Primates: Red ruffed lemur

Fact Sheet Compiled by: **Hester van Bolhuis MSc DVM AAP, Rescue Centre for Exotic Animals**

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Fact Sheet Reviewed by: **Yedra Feltrer MSc MRCVS**

Contraceptive methods:	GnRH agonist (implant)	Progestagen (implants)	Progestagen (injection)	Progestagen (injection)	Surgical/ Permanent
Contraceptive Product:	Deslorelin acetate	Etonogestrel 68 mg	medroxyprogesterone acetate;	proligestrone 100mg/ml	N/A
Commercial Name:	Suprelorin®	Implanon® Nexplanon®	Depo-Provera®, Depo-Progevera®	Delvosteron®	Vasectomy
Product Availbility:	4.7mg ('Suprelorin® 6') and 9.4 mg ('Suprelorin® 12') widely available through veterinary drug distributors in the EU. 9.4 mg ('Suprelorin® 12') is also available through Peptech and Virbac.	Manufactured by Bayer Schering Pharma AG. Available through human drug distributors	Manufactured by Pfizer. Widely avilable 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	N/A
Restrictions and/or permit required by Importing Country:	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	N/A
Mechanism of action:	GnRH agonist suppress the reproductive endocrine system, preventing production of pituitary and gonadal hormones. GnRH agonists initially stimulate the reproductive system -which can result in oestrus and ovulation in females, or temporary enhancement of testosterone and spermatogenesis in males. Therefore additional contraception is required during this time. Please see below and refer to Deslorelin datasheet.	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	Surgical procedure in which the ductus deferens are cut, tied, cauterized, or otherwise interurrupted
Insertion/Placement:	Sub-cutaneously, in a place where it can be easily detected or seen for removal at a later date (I.e.upper inner arm); refer to the Suprelorin® fact sheet for effective methods of implant placement (tunnelisation)	Subcutaneous in upper inner arm for visibility (aid for later removal)	Injectable intramuscular. As hand-catching is possible in prosimians, this provides greater assurance the appropriate dose is delivered	Injectable subcutaneously - do not inject intradermally or into subcutaneous fat or scar tissue	Surgical
Females					

Dose	Dosage depends on the body weight of the individual. 1x 4.7mg is recommended for a minimum duration of 6 months and 1x 9.4mg is recommended for a minimum duration of 12 months. **DO NOT CUT THE IMPLANT**	Recommended 1/3 to 1/2 implant, depending on species and weight. Doses not well established	5 mg/kg body weight at 40 days intervals througout the breeding season for all prosimians. For *Hapalemur* sp. 5mg/kg at 30 days interval more effective.	A dose of 50 mg/kg of Delvosteron® has been used in a collection for short term contraception being effective for approximately 3 months	N/A
Latency to effectiveness:	3 weeks average as GnRH agonists initially stimulate the reproductive system- **please refer to Deslorelin datasheet for detailed information -** additional contraception is needed during this time (see product data sheet. ~2mg/kg Megestrol acetate pills daily 7 days before and 8 days after has been used to suppress inital stimulation phase)	In general inhibition of ovulation after 1 day when inserted on day 1-5 of cycle or when replacing oral progestagen. As the exact stage of the menstrual cycle is often unknown, it is advised to use other contraceptive methods for at least 7-14 days after insertion of the implant	1-3 days post injection. However, if the cycle stage is not known then extra time must be allowed; therefore, separation of the sexes or alternative contraception should be used for at least 1 week.	1-3 days post injection. However, if the cycle stage is not known, extra time must be allowed; therefore, separation of the sexes or alternative contraception should be used for at least 1 week.	N/A
Oestrus cycles during contraceptive treatment:	Initial oestrus and ovulation (during the 3 weeks of stimulation) then no oestrus cycle. To supress the initial osetrus and ovulation you can follow the megestrol acetate protocol mentioned above.	Oestrus is inhibited. Menstruation in non-human primates are more or less present with regular cyclicity. This is an individual and dose-dependent response. Some will swell during treatment and some will not.	Oestrus behaviour may be observed. Ovulation and cycling can occur in adequately contracepted individuals (but is unlikely and the degree of suppression is dose dependent).	Oestrus behaviour may be observed. Ovulation and cycling can occur in adequately contracepted individuals (but is unlikely and the degree of suppression is dose dependent).	N/A
Use during pregnancy:	**Not recommended**	In non-human primates progestagens normally do not interfere with parturition. However in other species progestagens are not recommended for use in pregnant animals because of the risk of prolonged gestation, stillbirth or abortion.	Progestagens are not recommended in pregnant animals because of the possibility of prolonged gestation, stillbirth, abortion, etc. in some species, although the effect may depend on dose. Progestagens in late pregnancy seem not to interfere with parturition in primates, but this is a taxon-specific phenomenon. Lemuridae that were administered with Depo-Provera® in the first or second trimesters of pregnancy had a successful parturition.	Progestagens are not recommended in pregnant animals due to the possibility of prolonged gestation, stillbirth, abortion, etc. in some species, although the effect may depend on dose. Progestagens in late pregnancy seem not to interfere with parturition in primates, but this is a taxon-specific phenomenon.	N/A
Use during lactation:	No contraindications once lactation established	Considered safe for nursing; Does not affect lactation, but etonogestrel is excreted in milk.	Considered safe for nursing infant.	Considered safe for nursing infant.	N/A
Use in prepubertals or juveniles:	**Data deficient** in this group, see product information sheet. Suprelorin implants should be **used with caution** in females that are to breed in the future, as long term impacts on fertility have not been assessed when used in prepubertal animals.	The use of synthetic progestagens in pre-pubertals or juveniles has not been fully assessed. Possible long-term effects on fertility are not known.	The use of synthetic progestagens in pre-pubertals or juveniles has not been fully assessed. Possible long-term effects on fertility are not known.	The use of synthetic progestagens in pre-pubertals or juveniles has not been fully assessed. Possible long-term effects on fertility are not known.	N/A
Use in seasonal breeders:	Should start at least 1 month prior the breeding season. In two ruffed lemur females implants were inserted in November and both females came into oestrus within a week, after which ovulation was effectively suppressed for the entire breeding season	To minimize progestin exposure, insert 1 month before the breeding season and remove 1 month after end of breeding season. e.g, *Eulemur macaco, E. fulus, Lemur catta* insert in early September, remove end of June; V*arecia spp.* Insert in November, remove in May	Should be injected at least 1 week before the breeding season starts. In some prosimians as few as 1 to as many of 6-7 Depo-Provera® injections were given within a single breeding season	N/A	N/A

Duration	Duration of efficacy has not been well established as a guide: 4.7 mg implants will suppress for a **minimum** of 6 months; 9.4mg will be effective for a **minimum** of 12months	2-3 years in various primates	Dose dependant: 45-90 days in general. However, effects could last 1-2 years in some individuals. In black lemurs, contraception with medroxyprogesterone acetate can extend the breeding season to as much as 9 months; this requires an extention of the period of contraceptive treatment.	Dose dependant: 30-90 days in general. However, effects could last 1-2 years in some individuals	N/A
Reversibilty	We have 3 records of reversals in lemurs, with most individuals conceiving in the next breeding season. Duration to reversibility extremely variable. Removal of implant to aid reversibility is recommended but often implant is difficult to recover	Designed to be fully reversible but individual variations can occur. To increase potential for full reversibility implants must be removed. We hold 1 record of a reversal, with the female giving birth two years following the estimated implant expiration.	Reversal rate for prosimians is high. 22 ruffed lemur females successfully conceived after multiple bouts of Depo-Provera,® including nulliparous females conceiving at 7 to 10 years of age. 74 % conceived within one season , 26% in second season. In 84% of births at least one live-born infant were produced. Designed to be fully reversible but individual variations can occur.	Designed to be fully reversible but individual variations can occur	N/A
Effects on Behaviour	None observed except lack of libido. There are anecdotal reports of change of hierarchy with the behavioural implications that this may have.	Effects on behaviour have not been studied, every individual may react differently. Because progestagens can suppress ovulation it can be expected that courtship and mating behaviour will be affected in some way. Further research in the subject is necessary.	Effects on behaviour have not been studied, every individual may react differently.Because it binds readily to androgen receptors and is antiestrogenic, females may experience male-like qualities (increased aggression , development of male secondary sex characteristics, etc.) Further research in the subject is necessary.	Effects on behaviour have not been studied, every individual may react differently.Because it binds readily to androgen receptors and is antiestrogenic, females may experience male-like qualities (increased aggression , development of male secondary sex characteristics, etc.) Further research in the subject is necessary	N/A
Effects on sexual physical characteristics	Similar to gonadectomy	There might be some degree of sexual swelling and menstruation might occur. Ovulation may also occur even though pregnancy does not ensue.	In lemurs, genital odorants of contracepted females are dramatically altered, which affect the behavirourl response in males	See Above	N/A
Males	**Data deficient**	**Not Recommended**	**Not Recommended**	**Not Recommended**	Reported
Dose	**Data deficient.** Usually a higher dose than in females is required in males. As a guide 1-2 implants dependent on body weight are suggested.	N/A	N/A	N/A	N/A
Latency to effectiveness:	Depending on the species there may be fertile sperm present in vas deferens for 6-8 weeks post treatment or even longer. Testosterone decreases after 3-4 weeks but sperm can stay fertile for many weeks after. Either additional contraception or separation of the sexes is required for this time.	N/A	N/A	N/A	Depending on species and individual, perhaps as long as 2 months or more
Use in prepubertals or juveniles:	**Data deficient** in this group, see product information sheet	N/A	N/A	N/A	Data deficient
Use in seasonal breeders:	**Data deficient.** Should start at least 2 months prior the breeding season.	N/A	N/A	N/A	N/A

Duration and Reversibility	**Data deficient** in this group, but deslorelin is considered reversible. See product information sheet. We have 6 records of reversals in ring tailed lemurs, with time to conception ranging from 1-4 breeding seasons after the estimated contraception expiry date.	N/A	N/A	N/A	The procedure should not be used in males likely to be recommended for subsequent breeding as reversal is unlikely
Effects on Behaviour	Testosterone related aggression is likely to decrease. Limited success as tool for aggression control in black lemurs and ringtailed lemurs, however this may have been as too low a dose was used.	N/A	In lemurs, genital odorants of contracepted females are dramatically altered, which affect the behaviroural response in males	N/A	Vasectomy will not affect androgen-dependant behaviours
Effects on sexual physical characteristics	Some dichromatic species may change colour if testosterone related. Decrease in body size, feminisation of males.	N/A	N/A	N/A	None observed in non-human primates

General:					
Side effects	Similar to gonadectomy; especially weight gain. Some dichromatic species may change colour.	Possible weight gain, possible increased or decreased frequency of bleeding during menstruation. **EGZAC recommends always reading the manufacturer's data sheet.**	Long term use is not recommended since it can have possible deleterious effects on the uterus and mammary tissue. Progestins are likely to cause weight gain in all species. In the human literature, Depo-Provera® has been linked to mood changes. Because it binds readily to androgen receptors and is anti-estrogenic, females may experience male-like qualities (increased aggression, development of male secondary sex characteristics, etc.) **EGZAC recommends always reading the manufacturer's data sheet.**	Long term use is not recommended since it can have possible deleterious effects on the uterus and mammary tissue. Progestins are likely to cause weight gain in all species. In the human literature, progestagens has been linked to mood changes. As it binds readily to androgen receptors and is anti-estrogenic, females may experience male-like qualities (increased aggression, development of male secondary sex characteristics, etc.). In some diabetic animals Delvosteron® has led to an increased insulin requirement, it is advised that the product be used with caution in diabetic animals and that urine glucose levels are carefully monitored during the month after dosing. EGZAC recommends always reading the manufacturer's data sheet.	N/A
Warnings	Causes initial gonadal stimulation; correct administration essential - see product information sheet	Causes initial gonadal stimulation	Interaction with other drugs are known to occur and may influence protection against pregnancy. In some diabetic animals progestagens have led to an increased insulin requirement, it is advised that the product be used with caution in diabetic animals and that urine glucose levels are carefully monitored during the month after dosing. **EGZAC recommends always reading the manufacturer's data sheet.**	Interaction with other drugs are known to occur and may influence protection against pregnancy. **EGZAC recommends always reading the manufacturer's data sheet.**	Infection of the surgical wound might occur. Intradermal closure of the skin is advised together with prophilactic antibiotic treatment and NSAID

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

References:

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