

Ryser-Degiorgis, M.-P., Lutz, H., Bauer, K., Sager, H., Ryser, A., Zimmermann, F., Breitenmoser-Würsten, Ch., and Breitenmoser, U. Veterinary supervision of lynx translocation within the Swiss Alps. European Association of Zoo- and Wildlife Veterinarians (EAZWV) 4th scientific meeting, joint with the annual meeting of the European Wildlife Disease Association (EWDA) May 8-12, Heidelberg, Germany. 147-153. 2002.

Keywords: 8CH/Alps/disease/Lynx lynx/Malme/parasite/quarantine/reintroduction/translocation/veterinary/virology/wildlife disease

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VETERINARY SUPERVISION OF LYNX TRANSLOCATION WITHIN THE SWISS ALPS

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Abstract

In 2001, six free-ranging Eurasian lynx were caught in the north-western Swiss Alps and translocated to north-eastern Switzerland. Veterinary supervision of lynx translocation was important not only to improve the chances of success of this reintroduction project, but also for scientific documentation of the work and for reasons of animal welfare. All lynx caught in the frame of the project were clinically healthy. To prevent problems associated with the stress of the translocation procedure, all animals were systematically treated with anti-parasitic and antibiotic drugs before and after quarantine. Quarantine did not only allow the observation of the animals, but also blood and faeces analysis, assessment of laboratory results, and the detailed organisation of the release procedure. The project has been successful so far, and translocation of more animals is planned for the winter 2002/03.

Zusammenfassung

In 2001 wurden sechs freilebenden Eurasische Luchse in den Schweizer Nordwestalpen gefangen und in die Nordostschweiz umgesiedelt. Die veterinärmedizinische Betreuung der umgesiedelten Luchse war nicht nur wichtig, um die Chancen eines Erfolges zu vergrössern, sondern auch aus wissenschaftlichen und tierschützerischen Gründen. Alle Luchse, die im Rahmen des Projektes gefangen wurden, waren klinisch gesund. Trotzdem wurden die Tiere systematisch mit Antiparasitica und einem Antibiotikum behandelt, dies vor und nach der Quarantäne, um den Tieren optimale Startbedingungen zu geben. Die Quarantäne erlaubte nicht nur die Beobachtung der Tiere, sondern auch die Durchführung der Blut- und Kotuntersuchungen, die Beurteilung der Laborresultate, sowie eine sorgfältige Organisation der Freilassung. Das Projekt war bisher erfolgreich; weitere Umsiedlungen sind für den Winter 2002/03 geplant.

Résumé

Au cours de l'année 2001, six lynx eurasiens en liberté ont été capturés dans les Alpes suisses du nord-ouest et déplacés dans le nord-est de la Suisse. La supervision vétérinaire des translocations était importante non seulement afin d'augmenter les chances de réussite de ce projet de réintroduction, mais également pour des raisons scientifiques et pour le bien des lynx concernés. Tous les lynx capturés dans le cadre du projet étaient en bonne santé. Les animaux ont quand même systématiquement reçu un traitement antiparasitaire et antibiotique, ceci avant et après la quarantaine, afin d'éviter tout problème lié à une infection. La quarantaine a permis non seulement d'observer les animaux, mais surtout d'effectuer les analyses de sang et de crottes, d'apprécier les résultats de laboratoire, et d'organiser en détails la procédure des lâchers. Jusqu'à présent, le projet s'est déroulé avec succès et d'autres translocations sont prévues pour l'hiver 2002/03.

Key words: Eurasian lynx, *Lynx lynx*, parasites, quarantine, reintroduction, Switzerland, translocation, viral diseases

Introduction

Lynx vanished from Switzerland during the 19th century as a result of persecution, loss of habitat and natural prey base. Since 1962 the species has been protected by law, and in the 1970s, some 25 lynx were reintroduced. Two populations arose from these releases: one in the Jura Mountains and one in the north-western Swiss Alps (1,10).

However, the population in the Alps expands very slowly. Although in the north-western Swiss Alps, lynx abundance was increased from 1996–2000 (2), barriers such as high mountain ridges or densely settled valleys with highways, rivers and lakes fragment the Alps and hinder the emigration of lynx. In order to help the lynx population to spread into new areas and to reduce at the same time local high densities leading to conflicts with sheep breeders and hunters, the Swiss Agency of Environment, Forest and Landscape implemented the Swiss Lynx Concept (3), a management plan for the lynx in Switzerland. An important consequence of the concept was the agreement between the federal authorities and several cantons to translocate 8–12 lynx (six in the first year) from the north-western Alps (cantons of Bern, Fribourg and Vaud) to eastern Switzerland (cantons of St. Gallen and Zurich). The foundation of a new population nucleus in the eastern Swiss Alps will help to join the isolated lynx populations in the north-western Alps and in the triangle of Austria, Slovenia and Italy, as it is recommended in the pan-Alpine conservation strategy for the lynx (11).

The LUNO Project (Luchsumsiedlung Nordostsuschweiz, Engl: lynx translocation north-eastern Switzerland) was thoroughly planned, for scientific and political reasons, following e.g. the IUCN recommendations for reintroduction (9). Several cases of mange in lynx in the north-eastern Swiss Alps in 1999 (13) caused uncertainty regarding the health status of the source population, and therefore the veterinary supervision of the translocations became of particular importance.

Planning of the veterinary supervision

The success of wildlife translocations, i.e. the transport of wild animals from an area to another one, depends on many factors. Sanitary aspects (including veterinary public health) play an important role, as translocations represent a potential danger for disease transmission. This danger can be summarised in two main scenarios: (i) Introduction of a disease into the new area through the translocated animals (transmission to wildlife and/or to domestic animals), and (ii) transmission of a local disease to the translocated animals in the new area (from wildlife and/or from domestic animals).

In addition, translocated animals risk injury before or during the transport to the new area; an infected wound could cause septicaemia and finally lead to death. Stress as a result of the capture, transport and change of territory is a predisposing factor for the outbreak of a disease (appearance of clinical symptoms) in infected animals. Although this last scenario does not necessarily represent a danger for other animals, it is a considerable risk for the individuals translocated and hence for the success of the whole project.

In the frame of a translocation project, three points must be clarified during the planning part:

- a. The susceptibility to disease and the eventual role as a reservoir of the species to be translocated;
- b. The presence of diseases and other health problems in the source population;
- c. The situation of disease in the new area.

In the LUNO Project, the three points were evaluated as follows:

a. *Causes of mortality and susceptibility of lynx (Lynx sp.) to disease:* First, the present knowledge on disease susceptibility and causes of death in lynx was reviewed (12).

b. *Health status of the lynx population in the north-western Swiss Alps:* The lynx population in the north-western Swiss Alps was considered to be healthy. The only disease observed in lynx in this area during the past 13 years was mange: five cases were observed for the first time in 1999 (13). A retrospective pathological study (16) revealed that only 11 out of 53 (20%) animals necropsied from 1987-1999 died of an infection. Six lynx were infected with parasites – five of them had

mange, and one suffered of a strong infestation with *Toxocara* worms – two animals died of a bacterial infection, and in two further cases the aetiology of the disease remained unknown. The bacterial infections were not caused by specific agents, but were in some cases a consequence of infected wounds. There was no indication of any viral disease. Switzerland is officially free of rabies since April 1999 (18).

c. Presence of infectious agents in north-eastern Switzerland which might infect the released lynx: The only disease for which the lynx is susceptible and which is found in north-eastern Switzerland but not in the north-western Alps is Borna disease. But there is very little chance that a lynx could be infected by the Borna virus: clinical cases in domestic cats are rare in Switzerland (8), and in Sweden, where the disease is common in endemic areas, only one single case has been described in a lynx (4).

Other infectious agents which could possibly infect lynx are widespread (e.g. cat viruses) but they do not represent a higher risk of infection in north-eastern Switzerland than in the north-western Alps.

We concluded that (i) the risk that the lynx would introduce new infectious agents from the north-western Alps to the north-eastern area of Switzerland was very low and (ii) the risk that the released lynx would get an infectious disease which would be new for them was minimal. On the base of this knowledge, a veterinary protocol was set up. Our goals were to release absolutely healthy animals and to gather as many data as possible for scientific documentation.

Realisation of the project

I. Capture

The plan was to capture 8-12 lynx over two years, and at least half of them had to be females. For biological reasons, the capture took place between February and April: Young lynx are born in May-June and stay with their mother until the next mating season (February-March). To avoid separation of dams from their kittens, captures could take place only during the mating season.

Lynx were caught by means of three capture systems. Foot snares or an remote controlled teleinjection system (14) were set at a kill over night and monitored by means of a transmitter by the team of Swiss lynx project. Or cage traps were set on paths in lynx territories and monitored by means of a transmitter by local game wardens.

During the season 2001, three males and three females were caught and translocated. Two more males caught in traps were released at the site of capture.

II. Veterinary supervision

Anaesthesia

The animals were immobilised with medetomidin-ketamin, and atipamezol was used for reversal. Anaesthesia was monitored by assessment of respiratory and heart rate, colour of the mucous membranes, capillary refill time, eye reflexes and body temperature. All animals (except those, which were released) were examined and marked in a protected place (garage, alpine hut, stable) to reduce the risk of hypothermia.

Physical exam

All animals caught in a box trap had fresh wounds: usually quite large superficial abrasions on the head with contusions in the ocular region and reddened conjunctivae, damages of claws (splintering, bleedings, ruptures) especially of the forepaws. Two animals had wounds on the balls and three had broken teeth.

Ectoparasites were found on several lynx: two had ear mites and four had ticks. Infections with *Otodectes cynotis* and ticks have already been described in Eurasian lynx (5,16). However, the presence of ear mites in 2 out of 8 lynx indicates that free-ranging lynx harbour these parasites more frequently than previously assumed.

Further findings were: 1x unilateral severe cataract, 1x monorchidia (not translocated), 1x old scar consisting in a deep splitting of the upper lip, 3x small old scars on the ears, some canini of two older males were quite used, 1x ulceration on the palate (not translocated).

Treatments and marking procedure

Each animal was marked with a radio-collar and with a microchip. All lynx received a preventive treatment consisting in a long acting antibiotic (amoxicillin) and anti-parasitic drugs (Doramectin and Praziquantel). Treatment doses were chosen according to the conventional recommendations for felines. Wounds were disinfected, in case of ear mites infestation, ears were cleaned and treated locally with an antibiotic ointment. If ocular inflammation was present, an antibiotic ointment was put in the eyes.

Quarantine

Animals to be translocated were put in a so-called quarantine enclosure for three purposes: (I) To obtain sufficient time to catch a lynx pair and to organise its release (since lynx were translocated during the mating season, it was considered as important to release animals in couples). (ii) « Break » in order to prevent a return to the original home range. (iii) To be able to observe the animals in order to make sure that all animals were in a good health

The animals were transported in flat transport boxes covered with a grid to allow anaesthesia monitoring. The car used for the transport to the quarantine station had to be heated as much as possible to keep a stable body temperature. Anaesthesia was prolonged until arrival and antagonised in the quarantine enclosure.

Enclosures, animal care and hygiene

Animals were housed alone in four 18.5 m² enclosures close to each other in a wildlife station not accessible for the public. To reduce the risk of injuries and to prevent lynx to be stressed by the surroundings (especially humans), all lateral grids were covered with wooden panels. Between the enclosures, small sliding doors that could be opened from outside gave the possibility to push an animal to the next enclosure or to join two enclosures. In each enclosure there was a platform with branches between the platform and the ground, giving the animals the possibility to climb and hide. In an edge of the enclosure, there was also a large transport box containing some hay, that might have been used as a "den". Water was continuously running from a tap and also offered in a separated basket. The ground was covered with sand. Discrete observation of lynx was possible through small holes in the main door.

Two animal keepers were present 24h a day to take care of the captive animals. The enclosures were cleaned twice a week (the lynx was first pushed into the next enclosure, then rests of food and faeces were removed, and the basket was filled with fresh water). After release, the whole enclosure was disinfected.

Feeding

Exclusively roe deer meat (exception: one hare) was fed to the animals. Keepers put a piece of roe deer (mainly road kills) once a day on a wood panel placed on the ground close to the main door. All lynx ate for the first time in the night from the 3rd to the 4th day in captivity (one exception: 2nd to 3rd day) and ate then about 2 kg meat per day. A lynx consumed about one roe deer per week, leaving just bones and pelt, and three animals used the hay of the box to cover their "prey". It is known from studies about free-ranging lynx that an adult consumes about one ungulate per week and hides its prey with leaves and grass until it is completely consumed (7).

Duration of quarantine and behaviour

The lynx spent an average of 19 days in captivity (13-26 days). Females (younger than males) were shier and used to hide several days before climbing on the platform. They sprang sometimes against the walls, trying to escape. Males seemed to be calmer but after release we noticed damages in the enclosure: platform and wood panels had been scratched and bitten, indicating that males had tried to break out as well.

Blood sampling and analysis

Blood samples were taken with vacutainers from the *Vena cephalica* for haematology blood chemistry, serology, genetic and research (cell culture). The samples were sent by train or brought directly to the laboratory (Clinical laboratory, University of Zurich) within the 12h following sampling

Blood analysis

Blood results (haematology, blood chemistry) were compared with reference data for domestic cats.

Erythrocytes: Results of all eight lynx were within the reference area but PCV, haemoglobin and RBC were rather at the upper reference limit.

Leukocytes and leukocyte differential count: There was big variation. In most lynx there was indication of stress, more or less evident depending on the capture technique.

Blood chemistry: most medians were within the reference ranges, some values being rather at the upper respectively lower reference limit.

None of the animals had values indicating any kind of serious disorder or infection.

Serology

All eight animals were tested for selected infectious diseases using established procedures (6).

Antigens: feline leukaemia virus (FeLV).

Antibodies: feline coronavirus (FCoV), Feline immunodeficiency virus (FIV), feline parvovirus (FPV), feline calicivirus (FCV), feline herpesvirus (FHV), *Bartonella henselae*, *Ehrlichia* sp.

Positive results were found only for FPV (4 lynx) and FCV (1 lynx).

Parvovirus infections have been described in free-ranging lynx from the Jura Mountains (16,17) but not from the north-western Swiss Alps. However, these results indicate that the virus is present in this population as well. Analysis of a larger number of blood samples collected by the Swiss Lynx Project during capture and marking procedures are on-going to determine the seroprevalence in both Swiss lynx populations.

Parasitology

For each lynx, the first faeces excreted in the enclosure was collected and analysed at the Institute of Parasitology (University of Bern). *Toxocara* sp. – which is known to be the most common parasite in free-ranging lynx (12) – was found in the faeces of all six lynx, five animals were also infected with *Capillaria* sp., and in one case *Cystoisospora* sp. was found as well.

To check if the anti-parasitic treatment had been effective, a second analysis was performed for four lynx just before release. The results indicated that the treatment had been only partially effective.

III. Release

Second physical exam

During captivity, all animals regularly ate and excreted normal faeces. All wounds caused in the box trap healed without problem. For release, all animals were again immobilised with medetomidine-ketamine. Since the lynx were very stressed by the presence of humans, the best procedure was to blind them with a light before sunrise and shoot them with a blow pipe. The animals were then brought inside, weighed and examined again. It was important to plan enough time for all the procedure. From our arrival at the quarantine station to the start of the drive to the release site, we needed 2-5 hours for 1-2 animals.

At the time of release, all animals had the same weight (+/- 1kg) as when they were caught. Four lynx had erosions of the lips and paws, possibly due to the sand but also because they bit wood objects and tried to escape. For the last animal brought to the quarantine station, the ground of the enclosure was covered with peat instead of sand and the lesions were smaller but still present. One male, which had caused more damages in the enclosure, had broken one of its teeth.

Treatments

Doramectin was injected again into all animals: first because some intestinal worm eggs were still present in the faeces, second because it was particularly important to be sure that lynx were not infected with mange mites. The treatment with amoxicillin was repeated as well, in case the lynx would get injuries during the transport.

Transport to the release site

The transport boxes were the ones standing in the enclosure as “den” boxes. Their size makes it possible for an adult lynx to sit inside. A sliding door allows anaesthesia monitoring and release. As soon as awake, the animals seemed to consider the breathing holes of the box as possible exits and scratched them, trying to escape. It was therefore very important to have boxes with many small holes instead of a few big ones. Boxes were transported in a minibus. As long as the animals were asleep, it was heated as much as possible to avoid hypothermia, and as soon as they were awake, the heating was turned off. Anaesthetics were not antagonised (one exception) so that the animals slowly awaked during transport. The anaesthesia lasted 2h +/- 15 min. First, the animals just turned themselves in the boxes. Then there was some excitation phase during which they were quite nervous, scratched the walls and moved in the box a lot (few minutes – 1h). Finally, the animals became quiet again but more and more attentive and reacted (growling) when humans came close to the box. Once they were awake, it proved to be particularly important not to speak since human voices made them very nervous.

IV. Conclusion and outlook

The first four lynx were released in couples in March 2001, and the two last animals were released separately in surrounding areas in April 2001. All animals bounced out of the boxes as soon as the door was open. At that time they had completely recovered from the anaesthesia, and they ran away to disappear in the forest. Since then, the six lynx have been closely followed by radio tracking. So far, all animals showed expected behaviour concerning habitat use and prey choice (15). Within the first few months, they established a typical land tenure system.

The LUNO project has been successful so far. In the winter 2002/03, another three lynx will be translocated to north-eastern Switzerland.

Acknowledgements

We acknowledge the Swiss Office of Environment, Forest and Landscape and the cantonal hunting inspectors who initiated the project. Many thanks go also to all people and institutions who helped in any way to the realisation of the project, in particular: the canton of Bern for transforming enclosures of the cantonal wildlife station into quarantine enclosures; Dr. M. Janovsky (University of Bern) for his help in the fields; Prof. Dr. B. Gottstein (University of Bern) for his logistic, and Mrs. Ursula Mäusli for her technical support; Prof. Dr. B. Spiess (University of Zurich) for assessment of eye disorders; Dr. G. Neiger-Aeschbacher (Royal Veterinary College, University of London, UK) for uncomplicated support and advises for the establishment of the anaesthesia protocol; and Dr. D. Grobler (Kruger Park, South Africa) for sharing his experience with transport and mange treatment in large wild cats.

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