Use of ART’s with exotic species: Blackbucks, Siamongs and Thai Fishing Cats

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Artificial reproductive technologies (ART’s), specifically gamete (sperm) preservation for genome resource banking and artificial insemination (AI), have been used to significantly enhance the genetic, reproductive and social management of endangered wildlife species housed in (ex situ) zoological institutions. In many cases ART will permit the establishment of permanent repositories of valuable genetic material that could be used to maximize the reproductive potential and maintain the genetic diversity of a particular species in situ. When genetic preservation is combined with in situ conservation efforts, the prevention of extinction of a particular species may be achieved (O’Brian and Robeck, 2010).

ART’s are also important tools that are used by veterinarians and scientists in the management of many ex situ/captive wildlife species. Some examples of the implementation of ART’s for both management and genetic preservation at Hamilton and Auckland Zoo will be presented.

Use of a vaccine against GnRH (Bopriva®) that is commercially available for use in bulls (Janett et al., 2012) was administered to 3 Blackbucks (Antilope cervicapra) housed at Hamilton Zoo, NZ. This vaccine was used as a tool to facilitate the management of a bachelor group of male Blackbucks housed together. The hypothesis was that the reduction of testosterone production...
would be associated with a reduction in fighting. Prior to vaccination, semen was collected via electroejaculation of 4 anaesthetised Blackbucks and frozen. Post thaw motilities ranged between 60-70%. Further freezing and banking was carried out 1 year after vaccination with similar success. Five months after vaccination, a reduction in scrotal circumference, % of morphologically normal sperm and blood testosterone concentrations was seen. Importantly, a return of these parameters to ‘pre- vaccination’ status was also documented. Total and forward progressive motility and total number of sperm per ejaculate were not significantly affected but this may be due to variability associated with the collection of semen by electroejaculation. Most importantly, a reduction in fighting was observed soon after administration of the vaccine and a stable hierarchy was established within the group so that when the vaccination was no longer effective the Blackbucks did not start fighting again and were able to live together safely. This is the first demonstration of the use of the commercial GnRH vaccine, Bopriva, as a tool for the management of housing bachelor groups of captive Blackbucks. Although fertility trials were not carried out it is likely this vaccine would also act as an effective short-term reversible contraceptive agent in Blackbucks.

Infertility investigation is often required for genetically valuable and endangered breeding animals in captivity. However, it is often the captivity itself that affects reproductive behavior and mating. This was the case with a young, hand-reared male Siamong (*Symphalangus syndactylus*) at Auckland Zoo. After an extended period of time with a female Siamong no mating had been observed by his keepers despite the female demonstrating regular overt receptive behaviour. Investigation of the male’s ‘potential’ fertility was undertaken before further investment of time and modifications of the breeding pair’s enclosure was undertaken. Under general anaesthesia manual and ultrasound examination of the Siamong’s testicles and scrotum was carried out. They were symmetrical and of firm consistency with homogenous parenchyma but were small in size.
Unfortunately there is little information on ‘normal’ scrotal circumference for this species. Importantly no gross abnormalities were seen on ultrasound. Collection of a very small semen sample by electroejaculation as described by Platz et al., 1979 and O’Brien et al., 2005 was achieved. Motile sperm were observed but a concentration was unable to be determined due to the size of the sample. Thirty percent of the Siamong’s sperm were classified as morphologically normal which was a positive finding as primate species usually have a very high level of teratospermia (O’Brien et al., 2005). Based on the information gained from the reproductive examination a management decision to persist with the breeding pair was able to be made. It is hoped that changes to the enclosure that allow a greater level of privacy will facilitate copulation as was reported with a pair of White faced gibbons (*Hylobates leucogenys*) at Lincoln Park Zoo, Illinois, USA (Lukas et al., 2002).

A need for intervention and use of ART’s was also required at Hamilton Zoo, NZ with their resident Thai Fishing Cat (*Prionailurus viverrinus*) pair as the male demonstrated life-threatening aggression towards the queen when they were put together during periods of call or receptivity by the queen. Under general anaesthesia semen was collected from the male fishing cat via the electroejaculation procedure as described by Wildt et al., 1983. This was done on 3 occasions; two for cyropreservation and genetic banking and a third and final time for AI of the queen. Semen assessment was carried out after each collection. Surprisingly a high proportion of morphologically normal sperm (73%) was seen which is unusual for most felid species (Wilt et al., 1983; Thiangtum et al., 2006). Furthermore, excellent total and forward progressive motility (85%; 5/5) was documented. Correspondingly, the post thaw motility was excellent (60%; 4/5). Oestrus and ovulation were detected in the female by monitoring faecal oestrogen concentrations and behavioural changes associated with receptivity. An injection of ‘human chorionic gonadotrophin’ (‘hCG’;
Chorulon®) was given on Day 4 of call to induce ovulation. A dose of 100 I.U was administered to the queen and she was then inseminated 33 h later (P4: >1.2 at time of AI) to reduce interference with ovulation and ova transport (Howard et al., 1992; Howard and Wilt, 2009). Subsequent faecal progesterone measurements performed after AI showed a progesterone profile similar to that of a pregnant queen. Intrauterine deposition of semen was initially attempted using the transcervical insemination method with a renourethroscope. Passage of the scope through the vaginal vault/cavity was not possible so a laparotomy was performed and the semen was deposited into the uterus surgically. Retrospective discussions with Dr Swanson revealed that oviductal deposition of feline semen via laparoscope is optimal for achieving pregnancy in felid species (Swanson, 2012). The queen did not come back into call for >65 days but she did not have kittens. A repeat anaesthesia for ultrasound examination for pregnancy was not able to be carried out.

References:


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