IMPACT OF RADIOTRANSMITTERS AND TRAPPING ON MORTALITY OF ADULT GREY PARTRIDGES (Perdix perdix)

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ABSTRACT

KAISER, W.: IMPACT OF RADIOTRANSMITTERS AND TRAPPING ON MORTALITY OF ADULT GREY PARTRIDGES (Perdix perdix). An increased mortality of grey partridges can be observed after trapping and tagging. During the first week postrelease mortality was 12 % (n = 240) compared to a mean of 3 % in the following 12 weeks (range 1 - 5 %). The difference found was significant (chi² = 9.80, 1 df, p < 0.05). Most losses occurred during the first two days after capture (59 %, n = 29). The increased mortality of tagged birds (27 %, n = 86) after the first week versus untagged birds (17 %, n = 169) in 27 coveys also was significant (chi² = 3.69, 1 df, p < 0.05, one-tailed). Predation was the main source of mortality found in the first week and later. During the first week postrelease mammalian predators were responsible for most of the losses (47 %, n = 29). Raptors only contributed 33 %, but were the main reason for losses after the first week (45 %, n = 96). To avoid bias of results on survival, birds lost during the first week after trapping should be excluded from analysis as has been recommended in other studies. Suitable techincs of trapping and further reduction of weight of radiotags in combination with the preference for necklace radios can further improve the number of birds surviving the critical period after capture. The overestimate of the real mortality by using only tagged birds for analysis should be kept in mind when discussing survival.

1. INTRODUCTION

In many studies radiotelemetry has been used to give estimates on survival of wild populations. Typical radio packages used weighed up to 12.5 % of a bird's body weight and were believed to increase mortality (Brander & Cochran 1969). Later studies indicated a high mortality of birds with packages of 4 % body weight (Schulz 1975; McCrow 1982) and among some phasianids even less than 4 % were suspected to increase mortality (Warner & Etter 1983). Beside the package weight the performance of studied birds also can be influenced by the way the transmitter is mounted and by the act of trapping and handling the birds. The objective of this paper is to show that radio-necklaces weighing less than the 2 % which were suggested by Warner and Etter (1983) also can have a severe impact on survival and that during the first week trapping itself is likely to be responsible for most of the losses.
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2. STUDY AREA AND METHODS

The study area is located east of Feuchtwangen (District Ansbach) in north-west Bavaria, near Nürnberg, Germany. It is situated between 427 m and 514 m above sea level. Of the total area 29% is covered by small woodlands and 60% is private farmland. The main crops are winter cereals (40%), maize, rape and root crops (21%). 39% of farmland consists of permanent grassland (Riedel, 1984).

From 1991 until 1994 a total of 240 birds was trapped using Japanese nets (5 x 18 m) with a mesh width of 3 x 3 cm. Most Birds were caught in February, March and September, October. The main methods used for trapping was driving them into the nets by helpers or by slowly driving up to coveys or pairs with a jeep. Also other methods like night-trapping with a strong light were tested. Only one bird was injured seriously during trapping and had to be killed. During ringing, radio tagging an weighing the eyes of the birds were covered with a hood. Time of handling was tried to be kept at a minimum. The birds were equipped with necklace radio tags (TW-3, BIOTRACK Co., England) with a life expectancy of 7-8 months and a range of 800 m to 1000 m. The weight of the tags (7 g) comprised about 1.8 % of body weight. During the tagging-procedure birds were kept in a dark box. All were released at the same time to avoid further disturbance of covey and pair integrity. I used a portable telemetry system (TELEVILT RX-81 receiver, Sweden, and a two-element Yagi aerial) to monitor survival of radio tagged birds. Partridges were located every day during the first week after capture and every second day on average in the following weeks. It was possible to discover deaths within 24 hours during the first week and within 48 hours in following weeks. The number of birds in the covey was counted at least once a week. A bird was considered alive until the first day its loss was noticed; because all radio tagged birds that were lost from a covey had died, missing birds without radio-tag also were assumed to have died. There was no visible difference in behaviour right after releasing for most birds. But juveniles weighing less than 350 g showed obvious stress symptoms and therefore were not radio tagged during later actions.

For analysis of survival of radiotagged birds I used PEARSON chi-square statistic.
3. RESULTS

Losses related to trapping and tagging

Increased mortality of adult, wild partridges was noted during the first week after release. The mortality rate found was as high as 12 % (n = 240) and decreased to a mean of 3 % (range 1 - 5 %) in the following weeks (Figure 1.). The difference was significant ($\chi^2 = 9.80$, 1 df, $p < 0.05$). By subtracting the mean mortality rate of week 2 - 12 from the one observed in week 1 an estimate for the suspected researcher-induced mortality of 9 % is obtained.

Analysing the time of loss within the first week reveals that most birds died within the first 24 hours and were found on the day of capture or the first day after. Both days together hold 59 % (n = 29) of the losses in the first week. After these two days mortality dropped quickly to a "normal" level and remained low until day 7 (Figure 2.).

Losses related to tags only

To assess if radiotags can also cause increased mortality after the birds got used to them radiotagged partridges in 27 coveys were compared to those without in the same coveys. The assumption was that birds without tags lost from the covey were dead. Results show a significant ($\chi^2 = 3.69$, 1 df, $p < 0.05$, one-tailed) difference: 27 % (n = 86) of partridges with necklaces were lost from coveys whereas only 17 % (n = 169) of birds without tags disappeared (Figure 3.).

Cause of losses

Predation was the main source of mortality both in the first week and later. In the first week postrelease most losses were due to mammalian predators (45 %, n = 29). The following weeks were dominated by losses to avian predators (45 %, n = 96) (Figure 4.). Mortality during the first 24 hours after trapping (day 0 and day 1, Figure 4.) also was mainly caused by mammals.
**Figure 1:** Loss rate of adult grey partridges during the first 12 weeks after trapping. The number of birds "at risk" each week was reduced by the number of losses the week before and the number of birds with signal loss.

**Figure 2:** Adult grey partridges lost during the first week after trapping (n = 29). Most losses occurred on the first day after capture.
Figure 3: Lossrate of 86 radiotagged partridges versus 169 wild partridges in 27 coveys during autumn and winter 1991 to 1994. Birds without radiotag missing from the covey were assumed to be dead.

Figure 4: Cause of loss of adult, radiotagged grey partridges during the first week (n = 29) and later (n = 96)
4. DISCUSSION

Researcher-induced mortality has been reported from several studies (DUMKE AND PILS, 1973; WARNER AND ETTER, 1983; MARKS AND MARKS, 1987; CARROLL, 1990; PUTAALA ET AL., 1997). But the actual proportion of losses due to trapping and tagging may vary greatly in different telemetry studies (CARROLL, 1990). CARROLL (1990) estimated a researcher-induced mortality of 34% during the first week after capture. Other work shows similar results to this study. In ring-necked pheasants 11% of the birds died within the first 5 days of radiotagging (DUMKE AND PILS, 1973). Losses of grey partridges in Finland also were as high as 12% (PUTAALA ET AL., 1997).

The reasons for losses during the first week are often attributed mainly to radiotransmitters. In Illinois results of a study on hen pheasants suggest a decrease of predicted survival with increasing weight of radio package from 2.3 to 3.3% of body weight (WARNER AND ETTER, 1983). Results from Finland show a reduced take-off capability of partridges with back-mounted transmitter of 4% of body weight (PUTAALA ET AL., 1997), but first week mortality was similar to this study with 7 g (1.8% of body weight) necklaces. The weight of tags also was found to have no effect on pheasant recovery rate, but recovery of birds with backpacks was lower than for birds with necklace (MARCSTRÖM ET AL., 1989). Partridges were caught in about the same time periods in different studies. Therefore neither weight of radiotag, way of mounting or time of year can explain all differences found in first week mortality in various studies although weather at time of capture may effect survival. The fact that most birds die within the first 24 hours after capture strongly suggests that trapping and handling itself has the most important impact on first week mortality. The use of necklaces being easier to mount can further reduce the time of handling and therefore is preferable to backpacks as has been recommended by MARCSTRÖM ET AL. (1989). In the first week mammals were found to be responsible for most of the losses suggesting that scent might play an important role, too.

Significantly increased loss rates of tagged birds versus untagged birds in coveys nevertheless emphasize a still negative effect of transmitters in later periods. Increased vulnerability to predation may be due to diminished acceleration and maneuvering capabilities as described by PUTAALA ET AL. (1997).

To avoid bias of results on survival, birds lost during the first week after trapping should be excluded from analysis as has been recommended in other studies. Suitable techniques of trapping and further reduction of weight of radiotags in combination with the preference for
necklace radios can further improve the number of birds surviving the critical period after capture. The overestimate of the real mortality by using only tagged birds for analysis should be kept in mind when discussing survival.

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