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EVALUATION OF 8 YEARS OF FERTILITY CONTROL TO MANAGE URBAN PIGEON POPULATIONS

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Abstract Presentation of Carlos González-Crespo's study, published by CSIRO Publishing. It examines the effectiveness of Nicarbazin (NCZ) in controlling urban pigeon populations in Catalonia, Spain, over 24 municipalities for an eight-year period. The NCZ treatment resulted in an average annual reduction of pigeon numbers by 12%, with minimal impact on non-target species, underscoring its specificity. The economic viability of the method was also notable, with pigeon management costs halved in 68% of municipalities within three years of implementation. The study highlights several key insights: NCZ's specificity minimizes the impact on other bird species, supporting ecological balance. Its economic benefits make it a sustainable approach, encouraging widespread adoption. Moreover, the long-term decline in pigeon numbers demonstrates the treatment's sustained effectiveness, making it a viable alternative to traditional culling methods. The integration of NCZ with habitat management strategies further enhances its efficacy, ptrventing future population surges.By managing pigeon populations, the study also addresses potential public health risks associated with their overabundance, contributing to safer urban environments. These findings underscore the importance of sustainable and humane wildlife management practices in urban areas.

Key words Nicarbazin, Ovistop, pigeon' fertility control, pigeons' contraception, feral pigeons

INTRODUCTION

Study Focus: Describes the experience of up to 8 years of use of fertility control by nicarbazion (NCZ) on pigeon numbers in 24 towns and cities in Catalonia (Spain) and audits:

1. Effectiveness of nicarbazin NCZ in controlling urban pigeon populations.
2. Potential for non-target species to be affected by NCZ.
3. Costs of implementing local population control of urban pigeons via NCZ.

Background: Pigeons cause public health risks, building damage, and high maintenance costs. The reduction of food and shelter could be an effective control method, but it does not apply in most cases where the amount of shelter and food can be unlimited and control very difficult to achieve. However, a reduction and control of the population by fertility control using nicarbazin (Ovistop®) could be succeeded without the need to capture and remove any pigeon.
Goal: Reduce pigeon numbers without harming pigeons, non-target species and environment but even controlling the costs.

METHODOS

Product Used: Ovistop®, produced by ACME Drugs Srl, it's a veterinary drug with NCZ as an active ingredient in a concentration of 800 mg/kg of bait (800ppm).

1. Composition: corn kernels, NCZ, dimethycone, stearic acid and butylated hydroxytoluene.

2. NCZ: carbanylide group, equimolar complex of 4.40 dinitrocarbanilide (DNC) and 2-hydroxy- 4,6-dimethylpirimidine (HDP). DNC is the active component, whereas HDP prevents DNC aggregation and allows its absorption in the gut.
3. NCZ effectiveness: Pigeons treated with 400 ppm NCZ concentration ceased egg-laying and recovered usual egg-laying rates after NCZ treatment was suspended.

Administration:

1. Period: from March to December
2. Method: Automatic feeders (Figure 1)

Figure 1. Automatic feeder model for terraces (b) automatic feeder for squares

Table 1 describes the year treatment started, the number of points, location (square or terraces), number of years of treatment and associated costs for each of the municipalities. The associated costs of annual treatment were calculated on the basis of an estimation of € 33.6 per pigeon.

Evaluation of efficacy and safety:

1. Census: during March, before starting the treatment, a census of pigeons was conducted (pre-treatment census). This method involved dividing the urban area of the municipality into grids of 200 m × 200 m. Each of the grids was travelled in a line as straight as possible by one observer who recorded the number of pigeons. Pigeons in flight were not counted if they flew in the same direction as the observer was walking but were counted if they did so in the opposite direction. This avoided the risk of birds being counted twice by the observer. In each municipality, the census was repeated a second time at least 1 week after the first one. Results were considered valid when the difference in the number of pigeons was below 10% of consecutive counts. If the difference was greater, a third census was conducted. In December, a new census (post-treatment census) was conducted in each of the municipalities, following the same methodology as described above. Censuses were conducted during peak activity of pigeons, i.e. March from 09:30 hours to 13:30 hours and in December from 10:00 hours to 14:00 hours. Censuses were not conducted on days with rain, wind or abnormal temperatures, to prevent climate factors from altering the results. To test for statistical differences in the number of

pigeons in each municipality among years, the results of the census were analysed by linear mixed models (LMMs).

2. Nest activity, near the treatment administration points, was monitored as another indicator of the efficacy of NCZ in suppressing reproduction.
3. Evaluation of intake by non-target species: in parallel with the evaluation of the effectiveness of the NCZ in reducing the number of pigeons, the potential intake by non-target species was also evaluated. This was undertaken through trail cameras in all those administration points located above the ground level (Victure HC100). Cameras were scheduled to start recordings at least 1 h before the daily dose of bait was administered and up to 1 h later. The treated bait was uniformly spread among the pigeons by the automatic feeders, and observations were confirmed, fully ingested within 2 min. Therefore, we considered 2 min sufficient for the cameras to record any potential non-target species feeding on NCZ treated bait. The cameras recorded videos each time movement was detected. The videos were recorded every day at least for a month, the average time recorded for each point was 3 months and the recorded videos were analyzed individually.
4. Estimate of the associated costs: On the basis of the costs incurred when using NCZ-treated bait, the annual cost of the treatment was calculated to be € 33.6 per pigeon. These costs included the treated bait, staff time and the rent of the automatic feeders. The calculations were based on the initial number of pigeons reported each year and were therefore considered to be an overestimation of the total expenses. However, these calculations provided a rough estimate of the potential cost for each municipality to implement the NCZ treatment for pigeon population management. It is important to note that the actual costs for each municipality may differ because of various factors such as the size of the population, number of devices required or number of years. Nonetheless, having an estimate of the potential costs is a valuable tool for decision-makers and stakeholders to evaluate the financial feasibility of implementing this type of treatment for pigeon population management.
5.

RESULTS

Population Decrease:

1. From the beginning of the treatment and across the treatment years, a significant steady decreasing trend in the pigeon abundance was registered. (Table 2)
2. The population trend and post hoc tests results showed a significant decrease in the number of pigeons during the first 2 years of treatment
3. After the second year of treatment, the rate of reduction in the local number of pigeons slowed down but continued throughout the years.
4. Average reduction of 12% per year in the 8 years period. (Table 2) (Table 3)

Nest Activity: Egg-laying ceased after one month of treatment and recovered in case of treatment interruption.

Non-Target Species: consumption by other birds was minimal.

Only 16 of 23,194 (0.07%) observations in three municipalities registered non-target species other than pigeons, Eurasian collared doves (*Streptopelia decaocto*) and magpie (*Pica pica*) in the proximity of the feeders, rarely feeding on treated kernels. (Table 4)

Costs: over the course of the study period, the estimated average annual cost of the treatment for each municipality was € 7,672.56. During the first year of treatment, the average cost was €

17,273.09 because of a higher initial number of pigeons. However, after 3 years of treatment, the total annual cost was reduced by 50% in 68% of the municipalities.

CONCLUSION

In conclusion, Gonzalez-Crespo's extensive study on the effectiveness of nicarbazin in controlling urban pigeon populations across 24 municipalities in Catalonia over an eight-year period provides substantial evidence that NCZ represents a sustainable and practical solution for managing urban pigeon populations. This comprehensive research highlights the significant long-term cost savings associated with the treatment, emphasizing its potential as a viable option for municipalities seeking to effectively control pigeon populations. By mitigating the negative impacts of overpopulation on public health and infrastructure maintenance costs, NCZ appears as an environmentally friendly method that does not adversely affect other non-target species. The eight-year span of this study allowed for thorough observation and data collection, reinforcing the reliability and robustness of its findings. With urban pigeon overpopulation posing a serious problem in many cities, this research underscores the importance of such sustainable methods, not only for the well-being of human communities but also for the broader ecological balance.

REFERENCES CITED

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Municipality	Start year (number of years)	Number of treatment points	Location	Estimated cost[A] (€)
Arenys de Mar	2016 (6)	2	Terrace	39 144
Badia del Vallès	2016 (6)	4	Two squares/two terraces	18 177.6
Calaf	2018 (3)	3	Two squares/one terrace	34 305.6
Capellades	2017 (7)	3	Terrace	55 440
Cardedeu	2017 (4)	7	Terrace	145 622.4
Cardona	2014 (8)	1	Terrace	83 932.8
Castellar del Vallès	2018 (4)	2	Terrace	25 468.8
Constantí	2017 (5)	3	Terrace	31 046.4
Cornellà de Llobregat	2021 (1)	2	Square	9576
Figueres	2021 (1)	6	Three squares/ three terraces	22 713.6
Igualada	2018 (4)	7	Square	107 604
La Bisbal del Penedès	2020 (2)	1	Terrace	3662.4
La Pobla de Claramunt	2017 (5)	1	Terrace	15 859.2
La Seu d'Urgell	2014 (8)	3	Terrace	58 665.6
Molins de Rei	2014 (8)	3	One square/two terraces	229 656
Olesa de Montserrat	2015 (7)	3	Two squares/one terrace	199 281.6
Puig-Reig	2016 (6)	2	Square	55 624.8
Ripoll	2015 (7)	3	Square	102 211.2
Sant Fruitós de Bages	2019 (3)	3	Terrace	59 623.2
Sant Vicenç de Castellet	2017 (4)	2	One square/one terrace	23 049.6
Solsona	2015 (8)	2	Terrace	96 919.2
Vidreres	2021 (2)	1	Terrace	5040
Viladecavalls	2018 (4)	1	Terrace	15 052.8
Vilafranca del Penedès	2016 (5)	6	Four squares/two terraces	66 292.8
Vilanova del Camí	2017 (5)	2	Terrace	30 542.4

Table 1. year treatment started, the number of points, location (square or terraces), number of years of treatment and associated costs for each of the municipalities The associated costs of annual treatment were calculated on the basis of an estimation of € 33.6 per pigeon.

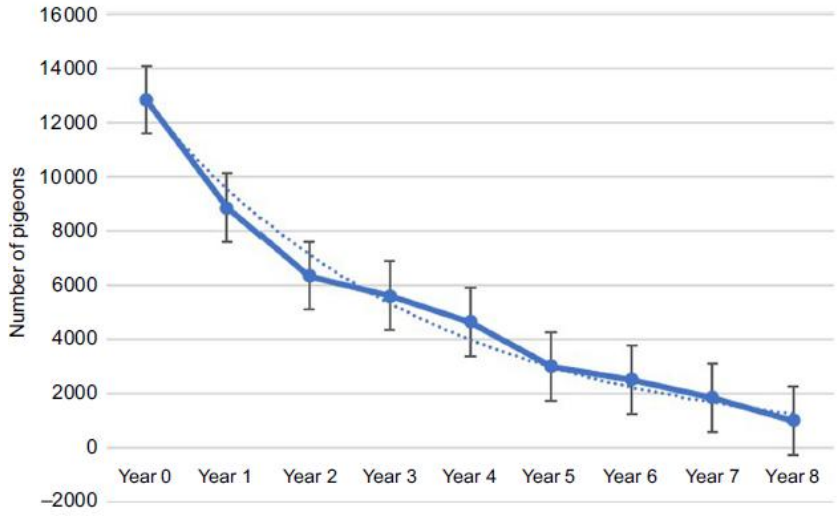

Table 2. Population trend of the total number of pigeons during the study years.

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8
Year 0	0.3842 ± 0.0812 s.e., $t = 4.729$, **$P = 0.0002$**	0.6714 ± 0.0852 s.e., $t = 7.877$, **$P < 0.0001$**	0.7949 ± 0.0866 s.e., $t = 9.178$, **$P < 0.0001$**	0.9329 ± 0.0895 s.e., $t = 10.419$, **$P < 0.0001$**	1.0098 ± 0.0994 s.e., $t = 10.163$, **$P < 0.0001$**	0.9874 ± 0.1123 s.e., $t = 8.79$, **$P < 0.0001$**	1.2079 ± 0.129 s.e., $t = 9.361$, **$P < 0.0001$**	1.2313 ± 0.163 s.e., $t = 7.552$, **$P < 0.0001$**
Year 1		0.2872 ± 0.0852 s.e., $t = 3.369$, **$P = 0.0275$**	0.4107 ± 0.0866 s.e., $t = 4.742$, **$P = 0.0002$**	0.5486 ± 0.0895 s.e., $t = 6.128$, **$P < 0.0001$**	0.6256 ± 0.0994 s.e., $t = 6.296$, **$P < 0.0001$**	0.6032 ± 0.1123 s.e., $t = 5.37$, **$P < 0.0001$**	0.8237 ± 0.129 s.e., $t = 6.383$, **$P < 0.0001$**	0.8471 ± 0.163 s.e., $t = 5.195$, **$P < 0.0001$**
Year 2			0.1235 ± 0.088 s.e., $t = 1.404$, $P = 0.894$	0.2615 ± 0.0908 s.e., $t = 2.878$, $P = 0.105$	0.3384 ± 0.1005 s.e., $t = 3.366$, **$P = 0.0278$**	0.316 ± 0.1134 s.e., $t = 2.787$, $P = 0.1307$	0.5365 ± 0.1299 s.e., $t = 4.129$, **$P = 0.0022$**	0.5599 ± 0.1638 s.e., $t = 3.419$, **$P = 0.0237$**
Year 3				0.1379 ± 0.0915 s.e., $t = 1.507$, $P = 0.8499$	0.2149 ± 0.1011 s.e., $t = 2.125$, $P = 0.4618$	0.1924 ± 0.1139 s.e., $t = 1.69$, $P = 0.7516$	0.413 ± 0.1304 s.e., $t = 3.167$, **$P = 0.0493$**	0.4364 ± 0.1641 s.e., $t = 2.659$, $P = 0.1748$
Year 4					0.077 ± 0.1027 s.e., $t = 0.75$, $P = 0.9979$	0.0545 ± 0.1153 s.e., $t = 0.473$, $P = 0.9999$	0.2751 ± 0.1316 s.e., $t = 2.09$, $P = 0.4851$	0.2985 ± 0.1651 s.e., $t = 1.808$, $P = 0.6769$
Year 5						−0.0225 ± 0.1205 s.e., $t = -0.186$, $P = 1$	0.1981 ± 0.1363 s.e., $t = 1.454$, $P = 0.8739$	0.2215 ± 0.1688 s.e., $t = 1.312$, $P = 0.9258$
Year 6							0.2206 ± 0.1433 s.e., $t = 1.539$, $P = 0.8345$	0.2439 ± 0.1745 s.e., $t = 1.398$, $P = 0.8966$
Year 7								0.0234 ± 0.183 s.e., $t = 0.128$, $P = 1$

Table 3. Results of the post hoc tests (Tukey test) of the registered population trend among treatment years. Bold data indicates statistically significant differences.

	No. of observations	No. of observations other species	Other species observed	% Observations with other species with respect to total observations
Arenys de Mar	1800	3	Eurasian collared doves	0.17
Badia del Vallès	1830	None		
Calaf	720	None		
Capellades	1440	None		
Cardedeu	1700	6	Magpie	0.35
Cardona	900	None		
Castellar del Vallès	1800	None		
Constantí	1440	None		
Cornellà de Llobregat	6	None		
Figueres	274	None		
Igualada	72	None		
La Bisbal del Penedès	360	None		
La Pobla de Claramunt	900	None		
La Seu d'Urgell	900	None		
Molins de Rei	1500	None		
Olesa de Montserrat	1085	None		
Puig-Reig	15	None		
Ripoll	21	None		
Sant Fruitós de Bages	720	None		
Sant Vicenç de Castellet	900	None		
Solsona	1800	None		
Vidreres	186	None		
Viladecavalls	125	None		
Vilafranca del Penedès	1800	None		
Vilanova del Camí	900	7	Eurasian collared doves/magpie	0.78
Total	23 194	16		0.07

Table 4. Observations of non-target species consuming nicarbazin.