

## A COMPARISON OF THE BEHAVIOUR OF DOMESTIC AND FERAL SHEEP (*Ovis aries*) ON LUNDY

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### ABSTRACT

It has been suggested that there are behavioural differences between the lambs of the Soay flock on Lundy and the lambs of a commercial flock on the Lundy farm. This claim was investigated by observing the activity of the different breeds and noting how each breed spent its time. Both ewes and lambs were observed. As some of the lambs were unwell, observations of a commercial flock in East Devon were also made. Differences were found in the amount of time spent engaged in grazing and resting, but not in the amount of time spent playing. Reasons for these differences in behaviour are put forward. It is argued that the quality of the grazing is of prime importance to the activity of the sheep and lambs. Several problems were noted, and further investigations suggested that would lead to a better understanding of the differences that exist between these two populations.

### INTRODUCTION

Man's association with sheep can be traced back to Neolithic times (Rüttmayer 1961, cited in Ryder 1983). These original sheep formed a group known as 'turbary' sheep (*Ovis aries palustris*). A relic of this type exists in the Soay sheep which are found mainly on St Kilda and remain the sole relic type since the extinction of the Lille Dimon in the Faroe Islands in 1850 (Boyd *et al* 1963). The Lundy flock was established in 1944 from seven ewes and one ram transferred from Woburn Abbey, the original source being the St Kilda archipelago (Gulland 1992). Ryder (1983) considers that the Soay resemble most closely Bronze Age sheep. The two types of sheep considered in this study are very different. The Soay are distinguished from domestic sheep by a number of physical features, most notably the possession of a short tail and white belly wool (Ryder 1983).

Evidence of behavioural differences are equivocal as Soay sheep are rarely kept in the same conditions as domestic sheep. Health factors represented another difficulty. The Soay sheep seemed in good health, but the Lundy domestic flock were suffering from a number of health problems, partly due to a lack of nutrition earlier on in gestation. There were also cases of spontaneous abortion caused by listeria. As a result of these problems, it was considered necessary to observe the third group, a healthy domestic flock in Honiton.

It was considered necessary to observe dam-lamb pairs, as while lambs are suckling, the behaviour of the ewes affects the amount of energy available to the lamb. It was suggested that there would be differences in the amounts of time spent grazing due to the poor quality of pasture that the Soay ewes had access to. It was hypothesised that this would be reflected in other behaviours such as resting, which would decrease, as Soay ewes had to work harder to meet their nutritional needs. This would lead to ewes having less milk so the Soay lambs would obtain less nutrition from their mothers. The lambs would be forced to rely on grazing at an early stage to meet their nutritional needs, leading them to rest and play less. Reduced amounts of play had previously been observed in the Soay: could this be considered a result of reduced resources? Care must be taken, however, not to confound true differences in play with either sex differences (Sachs and Harris 1978) or effects of the bimodal distribution of play (Fagen 1980).

## METHOD

Three different groups of ewes and lambs were defined, each group consisting of 30 dam-lamb pairs.

*Soay*: The Soay flock was unmanaged except for occasional culling. The sheep had access to unimproved heath land throughout the year. The lambs were between one and four weeks old, most being two weeks old.

*Lundy Domestic*: The sample was taken from a flock consisting of mixed modern domestic breeds. The lambs were between one and two weeks old at the time of observation. The Soay ewes were rarely seen with twins so when observing domestic sheep only ewes with single lambs were considered. These sheep were given concentrate feed over the lambing period, and grazed on managed pasture.

*Honiton Domestic*: The sample was taken from a flock consisting of mixed modern domestic breeds. The lambs of this flock were also between one and four weeks old. The ewes in this flock had supplementary feeding over the lambing period, although this was curtailed for ewes with single lambs at turnout. As with the Lundy domestic sheep, only ewes with single lambs were observed. The similarity in age and the lack of health and nutritional problems made this flock a good comparison.

## PROCEDURE

Observation was carried out during April 1995. Focal-animal sampling was used (Altmann 1974,242), and spaced throughout the day. Both the Soay and the modern domestic sheep, were observed for five minute slots of time. The classifications of behaviour were derived by an initial observation of the sheep before settling on the following categories:

*Ewe* suckling lamb, wandering off, grazing and resting.

*Lamb* suckling ewe, following ewe, picking, playing and resting.

'Picking' was the label given to attempted grazing behaviours that the lambs exhibited. Resting referred to resting while standing or lying down and included ewes chewing the cud. For each dam-lamb pair the amount of time spent engaging in each of the listed behaviours was noted.

The problems of unconscious subject selection were overcome in the case of the Soay by simply sampling every dam-lamb pair in observable range. The domestic sheep were sampled as they were encountered, although some selection inevitably took place. For the domestic sheep a record was kept of their identifying number, which was spray-painted onto one side of the ewe and on the lamb. This ensured no pairs were sampled twice. Despite sampling in different areas of the island, the movements of the Soay meant that some pairs may have been recorded more than once.

## RESULTS

The charts (figs 1-2) show ewe and lamb behaviour, across all three groups. There are differences between the amount of time spent grazing between the Honiton farm ewes and the modern domestic ewes on Lundy. There also appear to be differences in lamb behaviour, notably in the picking and resting categories. Separate behaviours were compared using t-tests, with an adjustment being made to the significance levels to account for experimentwise error rate<sup>1</sup> (or familywise error rate).

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<sup>1</sup>Because of the number of t-tests involved, it was considered appropriate to apply some sort of correction to ensure the experimentwise error rate stayed at a reasonable level. The method chosen was to multiply all the p-values given by Minitab by the number of categories in each data set. This means that p-values for tests on ewes were multiplied by 4, as there were four behaviour categories for ewes, and test on lambs were multiplied by 5.

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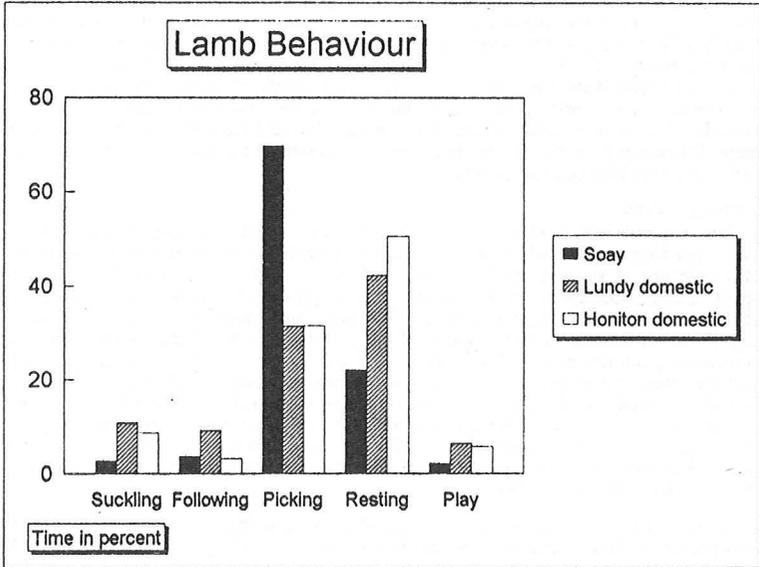


Fig. 1

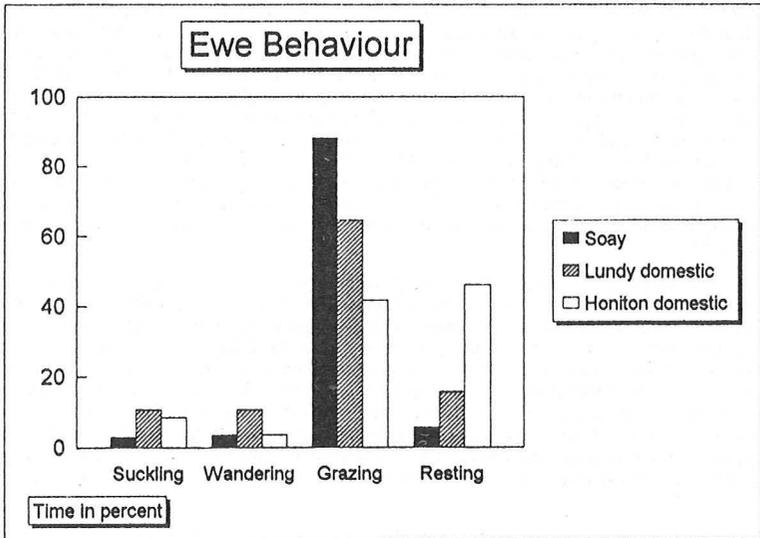


Fig. 2

There is evidence for a trend: an increase in time spent grazing as quality of pasture decreases, as predicted. This can be seen in the graph and was supported by the t-tests. The Soay ewes spent significantly more time grazing than both other groups ( $p < 0.025$ ). It also appears that there is a significant difference in the amount of picking by the three groups of lambs ( $p < 0.05$ ). There were no significant differences in suckling behaviour between the three groups. There was a significant difference in resting, with the Honiton lambs resting more than the Soay lambs. Following behaviour was not considered, as it bears little relevance to the question and there do not appear to be any large differences from the charts. There were no significant differences in the amount of play behaviour between the groups.

## DISCUSSION

The hypothesis that Soay ewes and lambs 'work' harder was confirmed, with Soay ewes spending significantly more time grazing than the other groups of ewes. There is also evidence to support the hypothesis that as the quality of grazing increases, time spent grazing decreases. Soay lambs spent significantly more time picking and significantly less time resting than the Honiton farm lambs, however there was no significant difference in the amount of play between any of the groups. This was surprising given the increased amount of time the Soay lambs spent picking, indicating that they were indeed on a lower plane of nutrition. Personal observation indicates that periods of inactivity of the ewes are accompanied by periods of inactivity in the lambs. It could be that because of the small sample size, observations occurred during periods of rumination rather than activity of the ewe which would favour inactivity in the lambs. This explanation would be supported by the rumination/grazing cycles that occur throughout the day (Hafez 1969).

The categories used by no means covered every possible behaviour. The emphasis was placed on those categories relevant to the study, for example, bleating and suckling were both relatively uncommon events, but suckling behaviour was recorded as it bears relevance to the ideas presented for investigation.

Several possible sources of bias were noted. Although when studying the Soay the possibility of duplicating observations occurs, there is the advantage that Soay lambs never stray far from their dams. This is not the case with the domestic sheep. The numbers spray-painted on the sides of the ewes and lambs allowed pairs to be found when they were separated, although there could have been a bias against lambs who were separated by large distances from their dams. This observation that Soay lambs remain closer to their dams is unverified, although evidence by Walser *et al* (1984) would lend weight to this view. The health problems in the domestic flock on Lundy added a further complication to the study. The Lundy domestic sheep are subject to the same weather conditions as the Soay, and because of this it would have been preferable to just consider the sheep on Lundy. As the study progressed it became increasingly obvious that some of the lambs were very unwell despite efforts on the part of the farmer to help. The data from the Honiton farm has advantages in that the flock was healthy and, in that respect, similar to the Soay flock, but the area and weather were different.

At this point, the bimodal nature of play in lambs must be carefully considered. According to previous studies (Sachs and Harris 1978 and Fagen 1980), play activity peaks at 2 to 3 weeks and 8 to 9 weeks, with a trough between these peaks. This means that the majority of the Soay lambs were entering the trough, but the lambs on the Lundy farm were reaching the peak. The lambs at Honiton were at a similar age to the Soay, so it was considered more appropriate to compare the amount of play behaviour in the Soay to the lambs on the Honiton farm. Other points to consider are the different flocking patterns of the Soay which vary depending on the time of year. As the Soay begin to congregate in larger groups the incidence of play will increase due to social facilitation. This is relevant as all the observations of play were also made towards the end of the study.

It was noted that ewes would repeatedly refuse to suckle lambs, either by walking away as the lamb tried to suckle or by kicking the lamb off once it had started to suckle. Fagen (1980) reports that this increases after the 4th week. A further study could

compare this behaviour between Soay and domestic sheep to see if there are any differences in the intensity and duration of this behaviour and whether age of lambs or quality of grazing are factors.

The one extended period of Soay play observed provoked some interesting thoughts. The play appeared to be more like "wild animal" play - concentrated on play fighting and butting. Compared to the gambolling and gaming of the domestic flocks it was very different.

The general impression gained was of the Soay as working hard and playing hard contrasted with the life of luxury that the Honiton flock enjoyed, with the Lundy domestic flock falling somewhere in the middle.

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#### REFERENCES

- Altmann, J. 1974. Observational Study of Behaviour: Sampling Methods. *Behaviour* 49, 227-267.
- Boyd, M., Mackay, J., Doney, R., Gunn, G., & Jewell, P. 1963. The Soay Sheep of the Island of St Kilda: A Study of a Feral Population. *Proceedings of the Zoological Society of London* 142, 129-163.
- Fagen, R. 1980. Ontogeny of Animal Play Behaviour: Bimodal Age Schedules. *Animal Behaviour* 28(4), 1290.
- Gulland, F. 1992. The Soay Sheep of Lundy. *Annual Report of the Lundy Field Society* 43, 50-1.
- Hafez, E. 1969. *The Behaviour of Domestic Animals* (second edition). The Williams and Wilkins Company: Baltimore.
- Ryder, M. 1983. *Sheep and Man*. Gerald Duckworth and Co: London.
- Sachs, B. & Harris, V. 1978. Sex Differences and Developmental Changes in Selected Juvenile Activities (play) of Domestic Lambs. *Animal Behaviour* 26, 678-684.
- Walser, E.S., Walters, E. & Ellison, J. 1984. Observations on Vocalization of Ewes and Lambs in the Field. *Behaviour* 91, 190-203.