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THE REINTRODUCTION OF THE GREY PARTRIDGE (*PERDIX PERDIX*) TO IRISH FARMLAND: TOWARDS A METHODOLOGY

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ABSTRACT

KAVANAGH, B.: THE REINTRODUCTION OF THE GREY PARTRIDGE (*PERDIX PERDIX*) TO IRISH FARMLAND: TOWARDS A METHODOLOGY. Restocking of grey partridge, using game farm reared birds, never been successful in establishing a wild breeding population. Little information is available on the precise reasons for this failure. While the importation or translocation of wild caught birds to new areas has had limited success, this option has not been possible in Ireland in recent time. The aim of this project is to investigate and develop a methodology for the reintroduction of partridges using game farm stocks in a captive breeding programme based on a combination of the 'Montabello' and 'Euston' systems, used in the 19th century. The project is based on the hypothesis that partridges reared by parents will be better adapted to breed in the wild than birds reared from incubators. The study area is 1,000 hectares of mixed farmland in County Kildare. Two 7×3 m permanent pens were erected on each of three sites in the centre of the study area in autumn 1996. The sites were separated by 1 km from each other. An additional portable pen 5×2,5 m was erected at each site in spring 1998 bringing the total number of breeding pens to nine. In autumn 1996 twenty-five game farm reared partridges were released from each site. Forty birds survived to covey break up in February 1997. Three cocks and two hens were retrapped in spring using unreleased birds in the pens to attract mates. Thus five of the six pairs formed were composed of a retrapped and a previously unreleased bird while the sixth pen was filled an unreleased pair. All six penned pairs mated, all hens set nets and incubated. Hatching success was poor. Four chicks survived from two pens. Ten pairs of partridge were recorded in the study area from the previous autumn release. No chicks survived from these ten pairs outside the pens. Excessively wet weather during late incubation and hatching was responsible for most losses in the pens. In autumn 1997 seventy five game farm birds were released once again bringing the total autumn population to 100 birds in 1997. Thirty seven birds survived to spring 1998. Two cocks and two hens were retrapped and paired with unreleased mates. Four additional pairs from unreleased birds were placed in pens. Eggs were removed for incubation and replaced with dummy eggs. Twenty incubated eggs were then returned to the sitting hen at the piping stage. The outcome of this programme is reported.

1. INTRODUCTION

The Grey partridge (*Perdix perdix*) has been declining in Ireland since the middle of the last century (KAVANAGH *ET CIT.*, 1992). The extent of the decline has most recently been

outlined in two national surveys (SHARROCK, 1976; GIBBONS *ET AL.*, 1993) and has continued despite conservation efforts since 1994 (KAVANAGH, 1992, 1998; O'GORMAN *ET AL.*, in press). The most recent assessment of the status of the remaining population (KAVANAGH *ET AL.*, in press) has identified two small discrete groups, one in Lullymore County Kildare containing 2-3 pairs, the other in Boora, County Offaly containing 6-8 pairs.

Given the small number of wild birds remaining in Ireland, it is unlikely that the population could ever recover to its former distribution nationally. Nor was it considered advisable to take wild birds from this pool for a reintroduction experiment.

Grey Partridge can be produced in volume in commercial game farms. Localised Grey Partridge releases using game farm stocks are carried out by gun clubs and game associations throughout Ireland in most years. The ability of such birds to establish wild breeding populations in subsequent years however is poor (DOWELL, 1992). While this fact has been known for almost a century (MAXWELL, 1911), little research has been conducted into the reasons for this poor performance.

This paper reports on a two year pen breeding programme, 1996 - 1998, using game farm grey partridge. The aim of the experiment was to provide additional information on the breeding performance of game farm stocks.

2. STUDY AREA

The area chosen for the experiment encompassed 1000 ha of farmland. The main crop type was winter wheat and barley (approximately 60% combined) with a small amount of spring barley and sugarbeet (5% combined). Permanent grassland used for sheep grazing and thoroughbred horses made up the balance (35% combined). Silage was not grown in the study area during the years of the experiment but a small section of hay (10 ha) was harvested in 1997.

The field sizes ranged from 5-15 ha in extent and were bounded by hedgerows. These were trimmed to 2 m high in the tillage areas within farms. Inter-farm hedgerows were larger with an average height of 3-4 m. Hedgerow trees (>15 m) were present on some farms though they never constituted a barrier to partridges. There was no forestry within the study area.

Wild grey partridge were absent from the study area for approximately 30 years prior to the experiment.

3. MATERIALS AND METHODS

An autumn release of game farm birds was made in 1996. Three discrete groups, separated by 1km, were gradually released over a three-week period, as recommended by the GAME CONSERVANCY, UK (ANNON, 1986). Over-winter survival was recorded.

In spring, after covey break-up, a number of survivors was recaptured for the breeding programme. The recaptured birds were paired with game farm birds, which had been overwintered outdoors but had not been released.

Breeding pens were erected at the release site. Each pen measured 3x6m in area and was 1m high. One section 2x3 m was separated from the main cage and was opened in April just prior to laying. This smaller section was used for nesting by the hens. Pens were separated from each other by 5m and were in the centre of the fields.

In 1998, a further modification was used in the breeding pens. This was based on the Euston system whereby eggs were removed from the nest and replaced with dummy eggs. The eggs were placed in an incubator and returned to the sitting hen when they began to chip. This improved the hatching success in 1998 and allowed the examination of subsequent success post hatching.

All breeding pairs and their young were released from the pens shortly after hatching. This was normally into a standing crop before harvest. The male from each pen was fitted with a necklace style radio-collar one week prior to release. The collars weighed 9 g and had a signal detection distance of 1.5-3 km depending on the terrain. All birds were followed for at least one-month post release.

4. RESULTS

75 game farm grey partridge were released from three sites in the centre of the study area in autumn 1996. In spring 1996 40 birds remained. Three males and two females were recaptured using single birds placed in the breeding pens from February 1997.

Six breeding pairs, two at each release site were established in the breeding pens in 1997. Five pairs were composed of one recaptured bird and one overwintered, game farm bird, the sixth pair was of two overwintered birds. In addition to the six penned pairs a total of 10 other pairs was present in the study area, which were from the survivors of the release the previous autumn.

In autumn 1997 a further 75 game farm birds was released in the study area. In spring 1998 thirty-seven birds were recorded. These were a combination of old birds from the release in 1996 and some survivors from the breeding programme in 1997 which had been released after breeding in the pens. Two males and two females were recaptured in spring 1998, using the same method as in 1997.

Eight breeding pairs were established in breeding pens in 1998. Four of these were composed of one recaptured bird and one overwintered bird, while the other four pairs were of two overwintered birds. In addition to the 8 penned pairs a total of 7 other pairs was recorded in the study area.

5. BREEDING PERFORMANCE

All penned hens layed a number of eggs loosely in the pen before establishing a nest. The 1st egg date was thus recorded in addition to the 1st egg layed in what subsequently became the nest (1st nest egg date). **Table 1** lists the breeding performance of the penned birds over the two years 1997-1998.

The penned pairs were released during the second half of July, before the grain was harvested. Nest productivity represents the number of chicks surviving to release (**Table 2**).

Of the 10 pairs recorded in the study area in 1997, three pairs were reported seen with very small chicks (less than one week old). In 1998 of the 7 pairs recorded in the study area one was reported seen with very young chicks (also less than one week old). Autumn counts in the study area after harvest failed to find any chicks surviving amongst these pairs in either year.

Table 1: Breeding performance of pen breeding pairs of game farm grey partridge in 1997-1998.

| Year | 1997 | 1998 |
|----------------------------------|-------------------------|----------------------|
| 1st egg date | 19th April (n=6) | 4th May (n=7) |
| 1st nest egg date | 3rd May (n=6) | 18th May (n=7) |
| Clutch size, range | 22 (n=6), 19-27 | 19 (n=7), 16-27 |
| Hatching success %, range | 41% (n=5 nests), 11-76% | 84% (n=5), 80-92% ** |
| Nest Productivity | 4+2Juv, (n=6) | 8+3+1+1 Juv** (n=7) |
| Net Productivity | 1.00 Juv/pair | 1.86 Juv/pair** |

** Hatching success in 1998 was higher as the eggs were placed in an incubator and returned to the sitting hen at chipping stage. Mean number of chipping eggs 17 (n=5), range 13-24 eggs.

Table 2: Breeding performance of penned pairs in 1997 and 1998 based on total number of eggs in nests.

| Year | 1997 | 1998 |
|---------------------------------------|-------------|-------------|
| Total number of incubated eggs | 132 | 133* |
| Number hatched (%) | 54 (41%) | 112 (84%) |
| Number of surviving chicks | 6 | 13 |
| Survival per hatched chicks | 11.1% | 11.6% |
| Survival per total eggs | 4.5% | 9.8% |

*Figure corresponds to the number of incubated eggs placed in nests. For further detail see text.

6. DISCUSSION

The net productivity of the grey partridge in this experiment was well below that required to establish a self-sustaining population both in the confines of the pens and in the wild (POTTS ,1986). It has long been appreciated that farm produced gamebirds are poor breeders in the wild (MAXWELL, 1911; DOWELL *ET AL.*, 1992). Two main reasons have been put forward for this, poor predator avoidance behaviour (DOWELL, 1990 a,b; ROBERTSON AND DOWELL, 1990) causing excessive mortality and heavy parasite burdens resulting in weight loss and desertion (WOODBURN, 1995; GAME CONSERVANCY TRUST, 1999).

In the observations reported in this paper, problems associated with predator avoidance or predation on the nest could not impact on the outcome of the breeding attempts since the pairs, by design were bred in pens. Thus predation in any of its manifestations could not account for the poor success of the gamefarm birds. Nor was there any measurable difference between pairs containing recaptured individuals, who had avoided predation while in the wild, and pairs composed of overwintered birds only.

Heavy parasitic loads have been reported in released pheasants surviving the winter (ref.) and many gamebirds are susceptible to helminth parasites commonly found in gamefarms. The penned pairs in this experiment however were treated with an antihelminth via their food and thus did not suffer any serious infection. Thus heavy parasite burdens could not have impacted on their performance in the pens.

The grey partridge used in this experiment were from captive stock going back 12 generations. Thus the breeding behaviour of these birds was innate, as they had no opportunity to learn appropriate behavioural patterns from either their parents or other adult birds. This

implies that the behavioural patterns, displayed by the birds, are inherited in a latent fashion from generation to generation.

Successful pair formation occurred both in and out of the pens. Two weeks after the onset of laying all penned birds selected a nest site and began a clutch. All pairs covered their eggs during laying and polished their eggs just prior to incubation. All females produced fertile eggs. 24-48 hours before hatching all the males moved close to the incubating female in preparation for the hatch. To this point the behaviour of the gamefarm birds is similar to that observed in the wild (JENKINS, 1961; CRAMP AND SIMMONS, 1980).

In 1997, hatching success in the penned birds was only 41%, which is well below the expected hatching rate in wild populations (MIDDLETON 1936, 93%; JOHNSGARD 1988, 86%; after SCHULTZ, 1977). In 1998, when the eggs were removed, incubated and returned at the chipping stage the hatching success rose to 84%. This would suggest that problems arise during incubation or just prior to hatching. During incubation the females were almost never seen off the nest and some eggs hatched in all but one nest under investigation.

Mean clutch size (19-22, **Table 1**), was significantly larger than in the wild (14.6-18, JOHNSGARD 1988 *ET AL.*) and chilling of eggs may have resulted in some eggs not hatching successfully. Examination of unhatched eggs revealed that a high proportion contained well-developed chicks, which were unable to break free of the shell. No pathology was carried out on the unhatched eggs.

Mortality of newly hatched chicks was extremely high in both 1997 (88.9%) and 1998 (88.4%). In 1998, problems associated with early incubation were avoided by transferring the eggs to an incubator. Chipping eggs were returned to the sitting hens that were on dummy clutches. Hatching success was over double that experienced in 1997. The percentage chick mortality was similar despite the larger number of chicks produced in 1998. Since all pens were supplied with chick crumb and also contained some natural insect food, it is unlikely that the main proximate cause of death was starvation. Dead chicks were found scattered throughout the pens and chicks were often heard calling as the pens were approached.

Survival of young chicks depends on the ability of the chick to obtain sufficient food while being brooded at regular intervals to maintain body heat. Since food was readily available in the pens it would appear that chicks died of exposure and hypothermia. The indications from this experiment are that the brooding behaviour of the gamefarm birds was maladapted. This is a behaviour adaptation, which may be modulated by the experience of the bird during the critical first few days of life. Parent reared birds learn critical adult activities

during their formative few days after hatching. This is consistent with the findings of research on other bird species (HAYES, 1994 *ET CIT.*).

The influence of weather on the overall breeding success of the game farm birds in this experiment is difficult to ascertain from these data. Poor breeding success was recorded in the remaining wild partridge populations in Ireland (KAVANAGH, in press) and in the United Kingdom (GCREVIEW) and no young were recorded amongst the other released pairs in the study area in 1997 and 1998. Further experimentation under a variety of weather conditions would be required to elucidate the impact of weather on the breeding success of released partridges.

Notwithstanding the weather, it would appear from these observations that the breeding success of gamefarm partridges is influenced by maladapted behavioural patterns during incubation and early chick rearing, which results in the production of insufficient young to sustain a breeding population in the wild. Further investigation of nesting behaviour is warranted.

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