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Effects of castrating and surgically dehorning male Drysdale and Tukidale lambs on the efficacy of mechanical head skinning

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ABSTRACT

The effects of castrating and surgically dehorning male Drysdale and Tukidale lambs at birth or docking on subsequent horn growth were investigated in 3 lamb crops at Whatawhata Hill Country Research Station.

Castration was more effective than dehorning in reducing subsequent horn growth. A combination of castration at birth and dehorning at docking was the most effective way to treat lambs to reduce horn growth. Excision of germative tissue around the base of the horn following dehorning increased the effectiveness of dehorning. Attainment of meat inspection standards for horned breeds is more dependent on the "trimmers" on the slaughter chain than the time of dehorning.

INTRODUCTION

Mechanical head skinners have been recently developed and installed in several export meat works to ease the physical effort of head skinning necessary to meet the post-slaughter inspection requirements for sheep meats to be imported into the European Economic Community (EEC). The head skinners are however not fully effective for horned heads which must be mechanically dehorned post-slaughter prior to head skinning. The relatively low numbers of horned sheep processed in New Zealand create difficulties on the slaughter chain as an extra person has to be available on stand-by to operate the "dehorner". A rapid on-farm method of preventing horn growth in horned breeds, particularly the Drysdale and Tukidale would be advantageous to both sheep breeders and export meat works alike.

The relative effects of castration and surgical dehorning on subsequent horn growth and efficacy of mechanical head skinning has been investigated in Drysdale and Tukidale lambs.

EXPERIMENTAL

Trial Design

Two factorial trials and a control trial using homozygous and heterozygous Drysdale and Tukidale lambs reared at Whatawhata Hill Country Research Station were carried out with the following treatments:

Trial 1 (1979/80): Castrated at birth, docking or left entire and either dehorned at birth or docking.

Trial 2 (1980/1): Castrated at docking or left entire and either dehorned at docking or not dehorned.
Trial 3 (1981/2): Left entire and not dehorned.

Treatment

Lambs were castrated (Elastrator rubber rings) and their tails docked (searing iron) at approximately 4 weeks of age. In trial 1 the horns were removed with scoop-type calf dehorners in which the cutters were either 60 mm apart (Farm-acy [N.Z.] Ltd) or 40 mm apart, depending on the size of the horn. In trial 2 the larger dehorners only were used and the germative horn tissue surrounding each horn excised by trephine. Minimal bleeding occurred and little apparent stress to the lambs. All lambs were vaccinated against tetanus.

General Management

Trial 1 lambs were transferred to Auckland Farmers Freezing Co. Ltd. (AFFCO) farm at Horotiu after weaning in December 1979 and slaughtered in March 1980 at 24 weeks of age. Both the trial 2 and trial 3 lambs were retained at Whatawhata throughout. Trial 2 lambs were slaughtered in April 1981 at 30 weeks of age and trial 3 lambs slaughtered in January 1982 at 16 weeks of age.

Horn Measurements

Normal horn growth in male Drysdale and Tukidale sheep is the shape of a spiral cone with an elliptical base. Horn base area and horn volume were

measured with calipers and flexible ruler prior to slaughter.

All lambs were slaughtered at the AFFCO Horotiu plant according to normal plant practice except that no lamb heads in either trial 1 or trial 2 were mechanically dehorned prior to head skinning. All heads were graded as to the amount of retained skin after head skinning and again after trimming.

RESULTS AND DISCUSSION

Growth Rate

Mean pre-slaughter live weight of the Drysdale and Tukidale lambs was similar in 1980 (25.4 ± 3.8 kg, 25.6 ± 3.8 kg respectively). In 1981 and 1982 the Drysdale lambs were heavier than the Tukidale lambs at slaughter (23.8 ± 3.6 kg, 21.5 ± 3.5 kg and 28.1 ± 2.0 kg, 25.9 ± 1.9 kg respectively).

Least-square means for pre-slaughter live weight for each treatment group are given in Table 1. Growth rate was depressed by castration but unaffected by dehorning. Regardless of the imposed treatment, live weight gain over the summer was limited in both 1979 and 1980 due to the high proportion of dead material in the available pasture (During *et al.*, 1980). The reduction in growth-rate due to castration relative to the pre-slaughter live weight was similar to that reported by other workers (Walker, 1950; Clarke, 1965).

Horn Growth

Horns develop in male Drysdale and Tukidale sheep as a pleiotrophic effect associated with the genes for medullation (Rae, 1956). Horn development was more advanced at birth in Tukidale than Drysdale lambs. Thirty-five percent of the Tukidale lambs were horn with formed horns and 65% with horn

buds. Two percent of the Drysdale lambs were born with formed horns, 81% with horn buds and 17% without horn buds. Horn development and growth in untreated lambs of the 2 breeds was similar from weaning onwards.

Least-square means for mean horn base area and mean horn volume prior to slaughter are given in Table 1. Breed effects for both characteristics were not significant. Horns are a secondary sex characteristic of male sheep and were thus significantly reduced by castration. The earlier in life that the lambs were castrated, the less horn that was present at slaughter.

Scoop dehorners were an effective means of cutting developed horns but were not effective in preventing subsequent horn growth. Difficulties were experienced in cutting through the resilient skin and wool surrounding horn buds when dehorning at birth. This was a particular problem for Drysdale lambs with delayed horn development. Use of the trephine in the second year to excise germative tissue not initially removed by the dehorners reduced subsequent horn growth. Horn growth in the Drysdale and Tukidale is apparently similar to the Merino in which it has also not been possible to prevent subsequent horn growth by surgical dehorning (Dun, 1963). This is in sharp contrast to the situation with cattle, where surgical dehorning is standard practice and totally effective.

Efficacy of Head Skinning

Meat inspection standards administered by the Ministry of Agriculture and Fisheries for meat to be imported into the EEC state that no piece of skin larger than 10 mm in diameter shall remain on the head when inspected following skinning.

TABLE 1 Least-square means for slaughter weight, horn measurements and efficacy of head skinning.

Trial	Castration	Treatment Dehorning	No. of lambs	Slaughter weight (kg)	Mean horn base area (cm ²)	Mean horn volume (cm ³)	Heads cleanly skinned (%)	Heads passed by inspector (%)	
1	Birth	Birth	10	24.2	1.5	3.3	70	80	
		Docking	20	25.1	0.4	0.2	60	80	
	Docking	Birth	15	25.9	2.2	4.6	40	40	
		Docking	18	25.3	1.6	3.6	44	61	
	Entire	Birth	21	26.4	15.3	69.1	0	5	
		Docking	12	25.5	11.0	45.8	17	17	
			Dehorning effect		ns	*	*	ns	*
			Castration effect		*	***	***	***	***
			Interaction		ns	ns	ns	ns	ns
	2	Docking	Docking	21	21.9	2.6	4.8	69	75
Not dehorned			28	22.4	6.2	19.4	19	22	
Entire		Docking	22	24.6	9.0	25.2	3	10	
		Not dehorned	18	23.8	18.0	87.5	0	0	
			Dehorning effect		ns	***	***	*	**
			Castration effect		***	***	***	***	***
			Interaction		ns	***	***	ns	ns
3		Entire	Not dehorned	26	26.8	17.7	83.6	42	70

The proportion of heads cleanly skinned by the mechanical head skinner and the predicted proportions of heads meeting the EEC meat inspection standards, analysed by logit transformation, are given in Table 1.

The mechanical head skinner did not perform well on either horned heads or heads mechanically dehorned post-slaughter. There was no clear threshold level for horn base area or horn volume below which head skinning was effective. Following extensive trimming to remove pieces of skin remaining on the head after skinning similar proportions of heads of lambs either concurrently castrated and dehorned at birth or docking, lambs castrated at birth and dehorned at docking or lambs mechanically dehorned post-slaughter met the meat inspection standards. Attainment of these standards was more dependent on the skills of the "trimmers" than on when the heads were dehorned. Heads dehorned post-slaughter were easier to trim than heads with small horns while heads with large horns could not be trimmed in the time available on the slaughter chain.

With an increasing acceptance of ram lamb meat by the meat trade and the use of existing equipment, castration and surgical dehorning of specialty carpet

wool type male lambs to reduce horn growth prior to slaughter is currently not warranted. However, the increased costs incurred in developing further automated machinery for the slaughter and dressing of horned as well as polled sheep will increase the desirability that all stock entering processing plants be hornless.

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