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EFFECT OF SUPPLEMENTARY FEEDING ON SURVIVAL AND BREEDING SUCCESS OF WILD PHEASANTS IN ITALY

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Introduction

Seed avaibility for pheasants and other birds has declined as a consequence of changes in land use and practice. In many hilly areas of Tuscany cereal cultivation dramatically declined often being replaced by uncultivated land, vineyards, olive tree grooves etc.

It is possible that the shortage of seeds during spring is a limiting factor for wild pheasant reproductive success. It was showed that food availability is a key factor influencing body condition of hen pheasants and that supplemental spring feeding with grain may improve density and reproductive success of populations (Draycott at al., 2002; Draycott et al., 2005). These studies were carried out on captive reared pheasants released in the wild, but there is no information about the efficacy of this option on wild populations which are still present in Tuscany inside specific no-hunting areas (Santilli & Bagliacca, 2008)

The aim of this study was to determine whether natural productivity of wild pheasant populations could be enhanced through supplementary spring feeding in areas where this species has declined as a consequence of the arable habitat changes.

Matherial and methods

The study was carried out in a game reserve of 1000 ha in the province of Pisa (central Tuscany - Italy) from 2008 to 2010. Inside the game reserve, an area of about 200 ha had supplementary feeding from February to June using 30 feeders that were regularly refilled with corn whereas another area of the same size was used as control.

Foxes (*Vulpes vulpes*) and mustelids were not controlled whereas corvids (magpies *Pica pica* and hooded crows *Corvus corone cornix*) were controlled by Larsen traps. The two areas were located along parallel valleys at about 250 m from each other. In 2009 and 2010 we inverted the areas to reduce the effect of environmental variables. In each area, four successive counts at dawn or dusk gave a reliable estimate of territorial male density and an index of female density. Pheasant broods were counted 4 times between July and August along standardized roadsides bordering fields.

In addition a total of 77 hens (29 in 2008, 21 in 2009 and 27 in 2010) were captured in February and early March in baited traps and fitted with a 16 g necklace radio trasmitters (40 in the experimental area and 37 in the control area).

The birds were located using IDS receivers and hand held three element Yagi antennas from March to August in order to evaluate survival and reproduction.

Results

Over the three years, cock density was higher in fed areas (16.3/km^2) compared to unfed areas (11.9/km^2) as well as the numbers of hens per cock (1.7 ± 0.79 vs 1.3 ± 0.63 $p<0.01$). Broods density was higher in fed areas (7.2/km^2) compared to unfed areas (3.9/km^2) as well as broods size (4.8 ± 2.32 vs 2.8 ± 1.72 $p< 0.01$) (Tab. 1). Survival of hens released in fed areas was 40% vs 29.7% in unfed areas. Radiotagged hen released in unfed areas were not able to reproduce successfully whereas 17.5% of hen released in fed areas produced broods. However total hen mortality was high in both areas (60% in fed areas and 70.7% in unfed areas (Tab. 2). Mortality

was due to mammalian predators (94%), raptors (2%), farm operations (2%), unknown causes (2%).

Discussion

Supplementary spring feeding seems to improve male pheasant density and harem size as well as hen reproductive success. Mortality of radiotagged hens was very high especially in 2009 and 2010 and there was no significant difference between treatments. It is possible that adverse weather conditions had a strong effect on pheasant survival. In the study area in 2009 and 2010 rainfall totals from March to June were 23% and 66% above the average respectively, whereas in 2008 in the same period were only 12% above the average.

However, the high mortality registered suggests that supplemental spring feeding alone may be not sufficient to counter the pheasant decline in areas with high predation pressure. To ensure the recovery of wild pheasant populations predation control and habitat improvement should be incorporated into management.

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Table 1) Density and demographic parameters of pheasant in the two experimental areas; Means with different letters are significantly different for $P < 0.05$ (t-test for independent sample)

Year	2008		2009		2010	
	Control	Supplementary food	Control	Supplementary food	Control	Supplementary food
Territorial cocks birds/km^2	16.19	16.67	13.14	18.03	6.43	14.17
Mean harem size	1.38 0.73 (n = 29)	1.66 0.67 (n = 29)	1.53 0.49 (n = 19)	1.77 0.92 (n = 23)	1.22 0.65 (n = 9)	1.53 0.83 (n = 15)
Broods density birds/km^2	7.1	9.3	1.9	5.8	2.7	6.4
Broods size	2.9 2.02 a (n = 10)	4.19 2.14 b (n = 13)	1.7 0.75 a (n = 5)	5.7 2.63 b (n = 7)	3.0 1.00 (n = 3)	3.8 6.36 (n = 6)

Table 2) Data on survival and reproduction of the 77 radiotagged hens from 2008 to 2010; * significant P value for $p < 0.05$

	Control	Supplem. food	χ^2
% hen mortality at 30 april	56.76	37.50	2.142
% hen mortality at 15 agust	70.27	60.00	0.496
% hen that nested	27.50	5.41	5.205 *
% hen succesfully nested	17.50	0.00	5.162 *
Mean cluth size (at 1 july)	5.00 ± 1.01	0.00 ± 0.00	
Start of incubation	29 IV ± 17.9 d	4 V ± 1.0 d	