EAZA RMG

EAZA Reproductive Management Group

Animal name: Baboons
(*Papio* sp.)

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We would recommend assessing 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 (injection)	Progestagen (implant)	GnRH vaccine (injection)	Surgical/Permanent
Contraceptive Product:	Deslorelin acetate	Luprolide acetate	Etonogestrel 68 mg	medroxyprogesterone acetate	Levonorgestrel 2x 75mg	GnRH protein conjugate	-
Commercial Name:	Suprelorin ®	Lupron ®	Implanon® Nexplanon®	Depo-Provera®, Depo-Progevera®	Jadelle®	Improvac®	Castration; Vasectomy; Ovariectomy; Ovariohysterectomy; Hysterectomy; Tubal Ligation
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 Pfizer. Widely available throughout Europe through human drug distributors.	Manufactured by Organon. Available through human drug distributors	Available through veterinary drug distributors.	-
Restrictions and/or permit required by Importing Country:	The EAZA RMG recommends: always check with your local licencing authority.	**Data deficient**	The EAZA RMG recommends: always check with your local licencing authority	The EAZA RMG recommends: always check with your local licencing authority.	The EAZA RMG recommends: always check with your local licencing authority	Current knowledge: widely available throughout European countries. The EAZA RMG recommends: always check with your local licencing authority.	-
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.	Anti-estrogenic activity. 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	Production of anti-GnRH antibodies by the immune system, neutralising endogenous GnRH activity. This results in a reduction of FSH and LH production by the anterior pituitary and, ultimately, in a reduction of ovarian follicular development and /or inhibition of testosterone secretion from the testes and spermatogenesis.	**Castration:** Permanent contraception by surgical gonadectomy; **Vasectomy:** Surgical procedure in which the ductus deferens are cut, tied, cauterized, or otherwise interrupted; **Ovariectomy:** removal of the ovaries; **Ovariohysterectomy:** removal of one or both ovaries and the uterus; **Hysterectomy:** removal of the uterus; **Tubal ligation:** fallopian tubes are clamped and blocked, or severed and sealed.
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	The EAZA RMG recommends sub-cutaneous, upper inner arm for visibility (aid for later removal). Intramuscular or subcutaneous.	Injectable intramuscular	Intramuscular or subcutaneous. The EAZA RMG recommends sub-cutaneous, upper inner arm for visibility (aid for later removal)	Injectable intramuscular or subcutaneously	Surgical
Females		**Data deficient**				**Data deficient**	
Dose	1 implant is recommended. 4.7mg implants are recommended for a minimum duration of 6 months and 9.4mg implants are recommended for a minimum duration of 12 months.	There are various formulations available lasting from 1-6 months. Dosing information is very **data deficient**. Doses of 10mg (4 month duration) have been used in guinea baboons. We would advise that you extrapolate from human literature is likely the best place to start. Please contact the EAZA RMG with specific dosage advice.	1/3 to 1/2 an implant (0.068g) is recommended for successful contraception in these species. Full implants have also been used successfully in the species.	As a guide 5mg/kg BW every 45-90 days (mean = 60 days). Please contact the EAZA RMG for specific dosage advice.	1 rod is recommended.	**Data deficient.** Two injections of 300ug are given 4 weeks apart and boosters are usually administered every 6 months. There is anecdotal evidence suggesting that doses may need to be inceased to 600ug in the second year of treatment. **Please contact the EAZA RMG to discuss product protocols prior to use.**	-
Latency to effectiveness:	Deslorelin will have a latency to effect of 3-4 weeks during which a stimulation of the reproductive system will occur. In order to suppress the initial stimulation phase, the first contraceptive bout should be supplemented with an oral progestagen such as megestrol acetate pills (Ovarid/Megace; ~2mg/kg BW), 7 days before and 8 days after the implant is inserted. Alternatively, the sexes can be separated for ~4 weeks.	Same as deslorelin with an initial stimulation phase and suppression should then occur 3-4 weeks later (please refer to deslorelin and lupron datasheet for more details)	In general inhibition of ovulation after 1 day when inserted on day 1-5 of cycle or when replacing oral progestogen. As the right stage during menstrual cycle is often unknown, it is advised to use other contraceptive methods for at least 7-14 days after insertion of the implant depending on administration route.	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.	In general inhibition of ovulation after 1 day when inserted on day 1-5 of cycle or when replacing oral progestogen. As the right stage during menstrual cycle is often unknown, it is advised to use other contraceptive methods for at least 7-14 days after insertion of the implant depending on administration route.	Latency to effectiveness can be up to 6 weeks so separation of the sexes is recommended if possible.	-
Oestrus cycles during contraceptive treatment:	Initial oestrus and ovulation (during the 3 weeks of stimulation) then down-regulation. To prevent the stimulation phase, the megestrol acetate protocol described above is recommended.	Same as deslorelin.	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 show a sexual swelling during treatment and some will not.	Oestrus behaviour may be observed. Cycling and even ovulation can occur in adequately contracepted individuals (but is unlikely and the degree of suppression is dose dependent).	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.	**Data deficient.**	-
Use during pregnancy:	**Not recommended**	**Not recommended**	In non-human primates progestagens normally do not interfere with parturition.	In non-human primates progestagens normally do not interfere with parturition.	In non-human primates progestagens normally do not interfere with parturition.	**Unknown**	-
Use during lactation:	No contraindications once lactation established	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	**Unknown**	-
Use in prepubertals or juveniles:	**Data deficient** in this group, see product information sheet.	**Data deficient**- see product information sheet	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.	**Unknown**	Should only be carried out after first oestus signs have occured (+/- 4 yrs of age)

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. There is anecdotal evidence of 4.7mg implants lasting ~12 months in chacma and hamadryas baboons. Animals should be monitored for signs of a return to fertility if implants are replaced at longer intervals than the manufacturer's minimum duration of efficacy (6 months with 4.7mg implants or 12 months with 9.4mg implants).	This is extremely **data deficient**. Lupron® is available in various formulations lasting from 1 to 6 months, but because the release of hormone from the depot formulation varies by individual, actual duration of efficacy can vary considerably.	The duration of this product can last 2 to 3 years. We advise to replace after 2 1/2 yrs. An increased sexual swelling could be a signal that Implanon is waning/ or lost. Check if implant is stil present.	Dose dependant: 45-90 days in general. However, effects could last 1-2 years in some individuals.	2-3 years in various primates	**Unknown** for most species.	Permanent
Reversibility	Deslorelin is designed to be fully reversible and we have three records of reversals in Hamadryas baboons: time to conception from implant placement was approximately 4.5 years in all three following contraception with 1x4,7mg or 1x9.4mg implants. Removal of implant may hasten time to reversal. Implants should therefore be placed in locations with thinner skin e.g. the inner arm, inner thigh, umbilical region, or armpit.	Considered reversible but every species has not been tested. Duration to reversibility extremely variable.	Designed to be fully reversible but individual variations can occur. Mean time to conception was 4 years 2 months after implant placement (range: 2 years 9 months - 6 years 9 months). To increase potential for full reversibility implants must be removed.	Designed to be fully reversible but individual variations can occur. Mean time to reversal in baboons is 1.3 years (range: 4 months - 6 years and 7 months). As Depo-Provera is an injection, you will need to wait for the drug to clear from the animal's system before reversal can be expected.	Designed to be fully reversible but individual variations can occur. To increase potential for full reversibility implants must be removed.	**Data deficient in this taxon.**	Ovariectomies are irreversible and should only be carried out following discussion with the EEP coordinator.
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.	Same as deslorelin	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; there may be individual variation in response. Medroxyprogesterone acetate binds readily to androgen receptors and are 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 progestagens can suppress ovulation it can be expected that courtship and mating behaviour will be affected in some way. At high doses can have masculinising effect. Further research in the subject is necessary.	**Data deficient.**	Aggession, masculinised behaviour after ovariectomies. No effect on behavior after tubal ligation.
Effects on sexual physical characteristics	Similar to gonadectomy.	**Data deficient** but likely 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.	See above	There might be some degree of sexual swelling and menstruation might occur. Ovulation may also occur even though pregnancy does not ensue.	**Data deficient.**	**Ovariectomy:** Increased appetite will result in weight gain. Some dichromatic species may change colour. **Tubal ligation:** In Hamadyas baboon severe sexual swelling might occur. In those cases Implanon or ovariectomy is advised.
Males	**Recommended**	**Data deficient**	**Not recommended**	**Not recommended**	**Not recommended**	**Data deficient**	
Dose	**Data deficient.** Doses are highly variable in the database; doses between 1 and 4 implants have been successfully used in guinea and hamadryas baboons. It is suggested that higher doses will be needed in males than females and that higher doses will be needed to mitigate testosterone-mediated behaviour than for reproductive suppression.	**Data deficient.** Usually a higher dose than in females are required in males. We would advise extrapolating from the human literature.	-	-	-	**Data deficient.** Two injections of 300ug are given 4 weeks apart and boosters are usually administered every 6 months. There is anecdotal evidence suggesting that doses may need to be inceased to 600ug in the second year of treatment. **Please contact the EAZA RMG to discuss product protocols prior to use.**	-
Latency to effectiveness:	Deslorelin will have a latency to effect of 3-4 weeks during which a stimulation of the reproductive system will occur. Alternatively, the sexes should be separated for ~2 months as viable sperm may remain in the vas deferens for up to 2 months. The initial stimulation period cannot be suppressed in males, and additional contraception should be used in females during this time.	Depending on the species there may be fertile sperm present in vas deferens for 6-8 weeks post treatment. Testosterone decreases after 3-4 weeks but sperm can stay fertile for many weeks after. Additional contraception needed during this time or separation of the sexes.	-	-	-	Latency to effectiveness can be up to 6 weeks so separation of the sexes is recommended if possible.	Depending on the individual, fertile sperm may be found in the vas deferens for as long as 2 months or more. Keep separate from fertile females for at least 6 weeks.
Use in prepubertals or juveniles:	**Data deficient** in this group, see product information sheet	**Data deficient** in this group, see product information sheet	-	-	-	**Data deficient**	**Data deficient**
Duration and Reversibility	**Data deficient** in this group, yet but deslorelin is considered reversible. Removal of implant may hasten time to reversal. Implants should therefore be placed in locations with thinner skin e.g. the inner arm, inner thigh, umbilical region, or armpit. See product information sheet. We have two records of reversal in male Hamadryas baboons who sired offspring 1.5 and 5 years after receiving 1x9.4mg and 1x4.7mg implants, respectively. The implant was removed in the individual who reversed within 2 years.	**Data deficient** in this group, yet but lupron is considered reversible. See product information sheet.	-	-	-	**Data deficient.**	**Castration:** Irreversible and should only be carried out following discussion with the EEP coordinator; **Vasectomy:** 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. **Data deficient** in this group, see product information sheet. Annual treatment with 4.7mg was effective in controlling aggression in chacma and hamadryas baboons.	Testosterone related aggression is likely to decrease. **Data deficient** in this group, see product information sheet.	-	-	-	Decrease in testosterone mediated behaviours e.g. some aggression and sexual behaviour. Similar to surgical castration but short-acting (duration of antibody effect). Decrease male aggression due to down regulation of testosterone synthesis. Mating behaviour may continue.	Vasectomy will not affect androgen-dependant behaviours.

Effects on sexual physical characteristics	Decrease in body size, feminisation (reduction of testicle size) of males. A loss of secondary sexual characteristics may occur (loss of manes in P. hamadryas).	Decrease in body size, feminisation (reduction testicle size) of males. A loss of secondary sexual characteristics may occur (loss of manes in P. hamadryas).	-	-	-	Loss of secondary sexual characteristics, loss of muscle mass, and a decrease in testicle size. Similar to surgical castration but short-acting (duration of antibody effect). Manes may become less evident.	Castration will likely result in the loss of secondary sexual characteristics dependent on testosterone. Males may lose muscle and overall weight if not replaced by fat. Males may become the size (weight) of females. Some dichromatic species may change colour. Vasectomy will not affect androgen-dependant sexual characteristics.
General:								
Side effects	In general weight gain as would be seen with ovariectomy or castration. Increased appetite will result in weight gain, especially in females. Males may become the size (weight) of females. Some dichromatic species may change colour. Males may lose muscle and overall weight if not replaced by fat. The EAZA RMG recommends always reading the manufacturer's data sheet.	In general weight gain as would be seen with ovariectomy or castration. Increased appetite will result in weight gain, especially in females. Males may lose muscle and overall weight if not replaced by fat. Males may become the size (weight) of females. Some dichromatic species may change colour. The EAZA RMG recommends always reading the manufacturer's data sheet	Possible weight gain, possible increased or decreased frequency of bleeding during menstruation. The EAZA RMG recommends always reading the manufacturer's data sheet	Possible deleterious effects on the endometrium following prolonged use. 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 masculinisation. The EAZA RMG recommends always reading the manufacturer's data sheet	Possible weight gain, possible increased or decreased frequency of bleeding during menstruation. At high doses can have masculinising effect. The EAZA RMG recommends always reading the manufacturer's data sheet.	Occasional swelling at the vaccination site - need to inject deep intramuscular in elephants and horses. The EAZA RMG recommends always reading the manufacturer's data sheet	-
Warnings	Causes initial gonadal stimulation. Do not cut the implant. If implant is not completely removed at the end of treatment, residual circulating levels of deslorelin may affect time to reversal. **Should not be used in conjunction with Depo-Provera.**	Causes initial gonadal stimulation. Should not be used in conjunction with Depo-Provera.	Interaction with other drugs are known to occur and may influence protection against pregnancy. In some diabetic animals progestagens 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. The EAZA RMG recommends always reading the manufacturer's data sheet.	Interaction with other drugs are known to occur and may influence protection against pregnancy. In some diabetic animals progestagens 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. The EAZA RMG recommends always reading the manufacturer's data sheet.	Interaction with other drugs are known to occur and may influence protection against pregnancy. In some diabetic animals progestagens 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. The EAZA RMG recommends always reading the manufacturer's data sheet.	It should be handled with extreme care to avoid handler accidents. The EAZA RMG recommends always reading the manufacturer's data sheet	The procedures should always be carried out under sterile conditions, potential for infection of the surgical wound.

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

References:

1) Asa, C.S. & Porton, I.J. (eds.) (2005) Wildlife Contraception: Issues, Methods, and Applications. The Johns Hopkins University press: Baltimore.

2) Martinez, G, Lacoste, R, Dumasy, M, Garbit, S, Brouillet, S, Coutton, C, Arnoult, C, Druelle, F, Molina-Vila, P. (2020) Deslorelin acetate implant induces transient sterility and behavior changes in male olive baboon (Papio anubis): A case study. *Medical Primatology* , 46(6):344-348. https://doi.org/10.1111/jmp.12479

3) Portugal, M.M. & Asa, C.H. (1995). Effects of chronic Melengestrol Acetate contraceptive treatment on perineal tumescence, body weight, and social sexual behavior of Hamadryas baboons (Papio hamadryas). Zoo Biology 14: 251-259.

4) Guy, AJ, Schuerch, FS, Heffernan, S, Thomson, PC, O'Brien, JK, & McGreevy, PD. (2008). The effect of medroxyprogesterone acetate on behavioural responses of captive female hamadryas baboons (Papio hamadryas). *Animal reproduction science* , 108(3-4), 412-424