EAZA RMG
EAZA Reproductive Management Group

Taxon name: *Hylobatidae*

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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
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Contraceptive methods	GnRH agonist (implant)	GnRH agonist (injection)	Progestagen (implants)	Progestagen (injection)	Progestagen (implants)	Combination Birth-Control Pills	Progestagen only Birth-Control Pills	Surgical/Permanent
Contraceptive Product:	Deslorelin acetate	Luprolide acetate	Etonogestrel 68 mg	medroxyprogesterone acetate;	Levonorgestrel 2x 75mg	Combinations of a synthetic progestagen and oestrogen at various doses are available	Oral synthetic progestagens without any oestrogen component	-
Commercial Name:	Suprelorin ®	Lupron ®	Implanon® Nexplanon®	Depo-Provera®, Depo-Progevera®	Jadelle®	Several commercial oral combination pills are available in the market for human use.	Several commertial oral progestagen pills are available in the market for human use.	Vasectomy
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 Bayer. Available through human drug distributors	Widely availabe in pharmacies for human use	Widely available in pharmacies for human use	-
Restrictions and/or permit required by Importing Country:	The EAZA RMG recommends that you always check with your local licencing authority.	**Data deficient**	The EAZA RMG recommends that you always check with your local licencing authority.	The EAZA RMG recommends that you always check with your local licencing authority.	The EAZA RMG recommends that you 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 the thickening of cervical mucus, interrupting gamete transport, disruption of implantation, inhibition of LH surge necessary for ovulation	Inhibit follicular development and LH surge preventing ovulation. Progestagen part also blocks fertilisation and/or implantation.	Interference with fertilization by the thickening of cervical mucus, interrupting gamete transport. Disruption of implantation. Inhibition of the LH surge necessary for ovulation. These mechanisms are dose dependant, typically higher dose of synthetic progestagens are required to block ovulation than to block fertilisatio and/or implantation.	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. The EAZA RMG recommends sub-cutaneous, upper inner arm for visibility (aid for later removal)	Injectable intramuscular	Intramuscular or subcutaneous. The EAZA RMG recommends sub-cutaneously on the upper inner arm for visibility (aid for later removal)	Oral	Oral	Surgical
Females	**Caution advised as several failures have been reported by EEP coordinators**	**Data deficient**	**Recommended**			**Data deficient**		
Dose	1 implant is advised. 4.7mg is recommended for a **minimum** duration of 6 months and 9.4mg is recommended for a **minimum** duration of 12 months. **Please contact the EAZA RMG for specific dosing advice.**	There are various formulations available lasting from 1-6 months. Dosing information is not available; extrapolation from human literature is likely the best place to start. **Please contact the EAZA RMG for specific dosing advice.**	½ - 1 implant are advised, depending on species and weight. We have some records of successful contraception in gibbons weighing between 5-13.5kgs with ½ of an implant.	As a guide 2.5-5mg/kg BW every 45-90 days. Doses in the database however, are incredibly variable, ranging from 2-12mg/kg BW.	It is advised that 1 rod (75mg) is used.	Dosage has not been well established; whole and half pills have been given. There are some reports that commercially available birth control pills are effective.	Dosage has not been well established; whole and half pills have been given. There are some reports that commercially available birth control pills are effective.	-
Latency to effectiveness:	Deslorelin will have a latency to effect of 3-4 weeks during which a stimulation of the reproductive system will occur. For this reason separation of both sexes is recommended for approximately 3-4 weeks. If you cannot separate the sexes, in order to suppress the initial stimulation phase, the first contraceptive bout must be supplemented with an oral progestagen such as megestrol acetate pills (Ovarid/Megace), 7 days before and 8 days after the implant is inserted.	3 weeks average as GnRH agonists initially stimulates the reproductive system- **please refer to Deslorelin datasheet for detailed information.** Separation of the sexes OR supplemental contraception (Megestrol acetate pills daily 7 days before and 8 days after implant insertion have been used to suppress stimulation phase. The dose for domestic dogs is 2mg/kg, but must be extrapolated for other taxa) is recommended during this time .	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 oestrus cycle is often unknown, it is advised to use other contraceptive methods for at least 7 days after insertion of the implant depending on administration route (IM or SC).	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 exact stage of the menstrual cycle is often unknown, it is advised to use other contraceptive methods for at least 7 days after insertion of the implant depending on administration route (Im or SC)	1 to 2 weeks but can take up to one month if treatment starts near the time of ovulation (refer to product insert for exact information on this)	1 to 2 weeks, although this varies depending on the brand. Please read the packet insert. The packet will outline when to start and how long to use secondary protection and/or how long the individual may need to be separated.	-
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.	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.	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 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 is more or less present with regular cyclicity. This is an individual and dose-dependent response. Some will swell during treatment and some will not.	Sings of oestrus can occur druing the placebo week if treatment not administer continuously (placebo week not necessary)	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). Be aware that progestagen-only pills are not being as effective at suppression oestrus as the combination pills.	-
Use during pregnancy:	**Not recommended** as may cause abortion	**Not recommended** as may cause abortion	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.	**Not recommended**	In non-human primates progestagens normally do not interfere with parturition.	-
Use during lactation:	No contraindications once lactation established; however, treatment during pregnancy may impede proper mammary development.	No contraindications once lactation established; however, treatment during pregnancy may impede proper mammary development.	Considered safe for nursing; Does not affect lactation, but etonogestrel is excreted in milk.	Considered safe for nursing infant.	Considered safe for nursing infant. In humans it is not recommended to use Jadelle for the first 6 weeks of lactation.	**Not recommended** - may interfere with milk production and affect the developing infant. Progestin-only birth control pills can be used instead.	Considered safe for the nursing infant	-

Use in prepubertals or juveniles:	**Data deficient** in this group, see product information sheet. Deslorelin may prevent epiphyseal closure of the long bones, resulting in taller individuals.	Lupron® may prevent epiphyseal closure of the long bones, resulting in taller individuals.	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.	**Not recommended** - **data deficient** and potential long-term effects in fertility	**Data deficient.** The use of synthetic progestagens in pre-pubertals or juveniles has not been fully assessed. Possible long-term effects on fertility are not known.	-
Use in seasonal breeders:	-	-	-	-	-	-	-	-
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.	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 2.5 to 3 years.	Dose dependant: 45-90 days in general. However, effects could last 1-2 years in some individuals.	The duration of this product can be up to 5 years in humans.	More than 1 day as effective during the placebo week in human. Duration for other species not fully established.	Not more than one day. Pills need to be administered daily (follow packet insert instructions if one day is missed).	Permanent
Reversibility	Deslorelin is designed to be fully reversible and we have one record of a reversal in which a female conceived nearly 6 years after she was implanted with 1x9.4mg implant. The deslorelin implant and a previous MGA implant had not been removed. Implants must be removed to facilitate reversal and should therefore be placed in locations with thinner skin e.g. inner arm.	Lupron® is designed to be fully reversible however there are no current cases of reversal in gibbons.	Implanon is designed to be fully reversible and we have one record of a successful reversal in an agile gibbon following contraception with ½ an implant (34mg). Following the removal of the implant, the female conceived in two years. Implants must be removed to facilitate reversal and should therefore be placed in locations with thinner skin e.g. inner arm.	Designed to be fully reversible but individual variations can occur. We have several records of reversal in hylobatidae with time between the first injection and offspring birth ranging between 1-2 years.	Designed to be fully reversible however, we have no records of reversal in the database. Individual variation with time to reversal can occur. Implants must be removed to facilitate reversal and should therefore be placed SC in the inner upper arm where the skin is thinner and will facilitate removal.	Reversibility is unknown but presumably would occur after cessation of treatment, although return to cycling can vary per individual. Even in humans, it may take several months (cycles) before normal ovulation returns. We have several records of reversal in which females conceived between 1 month and 10 months after the cessation of treatment.	It should be reversible after cessation of treatment, although return to cycling can vary per individual. Even in humans, it may take several months (cycles) before normal ovulation returns. We have one record of a reversal in which the female conceived approximately one month after the cessation of treatment.	-
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.	**Data deficient.** Effects may be similar to deslorelin.	Effects on behaviour have not been studied, every individual may react differently. As 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.	Effects on behaviour have not been studied, every individual may react differently. Further research in the subject is necessary.	Effects on behaviour have not been studied, every individual may react differently. Further research in the subject is necessary.	-
Effects on sexual physical characteristics	Some dichromatic species may change colour. Loss of muscle mass may also be seen.	GnRH agonists may cause the suppression of physical secondary sexual characteristics.	There might be some degree of labial swelling might occur. Ovulation may also occur even though pregnancy does not ensue.	See above	None reported.	**Data deficient**	**Data deficient**	-
Males	**Recommended**	**Data deficient**	**Not recommended**	**Not recommended**	**Not Recommended**	**Not Recommended**	**Not Recommended**	
Dose	**Data deficient.** Usually a higher dose is required than in females. We have some records of successful contraception in gibbons weighing between 4-12 kgs with 1 implant.	There are various formulations available lasting from 1-6 months. Dosing information is not available; extrapolation from human literature is likely the best place to start. **Please contact the EAZA RMG for specific dosing advice.**	-	-	-	-	-	-
Latency to effectiveness:	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.	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 or separation of the sexes is needed during this time.	-	-	-	-	-	Depending on species and individual, perhaps as long as 12 weeks or more
Use in prepubertals or juveniles:	**Data deficient** in this group, see product information sheet. Deslorelin may prevent epiphyseal closure of the long bones, resulting in taller individuals.	**Data deficient** in this group, see product information sheet. Lupron may prevent epiphyseal closure of the long bones, resulting in taller individuals.	-	-	-	-	-	**Data deficient**
Use in seasonal breeders:	-	-	-	-	-	-	-	-
Duration and Reversibility	**Data deficient**, but deslorelin is considered reversible. See product information sheet.	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. Lupron is considered reversible. See product information sheet.	-	-	-	-	-	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.	Testosterone related aggression is likely to decrease. **Data deficient** in this group, see product information sheet.	-	-	-	-	-	Vasectomy will not affect androgen-dependant behaviours
Effects on sexual physical characteristics	Some dichromatic species may change colour if testosterone ralated. Decrease in body size, decrease testicular size, feminisation of males.	Some dichromatic species may change colour if testosterone ralated. Decrease in body size, decrease testicular size, feminisation of males.	-	-	-	-	-	-
General:								
Side effects	In general weight gain as would be seen with ovariectomy or castration, there is a marked reduction in gonadal size.. 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 that you read 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 that you read the manufacturer's data sheet.**	Possible weight gain, possible increased or decreased frequency of bleeding during menstruation. **The EAZA RMG recommends that you read 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 (increased aggression, development of male secondary sex characteristics, in dichromatic species, aspects of male colouration, etc.) **The EAZA RMG recommends that you read 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 that you read the manufacturer's data sheet.**	Weight gain is less likely than with the progestagen only pills. Mood changes might occur.	Progestagens likely cause weight gain in all species. Possible deleterious effects on uterine and mammary tissues vary greatly by species. To date, few studies have shown link between synthetic progestagen treatment and serious health risk in non-human primates.	-

Warnings	Causes initial gonadal stimulation. Duration may be reduced if implant is broken. 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	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. **The EAZA RMG recommends that you read 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 that you read 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 that you read 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.	Progestagen only contraceptive pills can fail in obese animals. Be aware that progestagen-only pills are not being as effective at suppression oestrus as the combination pills. In some diabetic animals progestagens has led to an increased insulin requirement, it is advised that the product is to be used with caution in diabetic animals and that urine glucose levels are carefully monitored during the month after dosing.	The procedure 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 *hylobatidae* 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.