Proc. Aust. Soc. Anim. Prod. (1972) **9**: *376*

COMPARISONS OF THE WALKING ACTIVITY OF SOME AUSTRALIAN SHEEP

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Summary

Comparisons were made of the walking behaviour of sheep of contrasting breed and physiological condition. The sheep were confined to narrow laneways in which the food and water sources were separated by long distances, and measurements were made of mean daily distance walked and walking speed.

Maximum daily distances walked when the food and water were 4 km apart were 14.0 km for Border Leicesters, 13.7 km for Merinos and 9.0 km for Dorset Horns. The speed of walking was 2.2-2.7 km/h for Border Leicesters and Merinos, but only 0.8 km/h for Dorset Horns. Pregnancy and lactation in Dorset Horn x Merino sheep reduced walking distance and walking speed.

I. INTRODUCTION

In the arid and semi-arid pastoral regions of Australia, sheep graze in paddocks that often exceed 4000. ha in area and have access to water at only one point. In hot weather the sheep require water daily (twice daily where the vegetation is highly mineralized), and long distances are walked while grazing and while travelling between the grazing areas and the water supply. Ability to walk long distances is of significance as it enables sheep to forage over a wider area, and reduces the grazing pressure on the vegetation close to water.

Information on the comparative walking ability of Egyptian sheep (Sharafeldin and Shafie 1965) and of Merino sheep with contrasting hock scores (Dun and Hamilton 1966) is available, but there is no data on the ability of Australian sheep to walk long distances, or of, the effect of physiological status on walking activity.

This paper reports the distance walked and walking speed of Merino, Border Leicester and Dorset Horn sheep, and pregnant and lactating and non-pregnant Dorset Horn x Merino sheep when compared under moderately hot conditions on level, shadeless terrain.

II. PROCEDURE

The experiments were conducted at Deniliquin, N.S.W. (35°C 30°S, altitude 100 m) in the summer of 1967-8, 1968-9 and 1969-70. Each comparison was made in the experimental laneways previously described (Squires and Wilson 197 1), and consisted of the two groups of sheep walking in separate laneways which were about 3 km apart. Each laneway was 6 m wide, bare of vegetation, shadeless and flat (approx. slope 1 : 3000). Water was supplied at one end, and a pelleted sheep ration was supplied in a self feeder which was moved progressively further from the water supply. Food and water were available without restriction. The water requirements of the sheep were increased by incorporating

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15 per cent common salt in the ration, so that frequent traverses between the food and water were encouraged.

The movement of the sheep was recorded automatically by both mechanical and photographic devices (Squires, Daws and Bawden 1969) which were placed near the feeder, near the water trough and at an intermediate site. Recordings were taken for 10 consecutive days, at each distance, and these records were used to calculate the distance walked and the walking speed of individually marked sheep.

In an initial comparison, two groups of Merinos, taken from a common flock, were placed in separate laneways for 80 days and were found to have the same activity patterns and walking distances. There were apparently no differences. between the laneways that could have influenced later comparisons.

(a) Breed

Medium-Peppin Merino wethers, one year old, were used in both comparisons. They were compared with one year old Border Leicester wethers in February 1968, and with one year old Dorset Horn ewes (non-pregnant, non-lactating) in February 1970. For the Border Leicester comparison, 20 sheep of each breed were placed in separate laneways, and the distance between the food and water was increased from 2.4 km to 4.8 km by increments of 0.8 km at 14 day intervals. At a distance of 4 km the Merinos ceased to walk regularly to water twice daily, so this distance was chosen for the subsequent comparisons. Twelve sheep of each breed were used in 1969-70 for the Dorset Horn comparison.

(b) Physiological Status

The effect of pregnancy on distance walked was assessed during February and March 1969 by comparing a group of 10 pregnant one year old Dorset Horn x Merino ewes with a similar group of non-pregnant non-lactating (NP — NL) ewes. The comparison was made during the fourth and fifth months of pregnancy when the food ‘and water were set 4.0 km apart. The sheep were introduced to this treatment by increasing the distance from 1.6 km to 4.0 km in steps of 0.8 km at weekly intervals during the third month of pregnancy.

The effects of lactation were assessed using one year old Dorset Horn x Merino ewes. The lambing period was narrowed by exposing a flock of 100 ewes to Border Leicester rams for two weeks; 10 pregnant ewes were later selected and taken to the laneway where all ewes produced single lambs over a period of 17 days. The food and water were placed 0.8 km apart until the youngest lamb was one week old, and then increased by 0.8 km stages at 14 day intervals until the test distance of 4.0 km was reached in December.

III. RESULTS

(a) Distance Walked

The distances walked by the three breeds of sheep are shown in Table 1. At a distance of 4.0 km, the Dorset Horns walked significantly ($P < 0.05$) less distance than the Merinos, and the Border Leicesters walked approximately the same distance as the Merinos. At 4.8 km the Border Leicesters maintained their twice daily frequency of drinking and walked 17.8 km/day, but the Merinos reduced their frequency to once daily and walked only 9.8 km/day.

TABLE 1

Mean daily** distance **walked by three breeds** of **sheep

Breed of sheep	Distance between food and water	
	4.0 km	4.8 km
Merino	13.7 ± 0.7*	9.8 ± 0.5
Border Leicester	14.0 ± 0.8	17.8 ± 0.8
Diff. between breeds	N.S.	$P < 0.01$
Merino	12.2 ± 1.4	n.d.†
Dorset Horn	9.0 ± 0.2	n.d.
Diff. between breeds	$P < 0.05$	

* Standard error.
† n.d. Not determined.

The pregnant sheep walked less distance than the NP — NL sheep ($P < 0.05$), and the difference increased from the fourth to the fifth month of pregnancy (Table 2). Lactating ewes with lambs at foot walked regularly once daily between the food and water over the whole range of distances tested (0.8-4.0 km). By the age of 60 days the lambs and their dams were walking an average of 7.9 km/day.

TABLE 2

Effect of ***advancing pregnancy on mean daily distance** walked by **ewes***

Physiological status	Months of pregnancy		Differences between months
	4	5	
Pregnant	9.6 ± 0.4*	6.6 ± 1.0	$P < 0.05$
NP — NL	13.0 ± 0.8	13.9 ± 0.6	N.S.
Difference between physiological states	$P < 0.05$	$P < 0.01$	

* Standard error.

(b) Walking Speed

The mean walking speeds of all groups are presented in Table 3. The Merinos and Border Leicesters were the fastest walkers (2.2-2.7 km/h). By comparison the Dorset Horns walked quite slowly (0.8 km/h). Walking speeds of pregnant and lactating ewes were also low (0.8-1. 1 km/h).

Walking speed ***en route*** to water was often greater than the speed on the return journey, and there was a general increase in speed of walking as the sheep approached water.

TABLE 3

Walking speeds by sheep of contrasting breed and physiological status

Breed and/or physiological status	Distance to water	Walking speed km/h
Border Leicester	4.0 km	2.4 ± 0.2*
	4.8 km	2.2 ± 0.3
Merino	4.0 km	2.7 ± 0.3
	4.8 km	2.4 ± 0.4
Differences at P = 0.05.		N.S.
Dorset Horn	4.0 km	0.8 ± 0.2
Merino	4.0 km	2.5 ± 0.2
Difference at P < 0.05		M > DH
DH x M pregnant, 4th month	4.0 km	1.1 ± 0.1 a.
DH x M non-pregnant non-lactating	4.0 km	1.9 ± 0.1 b.
DH x M pregnant, 5th month	4.0 km	0.8 ± 0.2 c.
DH x M non-pregnant non-lactating	4.0 km	1.5 ± 0.2 d.
Differences at P < 0.05		b, d > a, c
Lactating DH x M	4.0 km	0.9 ± 0.2

* Standard error.

IV. DISCUSSION

In these observations, the distance walked by sheep differed between breeds and between sheep of contrasting physiological status. Border Leicesters walked the same distance as Merinos when the food and water were 4.0 km apart, but walked longer distances than the Merinos when the food and water were 4.8 km apart. This indicates that the Border Leicesters are as good or better walkers than the Merinos and in this respect are suitable for pastoral areas. By contrast the Dorset Horns were poor walkers and may be unsuitable. The effect of pregnancy and lactation was to reduce the distance walked. In the pastoral regions ewes are likely to be pregnant in autumn when forage is sparse. Under these circumstances the decreased walking ability of these sheep would decrease their grazing range and increase nutritional stress.

From the data presented the maximum grazing range of sheep on saltbush in summer may be predicted. The maximum distances walked suggest ranges of 4.5, 7 and 9 km respectively for Dorsets, Merinos and Border Leicesters drinking once daily, and 2-4 km when drinking twice daily. For pregnant sheep the maximum range would be 2-4 km, depending on drinking frequency. The actual ranges may be less than these because of slower walking while grazing and walking across the main axis of travel. Observations on the utilization of saltbush (Osborn, Wood and Paltridge 1932) suggest an effective grazing range of 2.4 km.

The average speed of walking recorded varied between breed and physiological status, but most were within the range (1.5-2.9 km/h) used by Clapper-ton (1964) in treadmill experiments. Graham (1964) used Clapperton's values on the energy cost of walking to calculate the increase in energy expenditure of sheep attributable

to grazing sparse pastures. The distance used in his calculations (16 km/day) is higher than the values generally recorded for all but Border Leicester sheep, so that the magnitude of the estimated increase in energy expenditure (about 11 per cent) for sheep grazing sparse pastures, over that of sheep grazing improved pastures, can be regarded as a maximum.

The ability of sheep to walk long distances, go for long periods between drinks and to maintain high levels of food intake is of importance in pastoral zone grazing systems when long distances separate the grazing areas from the water supply. In this situation, the walking ability of sheep can determine the area of land around a watering point that is effectively utilized (Squires 1970).

V. ACKNOWLEDGEMENT

The work was supported by the Australian Pastoral Research Trust.

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