**Blood sample volume in animals**:

Total blood volume accounts for about 10% to 11% of body weight in hot blooded. It may be desirable to calculate the total blood volume of an animal in determining the size of a needed blood transfusion, or the amount of blood that can safely be removed for a series of diagnostic tests, or when an animal is to be used as a blood donor.

|  |  |
| --- | --- |
| Species of animal | Blood volume |
| Ruminants ,cats, rodents, cold blooded  | 6-7% |
| horse | 10-11% |
| dog | 8-9% |
| Young growing animals | Exceed 10% |

 For example, the **total blood volume** of a 4-kg cat is 0.07 × 4 kg = 0.28 kg = 280 mL, assuming that 7% of body weight is blood in cats and the specific gravity of blood is 1.0 (1 mL weighs 1 g).Two methods used to calculate the blood volume safely remove from an animal:

1-Since one can safely remove **20%** of the blood volume from an animal, the calculated amount that can be removed from the cat in this example is:

**Total blood volume(ml)**×**20%**

280 × 0.2 = 56 mL(the blood volume safely remove from an animal).

2-The blood volume safely remove from an animal calculated by used the following table:

1. Dog …….………….…..77-78 ml/kg
2. Sheep …………….……62-66 ml/kg
3. Horse…………….…… 88-110 ml/kg
4. Rat ……………….……70-82 ml/kg
5. Guinea pig …………….66-78 ml/kg

As a practical guide ...70 ml/kg

**Method of blood collection:**

1. Using a needle and syringe.
2. Using evacuated tube.
3. Using butterfly catheter(canula).

**Collection sites in different animals :**

COLLECTION OF BLOOD FROM **CAT**:

The medial **saphenous vein** of the **cat** has a long straight course and is very superficial.

It is a good vein from which to collect small volumes of blood. The cat is restrained in lateral recumbence. Pressure is applied in the inguinal region to occlude venous return and causing engorgement of the vein with blood. The site is wiped with alcohol and hairs are shaved. Use, **22– to 25**–gauge needle attached to a 1–or 3–ml syringe for the collection of blood.

Because the vein has a small diameter, vigorous aspiration will result in **collapse** of the vein. Therefore only slight suction should be applied to the syringe when aspirating blood. The blood will drow slowly into the syringe; collect only a small volume (up to ~1ml) of blood. At the completion of the venepuncture, the needle is removed from the vein; the holder should release pressure from the inguinal region and place firm digital pressure at the puncture site for several minutes to prevent hematoma formation. Apply some disinfectant on the area after withdrawing blood .

COLLECTION OF BLOOD FROM **DOG**:

1-Restrain the dog and shave the area just below the elbow on the top of the leg. Shave where the **cephalic vein** is most prominent.

In some dogs, the cephalic vein is not as prominent and you may have to draw from the **jugular vein**. If drawing a sample from the jugular vein, shaving is usually not required unless the dog has excessive amounts of hair. Some dogs will willingly give you their leg and allow you to take a blood sample without much restraint.

Selecting the needle size should be based on the size of the dog and the size of the vein. Typically, a **22G** needle works for most blood draws. In larger breed dogs, an 18G needle will be better and the blood sample will be obtained much more quickly.

 Spray alcohol on the area that is about to be punctured by the needle as this will **sterilize** the area and prevent any bacteria from entering with the needle. Grab the leg with your hand that is not holding the needle and place your thumb next to the lateral aspect of the cephalic vein to prevent the vein from moving on you.

Insert the needle of the syringe directly over the raised cephalic vein. If you have entered the cephalic vein correctly, a small amount of blood will enter the tip of the syringe. At this point, you should pull back on the syringe plunger and blood should begin to enter. Take 2–5 ml of blood at one time. Pulsate the leg if blood is not entering the syringe very quickly.Remove the needle and tell your assistant to release pressure over the vein before doing this (Fig.3-1).

 Otherwise, blood will start coming out of where you just inserted the needle. Apply pressure over the venipuncture site for 30 seconds and then apply a disinfectant (14).

* **COLLECTION OF BLOOD FROM SHEEP** :

 **Jugular Venipuncture** Shave the area approximately 4 inches wide by 8 inches long. Beginner can take the help of assistant. The assistant should turn the head of the animal at a 30–degree angle to the side by holding the animal under its jaw to allow for easy access to the vein. The animal’s body may also need to be restrained and Locating the vein.small amount of alcohol poured over the area where the vein is supposed to be located.

Once the vein has been located, the area needs to be properly cleaned to keep bacteria out of the needle insertion site. This is accomplished by using the alcohol spray on the area. Never go back over a place that has already been wiped, because bacteria could be carried back into the clean area.

Once the area has been cleaned and the vein has been located, the blood can be drawn. This can be done by using a needle (20 gauge) and 5 cc syringe. If a needle and syringe are used, be sure to check that the needle is firmly attached to the syringe and that both the syringe and the needle are new and clean. Contamination from other animals could cause contamination of the sample or infection of the animal. Remove the cap from the needle first and be careful not to prick yourself.

Insert needle into the vein at the lowest point possible on the exposed area of the neck. By doing this, the vein can still be used if there are unsuccessful attempts at drawing the blood. Gently pull back on the syringe to see if the needle is in the vein. If no blood pulls back into the syringe, the needle is either parallel to the vein, or it has gone completely through the vein and out the opposite side.

Light movements of the syringe can be used to try to locate the vein and penetrate it. When blood is easily pulled back into the syringe, the needle is within the vein. Fill the syringe with the desired amount of blood. Once the sample has been obtained, remove the pressure from the vein, take the needle out, and press gently on the site of needle insertion. Finally, place the needle through the stopper of the appropriate blood collection tube.(Fig.4-1)

* **COLLECTION OF BLOOD FROM CATTLE:**
* **Jugular Venipuncture:**

Using the halter, the head is elevated slightly, drawn to the side opposite the jugular vein to be sampled, and tied to a stationary surface. The vein is occluded by digital pressure in the jugular groove low in the neck. Insert 18 gauge needle into the distended jugular vein at approximately 45°. When positioned in the vein, collect blood. When the desired volume has been collected, the occluding pressure is removed.

* **Coccygeal Venipuncture** :

Blood collection from the coccygeal (tail) vein is performed with the animal restrained in a crush. The tail is held in one hand such that the ventral surface is accessible. The ventral surface of the tail is cleaned with a swab to remove faecal material. A needle is then inserted perpendicular to the skin surface on the midline between (approximately) the third and fourth coccygeal vertebrae. When blood flows from the needle, the syringe is attached and the sample is collected. After sample collection is complete the tail is released. The syringe may be attached to the needle prior to insertion with gentle aspiration used to determine if the needle is in the correct location(15).

* **COLLECTION OF BLOOD FROM HORSE** :

The jugular vein in the neck region of a horse is the best place to collect a blood sample. First, clean the jugular furrow of the neck with a piece of cotton or gauze pad soaked in alcohol. This will sanitize the area and make the vein easier to see. Restrain the animal with the head slightly elevated. The jugular groove is identified. The vein is occluded with digital pressure at the base of the jugular groove. A needle is advanced through the skin either with a firm thrust into the jugular vein or by gently easing the needle of 21gauge through the skin and into the jugular vein at a 35o angle towards the head. When the desired volume is received, digital pressure may be removed and the needle withdrawn from the vein. On completion of procedure observe animal for signs of excessive distress and treated if necessary. After collection of desired sample, apply disinfectant on the area(Fig.5-1)

**Problems of blood collection:**

**Haemolysis coagulation contamination**

To minimize haemolysis of the blood sample:

1-remove the needle from the syringe and gently expel the blood into the tube containing the anticoagulant.

2-Gently rotate the tube(8 figer) so that the blood is entirely mixed with anticoagulant.

3-Vigorous shaking may cause haemolysis and should be avoided.

Take care with small (0.5 ml,) tubes to ensure the blood is mixed with the anticoagulant because it may be held stationary by surface tension despite the movement of the tube.

If the blood is squirt through the needle into a tube, shaken too vigorously, subject to delayed processing or exposed to temperature extremes then the erythrocytes will lyse (i.e. haemolysis), which may result in false laboratory data such as decreased haematocrit and increased mean corpuscular haemoglobin concentration.