The influence of age and generation number of the Döhne Merino on different wool production traits

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Age had a significant ($P \leq 0,05$) influence on greasy fleece mass and clean fleece mass. The staple length, fibre density and bodymass were influenced highly significantly ($P \leq 0,01$). Generation number had a significant ($P \leq 0,05$) influence on fibre density, whereas bodymass was influenced highly significantly ($P \leq 0,01$).

Ouderdom het 'n betekenisvolle invloed ($P \leq 0,05$) op rouvagmassa en skoonvagmassa gehad, terwyl die invloed op stapellengte, veseldeursnit, veseldigtheid en liggaamsmassa hoogs betekenisvol ($P \leq 0,01$) was. Generasienommer het die veseldigtheid betekenisvol ($P \leq 0,05$) beïnvloed, terwyl die liggaamsmassa hoogs betekenisvol ($P \leq 0,01$) beïnvloed is.

Keywords: Döhne Merino, wool production, age, generation number

The aim of this study was to determine the influence of age and generation number on wool traits and bodymass of the Döhne Merino. Generation number was defined as the following number of an animal which was born after the first crosses between the Merino and the S.A. Mutton Merino.

Wool and skin samples were taken from all stud ewes present at the Döhne Research Station in June 1979. The age of the ewes ranged from 2 to 10 years, which included individuals from the third to the nineth generation of the Döhne Merino development programme.

Wool samples were cleaned by ether extraction. Fibre density was determined by weighing and counting 250 fibres from each sample at 65% RH and 22°C. The fibre density per cm^2 was subsequently calculated by ratio and proportion. The skin samples were analysed by normal histological techniques (Carter & Clarke, 1957; Grobler, unpublished data, Nay, 1975). To investigate the influence of age and generation number on skin and fibre traits, as well as bodymass, one-way classification variance analysis was undertaken.

There was a significant age-effect ($P \leq 0,05$) on greasy and clean fleece mass which corresponds to results by Heydenrych (1975). These differences are to be expected and could be ascribed to the climatic circumstances which influenced the nutritional value of the veld during the respective early developmental years of the different age groups. According to Schinckel (1962) nutritional circumstances do influence the pre- and postnatal development of follicles. S:P ratio, however, showed no significant difference between age groups. Consequently wool traits must have been responsible for the significant differences between age groups. The question arises as to whether the physiological function of the follicles were effected during early development, resulting in the differences in wool traits.

Age had a highly significant ($P \leq 0,01$) influence on staple length, fibre diameter, fibre density and bodymass. (Table 1) Staple length decreased with age, except for 7-year-old ewes, which, according to the pattern, had a longer than expected staple (84,80 mm). The decreasing tendency of staple length with age is in agreement with results for Merino sheep obtained by Brown, Turner, Young & Dolling (1966) and Mullaney, Brown, Young & Hyland (1969).

As with fibre diameter, younger ewes produced a finer fibre as compared to older ewes (Table 1). This is contradictory to findings by Brown, *et al.* (1966) and Turner & Young (1969) who found an increase in fibre diameter up to 5,5 – 6,5 years of age, whereafter the diameter decreased. Lax & Brown (1967) determined a maximum diameter at 3 years of age. The increasing tendency in this study can be explained by the increasing fibre density for younger ewes. An important factor contributing to the higher fibre density and lower fibre diameter in younger ewes (Table 1), was the lower bodymass. Ewes which were 8 years old had the highest mass (55,97 kg), the lowest fibre density (3435 fibres/mm^2) and the highest fibre diameter (23,74 µm), as well as the shortest staple length (75,66 mm). The longest staple length (88,78 mm) of 2-year-old ewes can be attributed to the lowest lambing percentage (48,97) of this group.

Table 1 The influence of age on different wool production traits of Döhne merino ewes

				Wool production traits								
Age (years)	Number of animals	Generation number	Lamging % (1979)	Greasy[a] fleece mass (kg)	Clean wool yield (%)	Clean[a] fleece mass (kg)	Staple[b] length (mm)	Fibre[b] diameter (µm)	Crimp frequency (/25 mm)	S:P Ratio	Fibre[b] density (/cm^2)	Body-[b] mass (kg)
2	50	6,67	48,97	3,34	69,5	2,32	88,78	21,59	13,76	13,72	4558	40,31
3	70	6,62	87,50	3,17	68,0	2,15	85,90	22,59	14,18	13,84	4164	50,37
4	57	6,24	80,30	3,09	68,5	2,12	84,75	23,26	13,93	13,53	4030	50,92
5	45	6,09	91,11	3,18	58,7	2,18	84,51	23,08	13,15	13,55	4114	50,66
6	41	6,19	80,95	3,30	67,6	2,25	80,07	23,34	13,95	13,43	4094	50,54
7	5	4,67	80,00	3,57	69,2	2,43	84,80	21,90	14,64	12,85	3768	49,85
8	35	5,82	76,47	3,17	70,5	2,24	75,66	23,74	13,08	12,92	3435	55,97
Total/Av.	303			3,21	68,7	2,21	83,96	22,85	13,77	13,51	4100	50,97

[a]$P \leq 0,05$; [b]$P \leqq 0,01$

Table 2 The influence of generation number on different wool production traits of Döhne merino ewes

			Wool production traits								
Generation number	Number of animals	Average age (years)	Greasy fleece mass (kg)	Clean wool yield (%)	Clean fleece mass (kg)	Staple length (mm)	Fibre diameter (μm)	Crimp frequency (/25 mm)	S:P Ratio	Fibre[a] density (/cm^2)	Body-[b] mass (kg)
3	2	4,00	3,50	67,10	2,35	81,00	25,60	15,20	14,28	2825	70,75
4	25	5,32	3,26	68,60	2,24	83,52	23,15	13,72	14,00	4128	50,19
5	58	4,76	3,22	67,80	2,18	82,91	23,03	14,00	13,15	3924	51,70
6	88	4,60	3,12	69,20	2,17	84,36	22,62	13,72	13,32	4105	50,48
7	72	4,58	3,32	69,60	2,31	84,24	23,19	13,22	13,56	4048	52,13
8	34	4,01	3,19	67,60	2,16	84,12	22,54	14,09	14,00	4256	48,92
9	24	3,56	3,14	67,90	2,14	84,71	22,05	14,39	13,67	4541	49,38
Total/Av.	303		3,21	68,70	2,21	83,96	22,80	13,77	13,51	4101	50,95

[a]$P \leq 0,05$; [b]$P \leq 0,01$

Generation number had a significant ($P \leq 0,05$) influence on fibre density and bodymass. Generation 9, however, showed the highest fibre density, which agrees with the previous observation that younger ewes produced higher densities than older ewes (Table 2). Ewes in higher generation groups also had a lower bodymass, which agrees with results obtained on age differences.

From these results (Table 1 and 2) it is clear that the age difference is of greater importance than the generation number to the production traits under observation.

References

BROWN, G.H., TURNER, H.N., YOUNG, S.S.Y. & DOLLING, C.H.S., 1966. Vital statistics for an experimental flock of Merino sheep. III Factors affecting wool and body characteristics including the effects of age of ewe and its possible interaction with method of selection. *Aust. J. Agric. Res.* 17, 557.

CARTER, H.B. & CLARKE, W.H., 1957. The hair follicle group and skin follicle population of Australian Merino Sheep. *Aust. J. Agric. Sci.* 8, 91.

HEYDENRYCH, H.J., 1975. Die studie van kuddestatistieke, niegenetiese faktore, genetiese parameters en seleksievordering met betrekking tot die Tygerhoek-Merinokudde. D.Sc. (Agric) proefskrif. Universiteit van Stellenbosch.

NAY, T., 1975. Technique for examining wool follicles in the skin of sheep. Division of Animal Genetics, CSIRO. *Farmer's Weekly,* Dec. 31 (1975), 16.

LAX, J., & BROWN, G.H., 1967. The effects of inbreeding, maternal handicap and range in age on 10 fleece and body characteristics in Merino rams and ewes. *Aust. J. Agric. Res.* 18, 689.

MULLANEY, P.D., BROWN, G.H., YOUNG, S.S.Y. & HYLAND, P.G., 1969. Genetic and phenotypic parameters for wool characteristics in fine woolled Merino, Corriedale and Polwarth sheep. 1. Influence of various factors on production. *Austr. J. Agric. Res.* 20, 1161.

SCHINCKEL, P.G., 1962. Variation in wool growth and of mytotic activity in follicle bulbs induced by nutritional changes. *Anim. Prod.* 4, 122.

TURNER, H.N. & YOUNG, S.S.Y. 1969. Quantitative genetics in sheep breeding. MacMillan, Melbourne.