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The manurial effect of Cape Barren Goose droppings

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Introduction

There are many ways in which geese interact with agriculture. One of these is the effect of their droppings (the term 'droppings' is used rather than 'faeces' because they include the product of the kidneys, which is largely uric acid). The droppings are often alleged to 'foul' the pasture. This 'fouling' is said to include the burning of the pasture plants, presumably due to ammonia (Kear, 1963) and making the grass unpalatable to sheep (Rochard & Kear, 1968, 1970). Cape Barren Geese *Cereopsis novaehollandiae* feeding on managed pastures in Australia are similarly accused of 'fouling' pasture.

Methods

Attempts were made to crop pasture following applications of goose droppings, but these failed in 2 consecutive years due to the effect of drought. Weed species came up to such an extent that the effect of the droppings on the pasture species was blurred. In the third year a rye grass and clover mixture was grown in boxes (25 cm × 25 cm) outdoors and droppings applied to the growing plants. The fresh droppings were crumbled and scattered evenly over the grass. Three levels of application, 10, 20 and 30 g wet weight of fresh droppings, were used plus a control to which no droppings were added. There were nine replicates of each application and control.

The droppings were applied three times at monthly intervals, beginning after 1 month's growth of the grass, making totals of 30, 60 and 90 g. The droppings were collected fresh from geese in the A. J. Marshall Reserve, Monash University.

A dropping's wet weight is approximately 4 g so the applications are equal to approximately 128, 256 and 384 droppings per sq. m. The maximum density ever recorded at one time on managed pasture at Yanakie (S. E. Victoria) was eighty-one droppings in a sq. m, and over 40 per sq. m were recorded commonly in the dry summer of 1967 around a stock dam (Figure 1). The rate of disintegration of droppings is not known

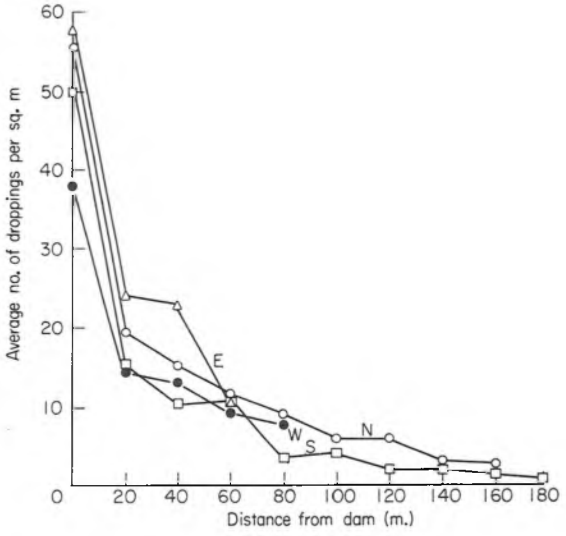

Figure 1. The distribution of Cape Barren Goose droppings in a paddock at Yanakie, S. E. Victoria in March 1967. The numbers of droppings per sq. m are the averages of ten 1-sq.-m quadrats placed at right angles to a transect line running from a stock dam to the paddock fence. The letters indicate the approximate compass bearings of the four transect lines. The transects show a marked concentration of droppings immediately around the dam.

and probably varies with the weather, but a figure of one month is assumed. The geese spend about 3 months in the paddocks in large numbers. Therefore the maximum number of droppings likely to be produced in a sq. m of paddock is probably $3 \times 81 = 243$, and the applications used in this trial span the likely maximum manuring to be expected. After 4 months' growth the grass was cropped with shears. The clover had scarcely grown by the time it was cut and contributed a negligible proportion of the final crop.

Results

There is a clear increase in the production of grass following the three applications of goose droppings (Table 1). The differences between the applications and the control were significant at the $P = 0{\cdot}001$ level for the two denser applications but not the + 30 g one ($P = 0{\cdot}1$). The differences between the applications were significant for the 30 versus 60 g application ($P = 0{\cdot}001$) but not for the 60 versus 90 g application ($P =$ greater than 0·1).

Table 1. The manurial effects of Cape Barren Goose droppings (mean weight (g) of grass cropped per 25 × 25 cm box)

Treatment	Wet weight	Dry weight	p*
Control	33·8	5·3	–
+ 30 g Droppings	44·3	6·6	1·10
+ 60 g Droppings	63·7	8·9	0·001
+ 90 g Droppings	66·6	9·5	0·001

*P = the probability that the differences from the control are due to chance (student t-test). The probabilities were the same for wet and dry weights.

Discussion

It is clear that the overall effect of Cape Barren Goose droppings on grass was to increase growth. The increase at the lowest rate of application was not significant but the final crop at the maximum rate of application was nearly twice that of the control. This suggests that on managed pastures only the highest densities of droppings close to stock dams (Figure 1) will have a significant effect on the pasture growth. It is interesting in this connection that the farmer at Yanakie (S. E. Victoria) who complained about the geese in one of his paddocks admitted that the pasture came up very lush and green where the geese had been, following harrowing and rain. There was no appearance of a burning effect of the droppings on the grass even at the maximum application, and any undetected effect is clearly outweighed by an enriching effect. No attempt was made to determine whether the droppings had an effect on the nutrient content of the grass.

The other effects of goose droppings were not investigated. Sheep were never seen obviously to avoid areas 'fouled' by goose droppings, and they often fed close to geese. Marshall (1966) claimed that preliminary experiments showed that sheep did not avoid areas where Cape Barren Geese had been, but he gave no data at all. Rochard & Kear (1968) showed that sheep did dislike goose droppings, but in field trials (1970) found this effect to be short-lived and thus unlikely to be the cause of real loss to the farmer. Such a dislike could still be locally important where goose droppings are markedly concentrated around stock dams (Figure 1).

Rochard & Kear (1968) cited observations of sheep and cattle eating goose droppings presumed to contain minerals from other areas where the geese had fed or gritted. In view of this ability of stock to overcome their distaste of goose droppings it may be worthwhile to speculate about what happens on some of the Bass Strait islands in the dry summer period. On Big Green Island (Furneaux group, Tasmania) fresh droppings were sometimes harder to find than expected. The suspicion that sheep were eating the droppings was purely subjective and unfortunately could not be tested. The question arises as to what they would gain if they did. The geese were resident and could not have been bringing in minerals from elsewhere. As the pasture at this time of year is largely dried-off grass with a very low nitrogen content (Marriott, 1970) the nitrogen in the goose droppings—particularly that in the uric acid—would be beneficial if the sheep could utilize it. Coombe & Tribe (1963) found that sheep fed low quality roughage diets could utilize supplementary urea and improve their nitrogen balance, and reduce weight loss. In a preliminary report Lawes & Kenwood (1970) refer to experiments being set up where sheep and beef cattle were being fed diets containing 12½ and 25% poultry manure. They comment that poultry waste may be a better additive than urea because the uric acid is less soluble, and being slower acting is less likely to release too much toxic ammonia. If sheep on Bass

Figure 2. A pair of Cape Barren Geese *Cereopsis novaehollandiae* on Big Green Island, Furneaux Group, Tasmania.

Strait islands could overcome their distaste of goose droppings (as other sheep apparently can in some circumstances) and utilize the uric acid, the presence of Cape Barren Geese on the islands in summer could be beneficial. This idea might repay further investigation.

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Summary

Fresh droppings from Cape Barren Geese *Cereopsis novaehollandiae* applied to grass produced an increase in the weight of grass cropped after 4 months. No 'burning' effect on the grass was observed.

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Plate V. Close ups of the two forms linking Anatidae to other groups. Above: a Caribbean Flamingo *Phoenicopterus ruber ruber* demonstrates its suction/filter feeding. Below: a pair of Black-necked Screamers *Chauna chavaria* indulge in mutual preening.

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