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THE RELATIONSHIP OF BIRTH STATUS AND EARLY REPRODUCTIVE PERFORMANCE WITH LIFETIME REPRODUCTIVE PERFORMANCE IN MERINO EWES

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The effectiveness of selection for improvement in reproductive performance of sheep depends on measurement at any early age. For this reason selection of rams and ewes on their birth status, (single or twin), (Kennedy, 1967; Turner, Hayman, Triffitt and Prunster, 1969), and ewes having multiple births during their first or second season (Young and Turner, 1965) have been investigated. Both these parameters were reviewed by Turner (1969) and proved to have application in selection for improvement of reproductive performance. This paper reports the results of an analysis of data from the Merino stud of the Grootfontein College of Agriculture. The paper is concerned with the relationship between being born as one of a twin or as a single, (the parents' performance), and of the ewe's own reproductive performance after one or two mating seasons with her lifetime reproductive performance.

The ewes included in the analysis had at least three lambing seasons, and a maximum of five lambing seasons, at which stage they were usually culled out of the stud. Although the stud was managed under range conditions, ewes were kept on veld of high nutritional value. During droughts and periods of weight loss, ewes were supplemented with additional feed. Intensive attention was given at breeding and lambing times. Ewes were simply classified according to: 1) being born as a single or as one of a twin; 2) the sex of twinborn ewes' littermates; 3) the ewe's own reproductive performance at two years of age; 4) at three years of age, and 5) her reproductive record in the following years. The reproductive performance of only the mated ewes was taken into account.

From Table 1 it is evident that twinborn ewes produced 0,075 more lambs per ewe mated than did single born lambs over their lifetime ($P < 0,005$). However, twinborn ewes were mated on an average of 4,55 times compared to 3,78 times, indicating that they were maintained longer in the flock. This difference is not significant ($P < 0,25$). To exclude the possible contribution of this age difference, an analysis was made of the reproductive performance of the ewes after four reproductive years. Although twinborn ewes produced 0,044 lambs more per mating than did single born ewes, this superiority was not significant. There was no evidence that lifetime reproductive performance of twinborn ewes was influenced by the sex of the ewe's littermate.

Table 1

Reproductive performance of ewes born in single or multiple births

	Type of Birth			
	Single		Twin	
	No.	%	No.	%
Matings	527	–	638	–
Matings per ewe	3,78		4,55	
Conceptions	456	86,5	580	90,9*
Lambs born/ewe mated	595	112,9	768	120,4
Lambs born/ewe lambing	595	130,5	768	132,4

*P < 0,01

The relationship between the reproductive performance of ewes after their first lambing season at approximately two years of age, and their subsequent reproductive performance over the following two to five years is summarised in Table 2. It is evident that ewes having either no lambs or one lamb at two years of age did not differ in their subsequent reproductive performance. However, ewes having multiple lambs at this age produced significantly more lambs over their subsequent life ($P < 0,005$). In Table 3 the subsequent lifetime reproductive performance of ewes having no lambs to four lambs after their second lambing season at three years is presented. The relationship between the ewe's three year old record and her subsequent lifetime reproductive performance is apparent from

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Table 2

Relationship between the reproductive performance of ewes at two years of age and their subsequent reproductive performance

	Number of Lambs born					
	0		1		2	
	n	%	n	%	n	%
Matings	169	–	589	–	125	–
Number of matings/ewe	2,28		3,25		3,05	
Conceptions	157	92,9	593	91,5	117	93,6
Lambs born/ewe mated	205	121,3	747	120,0	180	144,0*
Lambs born/ewe lambing	205	130,6	747	128,0	180	153,9*

*P < 0,01

Table 3

Relationship between the reproductive performance of ewes at three years of age and their subsequent reproductive performance

	Number of lambs born									
	0		1		2		3		4	
	n	%	n	%	n	%	n	%	n	%
Number of ewes	7	–	41	–	118	–	51	–	6	–
Matings	20	–	101	–	250	–	117	–	13	–
Number of matings/ewe	2,86		2,46		2,12		2,29		2,17	
Conceptions	10	50,0	82	81,2	224	89,6	110	94,0	12	92,3
Lambs born/ewe mated	13	65,0	112	110,2	312	124,8	181	154,7	22	169,2
Lambs born/ewe lambing	13	130,0	112	136,6	312	139,3	181	164,5	22	183,3

these results. It is of importance to note that both subsequent conception rate and lambing rate (fecundity) increased with an increase in the three years old lambing performance of the ewes.

The results of this study suggest that positive gains can be made in reproductive performance of a standing flock of Merino sheep by selection of twinborn ewes, ignoring the sex of their littermate, and by selecting ewes producing twins in their first lambing season. These conclusions support the work of Kennedy (1959), Turner *et al.* (1962) and the work reviewed by Turner (1969). However, in this study, only ewes having twins at two years of age show higher reproductive performance in the following two to five years ($P < 0,005$). Young and Turner (1965) found this selection criterion of little value when combined with selection for wool growth, but suggested that selection on the ewe's three year old record yielded optimal results when twinning rate was high (30%).

The results of this study, together with those of Young and Turner (1965) suggest that a selection differential may exist between ewes having twin versus single or no lambs, but since reproduction is a threshold character, it may not be the same as the difference between no lamb and a single lamb, although a large difference may exist between these groups. Under this system selection is therefore limited to the 14,6% ewes having twins at

first breeding – a slight contribution to the whole flock.

From the results of the ewe's three year old record, (Table 3), it is obvious that a more efficient quantitative evaluation of the ewe's reproductive performance can be made. The significant relationship between the ewe's three year old record and her lifetime reproductive performance suggest that selection of Merino ewes on their three year old record is of much greater value than selection at the age of two years.

In the present study selection for twinning rate led to a marked increase in twinning rate, which was also accompanied by an increase in conception rate. Identification and utilisation of these characters with high repeatability made improvement of the reproductive performance possible. Considering, therefore, reproduction as a threshold phenomenon, the ewe's reproductive status is only (for identification) expressed in the number of lambs born. It is therefore thought that selection for twinning rate increases the ovulation rate (gonadotrophin secretion), thereby possibly also increasing the recorded conception rate (measured in number of ewes lambing) by increasing the chance for successful fertilization and embryonic survival. For instance, in twin ovulations the ewe would have two chances of conception, while embryonic mortality of one fertilized ovum will not affect the recorded conception rate. The influence of nutritional status of the ewe at mating may influence the occurrence of this character by carrying the animals that come near to the threshold value, through it. This nutritional influence will consequently also limit the efficiency of selection on the ewe's two year old record, especially under low levels of nutrition and subsequent low lambing and twinning rates.

It is concluded that although selection of the ewe on her year old record may be of some value, a more detailed evaluation of the ewe's reproductive abilities can be done after her second reproductive year.

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