Blood collection from the jugular vein in sheep

Adapted from Schwartz-Cornil et al. (2006)

Basic principle

Blood collection from the jugular vein in sheep is a standard procedure for veterinary purposes and research. The jugular vein is chosen because it is large, relatively accessible, and provides a sufficient blood volume with minimal risk to the animal when performed correctly.

Required equipment and consumables

1. Alcohol swabs for skin disinfection.
2. Blood collection tubes (appropriate for the type of analysis: EDTA, serum separator, etc.).
3. Cotton balls or gauze for post-collection pressure.
4. Electric trimmer
5. Gloves (for hygiene and to avoid contamination).
6. Sterile needles and syringes (usually 18–22 gauge, depending on the size of the animal and the volume of blood needed).
7. Pen or marker
8. Weighing scale

Procedure

1. Restrain the sheep: It's important to ensure the sheep is calm and safely restrained inside the weighing scale. Each sheep must be restrained by one person while another performs additional handling.
2. Positioning: The sheep should ideally be standing or slightly restrained in a way that allows easy access to the jugular vein on either side of the neck.
3. Identify the Jugular vein. The jugular vein runs along the side of the neck, just beneath the skin, and can be palpated by gently pressing along the neck. It is generally located between the trachea (windpipe) and the muscles on the side of the neck. If it cannot be easily identified, proceed to trim the area.
4. The vein is most easily seen when the animal is calm or after gently pressing over the area with your finger, as it may be more pronounced.

5. Clean the site: Use an alcohol swab to disinfect the skin over the jugular vein. This helps reduce the risk of infection and ensures sterility of the area where the needle will be inserted.
6. Allow the alcohol to dry to avoid stinging or discomfort during the procedure.
7. Needle Insertion, choose the correct angle: Insert the needle into the vein at a 30-45 degree angle, directing it towards the vein. It's typically inserted bevel-up to improve blood flow into the syringe or collection tube.
8. Aspiration: After insertion, gently pull back on the plunger of the syringe to confirm that blood is entering the syringe. Once blood is drawn into the syringe, you can proceed to collect the required volume.
9. Blood Collection: The amount of blood that can be safely drawn depends on the size of the sheep and the purpose of the collection. Generally, you should not collect more than 10% of the animal's total blood volume in a single session to avoid causing harm (for a typical adult sheep, this is approximately 50–100 mL).
10. Collection Method: Blood can be collected directly into a syringe or into vacuum blood collection tubes, depending on the type of test being performed. For example:
    a. EDTA tubes for whole blood or blood smears, metabolome assessment using LC-MS/MS, and DNA extraction.
    b. Serum separator tubes for serum collection.
    c. Heparinized tubes for plasma.
11. Withdraw the needle: Once the required volume of blood has been collected, remove the needle from the vein quickly and apply pressure to the puncture site to prevent bleeding.
12. Apply pressure: Hold a cotton ball or gauze over the puncture site and apply gentle pressure for 30 seconds to 1 minute to stop any bleeding. This is especially important to prevent hematomas or bruising.
13. Dispose of the needle and syringe: Safely dispose of the needle and syringe in a proper sharps container to prevent injury.
14. Monitor the animal: After blood collection, monitor the sheep for any signs of discomfort, such as excessive bleeding, swelling, or signs of distress.
15. Comfort the sheep: Once the blood has been collected and the site is properly bandaged (if needed), the sheep can be released. Allow some time for the animal to calm down, and ensure it is not showing signs of stress or fainting.
16. Label the samples: Properly label the blood tubes with the sheep's identification, date, and any other relevant information.
17. Transport to the laboratory: Ensure that blood samples are transported under appropriate conditions to the laboratory for analysis. Place all samples in a container at low temperature, with no tube agitation, to prevent cell disruption and DNA fragmentation.

Precautions

Always invert the collection tube several times to ensure a homogenous mixture with additives such as EDTA.

Applications

Blood samples can be used for downstream processing such as DNA extraction and liquid chromatography mass spectrophotometry analysis.

Bibliography

Schwartz-Cornil, I., Epardaud, M., & Bonneau, M. (2006). Cervical duct cannulation in sheep for collection of afferent lymph dendritic cells from head tissues. *Nature Protocols*, *1*(2), 874–879. https://doi.org/10.1038/nprot.2006.147