

Short Communications/Kort Mededelings

Influence of season of birth on sexual maturity in Karakul ewe lambs

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Ewe lambs born to group pen-fed Karakul ewes in the summer (February), winter (June) or spring (October) respectively, were raised to study the influence of season of birth on the onset of sexual maturity. Lambs were exposed to fertile rams from 90 days of age (weaning). Ewe lambs born in summer, winter or spring attained sexual maturity at a mean (\pm SD) age of 355,3 \pm 22,6; 275,6 \pm 41,9 and 225,4 \pm 12,1 days at a mean (\pm SD) body mass of 53,3 \pm 3,6; 40,6 \pm 6,3 and 35,6 \pm 4,2 kg respectively. Season of birth in this study had a highly significant ($P < 0,01$) influence on age and body mass at first conception in Karakul ewes.

Ooilammers van Karakoelooie gebore in die somer (Februarie), winter (Junie) of lente (Oktober) respektiewelik, is met kraal-groepsvoeding grootgemaak om die invloed van seisoen van geboorte op die aanvang van geslagsrypheid te ondersoek. Lammers is blootgestel aan vrugbare ramme vanaf 90-dae-ouderdom (speenouderdom). Ooitjies gebore in die somer, winter of lente het geslagsrypheid by 'n gemiddelde (\pm SA) ouderdom van 355,3 \pm 22,6; 275,6 \pm 41,9 en 225,4 \pm 12,1 dae bereik met gemiddelde (\pm SA) liggaamsmassas van 53,3 \pm 3,6; 40,6 \pm 6,3 en 35,6 \pm 4,2 kg respektiewelik. Seisoen van geboorte het in hierdie ondersoek 'n hoogs betekenisvolle ($P < 0,01$) invloed op ouderdom en liggaamsmassa met eerste besetting in Karakoelooie gehad.

Keywords: Karakul ewe lambs, birth season, sexual maturity.

Optimal reproduction is of the utmost importance in farm animals. Ewe lambs reaching puberty during their first breeding season have a higher reproduction potential, even if they are not bred, than those failing to reach puberty during the first year (Hulet, Wiggins & Ercanbrack, 1969). There is also a positive relationship between early lamb production and later reproduction performance (Terrill, 1972). It has been demonstrated that ewes bred as lambs have a higher lifetime production rate than those bred as yearlings (Southam, Hulet & Botkin, 1971).

Season is an important determinant of age at sexual maturity. A significant season-of-birth effect on age at first estrus (puberty) in ewe lambs was demonstrated by Watson & Gamble (1961), Dufour (1975), Foster (1981) and Fitzgerald & Butler (1982). Foster (1981) found that autumn-born ewe lambs, in contrast to spring-born ewe

lambs, did not reach puberty at 30 weeks; an age which is attained during the spring and summer anestrus season. These results suggest the hypothesis that the delay in onset of ovulation in autumn-born lambs is due to a photoperiod-induced delay of the decrease in responsiveness to estradiol inhibition of tonic LH secretion. In general it means that the earlier ewe lambs are born prior to the subsequent breeding season, the higher their age is at puberty.

According to a report on Agriculture in South West Africa (Verslag oor Landbounavorsing, 1976/1977), problems are experienced in the successful breeding of spring-born Karakul ewe lambs during their first breeding season. Le Roux, Van der Westhuizen & Marais (1975) found that spring-born Karakul ewe lambs reached puberty at a significantly ($P < 0,01$) higher age than autumn-born ewe lambs. Consequently to possibly clarify this contradiction, this experiment was undertaken to study the influence of season of birth on sexual maturity in Karakul ewes under favourable feeding conditions.

Groups of 10 ewe lambs each born (mean \pm SA) to group pen-fed Karakul ewes during the summer (7 \pm 3,7d February), winter (13 \pm 0,3d June) or spring (5 \pm 2,6d October) season were used in this study. Lambs were docked soon after birth. The diet consisted of lucerne and maize cob meal to satisfy their maintenance requirements (National Research Council, 1975). Ewe lambs were exposed to fertile rams from weaning (90 days) until the end of the following breeding season in mid-August.

Sexual maturity, defined as first conception, was calculated by deduction of the gestational period of 148 days for maiden Karakul ewes (Nel, 1950), from the age of individual ewes at partus. This approach was necessitated by the difficulty experienced in identification of first estrus. The unfasted body mass of the experimental animals was determined fortnightly.

Season of birth had a highly significant ($P < 0,01$) influence on age at first conception in Karakul ewes. Ewes born in summer (100%), winter (100%) or spring (90%) reached sexual maturity at a mean of 355, 276 and 225 days respectively, (Table 1) during their first breeding season, compared to Watson & Gamble (1961) who found Merino ewes born in summer, winter and spring to

Table 1 Mean conception rate, age and body mass of maiden Karakul ewes at first conception

Season of birth	First conception			
	<i>n</i>	%	Age days \pm SD	Body mass kg \pm SD
Summer	10	100	355,3 \pm 22,6 ^a	53,3 \pm 3,6 ^{bc}
Winter	10	100	275,6 \pm 41,9 ^a	40,6 \pm 6,3 ^c
Spring	10	90	225,4 \pm 12,1 ^a	35,6 \pm 4,2 ^b

^{a,b,c} = Mean values with a similar superscript differ significantly ($P < 0,01$)

n = Number of animals

reach puberty at 375, 286 and 186 days respectively. Both Dufour (1975) and Foster (1981) found puberty to occur sooner in spring than in autumn-born ewes at 202 ; 217 and 313; 343 days of age respectively. When taking into consideration that ewe lambs experience one to two silent ovulations before conception is accomplished (Bernardinelli, Dailey, Butcher & Inskeep, 1980), then the results of this study are similar to those cited in the literature.

The mean time of sexual maturity in summer-, winter- and spring-born lambs occurred after the onset of the breeding season, (mid-January) for mature Karakul ewes (Boshoff, Gouws & Nel, 1975).

Sexual maturity was initiated later in the breeding season alternatively in summer, winter- and spring-born ewe lambs. This is in accordance with results found by Foster (1981).

Karakul ewe lambs born in summer, winter or spring attained sexual maturity at a mean body mass of 53, 41 and 36 kg respectively (Table 1). Comparable masses found for the Merino at puberty are 43, 37 and 34 kg respectively (Watson & Gamble, 1961). The average body mass of 34 and 32 kg at puberty for autumn- and spring-born ewes (Dufour, 1975), together with the wide range of masses in the present study at sexual maturity and masses at puberty for spring-born, outside autumn-born and inside autumn-born ewe lambs (40 – 49 kg, 33 – 51 kg and 33 – 44 kg respectively) found by Foster (1981), showed that a uniform 'critical' body mass for initiation of ovulation does not exist. However, a minimum body mass may be required for onset of ovulation. From the above it is evident that the photoperiod (season of birth), in conjunction with feeding regime, plays a major role in determining the body mass at puberty or sexual maturity.

References

- BERARDINELLI, J.G., DAILEY, R.A. BUTCHER, R.L. & INSKEEP, E.K., 1980. Source of circulating progesterone in prepubertal ewes. *Biol. Reprod.* 22, 233.
- BOSHOFF, D.A., GOUWS, D.J. & NEL, J.A., 1975. Die reproduksiepatroon van vyf skaaprasse onder ekstensiewe toestande. *S.-Afr. Tydskr. Veek.* 5, 37.
- DUFOUR, J.J., 1975. Effects of seasons on postpartum characteristics of sheep being selected for year round breeding and on puberty of their female progeny. *Can. J. Anim. Sci.* 55, 487.
- FITZGERALD, J. & BUTLER, W.R., 1982. Seasonal effects and hormonal patterns related to puberty in ewe lambs. *Biol. Reprod.* 27, 853.
- FOSTER, D.L., 1981. Mechanism for delay of first ovulation in lambs born in the wrong season (fall). *Biol. Reprod.* 25, 85.
- HULET, C.V., WIGGINS, E.L. & ERCANBRACK, S.K., 1969. Estrus in range ewe lambs and its relationship to lifetime reproductive performance. *J. Anim. Sci.* 28, 246.
- LE ROUX, P.J., VAN DER WESTHUIZEN, V. & MARAIS, C.B., 1975. Die effek van vroegepeen op groei en puberteit van Karakoellammers. *S.-Afr. Tydskr. Veek.* 5, 95.
- NATIONAL RESEARCH COUNCIL, 1975. Nutrient requirements of domestic animals. Nutrient requirements of sheep. National Academy of Sciences, Washington.
- NEL, J.A., 1950. 'n Kritiese studie van die ontwikkeling, teling en versorging van die Neudam-Karakoelstoet. M. Sc. (Landbou) verhandeling Universiteit van Stellenbosch.
- SOUTHAM, E.R., HULET, C.V. & BOTKIN, M.P., 1971. Factors influencing reproduction in ewe lambs. *J. Anim. Sci.* 33, 1282.
- TERRILL, C.L., 1972. Reproduction of sheep. In: Reproduction in Farm Animals. (Ed.) E.S.E. Hafez, Lea & Febiger, Philadelphia.
- VERSLAG OOR LANDBOUNAVORSING 1976/1977. Die effek van ouderdom en eerste paring op produksie en reproduksie van Karakoelooie. S.W.A. Streek, Departement van Landbou-tegniese Dienste.
- WATSON, R.H. & GAMBLE, L.C., 1961. Puberty in the Merino ewe with special reference to the influence of season of birth upon its occurrence. *Aust. J. agric. Res.* 12, 124.