

Brief Report on Analysis of Four-horned Sheep Eyelid Survey 2008

Introduction

From the first year of the survey in 2008 some information was obtained for 228 Hebridean lambs, 142 Hebridean adults, 47 Manx Loaghtan lambs and 45 Manx Loaghtan adults. Unsurprisingly there was some variation in the quality of the data e.g. not all respondents recorded both left and right eyes. In addition, data on adults alone is of little value as the data is not based on a random sample as breeders are more likely to retain, and breed from, adults with better eyelid scores. This was particularly apparent for Manx Loaghtan adults for which 66% of the individuals with both eyelids recorded were in the best (1/1) category.

In most of the analyses below only sheep for which both eyelids had been recorded are included. It should be emphasised that all data concern multi-horned sheep within the two breeds; there is no evidence that eyelid faults occur within the genetically two-horned populations of either breed.

Left and Right Eyelids

Although significant differences were not anticipated, two analyses comparing left and right eyelids were conducted as, where both eyelids had been recorded, it was apparent that the left and right eyelids were frequently scored differently.

- There was no significant difference between left and right eyelids in terms of which were scored worst.
- Significantly more sheep had equally scored eyelids than unequally scored eyelids.

Although there were more sheep with equal scores than unequal scores, that the eyelids were frequently unequal indicates the value of recording both and the survey form for 2009 has been redesigned to encourage separate records for left and right eyelids. However, as there was no significant difference between left and right eyelids in subsequent analyses left and right are treated as interchangeable e.g. scores of 1/2 and 2/1 are considered equivalent.

Frequency of Eye Scores

Of the 140 adult Hebrideans for which left and right eyelid scores were available 87 (62%) were in the best two categories for eyelid scores (Figure 1). As noted above this merely shows that breeders are actively selecting breeding stock with 'good eyes'.

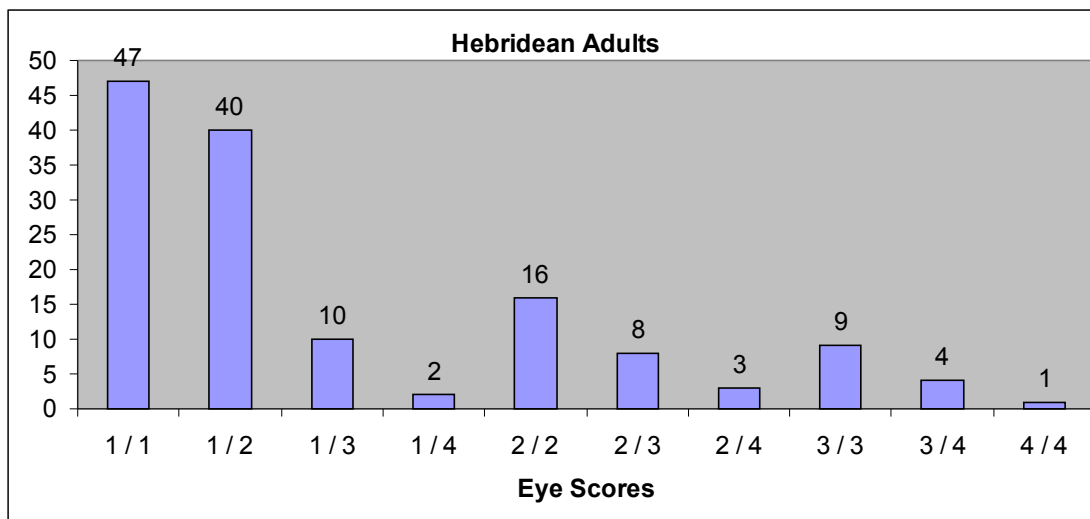


Figure 1. Number of Hebridean adults with each combination of left and right eyelid scores.

For 183 Hebridean lambs there were higher frequencies of poorer eyelid scores, especially 2/2, 2/3 and 3/3 than in adults, although about a third were in the best two classes (Figure 2). Approximately 15% of Hebridean lambs had at least one eyelid with a split (scored 4). Although the data for lambs are subject to less bias than the adult data, it cannot be assumed that a random sample would give precisely the same proportions in each class; nevertheless, assuming that respondents have not been selective in which lambs they recorded and submitted to the survey, the data for lambs are likely to be a better reflection of the distribution of eyelid scores and hence the basis on which selection for better eyelids could be made.

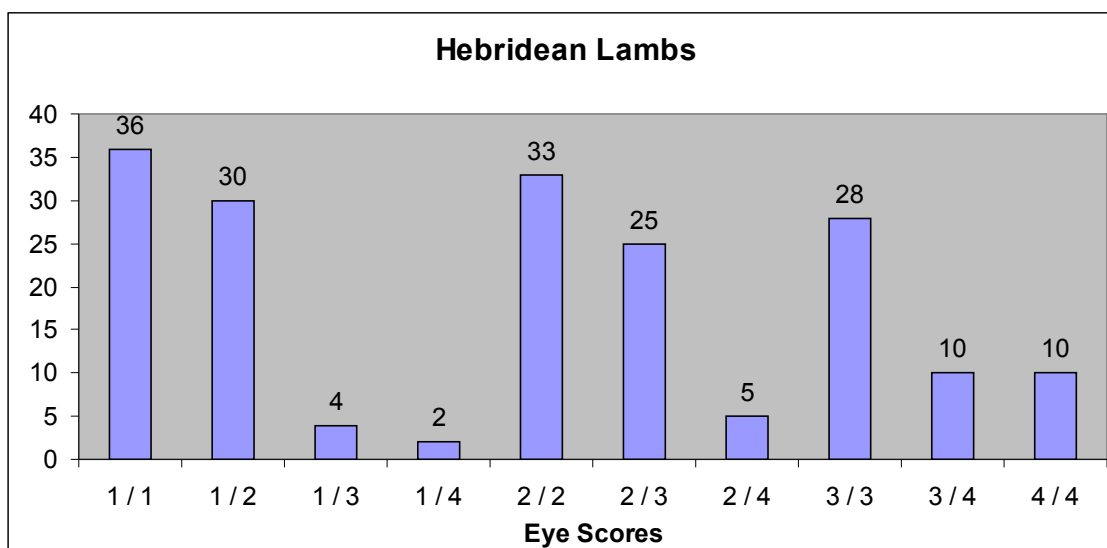


Figure 2. Number of Hebridean lambs with each combination of left and right eyelid scores.

The effect of selection for breeding stock can be seen in Figure 3, which compares the percentage of Hebridean adults and lambs in each eyelid category. Adults with at least one 'good' eyelid were retained whereas there were lower proportions of adults with scores of 2/2 or worse than for lambs.

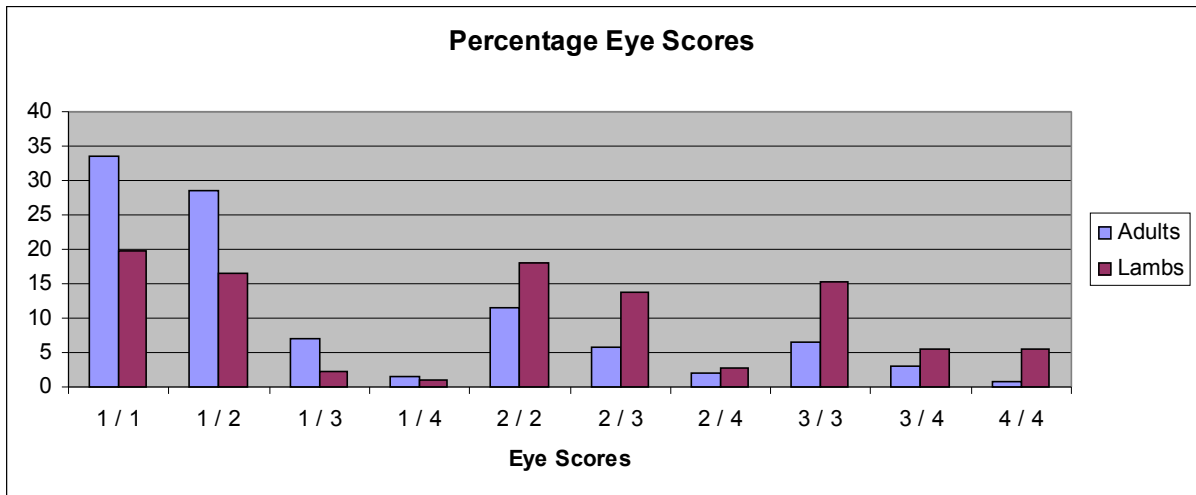


Figure 3. Percentage of Hebridean adults and lambs in each class of left and right eyelid scores.

Figure 4 shows the same data as Figure 3 but with the addition of Manx Loaghtan lambs. The higher proportion of Manx Loaghtan lambs in the best eyelid category and their absence from the worst categories (1/3, 1/4, 3/4, 2/4) might suggest that Manx breeders have made more progress towards eliminating particularly poor eyelids than have Hebridean breeders, but the effect of sample size cannot be ignored – there were records for both eyelids for just 18 Manx Loaghtan lambs compared to 183 Hebridean lambs. Only 1.1% of Hebridean lambs were in the 1/4 category so a sample of 18 would be likely to miss any such individuals.

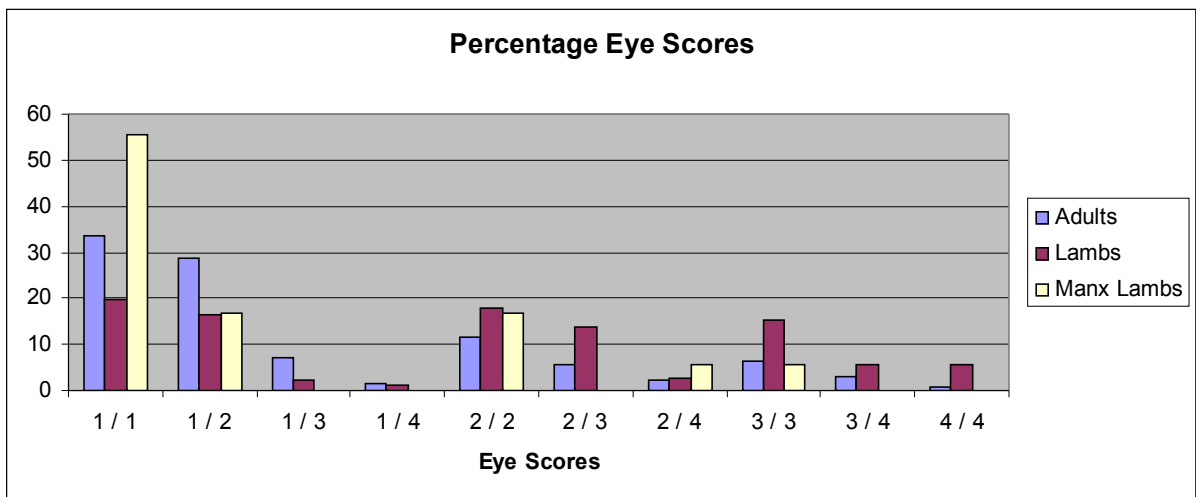


Figure 4. Percentage of Hebridean adults and lambs and Manx Loaghtan lambs in each class of left and right eyelid scores.

Horn Number

In Hebrideans the percentage of individuals with particular horn numbers is very similar in adults and lambs (Figure 5); over 85% of both adults and lambs were recorded as having four horns. No individuals were recorded as having one horn but low numbers were recorded with 2, 3, 5 and 6 horns or were hornless.

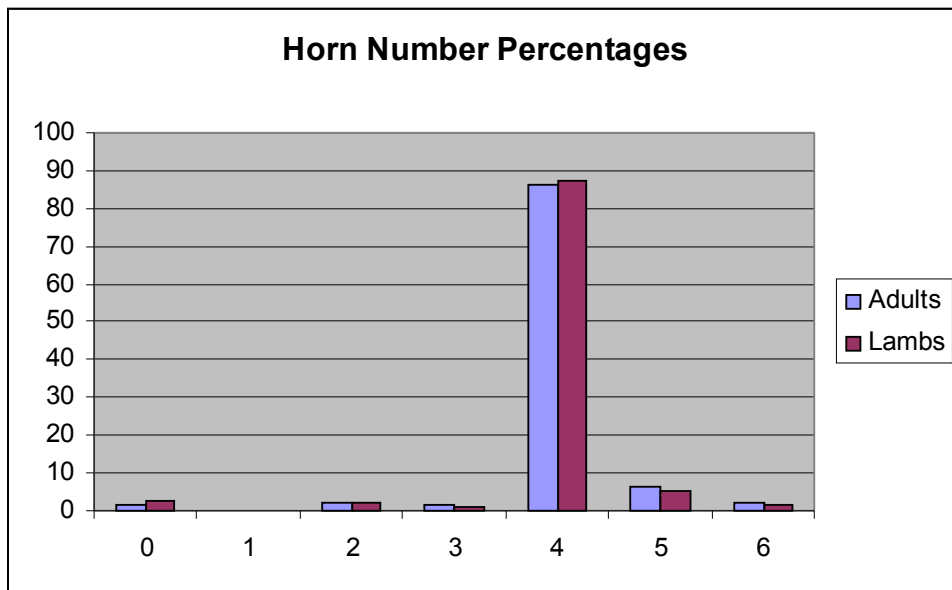


Figure 5. Percentage of Hebridean adults and lambs with 0-6 horns.

In Manx Loaghtan all 45 reported adults had four horns. For Manx Loaghtan lambs numbers (and percentages) were: 2: 3 (6.4%); 3: 2 (4.3%); 4: 41 (87.2%); 5: 1 (2.1%). Thus percentages were similar to those of Hebrideans, but with no reported hornless lambs in the much smaller sample.

Horn Direction

In Hebridean adults numbers (and percentages) with each horn direction were V (vertical): 50 (63%), F (forward): 26 (33%) and B (back): 4 (5%). Once again, this could reflect selection for particular horn directions, so the equivalent data for Hebridean lambs may be of more interest: V: 100 (68%), F: 30 (20%) and B: 18 (12%). These data imply selection for forward directed horns at the expense of backward directed horns, which is perhaps surprising as forward directed horns have been associated with impedance of grazing in rams and growing towards the face in ewes.

So far I have only attempted to quantify the eyelid scores with horn direction (V, F and B). This was analysed by calculating an index for eyelid score by multiplying the scores for the two eyelids together; thus the scores ranged from 1 (1x1) to 16 (4x4). The mean scores (based on the number of individuals above) for Hebridean adults were: V: 2.94, F: 4.11 and B: 1.75 and for Hebridean lambs V: 5.44, F: 7.43 and B: 2.94. The lower mean scores in adults reflects the selection against the worst eyelid scores, but the pattern in both adults and lambs is consistent and suggests that the further forward the horns lean the worse the eyelid scores. However, this has not yet been analysed this statistically.

There were only three Manx Loaghtan adults for which horn direction was recorded (all forward); none of these had both eyelids recorded. Horn direction was recorded for just 17 Manx Loaghtan lambs: F: 13 (76.5%) and V: 4 (23.5%). Of these eyelid scores for both eyelids were only recorded for six lambs, two with forward directed horns and four with vertical horns. For the record, the mean eyelid scores were F: 6.5

and V: 2.0, which again is consistent with the Hebridean data in that forward directed horns were associated with worse eyelid scores.

Horn Type

For Hebridean horn types A-D were recorded for 107 adults; the vast majority (88, 82.2%) had Type A horns. Numbers (and percentages) for other horn types were B: 13 (12.1%), C: 4 (3.7%) and D: 2 (1.9%). Horn types were recorded for 210 Hebridean lambs; the total recorded each horn type were A: 180 (85.7%), B: 19 (9.0%), C: 4 (1.9%) and D: 7 (3.3%).

Mean eyelid scores (calculated as above by multiplying left and right eyelid scores where both were available) in relation to horn types for Hebridean adults were: A: 3.31, B: 2.08, C: 1.67 and D: 2.50 but the very low numbers for types C and D (2 and 3 respectively) for which both eyelids were recorded make these estimates unreliable. However, it does seem as type A horns may be associated with poorer eyelid scores.

For Hebridean lambs mean eyelid scores in relation to horn type were: A: 5.54, B: 3.64, C: 7.33 and D: 6.25. Again low numbers of types C and D (3 and 4 respectively) make these estimates unreliable. There were also relatively few type B individuals (17) but it does seem that these tended to have a lower eyelid score than type A lambs.