



Animal name: Small carnivores (Procyonidae, Herpestidae/Eupleridae, Mustelidae, Viverridae, Mephitidae, Ailuridae)

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We would recommend supplementing any contraceptive bout with behavioural and hormone monitoring. For more information on this, please contact contraception@chesterzoo.org

Contraceptive methods	GnRH agonist (implant)	GnRH agonist (injection)	Progestagen (implants)	Progestagen (implant)	Progestagen (injection)	Progestagen (injection)	PZP vaccine	Surgical (Permanent)
Contraceptive Product:	Deslorelin acetate	Luprolide acetate	Etonogestrel 68 mg	Levonorgestrel 2x 75mg	medroxyprogesterone acetate;	proligestone 100mg/ml	PZP vaccine main components are antigens derived from porcine zona pellucida glycoproteins and an adjuvant to stimulate the immune response (Freund's modified complete adjuvant for primary vaccination and Freund's incomplete	N/A
Commercial Name:	Suprelorin® (1384 records)	Lupron® (73 records)	Implanon® Nexplanon® (19 records)	Jadelle® (4 records)	Depo-Provera®, Depo-Progevera® (72 records)	Delvosteron® (12 records)	Porcine Zona Pellucida (10 records)	N/A
Product Availability:	4.7mg (Suprelorin 6) and 9.4 mg (Suprelorin 12) widely available through veterinary drug distributors in the EU.	Luprolide acetate licenced for human use	Manufactured by Bayer Schering Pharma AG. Available through human drug distributors	Manufactured by Organon. Available through human drug distributors	Manufactured by Pfizer. Widely available throughout Europe through human drug distributors.	Manufactured by MSD animal Health UK, Intervet Europe. Licensed for use in female dogs, cats, and ferrets; available through veterinary distributors.	Not commercially available in Europe. Can be imported from the USA.	N/A
Restrictions and/or permit required by Importing Country:	EGZAC recommends: always check with your local licencing authority	Data deficient	EGZAC recommends: always check with your local licencing authority	EGZAC recommends: always check with your local licencing authority	EGZAC recommends: always check with your local licencing authority	EGZAC recommends: always check with your local licencing authority	License required UK and France; all other Countries unknown. EGZAC recommends: always checking with local licencing authority	N/A
Mechanism of action:	GnRH agonist suppress the reproductive endocrine system, preventing production of pituitary and gonadal hormones. As an agonist of the GnRH initially stimulates the reproductive system -which can result in oestrus and ovulation in females or temporary enhancement of testosterone and spermatogenesis in males - therefore additional contraception needed during this time. Please see below and refer to Deslorelin datasheet for detailed information	GnRH agonist suppress the reproductive endocrine system, preventing production of pituitary and gonadal hormones	Interference with fertilization by thickening cervical mucus, interrupting gamete transport, disruption of implantation, inhibition of LH surge necessary for ovulation	Interference with fertilization by thickening cervical mucus, interrupting gamete transport, disruption of implantation, inhibition of LH surge necessary for ovulation	Anti-estrogenic activity. Interference with fertilization by thickening cervical mucus, interrupting gamete transport, disruption of implantation, inhibition of LH surge necessary for ovulation	Anti-estrogenic activity. Interference with fertilization by thickening cervical mucus, interrupting gamete transport, disruption of implantation, inhibition of LH surge necessary for ovulation	The PZP antibodies interfere with fertilisation by binding to the ZP glycoprotein receptors that surround the egg of the vaccinated female, blocking the binding and subsequent penetration of sperm.	Ovariohysterectomy: removal of one or both ovaries and the uterus; Ovariectomy: removal of the ovaries; Hysterectomy: removal of the uterus; Castration: Permanent contraception by surgical gonadectomy; Vasectomy: Surgical procedure in which the ductus deferens are cut, tied, cauterized, or otherwise interrupted
Insertion/Placement:	Sub-cutaneous, in a place where it can be easily detected or seen for removal at a later date (i.e. Upper inner arm); refer Suprelorin fact sheet for effective method of implant placement (tunnelisation)	Injectable	Intramuscular or subcutaneous. EGZAC recommends sub-cutaneous, upper inner arm for visibility (aid for later removal)	Intramuscular or subcutaneous. EGZAC recommends sub-cutaneous, upper inner arm for visibility (aid for later removal)	Injectable intramuscular	Injectable subcutaneously - do not inject intradermally or into subcutaneous fat or scar tissue	Injectable intramuscular	Surgical
Females		Data deficient	Data deficient	Data deficient	Data deficient	Data deficient	Not recommended in species which experience copulatory induced ovulation	Ovariohysterectomy; Ovariectomy; Hysterectomy
Dose	1-2 implants depending on species and body weight. 2 implants are recommended in must lids weighing >10kgs bw. 2 others weighing >10kgs were only implanted with 1x4.7mg implants to successfully treat hyper maternal behaviour. 1 implant seems sufficient in binturong weighing between 15-20 kgs. Individuals with body weight >20 kgs received 2x implants. 1 implant seems sufficient in procyonidae.	Data deficient. Lupron is available in varying dosages from formulations lasting 1-6 months.	Data deficient. Please contact EGZAC for dosage recommendations. 1/4 - 1/2 an implant dependent on species weight. We have records of 1/2 an implant being successfully placed in coati, kinkajou and several raccoons ranging between 2-6 kgs. 1/3 of an implant has been administered in slender-tailed meerkats.	Data deficient. Please contact EGZAC for dosage recommendations. 1 implant has been successfully administered in slender-tailed meerkats and a yellow mongoose.	Data deficient. Please contact EGZAC for dosage recommendations. Between 1 and 2mg/kg have been administered in coati at 3 month intervals. 5mg/kg BW in various otter species in 2-3 month intervals.	Data deficient. Please contact EGZAC for dosage recommendations. 2mg/kg bw in coati. Very variable dosages reported in meerkats; ranging from 4-10mg/kg BW while doses of 7.5mg/kg BW were used in free ranging meerkats (paper). Generally 5mg/kg in otter species. 4mg/kg BW in genet sp.	Data deficient. Please contact EGZAC for dosage recommendations.	

Latency to effectiveness:	3 weeks average as GnRH agonist initially stimulate the reproductive system- please refer to the Deslorelin datasheet for detailed information - additional contraception is needed during this time in order to suppress the initial stimulation phase (see product data sheet: ~2mg/kg Megestrol acetate pills /Megace® daily 7 days before and 8 days after has been used to suppress initial stimulation phase).	Data deficient (similar to deslorelin acetate)	A latency to effect of 7-14 days. Separate the sexes if possible.	A latency to effect of 7-14 days. Separate the sexes if possible.	A latency to effect of 7-14 days. Separate the sexes if possible.	Data deficient.		
Oestrus cycles during contraceptive treatment:	Initial oestrus and ovulation (during the 3 weeks of stimulation) may occur and then no oestrus cycle. To suppress the initial oestrus and ovulation with the concomitant progesterone production and the associated deleterious effects of this you MUST follow the megestrol acetate protocol mentioned above.	Data deficient (similar to deslorelin acetate)	Data deficient. Oestrus cycles should be suppressed.	Data deficient. Oestrus cycles should be suppressed.	Data deficient. Oestrus cycles should be suppressed.	Data deficient. Oestrus cycles should be suppressed.		
Use during pregnancy:	Not recommended	Data deficient (similar to deslorelin acetate)	Not recommended	Not recommended	Not recommended	Not recommended		
Use during lactation:	Data deficient	Data deficient (similar to deslorelin acetate)	Data deficient. In principle there should be no adverse effects.	Data deficient. In principle there should be no adverse effects.	Data deficient. In principle there should be no adverse effects.	Data deficient. In principle there should be no adverse effects.		
Use in prepubertals or juveniles:	Data deficient	Data deficient (similar to deslorelin acetate)	Data deficient.	Data deficient.	Data deficient.	Data deficient.		
Use in seasonal breeders:	Data deficient. Should start at least 1 month prior the breeding season.	Data deficient (similar to deslorelin acetate)	Data deficient. Should start at least 1 month prior the breeding season.	Data deficient. Should start at least 1 month prior the breeding season.	Data deficient. Should start at least 1 month prior the breeding season.	Data deficient. Should start at least 1 month prior the breeding season.		
Duration	Duration of efficacy has not been well established. As a guide: 4.7 mg implants will suppress for a minimum of 6 months; 9.4 mg will be effective for a minimum of 12 months.	Data deficient. Lupron is available in varying dosages from formulations lasting 1-6 months.	Duration of efficacy has not been well established. As a guide: 2-3 years	Duration of efficacy has not been well established. As a guide 3 years.	Duration of efficacy has not been well established. As a guide: Duration of effect is very variable, lasting between 1 month-2.5 years. On average, 1-3 months.	Data deficient. As a guide: 3 months. Repeated application isn't advised.		
Reversibility	Suprelorin is considered reversible and we do currently hold multiple records of reversals in several small carnivore species. 1 reversal in a coati implanted with 1x4.7mg Suprelorin. It is estimated that she conceived within 7 months of implant removal. 6 cases of reversal in slender-tailed meerkats and a banded mongoose. Reversal times ranged between 2 months-2 years following implant expiry. We hold 4 records of reversals in must lids: reversal times ranged between 10 months - 2.2 years in females implanted with 1x 4.7 or 9.4 mg Suprelorin. One female implanted with 2x 4.7mg Suprelorin conceived within 9 months following removal of the implant. 1 reversal in binturong implanted with 1x4.7mg Suprelorin, conception within 1 year of implant removal. EGZAC recommends removing the implant to aid reversal. Duration to reversibility is extremely variable. Removal of the implant is considered to aid reversibility.	Data deficient	Designed to be fully reversible however, we do not hold any records of reversal in our database. We would recommend removal of the implant to aid reversal.	Data deficient. We recommend removal of the implant to facilitate reversal.	Depo-Provera is considered reversible however, we do not hold any reversal records.	Delvosteron is considered reversible however it is data deficient.		
Effects on Behaviour	Similar to those seen with gonadectomy but reversible.	Data deficient (similar to deslorelin acetate)	Data deficient	Data deficient	Data deficient. Masculinization of females in some species	Data deficient		
Effects on sexual physical characteristics	Individuals may experience an increase in appetite and associated weight gain.	Data deficient (similar to deslorelin acetate)	Weight gain	Weight gain	Weight gain and masculinization of females	Data deficient		
Males		Data deficient	Not recommended	Not recommended	Not recommended	Not recommended	Not recommended	Castration, Vasectomy
Dose	Data deficient. Please contact EGZAC for dosage recommendations. Our records show a coati weighing 5.3 kgs BW implanted with 1x4.7mg Suprelorin. As a general guide 2x implants should be used in must lids weighing >10kgs.	Data deficient. Please contact EGZAC for dosage recommendations. Lupron is available in varying dosages from formulations lasting 1-6 months. 0.2ml/kg bw has been administered in various otter species and the domestic ferret. Injections are given at various intervals depending on the formulation.						Vasectomising males in which the females of the species experience copulation induced ovulation is not recommended due to the continued risk of pseudopregnancy.

Latency to effectiveness:	Data deficient. Depending on the species there may be fertile sperm present in vas deferens for 6-12 weeks post treatment or even longer. Testosterone decreases after 3-4 weeks but sperm can stay fertile for many weeks after.	Data deficient						
Use in prepubertals or juveniles:	Data deficient	Data deficient						
Use in seasonal breeders:	Data deficient. Should start at least 2 months prior the breeding season.	Data deficient						
Duration and Reversibility	Suprelorin is considered reversible and we hold one record of a male slender tailed meerkat siring young 2 years after being implanted with 1x9.4mg implant. Duration to reversibility is extremely variable. Removal of the implant is considered to aid reversibility.	Data deficient						
Effects on Behaviour	Testosterone related aggression is likely to decrease. Data deficient in this group, see product information sheet.	Data deficient						
Effects on sexual physical characteristics	One side effect of deslorelin is feminisation of males; it is therefore important to think about the implications that can occur when secondary sexual characteristics are removed. Other possible side effects in males include a decrease in body size and a decrease in testicular size.	Data deficient						
General:								
Side effects	Pseudopregnancy, endometrial hyperplasia and pyometra may be associated with the use of GnRH agonist as a result of high progesterone levels during the stimulation phase. A more recently developed Suprelorin [®] /deslorelin protocol using Megace/Ovarid [®] /megestrol acetate to prevent the initial stimulation phase, followed by implant removal when reversal is desired, may be a safer contraceptive option.		Weight gain	Weight gain	Weight gain and masculinization of females	Data deficient	Not recommended in species with copulatory-induced ovulation due to the risk of pseudopregnancy.	
Warnings	Causes initial gonadal stimulation that MUST be suppressed in females (see above); correct administration essential - see product information sheet		Risk of pseudopregnancy, endometrial hyperplasia and pyometra increases with exposure to prolonged circulating progestagens/ progesterone. Repeated long term use is not recommended. Should not be used in individuals suffering from diabetes.	Risk of pseudopregnancy, endometrial hyperplasia and pyometra increases with exposure to prolonged circulating progestagens/ progesterone. Repeated long term use is not recommended. Should not be used in individuals suffering from diabetes.	Risk of pseudopregnancy, endometrial hyperplasia and pyometra increases with exposure to prolonged circulating progestagens/ progesterone. Repeated long term use is not recommended. Should not be used in individuals suffering from diabetes.	Risk of pseudopregnancy, endometrial hyperplasia and pyometra increases with exposure to prolonged circulating progestagens/ progesterone. Repeated long term use is not recommended. Should not be used in individuals suffering from diabetes.		We would not recommend using tubal ligation in females due to the increased risk of developing uterine pathology. We would instead recommend ovariectomies.

Reporting Requirements: In order to increase our knowledge of the efficacy of contraception methods in the small carnivore families it is recommended that all individuals on contraception be reported to EGZAC

- References:**
- 1) Suppressing subordinate reproduction provides benefits to dominants in cooperative societies of meerkats. M. B. V. Bell, M. A. Cant, C. Borgeaud, N. Thavarajah, J. Samson & T. H. Clutton-Brock (2013) *Nature Communications* (5), pp 1-4.
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Disclaimer: EGZAC endeavours to provide correct and current information on contraception from various sources. As these are prescription only medicines it is the responsibility of the veterinarian to determine the dosage and best treatment for an individual