

GRASSLAND MANAGEMENT FOR GEESE: SUSTAINABLE USE FOR CONSERVATION AND AGRICULTURE

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ABSTRACT

Increasing numbers of overwintering wild geese have caused considerable problems to agriculture but are often also of conservation concern as their populations are relatively small. Islay, Scotland, is one site where this problem is particularly acute. We studied the two goose species which use this site, the barnacle goose, *Branta leucopsis*, and the white-fronted goose, *Anser albifrons flavirostris*, and found that they preferred younger pastures located closer to their roost sites. These preferred areas could be important in developing a sustainable strategy for future goose management. Further non-sustainable population increases might be avoided by increasing disturbance in these areas.

KEYWORDS

Barnacle goose, white-fronted goose, pasture management, sustainability, feeding preference, disturbance

INTRODUCTION

Many wild goose populations have increased dramatically over the last 40 years (Ebbinge, 1991) but are often still of conservation concern as their populations are relatively small (Batten *et al.*, 1990). Agricultural intensification has facilitated this increase, creating grasslands which are highly attractive to feeding geese (Percival, 1993). Goose grazing on pastures has caused problems to agriculture as it can result in significant yield reductions (Patterson, 1991; Percival and Houston, 1992).

This paper focuses on one site, Islay, an island 30 km off the west coast of Scotland, UK, which supports internationally important numbers of barnacle and white-fronted geese. Goose numbers have increased from less than 10,000 to 40,000 over the last 30 years and continue to rise (Pettifor *et al.*, 1996). A goose management scheme was introduced in 1992 to pay farmers to provide the geese with undisturbed feeding sites. This has resulted in accelerating the annual rate of population increase to 9% (Percival, 1996). The payments in the scheme are directly linked to goose numbers (US\$14 per goose in 1996).

The purpose of this paper is to investigate goose feeding preferences and assess the options for sustainable goose management.

METHODS

Previous small scale experiments at the field level have shown that barnacle geese prefer younger pastures (Percival, 1993). We sought to determine whether this finding holds true for this species on a larger scale and for the white-fronted goose which also winters at the site. Goose feeding preferences were measured by carrying out regular field counts over the whole island (Easterbee *et al.*, 1991). Counts were carried out twice monthly between October and April 1992/93 and 1993/94. A survey of the crop types and pasture age of all the fields on the island was carried out to determine habitat availability and the area of each field and its distance from each species' roost were measured from a 1:10,000 map.

RESULTS

Goose grazing densities on pastures of different age were highly significantly different (Kruskal-Wallis $H=150.2$ and 142.4 for barnacle and white-fronted geese respectively, $P<0.001$ and $df=8$ in both

cases; see Fig. 1). Both species showed a preference for younger pastures but this was stronger in the barnacle goose.

Both species were negatively influenced by the distance of a field from their roost site ($r_s=-0.35$ and -0.14 for barnacles and white-fronts respectively, $n=1581$, $p<0.001$ in both cases). Greater densities of barnacle geese were recorded in larger fields ($r_s=0.22$, $n=1581$, $P<0.001$) but white-front density was unrelated to this factor ($p>0.05$).

Stepwise multiple regression showed that the total area of potential goose feeding habitat and the distance from the roost site were significant factors affecting the numbers of both species of geese using a farm, with more geese on farms with larger potential feeding areas and on those closer to roost sites (Table 1). In addition more barnacle geese were found on farms with larger areas of reseed less than 5 years old, and more white-fronts on farms with less permanent coastal grassland.

DISCUSSION

Barnacle geese showed a similar preference for younger pastures across the whole island as they had done in previous smaller scale experiments (Percival, 1993). White-fronted geese showed similar results but their preference was less strong. At the larger scale investigated here the distance from the roost site was also an important factor in determining distribution, with geese of both species found in greater numbers closer to roost sites.

Knowledge of feeding preferences such as these is essential for assessing management options. Provision of more high productivity grassland would be likely to result in a further increase in goose numbers, especially if it is located close to roost sites. Current management of Islay geese, in common with several other goose management schemes (Van Roonen and Madsen, 1995) concentrates on ameliorating the impacts of goose grazing on grasslands and crops. With increasing goose numbers there is a corresponding increase in funding levels for the scheme. Perhaps now there is more scope to develop a more sustainable management strategy involving manipulation of goose feeding behaviour. It may be possible to concentrate the geese in fewer parts of the island with appropriately managed refuges. This option failed in the past because it did not take into account the birds' population structure (Percival, 1991) and many geese never visited the refuges. Locating refuges close to each of the main roosts could accommodate large numbers of geese. This may, however, not be sustainable as these refuges will eventually reach their capacity and birds will spill over onto adjacent areas.

An alternative strategy might be to encourage dispersal from Islay to other parts of the wintering range by increasing disturbance. It has proved possible to increase emigration rates by scaring in some areas (Percival *et al.*, 1988). If disturbance were concentrated in the most preferred areas it would have the maximum impact. Pastures in these areas could also be managed to reduce productivity, for example reseeding less frequently, but this would need to be considered carefully in relation to the farm economics.

In conclusion, knowing the birds' preference for feeding on younger pasture closer to roosts should greatly assist in the development of a successful and sustainable goose management strategy.

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Table 1

Stepwise multiple regression results of habitat, area and roost distance on goose numbers per farm. n = 137, P<0.001 in all cases

	Regression equation	r ²
Barnacles	Area grass<5yrs x 0.73 - Roost distance x 3.83 + Total area x 1.49 + 2.96	57.6%
White-fronts	Total area x 1.80 - Roost distance x 1.35 - Area coastal grass x 0.76 + 1.78	43.7%

Figure 1

Goose grazing densities and pasture age

