



## AgMOOC Course on Fluid Therapy and Management of Clinical Syndromes in Cattle and Small Ruminants

Unit : Anemia and Blood Transfusion in Ruminants

Lesson : 5

# Blood Transfusion in Small Ruminants

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# Lamb to Human Transfusion is the Land Mark Beginning of Transfusion Medicine



Figure 1. Lower's blood transfusion, 1667. The tubes used to puncture the blood vessels and transfer the blood are at the top left. This illustration is from a 1692 work by the German surgeon Matthäus (Mattias) Gottfried Purmann (Wellcome Collection. CC BY, <https://wellcomecollection.org/works/fj7nx24>).

# Small Ruminant Anemia

- Most common reason for is internal parasitism.
- *Hemonchus contortus*.
- With the ever increasing issue of parasite resistance, practitioners will be faced with the severely anemic small ruminant.
- Blood parasites and External Parasites are another common cause

# Sheep Blood Groups

- Seven blood group systems have been identified in sheep
- **A, B, C, D, M, R and X.**
- Similar to cattle, the B system is highly polymorphic.  
The R system is similar to the J system in cattle, in that the antigen is soluble.
- The M-L system is involved in active red cell potassium transport and polymorphisms in this system result in breeds of sheep with varying erythrocyte potassium content.

- Neonatal isoerythrolysis has been reported in lambs administered bovine colostrum.
- This is due to the presence of antibodies to sheep erythrocytes in bovine colostrum (called “heterophile” antibodies), which is a common occurrence.
- They are antibodies produced to common cross-reactive antigens present on the surface of bacteria and protozoa that are identical to epitopes on blood group antigens.

# Goat Blood Groups

- Blood group antigens in goats are similar to those in sheep and the same reagents are used to type both species.

Five major systems have been identified in goats:

- **A, B, C, M and J**
- J is also a soluble antigen like in cattle.

# Blood Collection from Donor Goat



# Donor Blood Collection

- 10-20 ml/kg can be collected from a healthy donor.
- We typically collect 10-15 ml/kg which equates to 500 to 750 ml from a 50 kg goat.
- Use of Standard Blood Bags are recommended.
- Blood can also be collected in sterile IV bags that have had sodium citrate added as an anticoagulant.
- One hundred ml of a 4% Na citrate solution should be added to a 1 liter bag.
- The bag should be agitated during collection to prevent clotting.



# Blood Transfusion in a Goat



# Transfusion Tips

- Infuse at a slow drip for the first 15 minutes, if no reactions occur, the rest of the volume may be transfused at a rapid drip.
- Reactions are quite rare in small ruminants during the first transfusion.
- Reactions will likely become more frequent if subsequent (days to weeks later) transfusions are necessary.
- Epinephrine is the drug of choice if a reaction occurs.
- If a serious reaction does occur, blood may be transfused very slowly or another donor should be considered.

# Emerging Therapies

## Preliminary Investigation of Bovine Whole Blood Xenotransfusion as a Therapeutic Modality for the Treatment of Anemia in Goats

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# Precautions

- Transfusions are regarded as only temporary.
- Donor erythrocytes being cleared in an average of 8 days in goats.
- Cross matching small ruminant blood before an initial Transfusion is not very necessary because of the minimal level of agglutinating antibody present in Ruminant serum.
- However, it becomes necessary when multiple transfusions are to be performed

# Transfusion Monitoring

- Clinical observations : heart rate, respiratory rate, and rectal temperature
- 30 minutes, six, twelve, 24, 48, 72, and 96 hours and eight and 16 days after transfusion
- Some reports claim that transfusion reactions in ruminants receiving a single blood transfusion are uncommon, as these animals have low levels of circulating iso-antibodies

# Transfusion Reactions

- **Commonest signs of transfusion reactions in ruminants are tachycardia, tachypnea, sudoresis, tremors, fever, pruritus, dyspnea, hematuria, and hemoglobinuria.**
- **Hyperthermia was the most frequent (50% of animals).**
- **Tachycardia occurred most frequently**
- **A single transfusion of fresh or stored blood can cause**
  - **inflammatory reactions**
  - **febrile non-hemolytic transfusion reactions in sheep**
- **Other types of transfusion reaction are such as hemolysis, circulatory overload, and anaphylaxis**

# Stored Blood & its Usage

- Stored total blood from sheep in blood bags containing CPDA-1, for 35 days had progressive increases in the concentrations of plasma hemoglobin, potassium, and lactate, and decreases in blood pH and in the concentrations of sodium, bicarbonate, and glucose.
- These are the storage lesions and are indicative of loss of quality of the stored blood, which may contribute towards occurrences of post-transfusion reactions



*Thank  
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