up to twelve by the end of 1964 which I hope will survive the winter and breed in 1965.

The first winter migrants were 15 Redwings on 1st October and ten Fieldfares on 18th. Peaks of about 60 and 70 respectively were reached by the end of the month, their numbers shrinking to less than ten through December.

The first of the 276 nests recorded (Table III) was a Moorhen with one egg on 25th March. This nest was in a tussock of *Juncus communis* that has provided the first Moorhen nest of the season for the past four years. Once again it was successful and the young had hatched and left the nest by 21st April. Many of the nest sites in the Decoy appear to be traditional and this may be one of the reasons for the increase of 170 records over 1963. This may also be interpreted as evidence of natural recovery after the winter of that year. A special note was made of nests containing partly hatched clutches, and details have been extracted for a Nature Conservancy inquiry into the possible effects of pesticides upon egg fertility. The Decoy was operated in July, a month earlier than usual, in order to learn about the dispersal of the Mallard present in summer. This resulted in many late warbler nests being missed. All flying warblers ringed were weighed and measured for a British Trust for Ornithology inquiry. Blackcaps topped the list with 52 individual records, 40 newly-ringed and 12 re-traps.

The assessment by grazing trial of goose damage to grass

JANET KEAR

Grazing trials using captive geese form an important part of the study into the interaction of wild geese and agriculture which is being carried out by the Wildfowl Trust. Experiments have involved mainly winter- and spring-sown cereals (Kear, 1965) since it was the possibility of damage to these crops which most interested the farming community. Grassland trials, in which some of the effects of goose grazing were simulated by clipping plots with garden shears (Kear and Rodger, 1963), indicated that close clipping has no effect on silage yield provided that it is not continued beyond the end of March. Thus it seemed that some loss of herbage during the winter was unimportant. However, a number of farmers' complaints concerned the *early* grazing of undersown grass soon after harvest when it was claimed that the geese rather than grazing actually pulled up the grass by the roots. During early October 1963, therefore, a grazing trial using a captive flock of Pinkfeet and Greylag Geese was run on a young ley at Rosemaund Experimental Husbandry Farm in Herefordshire.

The experiment was set up so that the trial contained one grazing treatment and one control and was replicated three times. The procedure was that given in Kear (1965): the randomly arranged plots measured 8·5 feet (13 drill rows) × 30 feet, or 1/171 of an acre. From field observations it appears that 9,000 goose-hours on the same acre is maximal in any season and a goose usage rather greater than this was therefore the aim in the experimental situation. Ten geese were penned for 6½ hours on each plot, giving the equivalent of about 11,000 goose-hours per acre. Grazing started at 8.45 a.m. and after removal from the experimental plots, the geese were kept overnight in a shed with adequate water for washing. Water for drinking only was provided during the grazing period.

Table I. Yield of grass and clover field grazed by geese in October

	Green weight (lbs.)		*Dry Matter (%)*	
	Grazed	*Control*	*Grazed*	*Control*
October 5th	49	30	18·5	17·7
6th	37	40	19·5	18·1
7th	33	38	15·5	17·7
Average	40	36	17·8	17·8

The spring barley was drilled on 4th April, 1964, undersown with a grass and clover mixture* on 15th May and harvested on 6th September. Grazing covered the period 5th–7th October and on the first and last grazing days there was rain. The geese obviously found the grass palatable, but only the slightest 'damage' by trampling could be seen on the wet days. Uprooted plants scattered on the surface, or patches of bare earth from which plants might have been pulled, were entirely absent at the end of each grazing period. Table I gives the yields of the plots on 22nd May, 1964, and shows that no statistical difference could be found between the harvests from the grazed and control areas. Thus it appears that, even with very high grazing

usage, geese need cause no damage to young grass in early autumn.

It is a pleasure to thank the staff of the Rosemaund Experimental Husbandry Farm at Preston Wynne, Hereford, for their assistance in the running of this trial.

* 5 lb. 2 23 Ryegrass (perennial)
5 lb. S 24 „ „
5 lb. S 101 „ „
4 lb. S 48 Timothy
4 lb. S 215 Meadow Fescue
2 lb. S 123 Red Clover
1 lb. S 100 White Clover

References

KEAR, J. 1965. The assessment of goose damage by grazing trials. *Trans. 6th Int. Union Game Biol.*

KEAR, J. and J. B. A. RODGER. 1963. Wild geese in east Scotland. *Scot. Agric.* 43: 123–126.

The reaction of captive Mallard to grain treated with a commercial bird repellent

JANET KEAR

Wildfowl predation presents a very minor problem to agriculture as a whole in Britain, and only at certain times and in certain places does it become necessary to limit their activities (Kear, 1963). It is recognised that the application of a substance to a crop which will render it unattractive but not kill would be very advantageous, but the study of chemical protection against birds is still in its early stages. A variety of substances relying on the sense of taste, smell, touch or pain has been tried unsuccessfully with ducks in America (Neff and Meanley, 1956); whole barely soaked in gum turpentine and in kerosene was completely eaten and the commercial American repellent Pestex, dusted on to the grain, did not even slow down the birds' feeding rate. However, Neff and Meanley (1957) and Neff, Meanley and Brunton (1957) claimed consistent success against grackles, cowbirds, redwings and other birds when anthraquinone was used at heavy levels. Later, Duncan (1963) reported the reactions of feral pigeons to seven active ingredients of commercial repellents in solution. All solutions, with the exception of anthraquinone, produced a significant reduction of fluid intake and β-naphthol was markedly rejected. Duncan pointed out that, although insoluble anthraquinone showed no repellent action when tested in this way, this does not mean that it is valueless when used as a powder. Anthraquinone (a harmless, yellow crystalline ketone, $C_6H_4(CO)_2C_6H_4$) is in fact a basic ingredient of a German-made bird repellent marketed in Britain as Morkit. At the Wildfowl Trust, a few preliminary tests have been made in which four caged hand-reared Mallard were offered grain treated with Morkit.

Methods

Wheat grain was selected for testing because it is known to be preferred to other cereals by both tame and wild-caught Mallard over short periods (Kear, unpublished data). The birds were kept in pairs (a male and a female together) in separate cages and fed on a mixed diet of wheat, rusks and commercial poultry crumbs, with water and grit always available. In their daily test regime, the ducks had a dish of mixed food over night and for part of the day, but for six daylight hours they were offered only wheat grain. For a preliminary period, this grain was untreated, and for the following two weeks the birds had a choice of treated and untreated grain from two similar containers, the position of which was altered at random. For the next two weeks they were offered only treated grain in both dishes and during the final fortnight they returned to the choice situation. The treated sample was prepared by mixing 10 kilos of wheat with 1 pint of Morkit 'solution', made up as directed on the packet (about 1·7 gms dry weight of Morkit to 10 kilos of wheat). This amount of liquid effectively wetted the surface of each grain, which was subsequently dried in warm air. The control wheat sample was moistened with one pint of tap water per ten kilos and also dried.

Results

During the first two weeks of the test the ducks consumed on average 15·7 gms per bird per trial period, and of this only 25·2 per cent during the first week and 23·6 per cent during the second week was of the treated wheat grain. During the third and fourth weeks, when only treated grain was available, the birds reduced their intake and consumed on average 5·9 gms and 4·6