

*Brief Communication*

A HEREDITARY SKIN DEFECT IN SHEEP

Some years ago a lamb with abnormal skin was received at the State veterinary research station for small ruminants (SVRS), Stavanger, from a farm in Ryfylke. The lamb had apparently been normal at birth, but by normal activity and contact with its mother, extensive wounds developed, with large, loose skin areas. The lamb's condition had deteriorated so much that it was killed when it was two days old. Two ewes sired by the same ram had given birth to similar lambs the same year, while some years earlier, lambs with the same defect had been born by other ewes in the flock.

These facts indicated a hereditary defect. The two ewes which had produced the abnormal lambs were bought later by SVRS, and mated with a ram that was sired by the one which gave rise to the defect lambs. From these two ewes a small flock was built up (Strain 1), and by inbreeding lambs with typical skin defects were occasionally born. The sheep were later transferred to, and retained at The Veterinary College of Norway, Oslo.

In 1970, two lambs from another area in Ryfylke, with an apparently similar skin disease, were received at the SVRS. The parents of these lambs were related, being the progeny of a ram originating from a farm in another area of the county. On the latter farm, lambs with abnormal skin had been born some years previously. The father of the two abnormal lambs born in 1970 was purchased and brought to The Veterinary College of Norway together with five ewes. These animals were called Strain 2. No relation between Strain 1 and Strain 2 is known.

During the last two years abnormal lambs have been born during inbreeding the sheep of Strain 1, as well as of Strain 2, and by mating ram of Strain 1 with ewes of Strain 2, and vice versa. Crossbred ewes, being progeny of a ram of Strain 1 and ewes of the Dala breed have produced lambs with the skin defect after mating with rams of Strain 1 as well as of Strain 2.

These observations indicated that the condition was inherited as a simple autosomal recessive character, and that it was the same gene which was present in the two strains. As this condition proved to be lethal, the most convenient breeding test was to mate animals heterozygous for the actual gene. Up to the present 14

heterozygous ewes, after mating with five heterozygous rams, have given birth to 57 normal and 29 defective lambs. Following the 3:1 ratio, the expected numbers are 64.5 and 21.5 respectively. The relatively great excess of defective offspring is due to the fact that the material does not comprise families consisting of normal individuals only. As the latter type of group would be expected to be relatively common in material composed of many small family groups, the data were corrected for this bias. Using the so-called a priori-method, a distribution ratio of 58.8:27.2 is obtained and this gives very good support to the hypothesis that the condition is inherited as a simple recessive character ( $\chi^2 = 0.18$ ;  $0.50 < P < 0.70$ ). Furthermore, the actual gene must be an autosomal one, as both sexes are afflicted by the abnormality.

Table 1. Distribution and sex ratio of the offspring of heterozygous ewes mated with heterozygous rams.

Number of ewes	range	Number of lambs			
		total	normal	defective	
				observed	expected a priori
14	1—22	86	57	29	27.189
Sex ratio			52 %	50 % *	

\* sex unknown in one normal and one defective lamb.

The condition appeared very similar in all affected lambs of both strains. Most of the lambs were born alive, apparently normal physically and in full vigour. In a few lambs, rupture of the skin occurred during birth, especially on the withers. The defect usually appeared during the first hour of life, as large wounds occurred when the ewe scratched the lamb with its hooves, or by accidents of other kinds (Fig. 1). New defects could easily be produced, even during careful handling. The development of the wounds was obviously painful, and it appeared as if the skin was not entirely removed. A thin layer of the deeper part of the corium covered the subcutis and underlying tissue, giving a soft, slightly oedematous surface, while bleeding from the defects was moderate. All affected lambs born alive were euthanized within 24 hrs., no attempts being made to keep them alive in protected environments.

The heterozygote animals seemed to be quite normal. There was a tendency that more of the abnormal lambs were stillborn as compared with normal lambs produced by the same ewes, the



Figure 1. Lamb with extensive skin damages.

figures being seven stillborn of 29 affected lambs, and seven out of 57 normal lambs. The difference was, however, not significant ( $\chi^2 = 1.98$ ;  $0.1 < P < 0.20$ ). Most of the stillborn abnormal lambs were highly inbred, all of them being born by one ewe or four of its offspring.

In this paper, no description has been given of organs other than the skin. The results of detailed pathological and biochemical investigations of the skin, as well as of other tissues will be published in another paper.

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*Oddvar Helle and Nils Norodd Nes*  
The Department of Medicine and  
The Department of Animal Husbandry and Genetics,  
Veterinary College of Norway, Oslo.

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Reprints may be requested from: Oddvar Helle, Department of Medicine, Veterinary College of Norway, P. O. Box 8146, Oslo Dep., Oslo 1, Norway.