

This Standard Operating Procedure (SOP) is applicable to all UniSQ Research Workers who care for and use Animals for Scientific Purposes. The procedure must only be performed by those persons who have been deemed competent, and who believe they remain competent to do so. Access to supervision by suitably qualified staff whilst undertaking this procedure is encouraged, where required.

## Species

- *Felis Catus*

## Purpose

The purpose of this procedure is to provide information to people considering use of the Mata Hari Judas female technique for detecting and control of wildlife, principally vertebrate pest species, an understanding about what the Mata Hari Judas technique is, how it is used and the process of getting a female into prolonged oestrus.

The domestic cat, *Felis catus*, an introduced predator, is a major global conservation problem and a significant threat to biodiversity (Legge *et al.* 2020). Not only is it ubiquitous, inhabiting almost every corner of Australia and its larger islands, but it is also a generalist and opportunistic predator of many of our native species (Murphy *et al.* 2019; Nogales *et al.* 2013). Their diet consists of a range of mammals, birds, reptiles, particularly in the critical range between 35 and 5,500 grams, and feral cats are estimated to kill between 1 and 2 billion vertebrates every year (Legge *et al.* 2020). Unsurprisingly cats have been implicated as the primary casual factor in the extinction of approximately 30 species in Australia and continue to contribute to the decline of many more (Legge *et al.* 2017; Murphy *et al.* 2019). Furthermore, extinction rates of insular species due to cats, is exceptionally high and poses a concern considering the disproportionately high biodiversity found on islands (Legge *et al.* 2017; Nogales *et al.* 2013). Additionally, cats are a competitor of food resources to native predators such as quolls (Legge *et al.* 2020).

Management of feral cats is not a new concept, with baiting, trapping and shooting all used as traditional control methods (Legge *et al.* 2020). These methods all have limitations, such as native animals consuming poison bait, and generally are only capable of reducing the local cat populations as opposed to eradicating them. Although there have been a number of islands around the world where cats have been successfully eradicated, the eradication programs have spanned years with increasing costs and labour requirements due to the difficulties associated in catching remnant cryptic cats (Nogales *et al.* 2013). As such none of the traditional control methods are considered 100% effective and innovative and more efficient management of cats is needed.

One technique used to successfully eradicate other vertebrate pests, only tested once (Dennien 2022) with cats *in situ*, is the Mata Hari Judas technique (Cruz *et al.* 2009). This is a technique where a female (in this case queens) of the target species is hormonally induced into prolonged oestrus to attract animals of the same species. The Mata Hari Judas technique was first developed 15 years ago as part of the PhD project by Dr Karl Campbell (Campbell 2007; Campbell *et al.* 2007) and the process of prolonging oestrus for the same purposes (detection for control of invasive species) has been demonstrated in cats (Murray *et al.* 2020) and dogs (N. Fraser, unpublished data as part of her PhD). All of these studies used Compudose-100 to induce prolonged oestrus.

Queens will be dosed at 0.5 mg/kg total oestradiol per queen, rounded to the nearest ¼ implant - approximately 1 implant for a 30-35 kg animal. Each implant contains 21.4 mg oestradiol. For an 8 kg queen, an average size for a large domestic cat, this would be a ¼ implant of Compudose-100. There have been previously examples of inducing prolonged oestrus in queens using this dose rate (Murray *et al.* 2020; Dennien 2022). For queens less than 8 kg a 1/8 implant of Compudose-100 should be used. For these species the duration of the prolonged oestrus has been 128 days for goats, 27 days for queens and 57 days in bitches. For both queens and bitches, both entire and ovariohysterectomised Mata Hari Judas females were attractive to males of the same species. Additionally, both males and females of the species have been attracted to the MHJ female. If we can collect the 'smell' and vocalisations from a queen in oestrus and demonstrate that they are as effective as the live queen in oestrus to attract and therefore detect other cats, then we overcome the welfare issues of using live Mata Hari Judas females.

## Definitions

MHJ	Mata Hari Judas
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### Linked SOPs

SOP ID number	SOP title
WL017	Use of the Vennel by a Mata Hari Judas queen

### Potential hazard to Research Workers

UniSQ Risk Management Plan ID number	UniSQ Management Plan title
RMP_2020_4960	Wildlife research and teaching fieldwork

### Personal Protective equipment required

- Disposable examination gloves
- Eye protection
- mask

### Animal wellbeing considerations

Perceived stressors	Management strategy
Poor appetite, lack of offered food eaten	Feed good quality dried cat food; monitor feed and water intake and faecal output to determine if the diet is eaten and if any digestive problems occur (indications include diarrhea, vomiting). Change diet if necessary; repeat process.

### The overall perceived level of risk to an animal undergoing this procedure is:

High
  Medium
  Low

### Substances to be administered

Substance	Dose	Route	Purpose
Crystalline oestradiol-17 $\beta$ (Compudose-100 implant)	21.1 mg Oestradiol per implant; queens will be dosed at 0.5 mg/kg liveweight	Inserted under the skin on the dorsal surface near scapulae	Used to induce and prolong oestrus in goats, pigs, cats and domestic dogs.
Lignocaine	Not to exceed 4 mg/kg; typically 10 mg (1mL) per animal	Dermal infusion	Used to numb tissue in the area where the implant is inserted.
Aflaxalone	5 mg/kg liveweight	Intramuscular	Provides muscle relaxation, chemical restraint, and general anaesthesia.

### Equipment/ materials required

- Compudose-100 implant and other drugs listed below
- Surgical equipment (e.g. syringes and needles - typically 21 G needles and 1, 5 or 10 ml syringes - plus scalpels, surgical drapes, staples and applicator to close wound)
- Disposable examination gloves – various sizes
- Fur clippers
- Aseptic cleaning fluid
- Swabs
- Rubbish bags

- Monitoring sheets and pens

## Site specification or location requirements

At locations/ fields outlined in a UniSQ AEC approved application that includes the use of this SOP.

## Duration of the procedure

- One hour

## Procedure

To be undertaken by a veterinarian

1. Prepare equipment required for the procedure. Bring the queen to a shaded area where the procedure can be completed.
2. Sedate the animal using 5 mg/kg intramuscular injection of aflaxalone. Females must appear healthy on visual examination and data recorded during the procedure using the Anaesthetic Form and the Anaesthesia Monitoring Queen form to record data from the queen at least every 15 minutes.
3. A 5 x 5 cm area on the dorsal surface near the scapulae of the queen should be clipped and aseptically prepared.
4. Lignocaine should be infused into the skin in the centre of the prepared area.
5. A scalpel blade will be used to make a stab incision, and the implant (1/4 of the normal size implant to achieve the correct dose of oestradiol for a queen, or 1/8 implant for smaller queens) placed within the stab incision.
6. Staples will be used to close the stab incision.
7. Additional aflaxalone will be provided if deemed necessary by the veterinarian performing the procedure.
8. Return the queen to the location required and monitor until fully recovered (use Monitoring queen in vannel record sheet).

## Training, qualifications or competencies required

This SOP can only be undertaken by a veterinarian.

## References

- Campbell, K.J., Baxter, G.S., Murray, P.J., Coblenz, B.E., and Donlan, C.J. (2007). Development of a prolonged estrus effect for use in Judas goats. *Applied Animal Behaviour Science* 102: 12-23.
- Campbell, K.J. (2007). Manipulation of the reproductive system of feral goats (*Capra hircus*) to increase the efficacy of Judas goats: field methods utilising tubal sterilisation, abortion, hormone implants and epididymectomy. PhD Thesis, School of Natural and Rural Systems Management. University of Queensland, Gatton.
- Cruz, F., Carrion, V., Campbell, K.J., Lavoie, C., and Donlan, C.J. (2009). Bio-Economics of Large-Scale Eradication of Feral Goats from Santiago Island, Galápagos. *Journal of Wildlife Management* 73: 191-200.
- Dennien, A. (2022). Use of Mata Hari Judas queens as an attractant to cats *in situ*. Bachelor of Science (Honours) thesis. University of Southern Queensland.
- Legge, S., Woinarski, J.C.Z., Dickman, C.R., Doherty, T.S., McGregor, H., and Murphy B.P. (2020). Cat ecology, impacts and management in Australia. *Wildlife Research* 47: i-vi.
- Muir, W., Lerche, P., Wiese, A. et al. (2009). The cardiorespiratory and anesthetic effects of clinical and supraclinical doses of alfaxalone in cats. *Vet. Anaesth. Analg.* 36: 42-54.
- Murphy, B.P., Woolley, L., Geyle, H.M., Legge, S.M., Palmer, R., Dickman, C.R., Augusteyn, J., Brown, S.C., Comer, S., Doherty, T.S., Eager, C., Edwards, G., Fordham, D.A., Harley, D., McDonald, P.J., McGregor, H., Mosebyn, K.E., Myers, C., Read, J., Riley, J., Stokeld, D., Trewella, G.J., Turpin, J.M., and Woinarski J.C.Z. (2019).

Introduced cats (*Felis catus*) eating a continental fauna: The number of mammals killed in Australia. *Biological Conservation* 237: 28-40.

Murray, P.J., Rogie, M., Fraser, N., Hoy, J.M., and Kempster, S. (2020). Development of the Mata Hari Judas queen (*Felis catus*). *Animals* 2020, 10(10): 1843. <https://doi.org/10.3390/ani10101843>.

Nogales, M., Vidal, E., Medina, F.M., Bonnaud, E., Tershy, B.R., Campbell, K.J and Zavaleta, E.S. (2013). Feral Cats and Biodiversity Conservation: The Urgent Prioritization of Island Management. *BioScience* 63: 10, 804-810.

Whittem, T., Pasloske, K.S., Heit, M.V. et al. (2008). The pharmacokinetics and pharmacodynamics of alfaxalone in cats after single and multiple intravenous administration of Alfaxan at clinical and supraclinical doses. *J. Vet. Pharmacol. Ther.* 31(6): 571-579.

SOP approval and review history			
Date	Version	Review Pathway	Notes
5 July 2021	0.0	<b>10/06/2021</b> USQ AEC "Subject to Modifications." <b>05/07/2021</b> Reviewed and approved by the USQ AEC Executive.	N/A
11 April 2024	1.0	<b>11/04/2024</b> UniSQ AEC reviewed and approved. USQ branding updated to UniSQ	3 year review