



Tammar Wallaby (*Macropia eugenii*)



Fact Sheet Compiled by: Veronica Cowl

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Fact Sheet Reviewed by: EGZAC Working group & Wayne Boardman BVetMed MANZCVS Dipl EC2M (WPH)

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)	Progestogen (implants)	Progestogen (implant)	Progestogen (injection)	Progestogen (injection)	GnRH vaccine	PZP vaccine	Permanent (surgical)
Contraceptive Product:	Deslorelin acetate	Luprolide acetate	Etonogestrel 68 mg	Levonorgestrel 2x 75mg	medroxyprogesterone acetate;	proligestrone 100mg/ml	GnRH protein conjugate	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 adjuvant for boosters).	
Commercial Name:	Suprelorin ®	Lupron ®	Implanon® Nexplanon®	Norplant®, Norplant-2®	Depo-Provera®, Depo-Progevera®	Delvosteron®	Improvac®	Porcine Zona Pellucida	
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.	Available through veterinary drug 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	Current knowledge: widely available throughout European countries. 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. 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	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	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.	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.	Vasectomy: Surgical procedure in which the ductus deferens are cut, tied, cauterized, or otherwise interrupted; Castration: Surgical procedure in which the testes are removed.
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	Intramuscular or subcutaneous.	Injectable Intramuscularly	Surgical
Females							Data deficient		
Dose	1 implant is recommended for this species. 4.7mg implants are effective for a minimum duration of 6 months and 9.4mg implants are effective for a minimum duration of 12 months. Please contact EGZAC for more dosing information.	Data deficient. Lupron is available in varying dosages from formulations lasting 1-6 months. Please contact EGZAC for more dosing information.	Data deficient. Data suggests that the implant should be replaced every 2.5-3 years. Please contact EGZAC for more dosing information. Etonogestrel-based contraceptives have not been effective at contracepting koalas, it is unknown whether they would be effective in wallabies ⁶ .	Data deficient. It is presumed that 1 implant should be sufficient in contracepting this species. Please contact EGZAC for more dosing information.	The advised dose is 5mg/kg body weight to be repeated every 45-90 days. We have one reported failure in which a tammar wallaby was contracepted with 3.5mg/kg body weight. Please contact EGZAC for more dosing information.	Data deficient. Please contact EGZAC for more dosing information.	Data deficient. Two injections of 400µg are given 35 days apart and boosters are usually administered every 6-7 months, although duration can vary between individuals.	~ 100 ug of protein. Recommended dose is 2 injections given typically 2+ weeks apart then a booster every 8 months for most species. For species with a well defined and short (2-3 months) breeding season, give first dose 1-2 months prior to the breeding season and the second inoculation no later than 1 month prior to breeding activity.	
Latency to effectiveness:	~3 weeks so the first bout of deslorelin should either be supplemented with oral megestrol acetate pills (Ovarid/Megace) for 7 days before and 8 days after implant placement, or the sexes should be separated during this time.	Data deficient	It is advised to use additional contraception or to separate the sexes for 7-14 days after inserting the implant.	Levonorgestrel does not prevent the reactivation of the diapausing blastocyst or its subsequent development in macropods ³ .	1-3 days post injection however if the cycle stage is not known then sexes should be separated for 7 days.		Data deficient. Latency to effectiveness can be up to 8 weeks so separation of the sexes is recommended if possible.	2-3 weeks after the last vaccination during year 1 (primary course of vaccination 2 injections 2-4 weeks apart, preferably 3 injections).	
Oestrus cycles during contraceptive treatment:	There will be an initial stimulation phase which can be suppressed with additional contraception (see above).	Data deficient	Data deficient. However oestrus should be suppressed	Oestrus should be suppressed	Oestrus should be suppressed		Data deficient	PZP should not suppress oestrous cycles and may extend the breeding season beyond what is considered typical, resulting in additional oestrous cycles.	
Use during pregnancy:	Pregnancy or birth may be affected by deslorelin treatment in some animals ¹ . Deslorelin treatment did not affect normal gestation or parturition in 60% (3/5) of animals ²	Data deficient	Progestogens in general do not prevent the reactivation of the diapausing blastocyst or its subsequent development, but suppress the post-partum oestrus.	Levonorgestrel implants do not prevent the reactivation of a diapausing blastocyst or its subsequent development. The implants will however, prevent post-partum conception ³ .	Data deficient but its use during pregnancy should be discouraged		Not recommended	Separation of the sexes from the beginning of the initial vaccination course until at least 2 weeks after the last injection during the first year	
Use during lactation:	In a study in tammar wallaby early phase of lactation was not affected ⁷	Data deficient	Data deficient. But presumed not to be affected	Data deficient. But presumed not to be affected	Data deficient. But presumed not to be affected		Unknown	Does not interrupt pregnancy or affect the foetus	
Use in prepubertals or juveniles:	Data deficient	Data deficient	Data deficient	Data deficient	Data deficient		Unknown	No known contraindications	
Use in seasonal breeders:	Treatment should start at least 1 month before the breeding season. In macropods deslorelin treatment might not inhibit the reactivation of a quiescent blastocyst and subsequent birth, but successfully inhibits follicular development and post-partum oestrus (in 4/5 animals ²)	Data deficient	Treatment should start at least 1 month before the breeding season. In macropods progestogen treatment might not inhibit the reactivation of a quiescent blastocyst and subsequent birth, but successfully inhibits follicular development and post-partum oestrus thereafter	Treatment should start at least 1 month before the breeding season. In macropods progestogen treatment might not inhibit the reactivation of a quiescent blastocyst and subsequent birth, but successfully inhibits follicular development and post-partum oestrus thereafter ¹ .	Data deficient. Treatment should start at least 1 month prior to the breeding season.		Data deficient. If used should be done at least 6 weeks prior to the breeding season.	Data deficient	
Duration	1x4.7mg implants for a minimum duration of 6 months and 1x9.4mg implants for a minimum duration of 12 months.	Data deficient	2.5-3 years however this can vary between individuals.	36 months in the tammar wallaby ³ . Anecdotal evidence suggests implants may be effective for 5-7 years in koalas.	Data deficient. 45 to 90 days.		Unknown for most of species. Improvac® generates short lived antibodies in the domestic pig (after 7-8 weeks following second injection antibodies start to decline).	Can be used in seasonal breeders but initial treatment and annual boosters should be carried out 2 and 1 months before the start of the breeding season respectively.	

Reversibility	Suprelorin is designed to be fully reversible, and we have 8 records of reversals in marsupials in our database. Four yellow-footed rock wallabies gave birth to live young 2-4 years after being implanted with 1x4.7mg implants, and four red kangaroos reversed between 2 months and 4 years after being implanted with 2x4.7mg implants. It is unknown whether implants were removed. EGZAC would always recommend removing implants to facilitate reversibility; they should therefore be placed in a location with thinner skin in which implants can be easily located and removed e.g. armpit, inner thigh, upper arm.	Data deficient	Implanon is designed to be fully reversible however we do not have any records of any marsupials reversing in our database. We would recommend removing the implant to facilitate reversal, so please place the implant in a location that facilitates removal.	In a study in tammar wallaby, Levonorgestrel implants were removed from six females and four of these animals resumed reproductive activity, confirming that the contraceptive effect of the implants is reversible ³ .	Depo-Provera is designed to be fully reversible and we have one reversal recorded in a red kangaroo in the database. The female conceived approximately 5 months after the estimated expiry date. As Depo-Provera is not an implant, you will need to wait until the product has cleared from the individuals' system before they can reverse.		Data deficient. Reversibility is unknown for most species. It is presumed to be reversible when used in the short term due to short lived antibodies. The longer it is used, the longer the time required for reversal. Long term effects on fertility are unknown and therefore EGZAC recommends caution when using for an extended period of time.	There are species differences on reversibility. Treatment for over 5 years has been associated with ovarian failure in some cases. The possibility of ovarian damage makes this method unsuitable for animals highly valuable to captive breeding programmes or where reversibility is important. We have one record of a western grey kangaroo who gave birth to live young 1 year after initial treatment. The dose is not known. PZP was used in one study in Eastern Grey Kangaroos ⁴ .	
Effects on Behaviour	Data deficient	Data deficient	Data deficient	Data deficient	An increase in aggression may occur.		Similar to surgical castration (duration of antibody effect). No oestrus behaviours in mares.	Since usually the vaccine doesn't suppress oestrus cycles it has almost no effects on social behaviour, and no undesirable behavioural effects have been registered in free-ranging elephants treated for up to 9 years. In some species the failure to conceive can result in longer than usual breeding season and in some cases this can result in aggression and social disruption.	
Effects on sexual physical characteristics	Females may experience weight gain due to an increase in appetite.	Data deficient	Data deficient	Data deficient	Females may develop ale secondary sex characteristics		Similar to surgical castration (duration of antibody effect).	Data deficient	
Males	Deslorelin is not known to be effective in male marsupials	Not recommended	Not recommended	Not recommended	Not recommended	Not recommended		Not Recommended	Castration/Vasectomy
Dose							Data deficient. Two injections of 400µg are given 35 days apart and boosters are usually administered every 6-7 months, although duration can vary between species and individuals.		
Latency to effectiveness:							Data deficient. At least 2 weeks following the booster.		
Use in prepubertals or juveniles:							No data available, therefore its use is not recommended		
Use in seasonal breeders:							Data deficient		
Duration and Reversibility							Data deficient. Reversibility is unknown for most of species. Improvac® generates short lived antibodies in the domestic pig (after 7-8 weeks following second injection antibodies start to decline).		
Effects on Behaviour							Similar to surgical castration (duration of antibody effect). Decrease male aggression due to downregulation of testosterone synthesis.		
Effects on sexual physical characteristics							Similar to surgical castration (duration of antibody effect).		
General:									
Side effects	Possible weight gain in females						Painful swelling at the vaccination site may occur - need to inject deep intramuscular in equids. EGZAC recommends always reading the manufacturer's data sheet.		
Warnings					Prolonged use may be associated with deleterious effects on the endometrium in other species however, there is no evidence of this in marsupials.		It should be handled with extreme care to avoid handler accidents. EGZAC recommends always reading the manufacturer's data sheet.	The only adjuvant used with PZP is Freund's Modified adjuvant, which DOES NOT CAUSE TB+ TEST RESULTS, and injection site reactions are less than 0.05%. Following the initial treatments, boosters are required, using only Freund's incomplete adjuvant. In rabbits and possibly canids PZP vaccine can cause depletion of oocytes, and in some primates it can cause temporary cessation of oestrous cycles. There are few data for its use in carnivores, aside from pinnipeds and bears, and recent research with felids indicates that the antibodies will not cross-react with the sperm receptors.	
Reporting Requirements: In order to increase our knowledge of the efficacy of contraception methods in the macropodidae family it is recommended that all individuals on contraception be reported to EGZAC									
References: 1) Herbert et al. (2005). Long-term effects of deslorelin implants on reproduction in the female tammar wallaby (Macropus eugenii). <i>Reproduction</i> . 129(3):316-319. doi:10.1530/rep.1.00432 2) Herbert et al. (2004). Effect of deslorelin implants on follicular development, parturition and post-partum oestrus in the tammar wallaby (Macropus eugenii). <i>Reproduction</i> . 127(2):256-273. doi:10.1530/rep.1.00094 3) Nave et al. (2000). Contraceptive effects of levonorgestrel implants in a marsupial. <i>Reproduction, Fertility and Development</i> . 12(1-2):81-6. 4) Wilson et al. (2013). Deslorelin implants in free-ranging female eastern grey kangaroos (Macropus giganteus): mechanism of action and contraceptive efficacy. <i>Wildlife Research</i> . 40(5):403-412. doi:10.1071/WR13050 5) Kitchener et al. (2009). Immuncontraception of Eastern Grey kangaroos (Macropus giganteus) with recombinant brushtail possum (Trichosurus vulpecula) ZP3 protein. <i>Journal of Reproductive Immunology</i> . 79(2):156-162. doi:10.1016/j.jri.2008.10.004 6) Hynes et al. (2010). Levonorgestrel, not etonogestrel, provides contraception in free-ranging koalas. <i>Reproduction, Fertility and Development</i> . 22(6):913-919. doi:10.1071/RD09253									
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									