Health surveillance for an Osprey (*Pandion haliaetus*) reintroduction project in south of Portugal

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INTRODUCTION

Breeding Ospreys (*Pandion haliaetus*) (Fig.1) were common along the Portuguese coast until the beginning of the 20th century. By 1978 only two pairs remained on the coast of southwest Portugal and in 2003 the last remaining individual disappeared [1]. A five year reintroduction project was set up in 2011 at the Alqueva dam in the Alentejo region (Fig.2 & 3) . It was implemented by the CIBIO, with funding from EDP, the Portuguese Electric Company and collaboration with organisations in the donor countries of Finland and Sweden. This project aims to contribute to the improvement of the survival, feeding and breeding conditions of the Osprey, and to establish a breeding population at the Alqueva reservoir, and its ultimate goal to recover the historic coast breeding territories [2].

Fig.1- Osprey (*Pandion haliaetus*)

Fig.2 - Releasing area Alqueva reservoir

Fig.3- Area of the project in the Region of Alentejo, Alqueva Dam (Southeast of Portugal)

It is well known that wildlife diseases can represent a serious conservation threat for free-living populations of endangered species, infectious diseases are one of the main five causes of global species extinctions [3]. Trade globalization of animal products and domestic and wild animals is recognize by the Office International des Epizooties (OIE) to pose risks on spreading infectious diseases with animal and human health (zoonosis) impact, which led to consequent regulation regarding international trade. Health surveillance to evaluate the sanitary status of animal populations reveal to be very important to the success of both *in situ* and *ex situ* conservation programs of endangered species with declining populations [3]. Health risk assessment has become a main topic of wildlife reintroductions and conservation translocations [4,5,6].

For this purpose, different stakeholders contribute to the translocation plan, a health risk was in advance assessed with a Conservation Medicine approach [4,5,6,7]. The health survey protocol consisting on a sample collection and laboratorial testing of biological material from osprey to detect the presence of pathogenic agents that might affect the sympatric populations at the area of the reintroduction project in the Southeast of Portugal.

OBJECTIVE

Evaluate the sanitary status of translocated ospreys, to assure success to the reintroduction project by ensure a significant number of healthy individuals during the hacking until the dispersion. On the other hand, minimize the risk of a potentially disease agent to be also translocated, avoiding diseases outbreaks.

TRANSLOCATION PLAN PROCEDURES

Legal and Health certification requirements

The main requests from Conservation (ICNF) and Veterinarian (DGAV) Portuguese authorities were:

- Official agreements of the donor countries' authorities on the export of nestlings;
- CITES certificate;
- Official veterinarian certificates (reports on the occurrence of diseases in the Origin region/countries and individual clinical health certification before travel, Clinical health examination upon arrival and before release);
- Laboratory screening for Highly Pathogenic Avian Influenza (HPAI) and Newcastle Disease (ND) upon arrival and before release ("Quarantine" period), both diseases were considered to have a high risk (Qualitative Risk Assessment).

Nestling collecting and transportation

Osprey nestlings are taken and marked with metal and colored rings at about 4–6 weeks of age from wild active nests (one per active nest with siblings), at the first half of July, from the Finnish and Swedish populations (Fig.4) with the collaboration of national expert scientists and local volunteers. They are temporarily kept in appropriate accommodations while waiting for translocation. Meanwhile, the nestlings are clinically evaluated by local official veterinarians to assure they do not show signs or symptoms of infectious diseases. Up to 6 nestlings from each country in a total of 10–12 are translocated each year, spanning up to 5 years. During the first four years of the project (2011–2014) a total of 44 nestlings were translocated. Our main concern at the transportation was the welfare of the nestlings. To minimize stress, they were put individually or in two in appropriate plastic boxes used for Airborne transportation of live pets. Shortly after, they are taken by direct flights from Helsinki and Stockholm to Lisbon. Flights are scheduled to arrive at Lisbon's airport in the late afternoon in order that the nestlings are taken by car to the hacking facility after sunset to prevent heat stress from the high summer daytime temperatures. Prior to air transportation, prophylactic antioxidant (Se and Vit. E) therapy was administrated subcutaneous to avoid capture myopathy.

Fig.4 - Nestling collecting

Fig.5 - Nestling arriving to Lisbon airport

Fig.6 - Clinical examination at arrival, oral mucosa fungal lesion

Fig.7 - Blood sampling

Fig.8 - Force feeding with pre- rehydrated

Fig.9- Hack tower (front view)

Fig.10- Pre-release physical exam

Fig.11- Nestlings direct observation at the feeding time

Fig.12- Direct observation at the feeding time

Fig.13- Tv monitoring

Fig.14- Osprey exiting right leg in a abnormal position (intertarsal joint luxation)

Fig.15-Osprey at UEVH being anaesthetized for clinical examination; X-ray (LL -incidence): comminuted proximal left tibiotarsus fracture

Health surveillance

Upon arrival at the Lisbon airport (Fig.5), a second clinical examination (Fig.6) and sampling (Fig.7) is carried out by the project veterinarians to characterize health status and establish physiological parameters, age and body condition. After the birds are force-fed with 3–4 small fishes (Sprat, *Sprattus sprattus*) previous rehydrated, provided by Lisbon's Oceanarium (Fig.8), and transport to the hack site (Fig.9).

Besides the clinical evaluations done in the countries of origin and at Lisbon's airport, a third physical exam is carried out in situ before release (Fig.10). and whenever any bird shows signs or symptoms of disease, detected by direct observation at the feeding time (3 meals per day of fresh fish fillets) (Fig.11 & 12) or indirectly by a tv monitoring system (Fig.13). In this case, the bird (Fig.14) is taken to the Veterinary Hospital of Évora's University (UEVH) for complementary diagnose tests (X-ray, endoscopy, laboratory tests, etc) (Fig.15) and emergency treatment. If prolonged treatment and care are needed the bird is transferred to a rehabilitation center. Blood samples taken during clinical examination are used for molecular sex determination, hemoparasite screening, complete haemogram and blood biochemistry with emphasis as well to calcium and phosphorus testing (Ca-P imbalance) (Table 1 & 2). Feces or cloacal swabs are analyzed for pathological bacteria (e.g. Salmonella). virus HPAI and ND and endoparasites. So far, all samples were negative for HPAI and ND or other pathogenic agents. However, a trematode was found in one individual (low parasitic burden) and in another one a yeast was isolate from a oral mucosa lesion.

Calcium and Phosphorus — VETNATURA

2013	17-07-2013		30-07-2013		
Anilha	Ca mg/dl	P mg/dl	Ca mg/dl	P mg/dl	Pthi ng/L
P24	9,78	6,3	10,41	15,7	10,7
P25	9,99	5,9	10,07	9,2	8,4
P26	10,14	5,1	11,65*	6,2*	S/R
P28	10,27	6,7	9,8	13	8,5
P29	10,08	6	10,83	8,7	7,4
P33	9,79	6,8	10,42	12,8	9,4
P51	9,96	6,9	9,88	10,7	8,5
P52	9,47	6,2	10,19	11,3	5,4
P53	9,93	6,3	9,96	10,4	9,2
P54	10,39	6,3	10,64	11,5	10,2
P55	10,07	6,6	10,12	13	1,7
P56	9,9	6,2	10,2	12,7	10,9
Ref	8,5-13	02 - 10	8,5-13	02 - 10	5-15

Table 1- 2013 Osprey's Calcium and Phosphorus imbalance (in red animals with hyperphosphatemia)

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2014	Calcium mg/dl		Phosphorus mg/dl		Parathormone ng/L		Vit D3 nmol/L	
Anilha	15/16-Jul	31-Jul	15/16-Jul	31-Jul	15/16-Jul	31-Jul	15/16-Jul	31-Jul
P62	9,66	10,19	6,2	5,3	9,4	9,8	30,8	32,2
P57	10,37	9,17	7,3	4	7,4	9,2	49,5	50,3
P64	9,34	9,22	7	5,1	8,6	8,8	27,5	26,2
P67	9,94	9,54	6,2	4,5	7,6	7,9	25,3	30,1
P66	9,71	8,97	6,7	4,2	8,9	9,3	38,3	40,1
P82	9,81	9,47	5,9	3,9	10,5	9,3	52	54,3
P84	9,54	9,53	7,3	5,3	9,7	10,3	53	56,3
P85	9,69	9,39	6,2	4,7	8,7	8,2	67,3	62,4
P86	9,21	10,74	5,8	4,3	28,3	28	69,3	70,9
P87	8,34	9,75	5,9	6	11,3	10,4	44	39,4
P88	9,43	9,29	6,6	5,5	9,2	9,7	37,5	36,8
Ref	8,5-13		02 - 10		5 - 15		7,2 - 380	

Table 2- 2014 Osprey's Calcium and Phosphorus metabolism data plus Parathormone and Vit. D3

Clinical cases

One bird showed a behavioural disorder (feather-plucking); Two birds suffered accidental rupture of the long digital extensor tendon and consequently their intertarsal joint luxation (Fig.14) while within the cages; Three other birds showed secondary osteodystrophy with fragile bone tissue, skeletal malformations (congenital or acquired?), with coracoid (n=1), furcula (n=1) or tibiotarsal fractures (n=1) (Fig.15). The five birds were treated at rehabilitation centers, 2 died due to clinical complications, other 2 were euthanized due incurable painful condition. One was rehabilitated and released, but the bird was found dead, collided with a fence. Suspected calcium deficit as an underlying factor of secondary osteodystrophy was later investigated on the birds translocated in 2013 and results showed Ca-P imbalance with abnormal high phosphorous values. Calcium and VitD3 supplement was administered to the birds, at the same time reservoir fish nutritional composition was analyzed to check the possibility of high P content in the food supplied, but abnormal values were not found. Meanwhile fish liver has been provided during the indoor period. Aditional laboratory tests for avian parathormone and serum Vit D3, were performed, and the results were normal. Three other birds were predated after release, two by foxes (*Vulpes vulpes*) in 2011 and a third by an Eagle Owl (*Bubo bubo*) in 2012. Post release monitoring confirm that 36 Ospreys made the dispersion successfully at the present time (Fig.16, 17 & 18).

Fig.16- Osprey released

Fig.17- Osprey released (Radio tracking monitoring)

Fig.18- Osprey fledglings eating fresh fish captured at the Alqueva´s reservoir (trap cam monitoring image)

Fig.19- Recently detected Osprey breeding couple at southwest coast (old osprey nest of "Ponta da agulha")

CONCLUSIONS

The translocation plan has contributed to minimize the risks of spreading pathogenic agents. However we had to make some readjustments during the project, since we have faced some challenges, with 10 clinical cases (involving 9 out of 44 nestlings) including birds diagnosed with nutritional deficiencies (secondary osteodystrophy and weight loss), traumatic lesions (fractures, luxations, tendon ruptures) and behavioural disorder (feather-plucking). Despite these issues 40 Ospreys have been successfully released into the wild through hacking, and 36 have migrated. The first birds returned to the hacking area in April 2015 and the confirmation of a breeding couple at the southwest coast (Fig.19), offering encouragement that the project will succeed in its aims.

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