

THE INFLUENCE OF MATERNAL HANDICAP ON GROWTH AND REPRODUCTION IN SHEEP

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OPSOMMING: DIE INVLOED VAN MOEDERSSTREMMING OP GROEI EN VOORTPLANTING BY SKAPE

Ooie met enkel lammers het óf voldoende voer ontvang om liggaamskondisie gedurende laktasie te handhaaf (hoë peil) óf die hoeveelheid voer is verminder sodat 'n gemiddelde verlies van naasteby 20% in liggaamsmassa teweeggebring is (lae peil). Die lammers het vrye toegang tot ru- en konsentraatvoere gehad. Na speen is die lammers gevoer om vinnige groei te bevorder. Die sogende lammers van ooie op die lae voedingspeil het nie merkbaar groter hoeveelhede ruvoer en konsentraat ingeneem as soortgelyke lammers van ooie op die hoë peil nie. Ondervoeding van die lakterende ooie het die liggaamsmassa van die ooi lammers by speen beduidend verlaag ($P = 0,001$). Gedurende die naspeen tydperk is hierdie agterstand in groei van die lammers geleidelik verminder, maar was nog merkbaar by geboorte van hul eerste lam.

SUMMARY

Ewes with single lambs received either sufficient feed to maintain body condition during lactation (high plane) or the quantity of feed was reduced so as to result in an average loss of approximately 20% in bodymass (low plane). The suckling lambs had free access to roughage and concentrate feeds. After weaning the lambs were fed so as to promote rapid growth. The lambs suckled by ewes on the low plane did not consume appreciably greater quantities of roughage and concentrate than similar lambs reared by ewes which were adequately fed. Underfeeding of the lactating ewes significantly reduced the bodymass of their ewe-lambs at weaning ($P = 0,001$). The deficit in growth of the lambs was gradually reduced during the post-weaning period, but was still evident at their first parturition.

Only about half the commercial producers in the Natal Region feed their sheep sufficiently to permit mating of young ewes at the two-tooth stage (Adler, 1964). The long generation interval which results from mating at a later stage retards genetic progress and increases the period during which production is primarily in the form of the fleeces.

Both the nutritional status of the dam during late gestation and that of the lamb during early post-natal life influence the productive level attained by the lamb (Allden, 1970). Since the importance of an adequate milk supply to the lamb is generally recognised it is surprising that so little attention has been given to the effect of inadequate feeding of the dam on the performance of her lamb.

In the course of an investigation into the influence of sub-maintenance feeding during lactation on the performance of ewes, data were also obtained on the growth of their lambs. The latter results form the basis of this report.

Procedure

During an 84-day lactation period ewes with single lambs at-foot were housed in partly-roofed pens and fed so as to maintain their body condition (high plane) or to lose approximately 20% of their bodymass (low plane). On the high plane of nutrition the ewes received a daily ration of 0,67 kg concentrate meal, 0,89 kg milled lucerne hay and 1,20 kg maize silage, while the ewes on the low plane of feeding received approximately half the quantities given above.

From approximately one week of age onwards the lambs were offered free access to the same feeds as supplied to the lactating ewes, except that the concentrate meal was replaced by a creep ration calculated to contain 17% crude protein. After weaning, and until commencement of the first grazing season, the quantity of lucerne hay was limited to 0,45 kg per lamb per day, the creep ration was replaced by maize meal (0,45kg/day) and maize silage was fed *ad lib*. During the second and subsequent winter-feeding periods 0,22 kg maize meal was fed in addition to silage and hay. Summer grazing consisted of kikuyu pasture (*Pennisetum clandestinum*).

The bodymass of each lamb was recorded three days after parturition and at frequent intervals thereafter. Oestrous observations were restricted to the ewe-lambs born during 1969. When these had reached an average age of 6 months daily observations for oestrus were made using vasectomized rams. These observations were continued until their first joining (average age 19 months) with entire breeding rams.

Results

Feed intake of lambs

The results given in Table 1 suggest that the plane of nutrition of the ewe had little effect upon the feed intake of her lamb during the suckling period. The lambs did not appear to increase their intakes of concentrate and roughage to compensate for possible reduction in the milk supply of the dam.

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Table 1

Feed intake of lambs classified according to the level of nutrition of the dam during lactation

Year	Nutritional level of dam during lactation	Average daily intake (kg) per lamb					
		Total pre-weaning period			7 days prior to weaning		
		Concentrate	Lucerne hay	Maize silage	Concentrate	Lucerne hay	Maize silage
1967	High	0,11	+	+	0,27	+	+
	Low	0,11	+	+	0,27	+	+
1968	High	0,12	0,07	0,19	0,27	0,17	0,21
	Low	0,12	0,09	0,21	0,23	0,21	0,23
1969	High	0,11	0,06	0,08	0,25	0,10	0,16
	Low	0,09	0,07	0,10	0,22	0,10	0,19
1970	High	0,11	0,06	0,08	0,25	0,10	0,30
	Low	0,13	0,12	0,23	0,23	0,24	0,31
1971	High	0,12	0,12	0,18	0,23	0,22	0,30
	Low	0,13	0,12	0,23	0,23	0,21	0,29

+ Intakes not measured

Table 2

Pre- and post-weaning growth of ewe lambs reared by dams on two planes of nutrition. In 1970 and 1971 observations were terminated at weaning

Year of Birth	Nutrition of dam	Bodymass (kg) of ewe-lambs at various ages:															
		12 weeks					6 months					Mating		Post-partum			
		n	Birth	n	12 weeks	% difference High > low	n	6 months	n	12 months	% difference High > Low	n	19 months	% difference High > Low	n	24 months	% difference High > Low
1967	High	28	4,3	28	14,6	18,6	28	20,6	28	31,4	4,7	26	31,9	1,5	-	-	
	Low	27	4,3	27	12,3	7,3	27	19,2	25	30,0	4,7	23	31,4	1,5	-	-	
1968	High	69	4,4	69	17,7	21,2	67	23,9	67	32,6	6,2	49	43,0	8,3	33	47,9	4,6
	Low	68	4,3	68	14,6	13,8	64	21,0	60	30,7	6,2	37	39,7	8,3	23	45,8	4,6
1969	High	51	4,4	51	16,1	31,9	22	21,3	21	31,5	5,7	20	42,8	4,4	14	41,7	2,7
	Low	69	4,6	69	12,2	11,5	24	19,1	24	29,8	5,7	21	41,0	4,4	15	40,6	2,7
1970	High	122	4,4	122	16,1	28,8											
	Low	117	3,9	117	12,5												
1971	High	27	4,6	27	18,2	30,9											
	Low	31	4,4	30	13,9												

Table 3

Oestrous activity and lambing performance of ewe-lambs reared by dams maintained on two planes of nutrition during lactation

Nutrition of dam	No. of ewes	Ewes oestrus (%) during 17-day periods commencing at average age of:				First fertile mating 1970			Lambing 1971 ⁺		
						% mated days:		% not mated	Number of ewes :		
		9 months	12 months	15 months	18 months	1-17	18-42			Barren	With singles
High	20	25,0	60,0	50,0	15,0	25,0	65,0	10,0	4	12	2
Low	21	19,2	28,8	28,6	4,8	38,1	52,4	9,5	4	15	0

⁺Two ewes in each group died after mating in 1970

Growth of female lambs

The data in Table 2 demonstrate that underfeeding of the lactating ewes resulted in a severe retardation of the pre-weaning growth of their female lambs. In all cases there was a significant difference in the weaning bodymass of the two groups of lambs ($P = 0,001$), favouring those reared by well-fed ewes. This advantage in bodymass which existed at weaning among the ewe-lambs, gradually diminished with age, but was still evident at the time of their first parturition.

Reproduction

The oestrous activity of the ewe-lambs (born 1969) during 17-day periods, at various selected ages, is presented in Table 3. The animals which experienced no severe growth restriction prior to the age of 84 days showed a higher level of oestrous activity than the ewe-lambs suckled by dams on a low plane of nutrition during lactation. There was however no effect on the number of lambs born during their first lambing season (Table 3).

Discussion

Except for breeding animals and those kept solely for wool, farm animals are usually disposed of before they reach their mature size. This is perhaps the reason why the aspects of lifetime productivity, longevity and ultimate size, have only recently formed the basis of intensive research (Allden, 1970). Several investigations support the conclusion that undernutrition during early post-natal life does not significantly affect final mature size (Schinckel & Short, 1961; Reardon & Lambourne, 1966; Allden, 1968 a) but will only delay maturity (Allden, 1968 a). The results reported here are in accordance with this conclusion. However, in spite of compensatory growth the effects of feed scarcity during the suckling period persist for some time (Allden, 1968 b; present experiment). Therefore, inadequate nutrition of the lactating ewe may result in ewe-lambs which do not grow at a sufficient rate to permit breeding at 18 months of age.

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