina et al., 1996; Maria and Ascaso, 1999; Koycegiz et al., 2009)** and increasing age at breeding **(Glimb,1971; Laster et al., 1972; Rajab et al., 1992; Bunge et al., 1993; Mouard et al., 2001; Kareta et al., 2006).** Ewes with high body condition score as a reflection of nutritional flushing produce more lambs than those with low body condition score **(Rattary et al., 1981; West et al., 1991; Vinoles et al., 2002).** On the other hand, higher live body weight of the ewe at the time of mating was positively associated with higher ovulation and prolificacy rates **(Hedges and Reardon, 1975; Rattary et al., 1981; Thomson and Bahhady, 1988; Clutton-Brock et al., 1996; Emsen and Yaprak, 2006).**
The objectives of this study included comparing the relative difference in prolificacy of ewes between Saidi and Ossimi breeds and determining whether parity, age, body condition score and body weight at breeding time are related to prolificacy of these ewes.

MATERIALS AND METHODS

Accommodation and management: This study was carried out in Sheep Experimental Unit, Experimental Station of Sids in Beni-Suef Governorate, Animal Production Research Institute, Agricultural Research Center belonging to Ministry of Agriculture, Egypt on a total of 150 Saidi and 200 Ossimi ewes over a period of January 2006 to June 2010. Ewes were housed in partially sheltered yards. In summer, ewes were fed on processed feed (14% protein and its main constituents are

yellow corn, soya bean, cotton seed meal, mineral and vitamin premix and common salt) at a rate of 3% of body weight in addition to roughage which is offered ad-lib; while in winter processed feed were offered at a rate of 2% of body weight in addition to berseem (Egyptian clover or Trifolium alexandrinum).Feed were distributed three times daily, in the morning, afternoon and late afternoon. Before the breeding season, ewes were flushed by feeding only straw at a maintenance rate for 2-3 days then feed allowances were increased by about 25% more than maintenance requirements and continued for 2-3 weeks.

Sheep are continuously bred all the year round at January, May and September each one concerning half the flock, in order to achieve an eight months lambing interval. In the breeding season one ram is kept with 25 ewes for two successive cycles (about 36 days) and then removed. No method for pregnancy diagnosis is used and only barren ewes were detected before expected lambing by 15-30 days from signs of pregnancy. Ewes are isolated in lambing pen before the time of expected lambing by 2-3 days and then returned to the group pen after 1-2 days. Animals were drenched bimonthly for gastrointestinal worms and sprayed with insecticides against ectoparasites every three months.

Data collection: Data about birth date, parity, season of breeding and live body weight at breeding of each ewe were collected and retrieved from records. Prolificacy was defined as the number of lambs born per lambing ewe (1, 2 or 3).

Body condition scoring: Condition scoring is a simple method of assessing the condition of sheep by placing the hand over the backbone in the area just behind the rib cage. Scoring is done on a five point scale of 1 to 5, where 1 is emaciated (extremely thin), 2 is lean (thin), 3 is good or right, 4 is fat and 5 is very fat or obese according to (Suiter, 1994; Thompson and Meyer,1994; Winter and Charnley,1999).

Statistical analysis: The effect of breed (Saidi or Ossimi) on prolificacy was analyzed by student *t*-test. Pearson correlation coefficient analysis was used to measure the degree of relationship between variables. All data were analyzed by using SPSS.13 statistical software (2004).

RESULTS

Table 1. Means of parity, age, BCS and body weight in Saidi and Ossimi sheep

Factors	Saidi		Ossimi	
	n	Mean ± S.E.	n	Mean ± S.E.
Parity	880	3.17± 0.06*	725	2.68 ± 0.09
Age (months)	485	52.47± 2.07*	420	46.67 ± 1.21
BCS	154	2.00 ± 0.09	125	2.48± 0.07*
Body weight kg	248	34.66 ± 0.96	223	40.29± 0.59*

Results are expressed as means ± S.E. * Within rows indicate significant difference at $p < 0.01$

Table 2. Means of prolificacy in Saidi and Ossimi sheep

Breed	n	Mean	S.E.
Saidi	882	1.32*	0.02
Ossimi	922	1.08	0.01

Results are expressed as means ± S.E.

*** Within rows indicate significant difference at $p < 0.001$**

Table 3. Correlation between parity, age, BCS and body weight of Saidi ewes and their prolificacy

Factors	n	r	Significance level
Parity	880	0.14	p< 0.01
Age at breeding	485	0.36	p< 0.01
BCS at breeding	154	0.44	p< 0.01
Body weight at breeding	248	0.40	p< 0.05

Table 4. Correlation between parity, age, BCS and body weight of Ossimi ewes and their prolificacy

Factors	n	r	Significance level
Parity	725	0.12	p< 0.05
Age at breeding	420	0.18	p< 0.01
BCS at breeding	125	0.06	p< 0.7
Body weight at breeding	223	0.28	p< 0.05

DISCUSSION

The obtained results in Table (1) revealed that means of parity (3.17) and age (52.47 months) in ewes of Saidi flock were significantly ($p < 0.01$) high as compared to parity (2.68) and age (46.67 months) of ewes in Ossimi flock. On the other hand, Ossimi ewes had a significantly ($p < 0.01$) higher means of BCS (2.48) and body weight (40.29 kg) than their corresponding (2.00) and (34.66 kg) of Saidi ewes respectively which is mainly related to breed difference.

Results in Table (2) Showed that Saidi ewes had a significantly ($p<0.001$) greater prolificacy (1.32) than Ossimi ewes (1.08). This difference in prolificacy can be attributed to the effect of breed on ovulation rate and number of ova shed from the ovary and this reported in many studies as **(Driancourt et al., 1986; Philipon and Driancourt, 1987; Rajab et al., 1992; Hunter et al., 2004; Lassoued et al., 2004; Gaskins et al., 2005; Kareta et al., 2006)**. **Salah et al. (2005)** found that Saidi sheep had a low prolificacy rate and recorded an average prolificacy (1.05) and twinning rate of 5%, while **Aboul-Naga and Aboul-Ela, (1985)** reported a prolificacy range from 1.15 to 1.25 in Ossimi ewes in Egypt.

From Tables (3&4), it was clear that a slight positive correlation exists between parity and prolificacy in Saidi ($r=0.14$, $p< 0.01$) and Ossimi ewes ($r=0.12$, $p< 0.05$). These results are, to some extent, in agreement with the data obtained by **(Galina et al., 1996; Maria and Ascaso, 1999; Koycegiz et al., 2009)** who found a significant strong positive relation between parity and prolificacy. Results of **Macedo and Hummel (2006)** indicated that Parity was not as significant a source of variation ($P>0.05$) for prolificacy rate in Pelibuey ewes under an intensive tropical management and they revealed this to the variation in mating weight of the ewes between their studies and other studies. So the effect of parity on prolificacy may vary according to breed, weight of the ewe, season of breeding and from year to another.

Concerning the relation between age of ewes at breeding time and their prolificacy as shown in Tables (3&4), it was apparent that a low positive correlation was found between age of Saidi ewes and their prolificacy ($r=0.36$, $p< 0.01$) whereas this correlation was slight ($r=0.18$, $p< 0.01$) in case of Ossimi ewes. These findings are nearly similar to that presented by **(Glimb, 1971; Laster et al., 1972; Rajab et al., 1992; Bunge et al., 1993; Kareta et al., 2006)** who reported that prolificacy can be increased with increasing age of ewes at breeding in some breeds. **Notter, (2000)** mentioned that high prolificacy was observed for ewes lambing between 4 and either 7 (Polypay) or 8 (Targhee and Suffolk) years of age. But these results disagree with **Al-Sabbagh et al. (1995)** and **Gaskins et al. (2005)** who found no marked effect of age at breeding on prolificacy in Columbia, Polypay, Targhee and Rambouillet sheep breeds and stated that this effect differ according to breed. Generally, the high prolificacy associated with increased parity and age at breeding may be related to the increase in body weight and body condition of the ewe with advancing age which can affect ovulation rate and subsequently prolificacy.

Body condition scoring is a method used for predicting body fat which is a reflection of the nutritional state of the ewe. The results illustrated in Tables (3&4) indicated that a moderate positive correlation was found between BCS at breeding time and prolificacy of Saidi ewes ($r=0.44$, $p<$

0.01), while this relation was not significant in Ossimi ewes (r=0.06, p< 0.7). The obtained results are similar to that reported by **(Rattary et al., 1981; Degen et al., 1987; West et al., 1991; Vinoles et al., 2002; Lassoued et al., 2004; Emsen and Yaprak, 2006).** In contrast, **Torre et al. (1991)** reported that BCS at mating seemed to affect fertility more than prolificacy. The significant association reported between BCS and prolificacy in Saidi ewes might have been due to more ovulation rate, more follicular wave and high FSH levels in ewes with high BCS as compared with those of low BCS. **Vinoles et al. (2002)** reported that all ewes with good body condition had three waves of follicular development during an interovulatory period, while a smaller number of follicular waves were seen in ewes with low body condition. Furthermore, during follicular phase, FSH was higher and oestradiol was lower in high body condition ewes than they were in low body condition ones. A higher FSH concentration before ovulation may allow the recruitment of additional follicles from a larger pool of small antral follicles and a subsequent increase in ovulation rate in high body condition than in low body condition ewes. A higher plane of nutrition may reduce the secretion of negative feedback hormones (oestradiol) from dominant follicles, which is allowing more follicles to reach the preovulatory stage **(Scaramuzzi et al., 1993)**. According to **Vinoles et al. (2005) and Forcada and Abecia (2006)**, high fat and food intake are able to modify the sensitivity of the hypothalamus to estradiol negative feedback, with those effects being associated with increased plasma concentrations of insulin, glucose and leptin which can stimulate the ovary and increase ovulation rate.

Regarding the correlation between body weight at breeding and prolificacy of Saidi and Ossimi ewes as shown in Tables (3&4), it was clear that a moderate positive correlation was found between body weight at breeding time and prolificacy of Saidi ewes (r=0.40, p< 0.05), whereas a low positive correlation was existed in Ossimi ewes (r=0.28, p< 0.05). Our findings are in general agreement with those of **(Hedges and Reardon, 1975; Thomson and Bahhady, 1988; Clutton-Brock et al., 1996; Emsen and Yaprak, 2006);** however, **Laster et al. (1972)** stated

that weight at breeding did not affect prolificacy of ewe lambs in 19 studied breed groups. Also **Michels et al. (2000)** found that within breed the relationship between ewe body weight and ovulation rate and consequently prolificacy was found to be positive in some breeds but among most breeds this relation was absent. As previously mentioned in BCS, body weight is a reflection of the nutritional state of the ewe, so the positive correlation between body weight and prolificacy may be related to high FSH level and consequently increased ovulation rate and prolificacy. In mature ewes, the positive relationship between weight at breeding and litter size or ovulation rate is well established **(Smith, 1985). Nawaz and Meyer (1991)** reported that premating body weight of the ewe had significant but small effects on both ovulation rate and litter size.In general, the low figures obtained in Ossimi ewes as compared to Saidi ewes may be resulted from their lower prolificacy.

CONCLUSION

Prolificacy can be improved through breed selection and good management. Saidi ewes are more prolific than Ossimi ones. Increasing age, body condition score and body weight at breeding can increase prolificacy in Saidi ewes and to a lower extent in Ossimi ewes. Improved management of sheep flocks through good nutrition and control of diseases, internal and external parasites can increase BCS and body weight of ewes at breeding which could increase their prolificacy. The economic feasibility of applying these management practices will vary among production systems.

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عدد الحملان المولودة للخلفة الواحدة فى النعاج الصعيدى الاوسيمى وعلاقتها بعدد الولادات وعمر ودرجة الاكتناز ووزن هذه النعاج

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تمت هذه الدراسة فى وحدة بحوث الأغنام بمحطة سدس للبحوث الزراعية التابعة لمعهد بحوث الإنتاج الحيوانى على عدد 150 نعجة صعيدى و200 نعجة اوسيمى فى الفترة من يناير 2006 إلى يونيو 2010 لاستبيان تأثير السلالة و عدد الولادات و العمر ودرجة الاكتناز و الوزن لهذه النعاج عند ميعاد التلقيح علی عدد الحملان المولودة للخلفة الواحدة فى النعاج الصعيدى الاوسيمى. أظهرت هذه الدراسة وجود زيادة معنوية فى عدد الحملان المولودة للخلفة الواحدة فى النعاج الصعيدى عنها فى الاوسيمى. كان هناك ارتباط معنوى ايجابى بين عدد الحملان المولودة للخلفة الواحدة فى النعاج الصعيدى وعدد الولادات والعمر ودرجة الاكتناز والوزن عند التلقيح لهذه النعاج . كما وجد ارتباط معنوى ايجابى بين عدد الحملان المول ودة للخلفة الواحدة فى النعاج الاوسيمى وعدد الولادات والعمر والوزن عند التلقيح لهذه النعاج. ولقد استنتج من هذه الدراسة انه يمكن زيادة عدد الحملان المولودة للخلفة الواحدة عن طريق انتقاء السلالات والرعاية والتغذية الجيدة .كما انه من الممكن زيادة عدد الحملان المولودة للخلفة الواحدة فى النعاج الصعيدى بازدياد العمر ودرجة الاكتناز والوزن لهذه النعاج عند ميعاد التلقيح وبحد اقل فى النعاج الاوسيمى.