Reproductive management of ferrets

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SARAH PELLETT, MOLLY VARGA explain the breeding cycles of male and female ferrets, before discussing various reproductive management methods to help regulate numbers

Summary

Domestic ferrets (*Mustela putorius furo*) are becoming increasingly popular as pets in the UK, with the Ferret Education and Research Trust estimating there to be around one million. Over recent years advice has changed over the reproductive management of ferrets. With increasing knowledge of the pathogenesis and development of adrenal disease – especially about surgical neutering – other methods have been suggested, which will be discussed within this article.

Key words

ferret, reproductive management, GnRH implant, progestagens, adrenal disease

OVER recent years there have been changes in advice over the reproductive management of ferrets. As knowledge increases about the pathogenesis and development of adrenal disease – especially in relation to surgical neutering – other methods to manage reproduction in ferrets have been suggested.

Reproductive biology

Female ferrets (jills) reach sexual maturity in the first spring after birth, at eight to 12 months of age. Sometimes, signs of oestrus can be seen in the first autumn if females were born early in the

season. Male ferrets (hobs) usually reach puberty at approximately nine months of age.

Ferrets are seasonal breed ers and photoperiod has the greatest effect on cyclical reproductive activity. In the northern hemisphere – under natural light conditions – the breeding season is approximately from March until September.

In jills, the start of pro-oestrus is indicated by an increase in vulva size, lasting on average two to three weeks. Full oestrus then follows once oestrogen is secreted by the ovaries (Fisher, 2009). This is noticeable as dramatic vulvar swelling **(**Figure 1**).** Jills are induced ovulators and will remain in oestrus until they are mated, chemically brought out of oestrus or until days shorten. Prolonged oestrus increases the likelihood of developing severe anaemia due to bone marrow suppression caused by persistent hyperoestrogenism.

The male breeding season starts earlier at the end of January, with plasma testosterone levels increasing to a peak plateau from the end of February until the end of July. Increased testosterone levels results in increased sebaceous gland activity, causing body weight gain.

Gestation length in the domestic ferret is 42 days on average. Jills deliver an average of eight kits weighing eight grams to 10 grams at birth. Kits are weaned by eight weeks of age, though early weaning can be achieved at six weeks. Reproductive data are summarised in Table 1**.**

Reproductive endocrinology

As shown in Figure 2, once day length exceeds 12 hours, reproductive activity can be seen. Melatonin, produced from the pineal gland, is significantly higher during the dark phase of the day and suppresses the release of gonadotrophin-releasing hormone (GnRH) from the hypothalamus.

This suppression is lost with the increase in day length and results in the pulsatile release of GnRH. This stimulates the production of luteinising hormone (LH) and follicle-stimulating hormone (FSH) from the anterior pituitary, which in turn stimulates the gonads to produce either oestradiol or testosterone. These hormones exert a negative feedback on the hypothalamus and pituitary gland to prevent excessive secretion of GnRH, LH and FSH.

Adrenal disease has been associated with surgical neutering. When ferrets are surgically neutered, there is loss of this negative feedback **(**Figure 2**).**

This results in an increased release of the gonadotrophins LH and FSH. These activate and persistently stimulate respective receptors in the adrenal cortex, eventually resulting in adrenocortical hyperplasia and tumour formation (Schoemaker, 2009).

Management options

• **Ovariohysterectomy**

Reproductive management is essential in jills to prevent persistent oestrus. If mating does not occur, oestradiol concentrations will remain elevated until there is a change in photoperiod with the shortening of day length. Continued high levels of oestradiol can lead to bone marrow suppression, causing a potentially fatal pancytopaenia. Clinical signs observed are:

• anorexia;

• lethargy;

• vulvar swelling;

• bilateral symmetrical thinning or alopecia of the hair coat **(**Figure 3**)**;

• pale mucous membranes;

• subcutaneous and mucosal petechiae or ecchymoses; and

• abdominal distension, seen in some ferrets due to the formation of a mucometra.

Ferrets in oestrus for longer than one month are at risk of developing this oestrogeninduced marrow suppression.

Previously, ovariohysterectomy was the method of choice to prevent this. Research has determined that surgical neutering predisposes ferrets to the development of hyperadrenocorticism, due to the increased secretion of gonadotrophic hormones after neutering. The incidence of adrenal tumours is higher in surgically neutered ferrets, compared with entire ferrets (Chen, 2010).

Clinical signs of hyperadrenocorticism in ferrets are recurrence of sexual behaviour in neutered hobs, reoccurrence of vulvar swelling in neutered females and alopecia of flanks, dorsum and tail **(**Figure 4a**).**

Unless there is obvious uterine or ovarian disease, it is now advised not to surgically spay jills. Potential alternatives to surgical neutering are the use of progestagens, slow release GnRH implants or mating jills with a vasectomised hob.

• **GnRH implants**

The subcutaneous insertion of a slow-release GnRH agonist, such as implants containing 4.7mg or 9.4mg of deslorelin acetate, has offered an excellent alternative for the reversible control of ovarian activity **(**Figure 5**).** A brief general anaesthetic with isoflurane or sevoflurane and oxygen is advocated for a few minutes to allow the insertion of the implant **(**Figure 6**).** The implant is the same size as a

microchip needle and, while implants can be placed conscious, to insert this into a conscious ferret would be painful and prove difficult for the handler.

The implant is inserted subcutaneously between the scapulae **(**Figure 7**).** Deslorelin acetate 9.4mg is licensed for use in the ferret, although 4.7mg can also be used effectively. Ovarian activity is suppressed for approximately 18 to 24 months using the 4.7mg implant and sometimes much longer when using the 9.4mg implant. Regular monitoring is needed after 18 months to detect any signs of coming back into oestrus. If clinical signs such as vulvar swelling are noted, another implant can be placed in the same manner.

If a ferret has already been surgically neutered and is showing no clinical signs of adrenal disease, it is recommended to implant a GnRH analogue every 18 to 24 months, to prevent adrenal disease. By giving a slow release GnRH agonist, the natural pulsatile release of hormones produced from the hypothalamus and pituitary gland is blocked. This results in the single release of gonadotrophins, followed by baseline concentrations. There is then decreased synthesis and release of LH and FSH, preventing follicular development in the entire female ferret.

In the neutered ferret, the implant causes cessation of hormone secretion by the adrenal gland, by suppressing gonadotrophin production, meaning circulating LH and FSH are reduced. Treatment with the GnRH agonist deslorelin has so far proved clinically safe, with no reported side effects (Prohaczik et al, 2010).

• Progestagens (jill jab)

An alternative to the GnRH agonist implant is the use of proligestone – a progestagen that suppresses or postpones the breeding season and maintains the jill in anoestrus for the remainder of that breeding season. Jills are allowed to come into season in the spring and are given proligestone, at 50mg per ferret, via a subcutaneous injection.

A single injection is usually given once a year, but some jills can come into season three to five months after treatment if kept in an artificial environment and exposed to a stimulating photoperiod, or where there is a long period of fine weather in the autumn. Occasionally, a jill requires two proligestone injections to be taken out of season.

Close monitoring on the part of the owner is essential to detect recurrence of oestrus. A second treatment would then be needed to prevent a prolonged season and oestrogenassociated anaemia.

• Teaser males

Owners and working ferreters with many jills sometimes choose to have a hob vasectomised to mate with the jills and take them out of season. Induction of ovulation requires both vagino-cervical

stimulation and neck gripping, therefore, it is not possible for owners to try to induce ovulation in jills.

Vasectomised hobs are sometimes used for “sham” mating to induce ovulation. Seventy-five per cent of ferrets are taken out of oestrus after one mating and 85 per cent of ferrets after two matings (Ryland and Lipinski, 1994). Copulation appears violent, with the hob biting and dragging the jill by the neck. Repeated matings throughout the season may result in damage to the skin at the back of the jill’s neck.

Pseudopregnancy lasting approximately 42 days will occur as a consequence of ovulation without fertilisation. During this time, jills may display increased aggression towards owners and cage mates. Abdominal enlargement and development of mammary glands may be seen, together with nesting behaviour (Schoemaker et al, 2003).

Sharing vasectomised hobs between ferreters is not advised as this increases the risk of disease transmission.

Hobs

Reproductive management in male ferrets is required to prevent reproduction if multiple ferrets are kept and to reduce interspecies aggression, enabling them to be kept in groups. In response to the increase of testosterone levels during the breeding season, entire male ferrets produce sebaceous secretions, leaving a sticky, greasy feel to the coat and a musky odour – many owners would be reluctant to handle them or keep then indoors.

An alternative to surgically castrating hobs is to place a GnRH analogue, such as deslorelin acetate, subcutaneously in the scruff of the neck every 18 to 24 months. Plasma FSH and testosterone concentrations, testis size and spermatogenesis were all suppressed after administering the deslorelin implant (Schoemaker et al, 2008). The positive correlation between testis volume and testosterone concentration allows owners to monitor changes. Once the testis size starts to increase, it will be an indication to replace the implant.

The deslorelin implant effectively prevents both reproduction and the musky odour of entire male ferrets. This is the preferred method over surgically castrating them as research has shown that, because of the lack of negative feedback and the constant pulsatile release of gonadotrophins, receptors on the adrenal gland are stimulated, leading to the development of adrenal disease.

Conclusion

With the improved understanding of adrenal disease development, unless there is obvious reproductive disease, surgical neutering is not advised.

The use of GnRH analogue implants suppresses ovarian function for on average 18 to 24 months (4.7mg version) and so far has proved to be clinically safe. This treatment is also a suitable alternative to surgical castration. It is also advocated to place the implant in surgically neutered ferrets that are not displaying clinical signs of adrenal disease as a preventive against development of hyperadrenocorticism.

An alternative for reproductive management in jills is to give a subcutaneous injection of progestagen. Each owner will have different needs and the approach taken should be adapted for the individual case.

• Please note sevoflurane is not licensed for use in ferrets.

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Figure 1. Vulvar swelling of an entire jill in season. Neutered females with hyperadrenocorticism may also present with a swollen vulva due to an over-secretion of sex hormones.

Photo: VIRBAC 2012/EMMANUEL RISI.

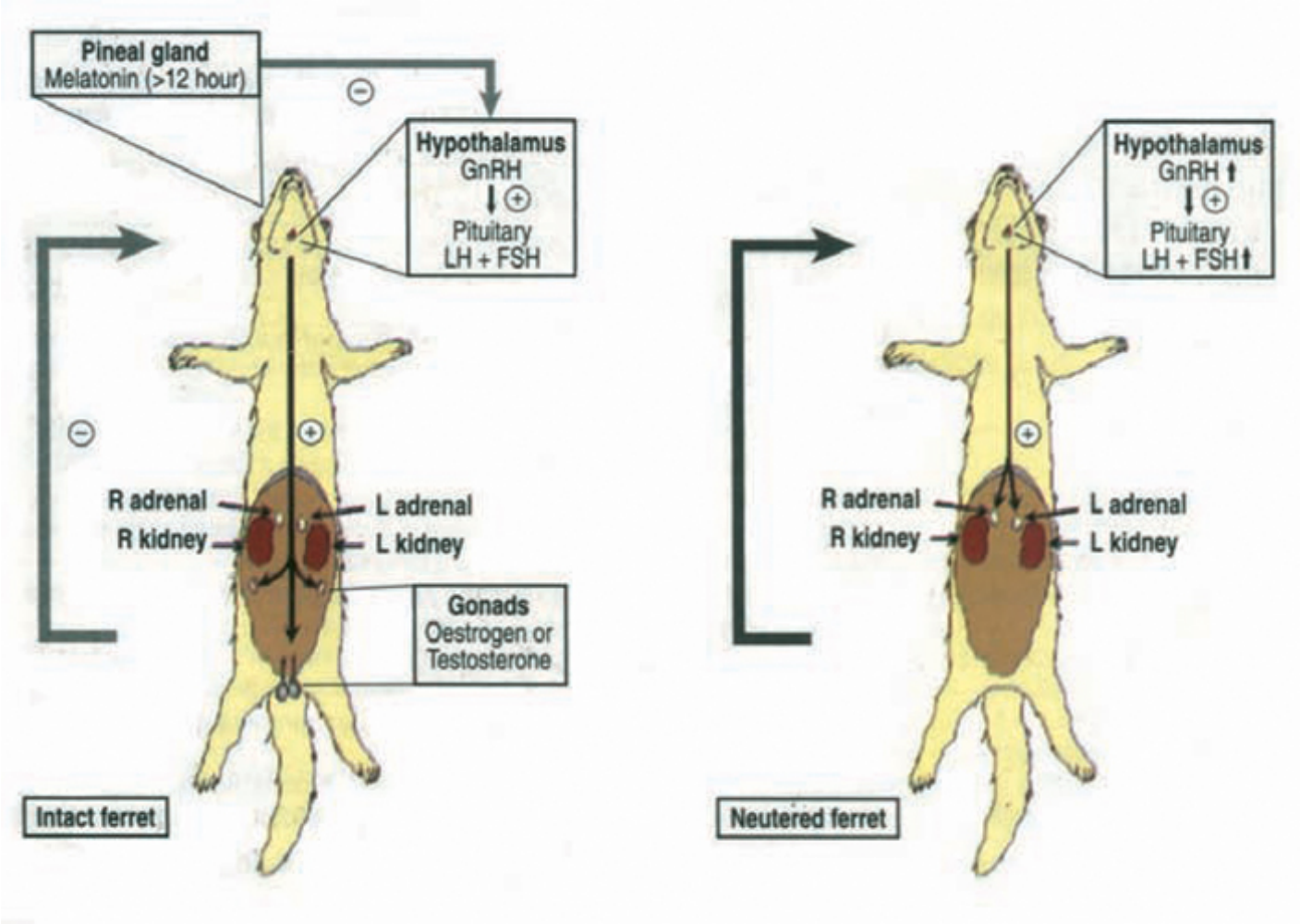

Figure 2. Regulation of reproductive endocrinology in entire ferrets, consequences of neutering and the possible role it plays in the development of hyperadrenocorticism (reproduced with permission from* BSAVA Manual of Rodents and Ferrets, *edited by Emma Keeble and Anna Meredith).

Illustration: BSAVA.

Figure 3 (above). Bilateral, symmetrical thinning on the dorsum and flanks seen in ferrets with persistent oestrus. Neutered ferrets with adrenal disease may also present clinically with hair thinning and alopecia.

Figure 4. Alopecia in a ferret with hyperadrenocorticism. Alopecia of the flanks and dorsum in a ferret with adrenal disease (4a), and alopecia of the tail (4b).

Photo: VIRBAC 2012/EMMANUEL RISI.

Figure 4. Alopecia in a ferret with hyperadrenocorticism. Alopecia of the flanks and dorsum in a ferret with adrenal disease (4a), and alopecia of the tail (4b).

Photo: VIRBAC 2012/EMMANUEL RISI.

Figure 5. The GnRH implant deslorelin acetate.

Figure 6. A ferret in a simple anaesthetic induction chamber to induce anaesthesia before implant placement.

Figure 7. Placement of deslorelin implant in an anaesthetised ferret. Subcutaneous placement of an implant (7a), and placement between the scapulae (7b).

Photo: VIRBAC 2012/EMMANUEL RISI.

Figure 7. Placement of deslorelin implant in an anaesthetised ferret. Subcutaneous placement of an implant (7a), and placement between the scapulae (7b).

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Gestation period	39-42 days
Average litter size	8
Weight at birth	8-10g
Opening of eyes	4-5 weeks
Eruption of deciduous teeth	3-4 weeks
Eruption of permanent teeth	7-10 weeks
Age of weaning	6-8 weeks
Chitty, 2009; Powers and Brown, 2012.	

TABLE 1. Ferret reproductive data