

# Influence of body weight on reproductive activity in Sarda female lambs

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**RIASSUNTO** – Influenza del peso corporeo sull'attività riproduttiva delle agnelle di razza Sarda. Per la presente ricerca sono state utilizzate 300 agnelle di razza Sarda, nate tra Novembre e Dicembre, allo scopo di studiare l'effetto del peso corporeo sull'attività riproduttiva. Gli animali, allevati a fotoperiodo naturale, durante il giorno venivano tenuti al pascolo e la notte nell'ovile, dove ricevevano 300 g/capo di concentrato. Le agnelle sono state pesate il 30 Giugno, il 1° Agosto (introduzione degli arieti), e il 10 Ottobre. Dal 1° Gennaio al 15 Marzo sono stati registrati i parti, il numero e il sesso degli agnelli nati. L'attività riproduttiva ha mostrato l'apice in corrispondenza del 10 Settembre. Il peso corporeo degli animali che hanno partorito è risultato, in tutti i rilievi effettuati, superiore ( $P < 0,01$ ) rispetto agli animali che non hanno partorito; mentre non ha influenzato la loro prolificità. I risultati hanno evidenziato che l'inizio dell'attività riproduttiva nelle agnelle di razza Sarda è condizionato principalmente dallo sviluppo corporeo degli animali.

**Key words:** body weight, puberty, female lambs.

**INTRODUCTION** – One way to improve reproductive performance of ewes is through extending its life-time productivity. Breeding ewe lambs is one method of improving the reproductive performance in the sheep. In order to produce an offspring when the ewe lamb is approximately 1 yr of age, the autumn-born ewe must obtain puberty before the autumn breeding season begins. Onset of puberty is determined by integration of both internal and external factors, which then enable the neuroendocrine or hormonal event occur (Shirley *et al.*, 2001). Age, photoperiod and body weight are the principal factors influencing puberty. The age at onset of the reproductive activity in the sheep is different among the various breeds. In the Sarda lambs the age of the onset of puberty is about 7-8 months. However the animals that have this age don't reach the puberty if photoperiod and body weight are not suitable. Both the female lambs born in October-November and in February reach puberty in the same subsequent autumn breeding season. This reproductive behaviour evidences that photoperiod plays an important role in the onset of puberty (Papachristoforou *et al.*, 2000). The female lambs born in later spring uneasily reach puberty within the subsequent breeding season, although photoperiod is favourable. This retard in the onset of reproductive activity is due to the attainment of the body maturity only during subsequent long day period but they reach reproductive activity only during the autumn of the subsequent year (Foster *et al.*, 1985). In fact, some authors suggested that besides photoperiod and age, attainment of the 60% of adult weight is essential for onset of puberty (Abecia *et al.*, 2001). Indeed the undernourished animals delay puberty, in comparison to well nourished subjects (FAnson *et al.*, 1997). This behaviour is linked to the different LH pulse frequency: restricted diet lambs show one pulse per 4 hours, instead fed *ad libitum* subjects manifest four or five pulse per 4 hours (Ebling *et al.*, 1990). The purpose of this investigation is to determine the onset of puberty and to research its linkage with body weight in Sarda female lambs during breeding season under natural condition.

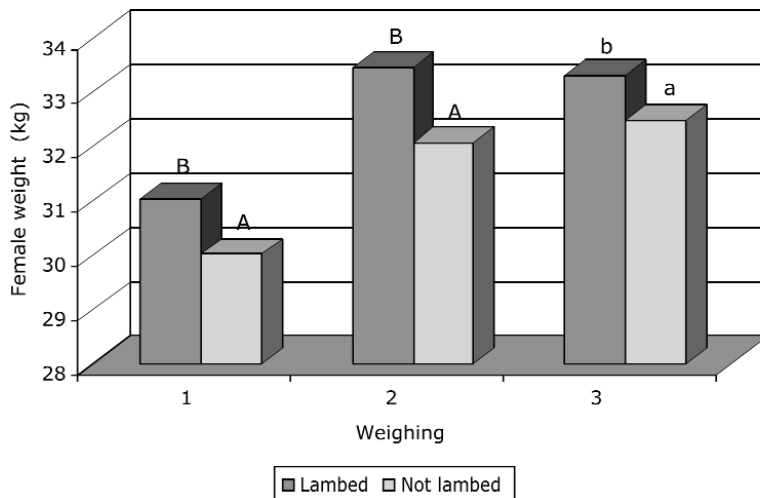
**MATERIAL AND METHODS** – The study was conducted in three sheep farms located in the centre of Sardinia where this breeding is very diffused. Among the female lambs born from later November to early December were chosen 300 animals which in June presented a body weight of at least 26.0 kg. Moreover the animals were born as singles because the twins are smaller at birth and increase their body weight slowly. The lambs were kept, from weaning, separated from the remainder of the flock and under natural photoperiod. During the day the animals went to a pasture of polyphytic grass and at night were kept in sheepfold where they received 300 g/head of concentrate feed, hay and water were *ad libitum*. The protein and energy levels of concentrate were 18% of crude protein and 12.5 MJ of metabolizable energy/kg dry matter, respectively. At the date of 30<sup>th</sup> June the lambs were identified by numerated collar and number of tattoo in the ear. All the animals were weighed on 30<sup>th</sup> June, 1<sup>st</sup> August and 10<sup>th</sup> October. Twelve males were introduced in the flock of female lambs on 1<sup>st</sup> August and they were removed on 10<sup>th</sup> October. From 1<sup>st</sup> January to 15<sup>th</sup> March the lambing dates and offspring number and sex were recorded. The data were submitted to analysis of variance (Minitab®).

**RESULTS AND CONCLUSIONS** – The results of the present experiment show that the female lambs started their reproductive activity during the second week from males introduction. Puberty in the female lambs is a physiological complex process requiring a certain time period to reach a full reproductive activity (Foster and Ryan, 1981). In fact in the present experience female lambs employed about two weeks for manifest reproductive activity stimulated by male effect. Moreover the peak of reproductive activity was registered around the sixth week after males introduction (Table 1).

Table 1. Reproductive activity in female lambs calculated through lambing date.

August				September				October	
1 <sup>st</sup> week	2 <sup>nd</sup> week	3 <sup>rd</sup> week	4 <sup>th</sup> week	1 <sup>st</sup> week	2 <sup>nd</sup> week	3 <sup>rd</sup> week	4 <sup>th</sup> week	1 <sup>st</sup> week	2 <sup>nd</sup> week
Cyclic female lambs									
0	5	25	33	30	56	29	23	21	20

Figure 1. Body weight in the three observations subdivided among the ewes that gave birth and those that have not lambd (A, B = P<0.01; a, b = P<0.05).



This retard in reproduction response is difficult to explain because the age and body weight were suitable yet at the moment of males introduction. However, it cannot be excluded that the photoperiod effect could have influenced the reproductive activity. Indeed, between later August and middle September the photoperiod presents a natural decrease in day length and this could have determined a further stimulus, besides male effect, to trigger reproductive activity (Herbosa *et al.*, 1994). The animals that gave birth in all the three weighing time displayed the higher weight as shown in figure 1. The difference with the ewes that have not lambed, was statistically significant for  $P < 0.01$  in the first and second observation and for  $P < 0.05$  in the third relief. In fact sexual development in the animals appears to be more closely associated with body growth than with chronological age (Dyrmundsson and Lees, 1972). According with these authors also in our observation body weight is an essential requirement for start reproductive activity considering that the female lambs were of the same age. In the Sarda female lambs it was thought that a weight more than 26 kg were enough for trigger puberty (Bini *et al.*, 2000). Instead, in the present research we have observed that the required body weight was about 30 kg. Presumably the genetic selection determined a rise in the body size of the Sarda breed and this is carrying to an increase of the demanded weight for the onset of the puberty.

In conclusion the present study provides evidence that body weight is the most important factor for the onset of puberty in the Sarda female lambs.

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