# **COLLECTION OF BLOOD SAMPLE: CATTLE**

#### 1. PURPOSE

To describe how to safely collect blood sample from cattle.

#### 2. RESPONSIBILITY

- 2.1 Dairy Manager
- 2.2 Farm manager
- 2.3 Veterinarian
- 2.4 Researchers

### **\*** NOTE

- Demonstrator: The operators should be familiar with the correct techniques and the anatomy of cattle before attempting this procedure
- Students: The procedures must be clearly demonstrated before students attempt them. Students should be aware of the requirements for sterile technique.

### 3. MATERIAL

The type of material used will vary according to the collection method.

- 3.1 Disposable gloves
- 3.2 Halter
- 3.3 Clippers (optional)
- 3.4 Vacutainer collection:
  - 3.4.1 20G1" vacutainer needle: Coccygeal vein collection
  - 3.4.2 14G2" vacutainer needle: Jugular vein
  - 3.4.3 One vacutainer tube or bottle per animal (lavender, green, red)
  - 3.4.4 Vacutainer tube holder
- 3.5 Syringe Collection:
  - 3.5.1 20G1" needle: Coccygeal venipuncture
  - 3.5.2 14G2" needle: Jugular venipuncture
  - $3.5.3 \quad 1-5 \text{ cc syringe}$
- 3.6 Bleeding Tube Collection (> 100 ml)
  - 3.6.1 2 x 14G2" vacutainer needles
  - 3.6.2 500ml heparinized bottle (for collection of large volume e.g. 500ml)
  - 3.6.3 Heparin
  - 3.6.4 Bleeding tube (for collection of large volume, e.g. 500ml)
- 3.7 Antiseptic
- 3.8 Gauze
- 3.9 Sharps container
- 3.10 Biohazard box for syringe disposal

#### 4. CONSIDERATIONS

- 4.1 Ensure that the animal is properly restrained to avoid injury to the animal and/or study personnel.
- 4.2 Blood can be collected from the jugular vein in cattle.

Blood Volume (mg/kg)	Total Blood volume (TBV), normal adult (ml)	Safe volume for single bled (ml)
60	27,000 - 36,000b (assumes adult weight 600-800kg)	2700 - 3600

FIGURE.1: NC3Rs Blood Sample Volumes

- 4.3 Minimal restraint is usually required to obtain blood samples from a cow. If restraint is necessary, it should be executed to ensure quick, easy and safe collection of the sample causing minimal distress.
- 4.4 Allow the animal some time to adjust to their restraint before beginning.
- 4.5 Operators should use gloves and disinfect them between animals to prevent the transmission of blood-borne diseases.
- 4.6 Equipment such as vacutainer holders must be cleaned between animals.
- 4.7 Use a fresh needle for each animal to eliminate risk of cross-contamination.

### 5. PROCEDURES

- 5.1 Use clean gloves to prevent the transmission of blood-borne diseases.
- 5.2 Use a fresh bleeding needle with every cow.
- 5.3 JUGULAR VENIPUNCTURE USING VACUTAINER NEEDLE AND TUBES: (<100 ml)
  - 5.3.1 Using the halter, position the animal's head so that it is slightly elevated and drawn to the side to expose the jugular vein. (Figure 2)



FIGURE 2: Restrain the animal to expose the jugular vein

5.3.2 Screw the 14G 2" Vacutainer needle onto the vacutainer holder.

- 5.3.3 Insert the vacutainer tube into the other end of the Vacutainer holder. DO NOT puncture the stopper. Hold these assembled materials in one hand.
- 5.3.4 Disinfect venipuncture site with alcohol.
- 5.3.5 Occlude jugular vein by applying pressure in the jugular groove located in the lower neck. (Figure 3)
- 5.3.6 Insert the needle into the distended jugular vein at a 45° angle cranial to the jugular groove. (Figure 3)

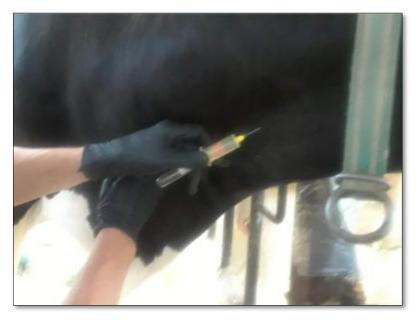


FIGURE 3: Occlude the vein and insert the needle

- 5.3.7 Once needle is positioned in the vein, insert a vacutainer tube into the needle to collect the blood.
- 5.3.8 You can collect more than one tube by replacing vacutainer tubes.
- 5.3.9 When the desired volume has been collected (5 ml minimum suggested) remove the occluding pressure from the vein.
- 5.3.10 Detach the tube from the needle and withdraw the needle from the jugular vein.

# \* NOTE

DO NOT PULL NEEDLE OUT OF VEIN WITH VACUTAINER TUBE STILL ATTACHED, AS THIS WILL RELEASE VACUUM IN VACUTAINER.

- 5.3.11 Apply pressure with gauze for 30 to 60 seconds in order to ensure adequate hemostasis.
- 5.3.12 Invert the tube several times to mix.

### 5.4 JUGULAR VENIPUNCTURE USING SYRINGE AND NEEDLE: (<100 ml)

5.4.1 Attach a 14G 2" needle to a 1 or 5 cc syringe.

- 5.4.2 Using the halter, position the animal's head so that it is slightly elevated and drawn to the side to expose the jugular vein. (Figure 2)
- 5.4.3 Disinfect venipuncture area with alcohol.
- 5.4.4 Occlude jugular vein by applying pressure in the jugular groove located in the lower neck. (Figure 3)
- 5.4.5 Pass the needle through the skin and into the vein by a firm thrust at an angle of 20° to the skin surface.
- 5.4.6 Withdraw the blood sample (Figure 4).



FIGURE 4: Occlude the vein, insert needle and withdraw blood

- 5.4.7 When the desired volume has been collected (5 ml minimum suggested), remove the occluding pressure from the vein. And remove the needle.
- 5.4.8 Apply pressure with gauze for 30 to 60 seconds in order to ensure adequate hemostasis.
- 5.4.9 Dispose of needle(s) in a Sharps container.
- 5.4.10 Transfer the blood to the appropriate vacutainer tube.
- 5.4.11 Invert the tube several times to mix.
- 5.4.12 Serial samples can be taken by alternating sides, and by moving insertion sites cranially, as long as there is no hematoma formation.

# 5.5 JUGULAR VENIPUNCTURE USING BLEEDING TUBE (> 100 ml):

- 5.5.1 Flush the Bleeding tube with heparin to prevent coagulation during collection.
- 5.5.2 Attach a 14G 2" vacutainer needle on each end of the bleeding tube.

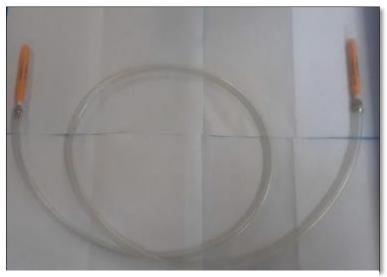


FIGURE 5: Attach vacutainer needle on each end of the bleeding tube

- 5.5.3 Disinfect the rubber seal of the heparinized bottle with alcohol.
- 5.5.4 Uncap the needle of one end of the bleeding tube and insert into the rubber top of the heparinized bottle.
- 5.5.5 Insert the needle on the other end of the tube into the distended jugular vein at a 45° angle cranial to the jugular groove. (see Figure 3 for positioning)
- 5.5.6 You can collect more than one bottle by transferring the needle on the bottle end to another bottle. Refer to Figure 1 NC3Rs Blood Sample Volumes for safe collections for a single bleed.
- 5.5.7 When the desired volume has been collected, remove the occluding pressure from the vein.
- 5.5.8 Detach the bleeding tube from the needle and withdraw the needle from the jugular vein.
- 5.5.9 Invert the bottle several times to mix.

# \* NOTE

DO NOT PULL NEEDLE OUT OF VEIN WITH VACUTAINER TUBE STILL ATTACHED, AS THIS WILL RELEASE VACUUM IN VACUTAINER.

- 5.5.10 Apply pressure with gauze for 30 to 60 seconds in order to ensure adequate hemostasis.
- 5.5.11 Serial samples can be taken by alternating sides, and by moving insertion sites cranially, as long as there is no hematoma formation.

### 5.6 COCCYGEAL VENIPUNCTURE USING VACUTAINER NEEDLE AND TUBES (<100 ml):

- 5.6.1 Restrain the cow to prevent her from moving away during the procedure.
- 5.6.2 Raise the tail vertically until it is horizontal with the ground and the ventral surface of the tail is accessible.
- 5.6.3 Locate the groove lying in the ventral midline of the tail. (~150 mm from the base of the tail). (Figure 6)



FIGURE 6: Coccygeal Vein

- 5.6.4 Screw the 20G 1" Vacutainer needle onto the vacutainer holder.
- 5.6.5 Insert the vacutainer tune into the other end of the Vacutainer holder. DO NOT puncture the stopper. Hold theses assembles material into one hand.
- 5.6.6 Disinfect venipuncture area with alcohol.
- 5.6.7 Midway along the body of a coccygeal vertebra, insert the 20G 1" needle attached to the vacutainer holder perpendicularly to the surface of the skin to a depth of a few millimeters.
- 5.6.8 Once needle is positioned, insert a vacutainer tube into the needle to collect the blood.
- 5.6.9 You can collect more than one tube by replacing vacutainer tubes.
- 5.6.10 When the desired volume has been collected (5 ml minimum suggested), remove the occluding pressure from the vein.
- 5.6.11 Detach the vacutainer tube from the needle and withdraw the needle from the jugular vein.

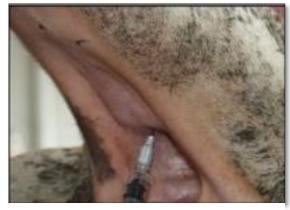
### \* NOTE

DO NOT PULL NEEDLE OUT OF VEIN WITH VACUTAINER TUBE STILL ATTACHED, AS THIS WILL RELEASE VACUUM IN VACUTAINER.

- 5.6.12 Apply pressure with gauze for 30 to 60 seconds in order to ensure adequate hemostasis.
- 5.6.13 Invert the tube several times to mix.

# 5.7 COCCYGEAL VENIPUNCTURE USING SYRINGE AND NEEDLE (<100 ml):

- 5.7.1 Restrain the cow to prevent her from moving away during the procedure.
- 5.7.2 Raise the tail vertically until it is horizontal with the ground and the ventral surface of the tail is accessible.
- 5.7.3 Locate the groove lying in the ventral midline of the tail. (~150 mm from the base of the tail). (Figure 6)
- 5.7.4 Disinfect venipuncture area with alcohol.
- 5.7.5 Midway along the body of a coccygeal vertebra, insert the 20G 1" needle perpendicularly to the surface of the skin to a depth of a few millimeters. (Figure 7)
- 5.7.6 Withdraw blood sample (Figure 8) and remove needle. In order to ensure adequate hemostasis, apply pressure with gauze for 30 to 60 seconds.



**FIGURE 7**: Insert the needle in the groove lying in the middle of the tail



FIGURE 8: Withdraw blood sample

- 5.7.7 Apply pressure with gauze for 30 to 60 seconds in order to ensure adequate hemostasis.
- 5.7.8 Transfer the blood to the appropriate vacutainer tube.
- 5.7.9 Invert the tube several times to mix.
- 5.8 Promptly dispose of used sharps in the sharps container. Note: Needle holders can be re-used.
- 5.9 Identify the tube(s) / bottle(s) with the animal's identification name or number and farm name and complete the sample form.
- 5.10 Place the tube(s) in an ice rack or refrigerator until it is shipped.

#### 6. REFERENCES

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#### Document Status and Revision History

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3-May-2018	NEW	Reviewed by Dr. Maxime Despots (Clinical Veterinarian)
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