

Phenotypic and genetic aspects of production in the Dohne Merino. III The influence of age of the ewe on reproductive performance

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To determine the influence of age of ewe on reproductive performance and the age specific death rate in the Dohne Merino, data from 1 310 individual lambings accumulated between 1975 and 1980, were used.

The reproductive performance of the Dohne Merino flock increased up to the age of 5 years after which it remained relatively constant to the age of 7 years and then declined. The maximum number of lambs born (0,98) and weaned (0,88) per ewe mated, occurred at 6 years of age. The same tendency was observed in respect of lambs born (1,12) and weaned (1,00) per ewe lambled. The maximum number of ewes lambled per ewe mated (0,89) also occurred at this age. Mortality in the ewe flock increased with age but increased steeply after the age of 7 years.

A flock structure including 5 to 6 age groups (ewes of 6 to 7 years of age) will thus ensure an optimum reproduction potential in the flock.

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Om die invloed van ooi-ouderdom op reproduksieprestasies en die ouderdomspesifieke sterftesyfer van die Dohnemerino te bereken, is 1 310 individuele lammings se data vir die periode 1975 tot 1980, benut.

Die reproduksieprestasies van die Dohnemerino kudde het tot op 5 jaar 'n stygende tendens getoon waarna dit tot op 7 jaar relatief konstant gebly het en toe weer gedaal het. Die maksimum aantal lammers gebore (0,98) en gespeen (0,88) per ooi gepaar, is op sesjarige ouderdom bereik. Dieselfde tendens is waargeneem ten opsigte van die aantal lammers gebore (1,12) en gespeen (1,00) per ooi gelam. Die aantal ooie gelam per ooi gepaar (0,89) het 'n maksimum op sesjarige ouderdom bereik. Totale verliese uit die ooi-kudde het toegeneem met toename in ouderdom, maar het skep gestyg na 7-jaar-ouderdom.

'n Ouderdomstruktuur van 5 tot 6 ouderdomsgroepe (ooie 6 tot 7 jaar oud) sal dus die optimum reproduksiepotensiaal van die kudde lewer.

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Introduction

Reproduction is the most important economic characteristic of farm animals (because it is the basis upon which the survival of the flock depends and also contributes the most to flock income). According to Turner and Young (1969) a high reproduction rate ensures sufficient animals for flock replacement, a surplus for sale and a high selection differential in the ewe progeny.

The reproductive potential of sheep can be defined as the number of lambs born (or weaned) per ewe mated. The rate of reproduction can be increased by increasing the number of lambs per birth, or by lambing at more frequent intervals. It has been found that in Merinos, not only the birth rate, but also the occurrence of twin births increases with the increasing age of the ewe (Heydenrych, 1975). The influence of ewe-age is therefore an important consideration in the determination of the optimum flock structure and reproduction rate (Turner, 1963).

Both culling and mortality are unavoidable and the erosion of breeding ewes from these causes will thus have an important influence on the reproduction potential of the flock. In the opinion of Turner, Brown and Ford (1968), the number of breeding ewes in each group, the number of surplus animals available and the mortality rate in the flock were the most important factors influencing the optimum age structure of the flock.

Procedure

In order to determine the influence of ewe-age on reproductive performance in the Dohne Merino flock at Dohne, the data from 1 310 individual lambings during the period 1975–1980 was used. As regards computer calculations, use was made of the BMD package for the regression analysis. The procedure for the calculation of the age-specific death-rate is described by Turner and Young (1969), who defined it as the losses in the flock in any particular age group and it is expressed as a percentage of the number of animals present at the beginning of the particular period.

Results and Discussion

The reproductive potential is reflected by the number of lambs born and weaned by each ewe per year. According to Van der Merwe¹ (1979) this character can be sub-

divided into ewes lambing per ewe mated (fertility) and the number of lambs born per ewe lambing (fecundity). The total number of ewes mated, ewes lambing and the number of lambs born and weaned in each age group from 1975-1980 is presented in Table 1. In addition the influence of ewe-age on reproduction is graphically illustrated in Figure 1 (per ewe mated) and Figure 2 (per ewe lambing).

From Table 1 it is clear that the number of ewes mated, decreased with increasing age. On the other hand, the relative values in respect of ewes lambing per ewe mated, lambs born and weaned per ewe mated and per ewe lambing all exhibited a rising tendency up to the age of 5 years after which they remained relatively constant up to the age of 7 years and they then declined. These tendencies are in agreement with the values determined for Merino's by Nel (1967); Turner and Dolling (1965) and Heydenrych (1975).

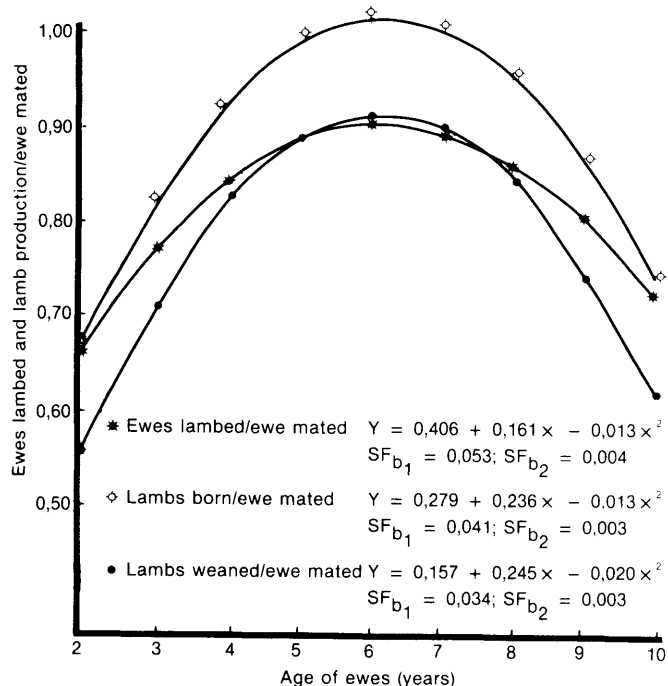


Figure 1 Regression of reproduction performance on age of ewes (in terms of ewes mated).

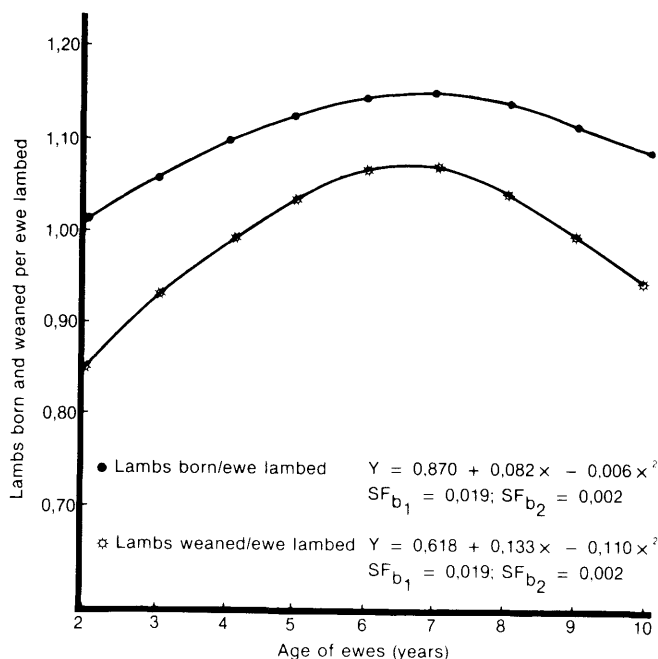


Figure 2 Regression of reproduction performance on age of ewes (in terms of ewes lambing).

The magnitude of these values is also in agreement with those of Turner and Dolling (1965), but are lower than the values obtained by Heydenrych (1975). The percentage lamb mortality to weaning was approximately 12% (Table 1) for ewes from 3 to 8 years of age. On the other hand the percentage lamb mortality in the 2-year-old group and the 9-10-year-old group was considerably higher (20%, Table 1). Turner and Dolling (1965) ascribed the poorer performance of older ewes to the fact that such ewes have proportionately more multiple births and that such lambs, because they are multiple born, have a poorer survival rate. According to Bekedam and van der Greeft, (1971) difficult births as a result of the larger foetuses of single lambs in the case of older ewes, can contribute to poorer reproduction in this age group. The higher lamb mortality experienced in 2-year-old ewes can, in turn, be ascribed to the smaller, weaker lambs produced by ewes of this age group.

Table 1 The number of ewes mated that lambing and the number of lambs born and weaned for the different age groups

Age (Years)	Number of ewes		Number of lambs		Ewes lambing per ewe mated	Lambs born per ewe		Lambs weaned per ewe	
	Mated	Lambing	Born	Weaned		Mated	Lambing	Mated	Lambing
2	281	186	194	159	0,66	0,69	1,04	0,57	0,85
3	245	190	194	172	0,78	0,79	1,02	0,70	0,91
4	167	143	155	139	0,86	0,93	1,08	0,83	0,97
5	175	155	174	149	0,89	0,99	1,12	0,85	0,96
6	182	160	178	160	0,88	0,98	1,11	0,88	1,00
7	137	107	121	108	0,78	0,88	1,13	0,79	1,01
8	82	72	83	71	0,88	1,01	1,12	0,87	0,99
9	33	28	31	24	0,85	0,94	1,10	0,73	0,86
10	8	5	5	4	0,63	0,63	1,00	0,50	0,80
Total	1310	1046	1135	986	0,80	0,87	1,09	0,75	0,94

Each individual ewe is regarded as an new individual for each lambing.

The results also indicate that ewe-age exhibits a significant curvilinear relationship with reproductive performance. Regression equations for the curves are provided with each figure. The maximum number of lambs born (0,98) and weaned (0,88) per ewe mated, was achieved at the age of 6 years (Figure 1). The same tendency was observed in respect of the number of lambs born (1,12) and weaned (1,00) per ewe lambled (Figure 2). The number of ewes lambled per ewe mated also reached a maximum of 89% (Figure 1) at 6 years of age. These findings are in agreement with those of Turner, Brown and Ford (1968) and Heydenrych (1975). Moule (1971) in a study of 13 flocks of Merino's also found that the optimum age for reproduction was 6 years. Various workers (Dun, 1961; Turner and Dolling, 1965; Turner and Young, 1969) have indicated that the reproduction potential of ewes increases up to approximately 7 years of age after which it decreases. The difference in reproductive potential between the ages of 5; 6 and 7 years is usually slight, as is confirmed by the results of this study.

The age-specific death-rate and other losses are indicated in Table 2 as ewe mortality, expressed as a percentage of each age group. From Table 2 it is clear that mortality

culling of the ewes for poorer reproductive performance and the wearing of their teeth in the older age groups. So far as total losses are concerned, it is clear that after the age of 7 years these increase sharply.

Conclusion

Lambs born per ewe mated increased with an increase in ewe-age and indicates that selection for higher reproduction will be more successful if applied later in the life of the ewe. The 9 ewe age-groups (Table 1) tend to reduce the average reproduction in the flock, increase the generation interval and consequently reduce the annual genetic progress. It is thus clear that ewes are retained for too long in this particular flock and that there should be fewer ewe age-groups. Taking the higher mortality of the older ewes into account, it is clear that it is also uneconomical to retain them in the flock for so long. An age structure of between 5 and 6 groups is recommended in order to achieve optimum reproduction performance.

References

- BEKEDAM, J. & VAN DER GREEFT, A., 1971. Fertility and lamb mortality in Texel ewes under Dutch farm conditions. *Anim. Breed. Abstr.* 40, 468.
- DUN, R.B., 1963. Recording the lambing performance of ewes under field conditions. *Aust. J. Exp. Agric. Anim. Husb.* 3, 228.
- HEYDENRYCH, H.J., 1975. 'n Studie van kuddestatistieke, nie-genetiese faktore, genetiese parameters en seleksievordering met betrekking tot die Tygerhoek Merinokudde. Ph.D.-proefskrif, Univ. Stellenbosch.
- MOULE, G.R., 1971. Vital statistics in sheep and wool production. *Anim. Breed. Abstr.*, 39, 623.
- NEL, J.E., 1967. Die invloed van kuddesamestelling op produksie en reproduksie-kenmerke van Merinoskape. Ph.D. (Landb.) proefskrif. Univ. Stellenbosch.
- TURNER, HELEN N., 1963. Does it pay to keep older sheep? *Proc. Symp. Prime lamb prod.*, 52. N.S.W. Branch Aust. Soc. *Anim. Prod.*
- TURNER, HELEN N., BROWN, G.H. & FORD, G.H., 1968. The influence of age structure on total productivity in breeding flocks of Merino sheep. 1. Flocks with a fixed number of breeding ewes, producing their own replacements. *Aust. J. Agric. Res.*, 19, 443.
- TURNER, HELEN N. & DOLLING, C.H.S., 1965. Vital statistics for an experimental flock of Merino sheep. 11. The influence of age on reproductive performance. *Aust. J. Agric. Res.*, 16, 699.
- TURNER, HELEN N., DOLLING, C.H.S. & SHEAFFE, P.H.G., 1959. Vital statistics for an experimental flock of Merino sheep. 1. Death rates in adult sheep, in relation to method of selection, age and sex. *Aust. J. Agric. Res.*, 10, 581.
- TURNER, HELEN N. & YOUNG, S.S.Y., 1969. Quantitative genetics in sheep breeding. Melbourne, McMillan.
- VAN DER MERWE, C.A., 1979. Teelverbetering van Vleisskape. Telingsimposium 9 Aug. 1979, Univ. Stellenbosch.

Table 2 Age-specific death-rates and other losses of ewes

Age	Deaths (%)	Other Losses (%)	Total Losses (%)
1,5- 2,5	3,91 (11)	1,99 (5)	5,90 (16)
2,5- 3,5	2,85 (7)	7,22 (17)	10,07 (24)
3,5- 4,5	3,59 (6)	16,22 (27)	19,81 (33)
4,5- 5,5	5,71 (10)	15,00 (26)	20,71 (36)
5,5- 6,5	5,49 (10)	30,09 (54)	35,58 (64)
6,5- 7,5	8,03 (11)	40,08 (54)	48,11 (65)
7,5- 8,5	13,41 (10)	54,37 (44)	67,78 (54)
8,5- 9,5	9,09 (3)	68,57 (22)	77,66 (25)
9,5-10,5	12,50 (1)	87,50 (7)	100,00 (8)

() Number of animals.

increased with age. The higher mortality in 2-year-old ewes is note-worthy and the reason for this is not clear. The rest of the values, up to the age of 5 years, are in agreement with those of Heydenrych (1975) and for ewes up to 9,5 years considerably higher than those recorded by Turner, Dolling and Sheaffe (1959). Other losses from the ewe flock increased from 1,99% to 87,5% from the first to the ninth age-group and are chiefly the result of the