

Effect of *BIRD FREE* on a night roost of feral pigeons

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1. Introduction

In order to assess the efficacy of the product *BIRD FREE* in repelling feral pigeons we performed a test on a night roost site at the Veterinary Clinic of the University of Pisa in San Piero a Grado (Pisa). The night roost subject of the study was located on the two lower pitches of a roof of a building, which houses heating equipment (Figure 1). Hot air from the equipment is expelled through vents on either side of the building, located below the higher roof. The warm air blown out from the vents creates an ideal night roost for pigeons.



Figure 1.

Materials and methods

In order to document the presence of the birds before and after the treatment one video-camera for each pitch of the roof hosting the night roost was installed. The south roof (Figure 2) was treated with *BIRD FREE* (video-camera CAM01); the north roof (Figure 3) was treated with empty PET dishes (CAM04). Each camera recorded a picture every minute.



Figure 2



Figure 3

1) South Roof treated with *BIRD FREE*

The dimensions of the south roof (Figure 4) are 9.09 m wide (east/west) x 4.15 m deep (north/south). The metal cladding on either side of the roof is 29.2 cm wide; the width of the tiled section of the roof, where roosting occurs is 8.51 m.



Figure 4

As shown by the pattern of the bird droppings the area where pigeons roosted (Figure 5) was approximately 80 cm deep towards the centre of the roof, tapering to approximately 50 cm at the sides of the tiled roof.



Figure 5. Picture of the South Roof taken on the 26th of March 2017 before the sunset (18:33), three days before the installation of *BIRD FREE*.

On the morning of 29th March 2017, more than 100 kg of pigeon faeces were manually removed from the south roof, which was then washed and disinfected (Figure 6).



Figure 6. South roof after bird dropping removal and cleaning.

After the south roof dried, the dishes of *BIRD FREE* were fixed with silicone adhesive as shown in Figure 7. According to the instruction for the use of the product in pigeons' night roosts, the dishes of *BIRD FREE* must be spaced of 20cm from centre to centre. In this case, however, the distance between the apexes of the bent tiles was 28cm and therefore the dishes on the tiles were fixed at that distances from each other. In addition, dishes of *BIRD FREE* were fixed one per shingle at a

distance of 20cm from each other centre. At the top of the roof closest to the warm air ducts the dishes of *BIRD FREE* were placed at 14 cm from each other centre.



Figure 7

The treated area was approximately 9x1.8 m (Figure 8 and 9).



Figure 8



Figure 9. South roof after the installation of *BIRD FREE*

In order to deter pigeons from sitting on the edges of the higher roof and fouling onto the *BIRD FREE* dishes below, dishes of *BIRD FREE* were fixed to the south edge of the higher roof at 25cm centre to centre (Figure 10)



Figure 10

2) North Roof treated with empty dishes

The dimensions of the north roof are the same as those of the south roof. However, there is a chimney approximately half way down the roof on the east side (Figure 11). Pigeons roost on this roof at night along the tiles close to the hot air vents, as described for the south roof (Figure 12).



Figure 11. North Roof before the treatment.

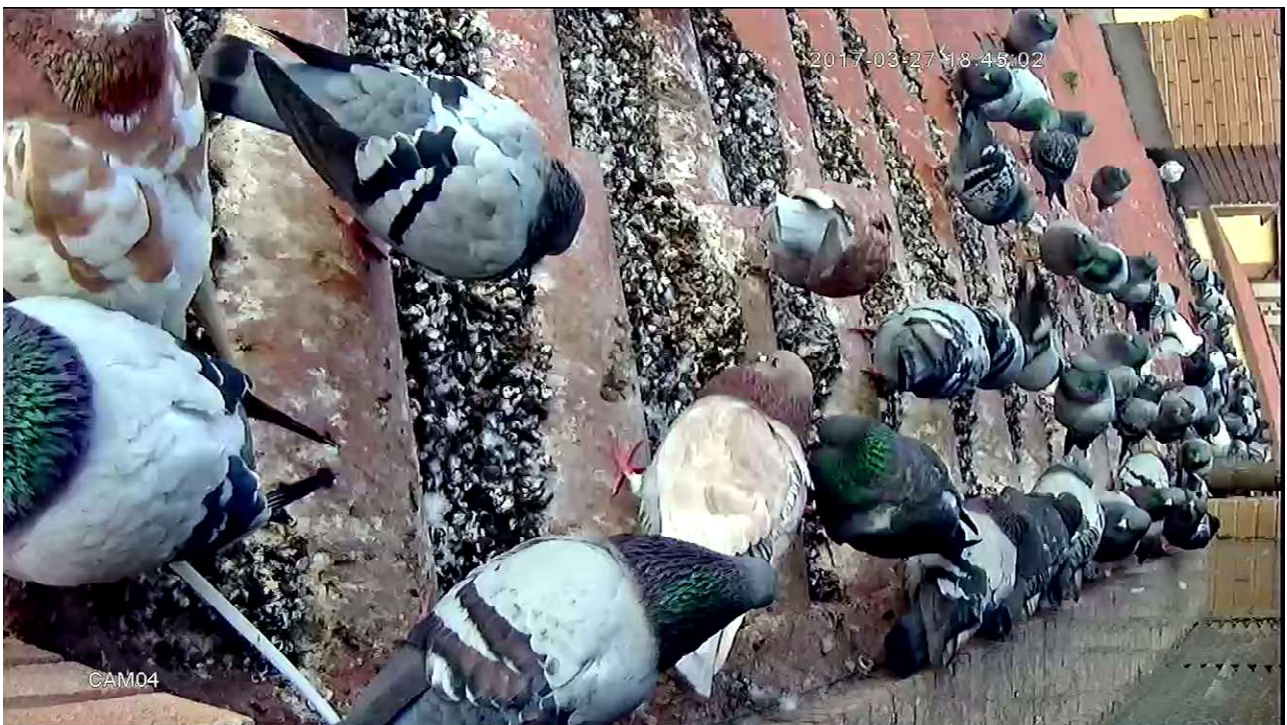


Figure 12. Picture of the North Roof taken on the 27th of March 2017 before the sunset (18:45), three days before the installation of the empty dishes.

In the morning of the 30th of March 2017, more than 100kg of pigeon faeces were removed from the North roof, which was cleaned and disinfected (Figure 13).



Figure 13. North roof cleaned and disinfected.

Empty PET dishes, the same as those containing the *BIRD FREE* gel, were fixed with silicone to the cleaned North roof. The empty dishes were spaced as the dishes of *BIRD FREE* fixed to the South roof. (Figure 14)



Figure 14. Empty dishes fixed on the North roof.

Empty dishes were also fitted to the north edge of the higher roof at 25cm centre to centre (Figure 15).



Figure 15

Data analysis

We considered Day 0 the day of the installation of the cups (either with the *BIRD FREE* or empty). We counted the number of pigeons visible in the photogram recorded by the video-cameras at sunrise, 12.00, 14.30 and sunset for each experimental Days (Day -3, Day -2, Day -1, Day 1, Day 2, Day 3, Day 7, Day 14, Day 30, Day 60, Day 90, 1 year later, 2 years later, 4 years later). For each experimental day we considered the highest number of birds observed. The median number of birds counted before the treatment was considered as baseline to compute the difference in the highest number of birds present in the experimental days after the treatment. One Way Repeated Measures Analysis of Variance was applied to the difference in the highest number of birds present after the treatment in each experimental day.

Results and Conclusion

After the installation of *BIRD FREE* no one single bird was observed to roost at night in the South Roof, while many birds regularly continued to roost on the North Roof of the building. The meteorological data on the experimental days are reported in Table1. The number of pigeons observed on the roofs on the experimental days at the established times are reported in Table 2.

Table 1. Weather data

Date	Temperatures °C (Min, Max)	Max Wind speed km/h	Rain
26/03/2017	5.7, 16.5	4.0	0
27/03/2017	5.8, 17.4	4.5	0
28/03/2017	0.3, 16.7	3.6	0
30/03/2017	5.5, 18.2	3.1	0
31/03/2017	9.0, 17.6	2.7	0
01/04/2017	7.5, 18.9	5.8	0
05/04/2017	7.4, 22.6	4.0	0
12/04/2017	7.5, 22.2	3.1	0
28/04/2017	8.4, 16.2	10.7	0
28/05/2017	13.5, 29.2	4.0	0
27/06/2017	20.3, 30.3	5.4	0
07/04/2018	7.4, 21.8	4.5	0
29/03/2019	9.3, 19.5	25.2	0
13/05/2021	12.2, 18.1	17.7	0

Table 2. Number of pigeons recorded in each experimental day at established times of the day. In bold the number of pigeons recorded after the treatment

		CAM01 South Roof <i>BIRD FREE</i>		CAM04 North Roof Empty Dishes	
DAY	Time	Date	Number of Birds	Date	
-3	sunrise	26/03/2017	29	27/03/2017	50
	12:00		44		0
	14:30		0		0
	sunset		48		52
-2	sunrise	27/03/2017	30	28/03/2017	34
	12:00		0		0
	14:30		0		0
	sunset		39		51
-1	sunrise	28/03/2017	22	29/03/2017	27
	12:00		0		0
	14:30		0		0
	sunset		37		29
1	sunrise	30/03/2017	0	31/03/2017	29
	12:00		0		0
	14:30		0		0
	sunset		0		35
2	sunrise	31/03/2017	0	01/04/2017	32
	12:00		0		0
	14:30		0		0
	sunset		0		25
3	sunrise	01/04/2017	0	02/04/2017	30
	12:00		0		0
	14:30		0		0
	sunset		0		36
7	sunrise	05/04/2017	0	06/04/2017	13
	12:00		0		0
	14:30		0		0
	sunset		0		41
14	sunrise	12/04/2017	0	13/04/2017	21
	12:00		0		0
	14:30		0		1
	sunset		0		48
30	sunrise	28/04/2017	0	29/04/2017	24
	12:00		0		0
	14:30		0		0
	sunset		0		35
60	sunrise	28/05/2017	0	29/05/2017	19
	12:00		0		1
	14:30		0		0
	sunset		0		41
90	sunrise	27/06/2017	0	28/06/2017	47
	12:00		0		2
	14:30		0		0
	sunset		0		37
1 year	sunrise	07/04/2018	0	07/04/2018	18
	12:00		0		0
	14:30		0		0
	sunset		0		29
2 years	sunrise	29/03/2019	0	29/03/2019	9
	12:00		0		0
	14:30		0		0
	sunset		0		23
4 years	sunrise	13/05/2021	0	13/05/2021	4
	12:00		0		0
	14:30		0		0
	sunset		0		22

The highest number of pigeons counted in each experimental day at the established times on the South Roof and on the North Roof provided with *BIRD FREE* and Empty Dishes, respectively, are

reported in Figure 15. The One Way Repeated Measures Analysis of Variance applied on the differences in the highest number of pigeons observed after the installation with respect to the median number of birds recorded in the three days immediately before the installation of the products, highlighted a significant difference between the treatments (*Bird Free* vs Empty Dishes $p < 0.001$, $F_{1,10} = 80.863$).

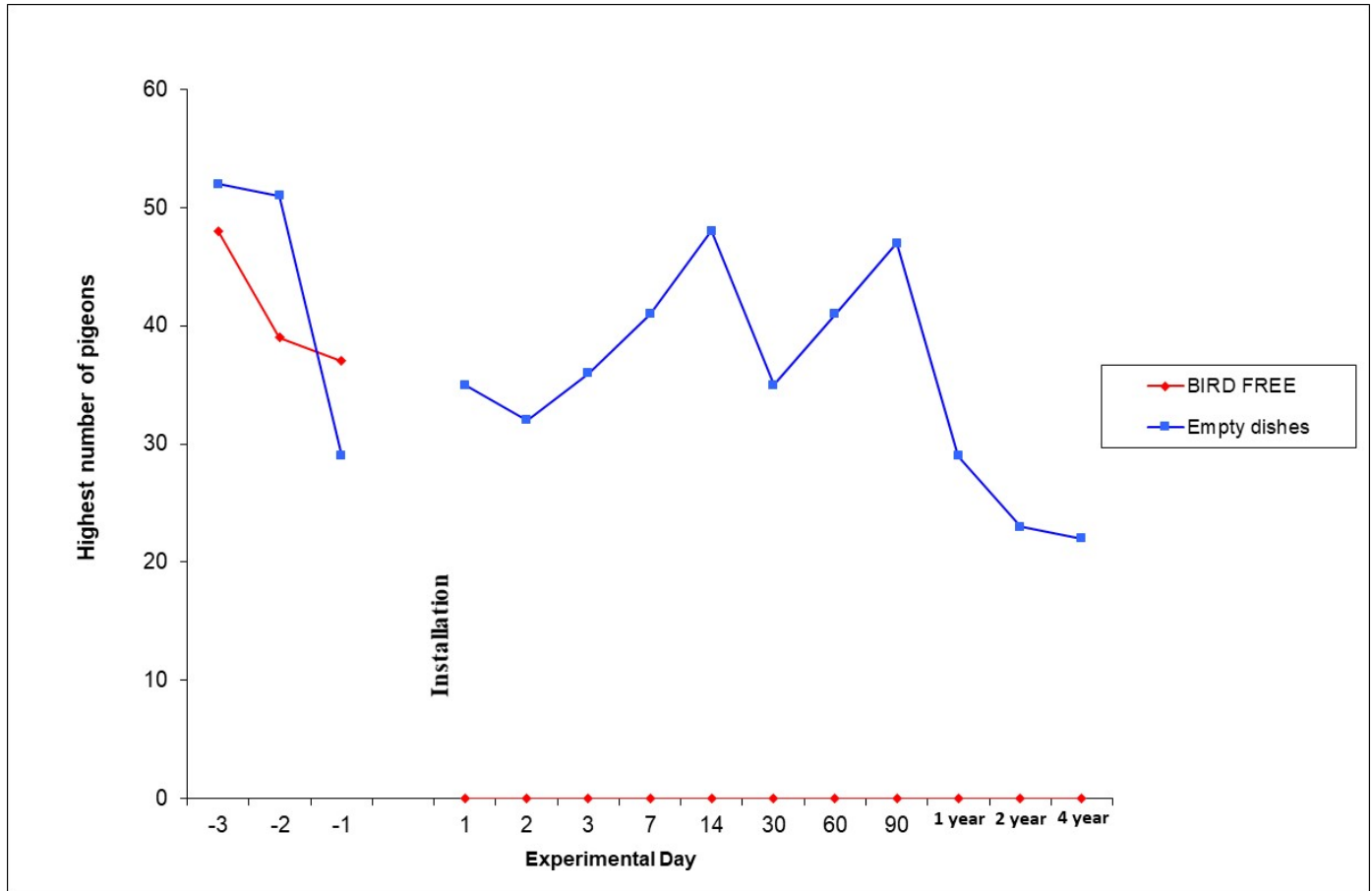


Figure 15

The condition of South Roof and the North Roof at the sunset of the Day 90 can be inspected in Figures 16 and 17, respectively. It is evident the accumulation of bird dropping on the tiles of the North Roof treated with Empty Dishes. By contrast, no accumulation of faeces is observed on the South roof treated with *BIRD FREE*. A year later, despite a few dishes of *BIRD FREE* had fell off from the tiles, the pigeons continued to avoid the South Roof, which was void of faeces. The condition of South Roof and the North Roof at the sunset more than 1 year after the treatment can be inspected in Figures 18 and 19, respectively. Two years after the treatment the efficacy of *BIRD FREE* was still clearly visible (see Figure 20 and 21 for the South and North roofs, respectively). Importantly, we were able to assess the efficacy of *BIRD FREE* even four years after the treatment (see Figure 22 and 23).

Conclusions

On the basis of the reported results we can affirm that *BIRD FREE* is effective in totally dissuading feral pigeons from roosting at night in the treated area, at least up to about 4 years from its installation. In fact, after the application of *BIRD FREE* 100% reduction of the presence of birds was observed.



Figure 16. South Roof provided with *BIRD FREE*. The picture has been taken at the sunset (Day 90)



Figure 17 North Roof provided with Empty Dishes. The picture has been taken at the sunset (Day 90).



Figure 18. South Roof provided with *BIRD FREE*. The picture has been taken at the sunset after about 1 year from the installation.



Figure 19. North Roof provided with Empty Dishes. The picture has been taken at the sunset after about 1 year from the installation.



Figure 20. South roof two years after *BIRD FREE* installation



Figure 21. North roof two years after the installation with Empty Dishes



Figure 22. South roof four years after *BIRD FREE* installation



Figure 23. North roof four years after the installation with Empty Dishes

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.....1st June 2021
Date