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Comparison between two censuses of Feral Pigeon *Columba livia var.* from Barcelona: an evaluation of seven years of control by killing

D. SOL & J.C. SENAR

Since 1983 the City Council of Barcelona has been attempting to control of the Feral Pigeon Columba livia var. *population by means of a trapping programme. To evaluate the effects of this programme we have compared two pigeon censuses carried out in 1983 and 1991. The difference between these censuses (948 vs. 940 pigeons/Km^2) is not significant (t=0.047, df=35, n.s.), which suggests a low efficiency of the method. The failure of the control programme might be due to the effects of intrapopulation regulation.*

Key words: Feral pigeon, *Columba livia var.*, control by killing, Barcelona.

Daniel Sol & Joan Carles Senar. Museu de Zoologia. Ap. 593, 08080 Barcelona.
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INTRODUCTION

One of the strategies used to limit damage by bird pests is to attempt to reduce their population size. Removal of individuals has been one of more commonly used methods (Dyer & Ward 1977). However, in the past little attention has been paid to assessing the extent to which this removal solves the problem (Feare 1991). For example, the City Council of Barcelona (NE Spain) started, in 1983, a culling programme to reduce the high number of Feral Pigeons, but no test on the effectiveness of these measures was carried out. The aim of the present work is to evaluate the effect of this control on the population size by comparing two censuses carried out in the city during 1983 and 1991.

METHODOLOGY

We have used two previously published censuses, one carried out in 1983 (Uribe et al. 1984) and the other in 1991 (Senar & Sol 1991). The census of 1991 differed from that of 1983 because the former used stratified data (i.e. the censsed area was divided into five subareas with more uniform pigeon density), a correction factor (based on the detectability of the individuals), and a slightly different census area. Prior to the

	1983	1991
Date	Nov-Dec.	January
Study area (Km^2)	74,97	76,12
Size of censused area	20%	30%
Population size estimated	70.782	71.586
Precision	23%	22%
Density (individuals/Km^2)	947,55	939,93

Table 1. Data on the censuses of *Columba livia var.* of 1983 and 1991.

Tabla 1. Datos de los censos de Columba livia var. de 1983 y 1991.

comparison of the censuses we had thus to rationalize their methodologies, recomputing the 1991 census data by 1) the use of the original unstratified data, 2) the exclusion of the correction factor, and 3) the inclusion into the census of the Zona Franca area (an industrial zone of Barcelona situated in the SW of the city). This area was surveyed from 19-I-91 to 21-I-91 using a random subsample of five squares, as explained by Senar & Sol (1991). Although the size of this subsample was small, it does not decrease the precision of the census since the area shows a low uniform pigeon density (see Uribe et al. 1984). Captures of pigeons by the City Council from 1983 to 1991 were carried out using clap- and cannon-nets, birds being baited for several days previously to the capture. Pigeons caught were counted, placed in cages and later killed by poison gas. Captures were carried out throughout the year with weekly programmes, following pre-established circuits around the city (over 70 points of capture). The highest number of individuals caught in a single capture was 362.

RESULTS AND DISCUSSION

The density of feral pigeons in Barcelona was estimated at 948 indvs./Km^2 in 1983 and 940 indvs./Km^2 in 1991 (Table 1). Differences between the two censuses are not significant ($t=0.047$, d.f.=35, n.s.), suggesting that the control measures carried out (see Table 2) had not succeeded in reducing pigeon density.

The failure of the control programme might be due to the presence of intrapopulation regulation: 1) killing of birds in certain parts of the city might have promoted an influx of birds from areas where no control was exerted (see Murton et al. 1972); 2) a reduction in the density of a population can lead to an overall increase in breeding success (Haag 1989, Kautz 1990) or the rate of recruitment in the colony (Preble & Heppner 1981, Coulson et al. 1982); and 3) if natural mortality is density dependent (as suggested by Kautz 1990), failure to exceed the natural mortality levels could lead to enhanced survival of those birds that were not killed, and thus the imposed mortality would not be additive but only substitutive (Dyer-Ward 1977, Conroy & Krementz 1990, Feare 1991).

Some other authors have also reached the conclusion that strategies of feral pigeon control based on the killing of individuals are not usually efficient, especially in non-isolated populations (e.g. Murton et al. 1972, Martin & Martin 1982, Baldaccini 1985). Culling programmes may drive to compensatory changes in the dynamics of the popu-

1986	1987	1988	1989	1990	TOTAL
10.083	19.498	24.671	28.361	25.573	108.193

Table 2. Number of pigeons captured by the City Council from 1986 to 1990 (from 1983 to 1985 no data of the captures are available).

Tabla 2. Número de palomas capturadas por el Ayuntamiento entre 1986 y 1990 (del período 1983-1985 no se disponen de datos de las capturas).

lation and if they are not accompanied by a reduction in the availability of the resources that have raised the "natural" limits of the population —probably food (Murton et al. 1972, Haag 1989)— will be unlikely to result in a definitive solution to the problem.•

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RESUMEN

Comparación entre dos censos de palomas Columba livia var. *en Barcelona: evaluación de siete años de control de la población por eliminación de individuos.*

El Ayuntamiento de Barcelona lleva realizando desde 1983 un programa de control de la población de palomas Columba livia var. *basado en la eliminación sistemática de individuos (ver Tabla 2). Para evaluar si este programa ha producido algún efecto sobre el tamaño de la población se han comparado los censos realizados en los años 1983 (Uribe et al. 1984) y 1991 (Senar & Sol 1991) (ver Tabla 1). El censo de 1991 presentaba algunas diferencias respecto al de 1983, y por ello ha sido necesario, previamente a la comparación, recalcular el censo de 1991 usando los datos originales no estratificados, excluyendo el factor de corrección e incluyendo la Zona Franca (ver Senar & Sol 1991). Las diferencias entre ambos censos no son significativas (t=0.047, g.l. 35, n.s.), lo cual sugiere que las medidas de control no han sido efectivas. Esto puede ser debido a la existencia de mecanismos reguladores de la población que actuarían compensando el efecto de las capturas. Las estrategias de control de palomas por eliminación no han dado generalmente buen resultado, y si no van acompañadas de una reducción en los recursos que limitan el tamaño de la población (e.g. el alimento) es difícil que aporten una solución definitiva al problema.*

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