

INDIVIDUAL SUPPLEMENTARY FEEDING OF THE EGYPTIAN VULTURE (*NEOPHRON PERCNOPTERUS*) IN BULGARIA AND GREECE (2012-2015)

TECHNICAL REPORT UNDER ACTION C4

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ABOUT THE PROJECT

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LIST OF ABBREVIATIONS

NSAIDs – Non-steroidal anti-inflammatory drugs

EU – European Union

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1. INTRODUCTION

The endangered Egyptian vulture (*Neophron percnopterus*) is one of the four vulture species in Europe, and the most threatened of all with ongoing population decline in most of its' range across Eurasia and Africa (Iñigo et al. 2008). The Balkan population of this globally threatened scavenger is declining more rapidly than populations in western Europe or India (Galligan et al. 2014; Velevski et al. 2015), likely due to a combination of several known threats such as poisoning, electrocution, landscape changes and direct persecution (Carrete et al. 2007; Mateo-Tomás and Olea 2010; Velevski et al. 2015).

It is well known that supplementary feeding through feeding stations is an important management tool and can increase the breeding success in the Egyptian vulture (Liberatori & Penteriani 2001, García-Ripollés & López-López 2006, Sarà et al. 2009) but on the other hand the provision of supplementary food at artificial feeding stations may have not only positive but also negative effects, for example by attracting a large number of non-breeding birds resulting in increased interference and a reduction of productivity (Carrete et al. 2006; Cortés-Avizanda et al. 2010; Lieury et al. 2015). Thus alternatives for vulture restaurants such as individual supplementary feeding which provides small quantities of quality food near the nests could be beneficial for the conservation of the species especially in small and isolated populations such as the Balkan one.

2. AIM OF THE INDIVIDUAL SUPPLEMENTARY FEEDING IN THE FRAME OF THE PROJECT

The project “The Return of the Neophron” (LIFE10 NAT/BG/000152, www.LifeNeophron.eu) aims to prevent the extinction of the Egyptian vulture in Bulgaria and Greece through a wide range of direct and indirect conservation measures and tools. Small scale individual supplementary feeding is one of the alternatives of the vulture restaurants implemented under the project in order to support the remaining Egyptian vulture pairs trying to mitigate key factors such as poisoning and lack of food and to support their breeding success and health status.

This conservation action implemented under the project aimed to:

- **Increase productivity**

It is well known that in birds of prey the start of breeding, clutch size and productivity are limited mainly by the food supply (Newton 1979; Newton 1989; Newton & Marquiss 1981; Aparicio 1994). In several raptor species, annual productivity varies up to six-fold depending on the food supply in a given year (Newton 1979). For the Egyptian vulture, supplementary feeding is an important management tool (Levy & Segev 1996; García-Ripollés, C. & López-López 2006; Andreotti & Leonardi 2009) and an important activity to increase breeding success (Liberatori & Penteriani 2001; Sarà et al. 2009). Supplementary feeding may stimulate newly formed and inexperienced pairs to start breeding, thus contributing to an overall increase in the productivity of the population. Adults in better body condition may also be able to produce more eggs and increase the survival probability of the juveniles (especially of the second and third hatched juveniles) in the critical two weeks after hatching (Donázar & Ceballos 1989). However supplementary feeding could potentially have some negative effects such as attracting many birds and thus increasing the intraspecific competition resulting in a decreased productivity (Lieury et al. 2015) so it should be applied with caution.

- **Increase adult survival**

The survival probability of adults, which has a very strong influence on population trends in long-lived species like vultures, is affected by the quality of the breeding territory (Grande et al 2009; Carrete et al. 2007). Food availability is a major determinant of territory quality. By providing a significant part of the necessary food to the chosen pairs, the individual supplementary feeding is expected to decrease the risk of adults

consuming poisoned or otherwise contaminated (e.g. by NSAIDs, hormones, antibiotics, etc.) food and thus also increase adult survival. It is supposed that antibiotics worsen the health of vultures, so the proposed action may contribute to the improvement of the health status of the Egyptian vulture population.

3. PREPARATORY STAGE

3.1. *European law*

During the implementation of this conservation action, European Union (EU) regulations were considered. Supplementary feeding of vulture species is allowed under current EU legislation to maintain their populations. The EU regulations for the disposal of animal products in nature govern the implementation of this activity. EU Regulation №1069/2009 has been in power since 04.03.2011 (thus replacing the older Regulation 1774/2002) and allows the feeding of vultures and other species living in their natural habitats, with materials from Category I (whole bodies or parts of dead animals, containing specific risky material at the moment of destroying), in order to encourage the conservation of biodiversity. This type of feeding is mentioned in Regulation 2009/147/EO of the European Parliament and Council from 30 November 2009 (which includes the Egyptian vulture), related to the conservation of wild birds.

3.2. *Coordination with relevant authorities*

Before starting the implementation of the supplementary feeding programme for Egyptian vultures in Bulgaria and Greece, information meetings were held with the relevant authorities. During these meetings, the methodology for the implementation of the supplementary feeding programme for Egyptian vultures was presented in detail. A written description of the expected results from this conservation action for the conservation of the Egyptian vulture was also provided to the authorities. In this way, the implementation of the supplementary feeding programme for Egyptian vultures was coordinated with all relevant authorities depending on the area where the supplementary feeding was to take place. In our case, these were the Ministry of Environment, the Ministry of Agriculture, Forestry Services, National and Natural Parks, and Veterinary Services. Finally, their permission for the implementation of the supplementary feeding programme was requested. Authorities were also updated annually on the results of the supplementary feeding programme.

3.3. *Information campaign for the key stakeholders*

Information meetings were organised and conducted with local hunters, livestock breeders and local people who live near the sites for supplementary feeding. All concerns, possible problems and their solutions were discussed openly (e.g. livestock breeders were concerned about the attraction of predators). Information materials about the Egyptian vulture, the project goal and activities were widely distributed.

4. IMPLEMENTATION

4.1. *Criteria for the selection of pairs for supplementary feeding*

Egyptian vulture pairs were selected for supplementary feeding based on the following criteria:

- Lower than average breeding performance in the previous breeding seasons (as far back as data is available). This was based on productivity levels (number of fledged juveniles per territorial pair): low (< 0.6 juv./pair), medium (0.6 – 1.1 juv./pair) or high (> 1.1 juv./pair).
- Recorded mortality incidents and mate changes.

- Limited experience of the pair, inferred from discontinuous territory occupancy (i.e. a newly formed pair).
- An increased chance of poisoned bait occurrence, determined by assessing the level of ‘predator-human’ conflict in a 5 km radius around the nest.
- Easy access and availability of human capacity to implement the individual supplementary feeding.

4.2. Location of supplementary food sites

The supplementary feeding was provided at carefully selected places which had the following characteristics:

- Located in open landscape with no trees or shrubs around (at least not in 5 - 10 metres radius). If possible, the food was placed on the top of a rock or on a separate rock inaccessible for carnivores.
- The places where there are farms in the neighbourhood were avoided in order to minimize the livestock-carnivore conflict (congregation of carnivores). When there were farms around the selected site for feeding, the risk of attracting carnivores and increasing the human-carnivore conflict was considered - in these cases the artificial feeding was done in a different place (at least 2 km away from the farm in order to avoid attracting carnivores and shepherd dogs).
- Whenever possible, places for the placing of the supplementary food were far away from a road or other human infrastructure.
- If feasible, we aimed to locate the site for supplementary feeding between 300 – 600 metres from the nest.
- We also aimed that the feeding site was directly visible from the nest (although this was not obligatory). More important was that the birds had good visibility over the location of the supplementary food.
- Since all supplementary food sites were situated in the vicinity of the nests of the targeted Egyptian vulture pairs, we considered the risk of attracting some other scavengers such as ravens or griffon vultures. Hence, there was a risk that the presence of other competitors may affect the breeding success of the Egyptian vulture pairs that were supplementary fed. In the cases, where such interspecific competition at feeding sites was recorded, the supplementary feeding was stopped and placed at another location at a safe distance (e.g. at least 500 m away from the nest of the targeted Egyptian vulture pair).



Image 1. A feeding site with a stone showing the exact place for placing the food



Image 2. Suitable solitary cliff top for supplementary feeding with birds on it

4.3. Supplementary food for the Egyptian vultures and its storage

4.3.1. Origin, type and way of obtaining of the food

In order to ensure that only food which is safe and free from antibiotics, veterinarian medicines (NSAIDs, antibiotics), hormones, etc., the meat we used for the supplementary feeding programme originated from animals raised extensively in farms with traditional practices on a small scale. Besides this, farmers were asked to sign a protocol confirming the dead animal was not treated with the above mentioned substances. Animal remains from intensive livestock farms were not used, since the animals in there are regularly treated with different substances that are not good for the health of vultures. Preferably meat from horses, donkey, cow,

sheep and goats (these animals are usually extensively raised with less possibility to have been treated) was used. In order to secure the use of safe food for the vultures, some village mayors, farmers and veterinarians in the region were asked to call the project local collaborators in case there are any dead animals that could be used for the supplementary feeding programme. Also if it was available in big quantities, meat was stored in freezers in order to secure the long term supplementary feeding in a given place for a given pair. Roadkill and animals with unknown origin, including those taken from small scale farms where the protocol from the local vet is missing were not considered for the targeted supplementary feeding.

4.3.2. Safety of the food

Before deciding whether to use a specific animal for the supplementary feeding programme it was checked whether it had received veterinarian treatment. If the animal had received treatment with antibiotics, or other drugs considered as possibly harmful to the vultures, it was not used. If possible, a consultation with the local veterinarian is also required.

4.3.3. Packing and storage of the food

Only muscle, fat and internal organs (heart, liver, lungs, kidneys, spleen) from big animals were used. These parts of the animal were removed and packed into plastic bags weighing between 1.5-2 kg. The plastic bags with the meat were stored in freezers purchased specially to store the food for the vultures. Up to 100 kg of meat and more can be stored in the freezer from a single large animal and this ensures its availability as supplementary food for a particular pair for months ahead.

4.4. *Timing and delivery*

4.4.1. Period of supplementary feeding

Supplementary feeding generally started in late March or early April when the pairs return from Africa and was implemented until the departure of the pair and its fledgling/s in September. If only one bird from a pair arrived in the target territory, even it was alone in the first days/weeks, supplementary feeding was implemented. In some places where a high interspecific competition exists (e.g. high density of other vultures or nests of ravens nearby), the feeding started when a hatchling appeared (or a bit later), in order to avoid the disturbance during the incubation.

Note: If the pair did not start breeding by 25th of May, the supplementary feeding could be terminated. However, depending on the specifics, the supplementary feeding of pairs which failed to start breeding may be continued throughout their stay in the breeding territory in order to decrease the risk of poisoning or increase their fidelity to the territory (in cases of newly formed pairs).

4.4.2. Defrosting and transportation of the meat

Each evening before the day planned to implement feeding, the necessary amount of meat was taken out from the freezer and defrosted. The best way to transport the meat is to put it into a hermetic plastic box, which prevents leakage and odour, and it is easy for cleaning.

4.4.3. Quantity of food per feeding

Each feeding consisted of 1.5-2 kg of food. This amount is easy for transportation and for placing it in small places with difficult access. Also the small quantity of food is less likely to attract other competitors.

4.4.4. Frequency of the feeding

Egyptian vultures were provided with supplementary food two or three times per week. In cases, when the pair failed to breed and the feeding continued to support the birds in the territory, the frequency was changed in an adaptive way according specifics of the pair. This was valid for newly formed pairs which usually occupy the territory during their first years but fail in breeding due to lack of experience. Hence, the additional food provided could make the territory more attractive and prevent the abandonment and the chance for re-occupying during the next breeding season. Also in cases when the partner bird has disappeared during the breeding season the supplementary feeding is crucial to support the bird left in the territory.

Note: The scheme here was flexible – it is not needed that the frequencies of supplementary feeding in different regions were equal. It is more important that they were planned in a realistic way considering the

local conditions per country, so that the resulted National schemes for supplementary feeding are applicable and practical.

Egyptian vulture pairs could have different behaviour towards the supplementary feeding – some pairs could benefit from it more often than others. Also some pairs could refuse the food in a month or two and start feeding just during the chick rearing period. Hence, the supplementary feeding, timing and frequency, could be adapted to the specifics of the pair and the place.

4.4.5. Time of the day for the supplementary feeding

The supplementary food was generally placed at the feeding place early in the morning (no later than 7:00 am). This early feeding ensures that the food may be spotted by the pair immediately before their first foraging trips. Moreover it gives the birds a chance to be the first ones to visit the feeding site and avoid competitors.

4.5. Monitoring

4.5.1. At the feeding site

Visual observations: Each provision with supplementary food was monitored by visual observations for at least four hours (or until the food was totally consumed by the birds) after the placing of the meat in order to record the behaviour of the birds and see whether they accept the food. The observers recorded the information in standard forms (Annex 1) which was subsequently inputted into a standard Excel spreadsheet (Annex 2). Additional observations on the behaviour of the birds were written down on the back of the standard forms.

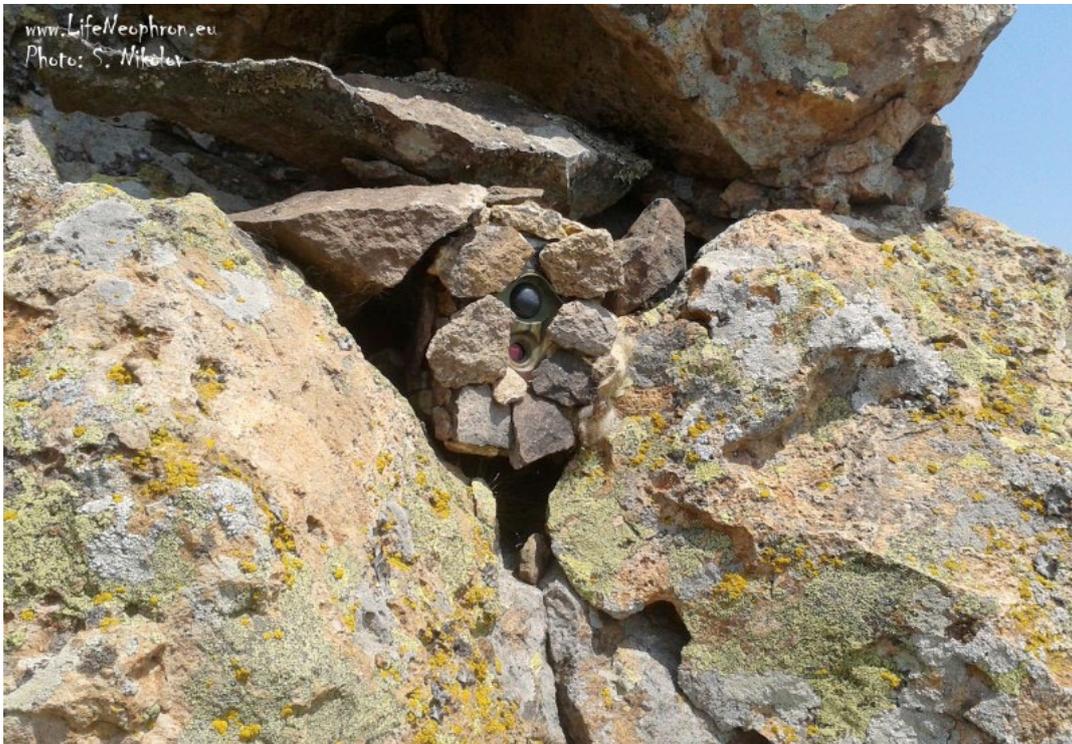


Trail cameras: Effective and cost-effective monitoring at feeding sites was carried out using trail cameras. Photos from close-up could sometimes even reveal individual characteristics of birds which were not clearly

Image 3. Supplementary feeding

visible from a distance (e.g. face markings, codes on rings, etc.). Installation of trail cameras was considered at 2-10 metres from each feeding site. Trail cameras were set to take 1 still image per shot. Also an interval of 30 seconds between shots was recommended to ensure enough photos of events were taken and to skip many repeating actions. Since the trail cameras were vulnerable to theft, the best value for money was

selected. Sticking a small label to the trail camera, explaining the purpose of the trail camera and providing contact details was considered. The label was intended to prevent eventual theft or destruction. Each time the supplementary food was provided, the SD card of the trail camera was collected in order to download the data at the office/home and a new empty SD card was inserted in its place. Also trail cameras were camouflaged with natural materials (little stones, leaves, branches) using a glue to stick them to the trail camera in order to avoid disturbance of the birds.



4.5.2. In the nests

Image 4. Camouflaged trail camera over a feeding site

We used trail cameras to monitor food delivery at targeted Egyptian vulture nests. The installation of trail cameras in the nest was in line with several criteria:

- If accessing the nests required climbing equipment, permission from the relevant authorities was obtained and an experienced team chose the exact place in the nest and accessed it safely;
- Installation took place before the return of birds from Africa (i.e. in the beginning of March).
- Trail cameras were well camouflaged to avoid disturbance of the birds.
- Once installed, trail cameras were accessed 2 to 3 times more during the breeding season in order to change the battery pack and SD cards. This was carried out when the chicks were sufficiently mature so as to minimise disturbance - the first change of batteries did not take place before chicks are at least 3 weeks old. The change was performed fast and with caution.

Image 5. Camouflaged trail camera in a nest and accessing a nest to install a trail camera



4.6. Human resources needed for the implementation of the action

The activity was performed by highly motivated people who are able to work in bad weather conditions, on a difficult terrain and during non-standard working hours (very early in the morning). Preferably local people were involved in the supplementary feeding because they usually live close to the pair, logistics are easy to organise and it is more sustainable over time. Local people involved in project activities were also good opinion makers and proponents of the conservation of the species amongst local communities.

Best scenario is to involve also local authorities in the supplementary feeding programme, if they have the capacity and skills to implement it. When local people or authorities are not an option, young researchers or volunteers can be involved in this action

5. RESULTS: INDIVIDUAL SUPPLEMENTARY FEEDING IN BULGARIA AND GREECE

During the implementation of the LIFE+ project “The Return of the Neophron”, the following results in relation to individual supplementary feeding of Egyptian vulture pairs in Bulgaria and Greece were achieved:

- An average of 16 pairs regularly received safe food during the breeding season each year (15 in 2012, 17 in 2013, 16 in 2014 and 2015).
- The average productivity in 2014 and 2015 (0.9) was higher than the before project baseline (0.85) and compared to the average productivity during the first two years of project implementation – 2012 and 2013 (0.79).
- The maximum number of food deliveries reached 107 per year just for one pair.
- Food was delivered to specially selected places or close to the nest.
- Average amount of safe food provided per nest was 62 kg per year.
- About 15 local collaborators each year helped for the implementation of this action.



Image 6. A bird from a pair in the north of Bulgaria on a supplementary feeding

6. LESSONS LEARNED

- Individual supplementary feeding is not advisable in cases when targeted pairs have many neighbouring competitors around such as ravens and griffon vultures. A change in the feeding place is an option to be considered.
- There are always pairs who do not take the food supplied to them and in these cases feeding should be adapted according to the pair and the time period.
- In order to measure the effect of supplementary feeding on some breeding parameters of the studied pairs a collection of a specific data set is required – the start date of feeding, the end date of feeding, number of food provisions per season, quantity of food per food provision, the type of food (meat, bones, intestines), time spent in observation of every feeding event, laying date of the pair, number of hatchlings, number of fledglings, fledgling date. A certain number of non-fed control pairs is required as well to assess the success of the action.
- Collection of data about how often the birds eat and how much of the food provided they consume is essential to study some aspects of their biology such as diet, productivity and behaviour.
- Monitoring the effect of the supplementary feeding is required in order to better plan and adapt conservation strategies for the species and to measure the effect of the feeding on target populations.

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