

Horny Soays - the mystery of the scurs

BY KEN WILSON, IAN STEVENSON & JOSEPHINE PEMBERTON

Perhaps more than any other breed of sheep, the Soay exemplifies the variation we all admire in rare breeds (see, for example, 'Colourful Soays', *The ARK - Winter 1997*). As well as the multitude of coat colours seen in Soays, most breeders will also be aware of variation in the size and shape of Soay horns - ewes in mainland flocks tend to be either polled or horned, whilst tups typically have longer and more robust horns. However, this situation contrasts with what we observe on St Kilda, where one in four ewes and one in eight tups possess 'scurs'. These are malformed and often asymmetrical horns, which are of variable size but typically are much less than half the length of normal horns and usually thinner (see photos).

Although most Soay breeders would probably regard scurred horns as 'abnormal', our work on St Kilda has shown not only that this horn 'polymorphism' is a natural attribute of the ancestral population, but also that it has important consequences for the mating behaviour of the sheep and the dynamics of the island's sheep population.

Horn Genetics

A number of people, including CHS Dolling in the 1960s, have examined the inheritance of horn type in domestic sheep breeds (mainly merinos). This work suggests that horn type is influenced by two major genes, one controlling the presence or absence of normal horns (ie. polled or normal-horned), and another determining the presence or absence of scurred horns. Both genes may be expressed differently in the two sexes and, to make matters more confusing, they may interfere with each other's expression. Our own work on St Kilda, using DNA profiling to determine paternity, provides clear support for genetic control of the three horn types. For example, in matings with normal-horned tups, nearly 20% of ram lambs born to scurred or polled ewes were scurred, compared with just 2% of those born to normal-horned ewes. Nevertheless, some details of the inheritance system remain obscure to us and will only be resolved as we accumulate data for various rare mating combinations.

Horns and Tups

The true importance of horns for tups is often hidden in domestic flocks where typically only a few are run with the ewes for tupping. In feral sheep, by contrast, tups of all ages are present throughout the year and stout horns enable large males to establish themselves high in the pecking order. Tups use their

A number of sheep breeds are observed from time to time to produce scurs - malformed and irregular horns. Here, a group of scientists from the University of Stirling report into studies into the occurrence in Soays.

horns at the beginning of the breeding season, both in head-to-head butting contests and in attacks on the flanks and sides of their opponents (see photo). They also use their horns to defend oestrous ewes from the unwelcome attentions of other males.

So, how do males with small scurs cope during the rut? Not surprisingly perhaps, they tend to fare rather badly in most years. As mature adults, normal-horned tups are able to achieve high dominance status and to monopolise access to receptive ewes. Even though they are of similar stature, scurred tups, with their small, weak horns, are usually much lower in the pecking order, and sometimes they are even bullied by younger, smaller males. Our behavioural studies suggest that, as a consequence, scurred tups very rarely gain long periods of exclusive access to ewes. As a counter-measure, they appear to adopt a different behavioural strategy from the normal-horned males, and instead of trying to defend receptive ewes, spend most of their time during the rut roaming the island trying to locate and mate with, undefended ewes.

So, is this strategy successful when it comes to siring lambs? We have now conducted extensive genetic analyses of the lambs born in each year (using DNA profiling) and found that, as expected, scurred males generally do rather badly. In most years, normal-horned tups sire at least twice as many lambs as scurred tups, though when the population density is high and rutting becomes more of a free-for-all, normal-horned tups do just as badly as their small-horned contemporaries.

Horns and Ewes

So, it appears that scurs are bad news. But, simple population genetics theory tells us that this cannot be the whole story. This is because the proportion of sheep on St Kilda with scurred horns has remained more or less constant since the first surveys were conducted by the late Moreton Boyd and Peter Jewell in the 1960s. If genes for scurs only had negative effects, then we would expect them to be eliminated by a process of natural selection. The fact that they are present at all, suggests that there must be some associated benefits with possessing them.

One of those benefits appears to be related to ewe fecundity. Our work indicates that scurred ewes tend to be slightly heavier than polled or normal-horned ewes, particularly when young. As a result, they tend to have higher conception rates and weaning rates, and tend to produce heavier lambs. So, the scurred genes may survive in



Scurred tup on St Kilda. Photo by Ken Wilson



Normal-horned tup on St Kilda. Photo by Ken Wilson

the population because they are associated with increased fecundity. But, are there any other beneficial traits associated with scurred horns?

Horns and Survival

A study published by Paul Moorcroft and others in 1996 suggests that the answer to this question is yes. They found that scurred animals of both sexes tend to survive the harsh winters on St Kilda better than non-scurred animals of a similar age. For example, their results suggest that in years when sheep numbers are high, more than 60% more scurred animals survive over winter than normal-horned or polled animals. As yet, we do not know the reason for this and it is currently under investigation. In tups, the difference in survival may be associated with the greater aggression shown by normal-horned animals in the mating season, but this cannot explain the difference in ewes. Another possibility is that scurred animals have lower energy costs outside the mating season, perhaps due to some hormonal difference between the horn-types.

A consequence of this difference in overwinter survival is that, despite siring fewer offspring in most years, over their entire lifespan scurred tups tend to father approximately the same

number of lambs as normal-horned tups. So, it might not be so bad being a scurred tup after all!

Conclusions

Our studies, and those by other groups, have shown that scurred animals are a natural and interesting component of the ancestral population of Soay sheep on St Kilda. More importantly, perhaps, their higher overwinter survival and fecundity suggests that rather than being curiosities or abnormal 'mutants', these animals may possess genes conferring important traits on the breed. As a result, we should perhaps be cultivating this curious trait, rather than trying to eliminate it. However, before we can say this for sure, we need to know much more about the inheritance of scurred genes and the fitness characters associated with them. We are therefore interested in hearing from anyone who has ever had scurred animals in their flocks (ewes or tups), or indeed from anyone who has kept Soays for a long time and never seen scurs. Together, we may be able to determine why this curious trait has survived for so long.

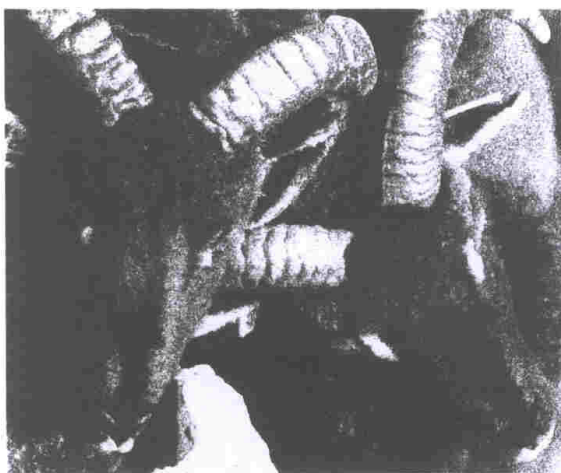
Acknowledgments

We gratefully acknowledge the support and assistance offered over many years by the National Trust for Scotland and Scottish Natural Heritage. We also gratefully acknowledge the generous help provided by SERCo and the Army units stationed on St Kilda, Benbecula and the mainland. We thank members of the Soay Sheep Project, especially Brian Preston and Jill Pilkington for their help with field work, as well as numerous field assistants. The NERC, BBSRC, Wellcome Trust and Royal Society provided financial assistance.

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Two normal-horned tups using their horns in a fight on St Kilda. Photo by Ian Stevenson



Normal-horned tup on St Kilda. Photo by Ken Wilson