

contrast to their absence or very small amplitudes on records of shocks in Greece.

It is suggested that this indicates a difference between the structure of the bottom of the Mediterranean Sea south of Greece and that south of Turkey. The exact nature of this difference and its important geotectonic implications would appear to make seismic refraction work at sea desirable in these areas.

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### Water Metabolism in the Sheep

SOME sheep appear to pass consistently lower urine volumes than others, and during metabolism cage experiments with *HK* and *LK*<sup>1</sup> Scottish Blackface sheep there was a suggestion that within each of these two groups there was much more variation between animals than between repeated observations on the same animal, and that, on the whole, urine volumes from *LK* animals tended to be lower than those from *HK* animals. The results of an analysis of the results from fifteen trials involving 19 *LK* and 17 *HK* animals are given below. Four or six animals were used per trial and equal numbers of *LK* and *HK* were used in all except three trials. The animals were in the cages for 10, 20, 32 or 93 days in each trial. A standard ration of hay and concentrates (oats and linseed meal) was fed throughout, and a sodium chloride supplement was given in all except three trials, but this did not have a marked effect on urine output.

The mean volume of urine excreted daily was found to be significantly lower for *LK* than for *HK* sheep ( $P < 0.01$ ). The difference can be seen most readily by studying the frequency distribution of the average results for individual sheep (Table 1) and, although there is considerable overlap, the mode for *LK* sheep (approximately 500 ml./day) is clearly lower than that for *HK* sheep (approximately 700 ml./day). In addition there are a number of high values for the *HK* sheep. Because of the skewed nature of the distributions, median values rather than mean values give a more accurate idea of the difference.

The means for the volumes of water consumed and urine excreted daily followed each other closely,

Table 1. SHEEP URINE VOLUMES PER DAY FREQUENCY DISTRIBUTION

Range of values (ml./day)	Numbers of sheep	
	<i>LK</i>	<i>HK</i>
151-250	1	
251-350	2	
351-450	1	1
451-550	8	1
551-650	3	2
651-750	1	5
751-850	1	2
851-950	1	
951-1,050		
1,051-1,250	1	1
1,251-1,450		1
1,451-1,650		
1,651-1,850		2
1,851-2,050		
Over 2,050		2
Median value (ml./day)	524	734

Table 2. MEAN WATER INTAKE AND URINE VOLUMES IN *LK* AND *HK* SHEEP

	Mean water intake (ml./day)	Mean urine volume (ml./day)	Mean faeces water and insensible loss (ml./day)
<i>LK</i>	1,845	552	1,293
<i>HK</i>	2,459	1,073	1,386
Difference	614	521	93

and the value for faeces water plus insensible loss therefore remained constant (Table 2).

Within both the *LK* and the *HK* groups, the differences between mean values for the daily urine output for different sheep were significantly greater than the differences between repeated observations on the same sheep ( $P < 0.001$ ). For those sheep which spent three separate periods in the cages, the mean range of the three values was 173 ml./day for *LK* sheep and 478 ml./day for *HK* sheep.

These results show that considerable variation in water metabolism exists between sheep, and that although part of this variation appears to be related to the potassium type of the red blood cells, other factors are also involved. A study of the mode of inheritance of these other factors would be of value particularly in relation to sheep populations subjected to periodic droughts or kept in semi-arid environments.

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<sup>1</sup> Evans, J. V., *Nature*, 174, 931 (1954).

### Changes in the Intestinal Mucosa of the Sheep following Death by Humane Killer

IN the course of an investigation of the changes in composition of the digesta along the alimentary tract of the sheep<sup>1</sup>, it was noted that there was a considerable addition of nitrogen to the chyme in the most proximal quarter of the small intestine. The nitrogen content in the remaining quarters fell off distally until the abomasal level was attained in the fourth quarter. It was noted from *in vivo* studies on fistulated animals, and in those with exteriorized loops of the small intestine within the first two feet or so of the pylorus, that this addition of nitrogen did not occur to the same extent as in the shot sheep. Lignin was used as a reference substance to assess these changes.

A comparison of the histology of the mucosa of the small intestine (obtained practically immediately after death) of sheep shot in the frontal region with a captive bullet fired from a humane killer, and then bled, with specimens removed from sheep under pentobarbitone anaesthesia revealed that whereas the mucosa remained intact when removed under this form of anaesthesia, there was a very marked shedding of the epithelium and a loss of material from Brunner's glands, giving a positive reaction with periodic acid-Schiff (Fig. 1) in the animals which had been shot and bled—the normal method of slaughter. These differences were naturally paralleled to some degree by corresponding differences in the nitrogen content of the digesta, but there was still some rise in nitrogen content in the proximal section of the anaesthetized group and this is being further examined. It was thought advisable to bring to the attention of all those who work on the intestinal wall and on intestinal