

RUM_003 Injections – Subcutaneous (SC) in Cattle

I. OBJECTIVE

To describe a subcutaneous (SC) 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 SC injection are appropriate (in any one session). If you find that is not uncommon that you require repeat attempts at SC 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:

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- Any variation to this SOP must be described in the relevant animal ethics application
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3. Draw up 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 SC injection volume is 20mL/site. Ensure a new needle is used for each animal. The needle gauge used should be the smallest size practical.

VI. PROCEDURE

1. Approach the restrained animal and identify the location for SC injection (see figure 1, illustrating the SC ‘triangular’ injection region of the neck bounded by the nuchal ligament dorsally, the scapula caudally, and the cervical spine and associated musculature ventrally).
2. If the skin at the intended injection site is dirty clean the area with swabs and skin disinfectant. Do not inject through dirty skin.
3. With one hand tent the skin, and with the other hand advance the needle-syringe through the skin at a 30–45-degree angle to the skin’s surface. Stop advancing the needle once the tip is within the subcutaneous space. Do not continue to advance the needle into any of the underlying muscle bodies. See figure 2, which demonstrates skin tenting, and placement of the needle tip into the subcutaneous space.
4. 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.
5. 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 <1min).
6. 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](#)).

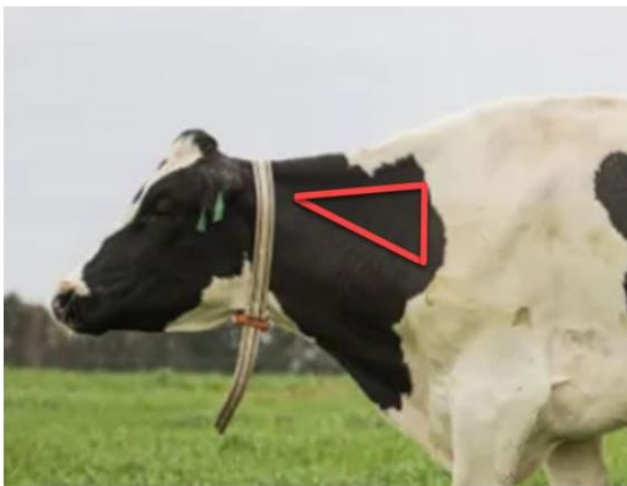


FIGURE 1: Subcutaneous injection zone

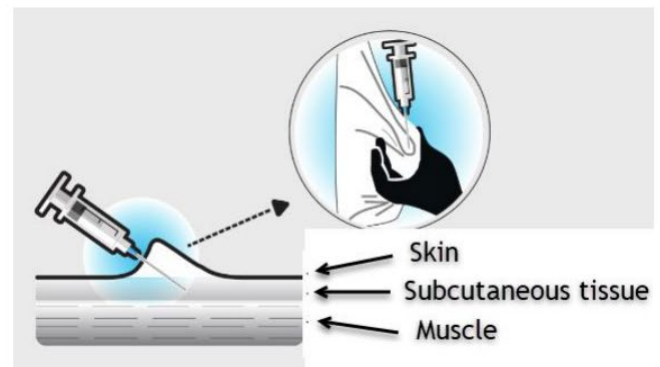


FIGURE 2: Subcutaneous injection site

(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 subcutaneous (SC) injection.

	Needle gauge	Needle length	Maximum volume (per site)
Calf (pre-weaning)	18 – 20G	~ 1 inch	10mL
Weaner/young adult	16 – 20G	~ 1 inch	20mL
Adult	14 – 20G	~ 1 inch	20mL

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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 of 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

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