

RUM_002 Injections - Intramuscular (IM) in cattle

I. OBJECTIVE

To describe an intramuscular (IM) injection method in cattle that is safe and effective.

II. DEFINITIONS

Competent - “the consistent application of knowledge and skill to the standard of performance required regarding the care and use of animals. It embodies the ability to transfer and apply knowledge and skill to new situations and environments.”¹

III. COMMENTS / RECOMMENDATIONS

- Relative to animal ethics applications, when using this SOP, the following must be detailed and justified in the individual ethics application: the substance for injection, and any intended variations to this SOP.
- Cattle must be appropriately restrained, considering the animal’s temperament and the procedure being performed. A cattle crush (or appropriate examination-bay) should be used for adult cattle, while young calves may be manually restrained.
- As per routine the conditions (see document footer), this procedure must be performed by, or under the direct supervision of, personnel who are competent to perform the procedure.
- Sterile, disposable needles are for individual use. Needle must not be reused between animals.
- No more than 3 attempts to achieve IM injection are appropriate (in any one session). If you find that you commonly require repeat attempts to effect IM injection, it is most likely that you are not competent in this procedure, and retraining is required.
- If there is an option to choose between intramuscular (IM) and subcutaneous (SC) injections, the SC route should be favoured as it is less invasive for the animal.

IV. EQUIPMENT

- PPE (as appropriate for your procedure) – protective clothing, footwear and disposable gloves are all recommended, if required seek advice from biosecurity personnel.
- Sterile, disposable, hypodermic needle
- Sterile, disposable syringe (of appropriate volume capacity)
- Substance for injection (see considerations, under Reference Information)
- Disposable swabs (or some form of clean cloth material) <may not be required>
- Skin disinfectant e.g. 70% ethanol <may not be required>

V. PREPARATION

1. Identify the animal for injection – with reference to individual identification tags ensure the correct animal has been selected and restrained for injection.
2. Assess the substance for injection – ensure the correct injection substance has been selected (carefully read the label), ensure the substance has not expired, and ensure there are no abnormal changes to the substance (e.g. unexpected precipitates or discolouration). If the bottle’s cap is at all dirty/dusty disinfect it with ethanol prior to use.

¹ NHMRC, 2013, Australian code for the care and use of animals for scientific purposes, National Health and Medical Research Council (NHMRC), accessible via: <https://www.nhmrc.gov.au/about-us/publications/aust...>

Conditions:

- Investigators named in an animal ethics application, relative to this SOP, must be competent to implement the SOP
- Any variation to this SOP must be described in the relevant animal ethics application
- If this SOP has not been reviewed and approved by a UQ AEC within the last three years it is no longer valid and cannot be used in animal ethics applications until reapproved (see “AEC Reviewed/Approved” date in this document’s header).

- Draw up the substance for injection – the required volume should be drawn up into syringes, ready for use. Large volumes must be divided up and injected at multiple locations: the maximum IM injection volume is 15mL/site. Ensure a new needle is used for each animal. The needle gauge used should be the smallest size practical for the procedure – see table 1, within Reference Information for more detail.

VI. PROCEDURE

- Approach the restrained animal and identify the location for IM injection (see figure 1 identifying NECK, 3 identifying THIGH, and 4 identifying RUMP injection zones). Intramuscular injections into the NECK should be favoured relative to THIGH and RUMP injections as this location is potentially less invasive for the animal and presents less risk for carcass downgrades (post-mortem).
- If the skin at the intended injection site is dirty clean the area with swabs and skin disinfectant. Do not inject through dirty skin.
- With your hand give the animal some ‘warning’ taps or firm scratches over the intended injection site. This helps to distract and desensitising the animal. After 1-2 seconds of ‘distraction’, with one hand, swiftly advance the needle through the skin at ≥ 45 -degree angle to the skin’s surface.
- Ensure the needle has entered a muscle body. See figure 2, which demonstrates placement of the needle through the subcutaneous space, with the tip within a muscle body.
- Draw back on the syringe. If blood does not enter the syringe, inject the substance. If blood “flashes” into the syringe reposition the needle tip and repeat this step.
- Withdraw the needle from the animal. If there is a bead of blood or some reflux of the injected substance at the injection site use one of the swabs to apply gentle pressure until the discharge ceases (usually < 1 min).
- Observe the animal for any sign of adverse reactions to the injection (e.g. acute swelling at the injection site, hives, increased respiratory rate, depression, or agitation). If unexpected adverse reactions occur immediately seek veterinary advise, and follow institutional procedures as appropriate (see guiding information on the [animal ethics webpage](#)).

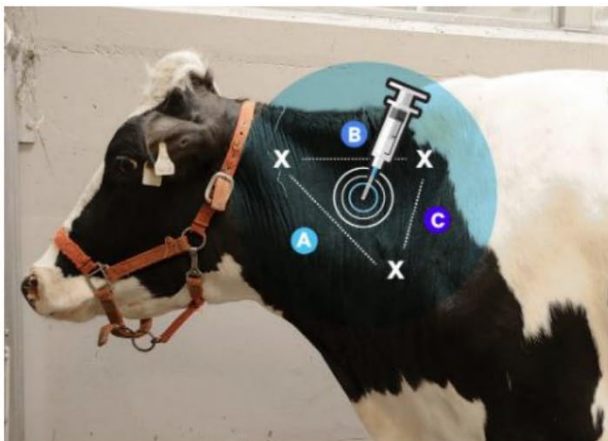


FIGURE 1: Intramuscular injection zone: NECK



FIGURE 2: Intramuscular injection site

Conditions:

- Investigators named in an animal ethics application, relative to this SOP, must be competent to implement the SOP
- Any variation to this SOP must be described in the relevant animal ethics application
- If this SOP has not been reviewed and approved by a UQ AEC within the last three years it is no longer valid and cannot be used in animal ethics applications until reapproved (see “AEC Reviewed/Approved” date in this document’s header).



FIGURE3: Intramuscular injection zone: THIGH

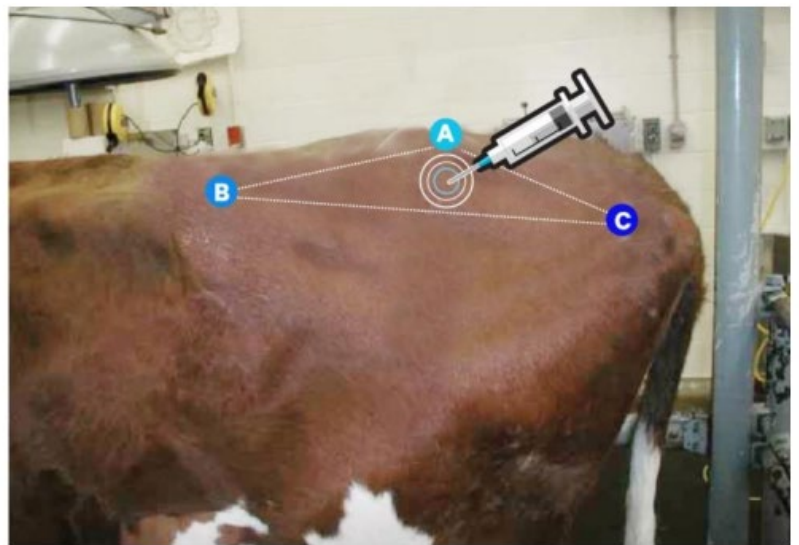


FIGURE4: Intramuscular injection zone: RUMP

(images sourced from McGill University, 2013; accessed via:

<https://www.mcgill.ca/research/research/compliance/animals/animal-research-practices/sop>)

VII. REFERENCE INFORMATION

Table 1. Needle gauge, needle length, and maximum injection volumes, relative to intramuscular (IM) injection.

	Needle gauge	Needle length	Maximum volume (per site)
Calf (pre-weaning)	18 – 20G	~ 1 inch	5mL
Weaner/young adult	16 – 20G	1 – 1.5 inches	10mL
Adult	16 – 20G	1 – 1.5 inches	15mL

Substance for injection – considerations:

Injecting substances can have deleterious impacts to animals. Any substance for injection should be as formulated to be as 'physiologically neutral' as possible, as this will help to minimise the risk and severity any potential impacts.

The following is a non-exhaustive list of recommendations, relative to achieving 'physiological neutrality',

- pH – maintained between 7.3 and 7.45
- tonicity – isotonic (i.e. the same tonicity as blood; 275 - 310 mOsm/L)
- temperature – approximately body temperature (i.e. 38 +/- 1°C)
- sterility – substances must be sterile
- volume – the smallest effective volume; refer to table 1 for maximum injection volumes per site.
- expiry – must be "in date"; ensure the expiry date is checked and that there are no abnormal precipitates in the substance

Version #	Reviewing AEC (note: all other relevant AECs ratify the approval)	AEC Review Date	Approval To Date
1	PCA	14/12/2022	14/12/2025

Conditions:

- Investigators named in an animal ethics application, relative to this SOP, must be competent to implement the SOP
- Any variation to this SOP must be described in the relevant animal ethics application
- If this SOP has not been reviewed and approved by a UQ AEC within the last three years it is no longer valid and cannot be used in animal ethics applications until reapproved (see "AEC Reviewed/Approved" date in this document's header).