

Clinical pathology 4 th class	Erythrocytes	Dr Mohammed A.Y.Al-Amery 2025
---	---------------------	----------------------------------

Erythrocytes function is oxygen transport, which is mediated by hemoglobin.

Normal erythron: vary within the animal species in terms of size, number, shape, lifespan, metabolism, and response to anemia.

Normal equine RBC:

Equine erythrocytes are about 5-6 μ in diameter and lack central pallor. Blood from healthy horses often displays prominent rouleaux formation. Occasional the erythrocyte lifespan in horses average 145 days.

Bovine erythrocytes:

Are similar in size to horse erythrocytes and have a small amount of central pallor. The approximate erythrocyte lifespan is 160 days.

Marked variation in red blood cell shape (poikilocytosis) in calf blood.

Normal canine erythrocytes:

The canine erythrocyte is a relatively large (6-7 μ), uniform, biconcave disc. This is reflected in the Wright's stained blood film as a cell with an area of central pallor (lifespan is 110 -120 days while 70 days in cat).

Small numbers of polychromatophilic erythrocytes are observed in blood smears from healthy dogs (<1.5% reticulocytes).

Normal sheep erythrocytes

Similar to bovine type but smaller (4.5 μ), no poikilocytosis.

Normal caprine erythrocytes:

Marked poikilocytosis can be a normal feature in the blood of some goats. Goat red cells are the smallest of the domestic animal species (3 μ). The caprine erythrocyte lifespan is approximately 125 days.

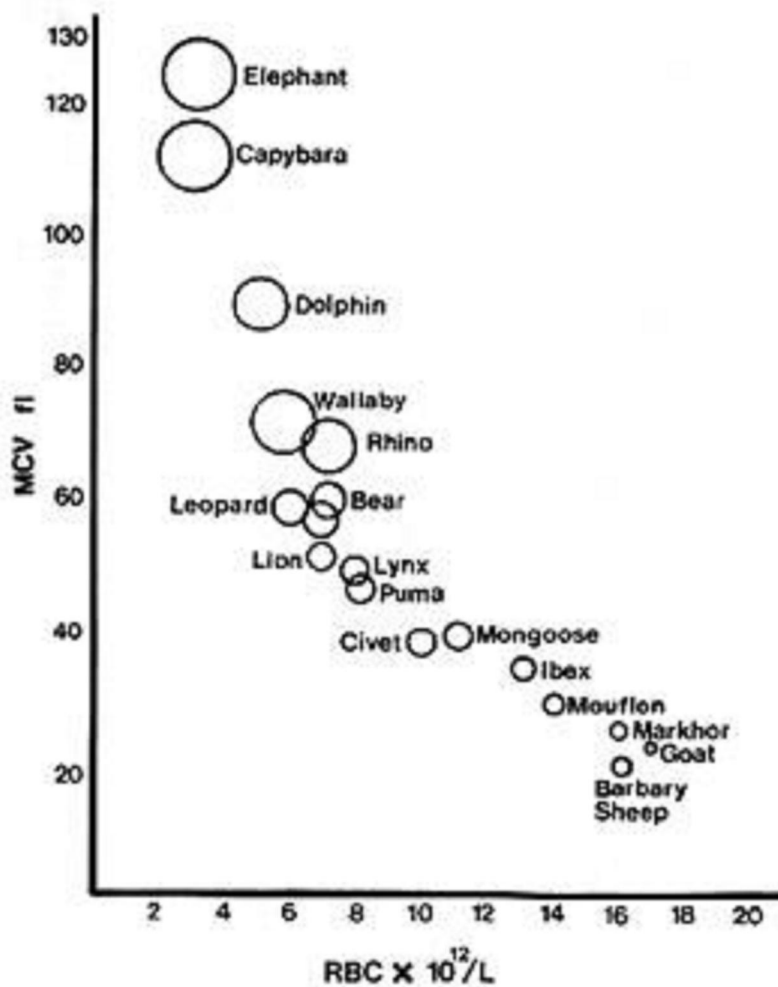
Normal Camel erythrocytes:

Elliptical (oval), smaller than cow and horse, lifespan range 90-120 day resistance to osmotic shock

Morphological features of normal red blood cells

Animal	Diameter (μm)	Central Pallor	Rouleaux	Anisocytosis
Dog	7.0	++	+	–
Cat	5.8	+	++	+
Horse	5.7	$\pm$	+++	–
Cow	5.5	+	–	+
Sheep	4.5	+	$\pm$	$\pm$
Goat	3.2	$\pm$	$\pm$	+
Llama	$4.0 \times 7.0^*$	–	–	$\pm$

Relationship between red cell number and size in mammals



Erythron evaluation:

a-Erythrocytes parameters : (can be by Automated hematology analyzer)

1. Hematocrit = packet cell volume (PCV) in % by use hematocrit centrifuge
2. Hemoglobin(Hb) in g by the cyanmethemoglobin technique
3. Red blood corpusculs (RBC) count hemocytometer

b-Red blood cell indices

1. Mean corpuscular volume (MCV) represents the red cell volume in femtoliters(fL)
 $(PCV \times 10) / RBC \text{ count (millions)} = MCV \text{ (femtoliters)}$, Reticulocytosis is the most common cause of macrocytosis (increased MCV)
2. Mean corpuscular hemoglobin (MCH) is how much Hb within erythrocyte in picograms(pg)
 $(Hb \text{ concentration} \times 10) / RBC \text{ count (millions)} = MCH \text{ (picograms)}$
3. Mean corpuscular hemoglobin concentration (MCHC) the average Hb concentration per erythrocyte in grams of Hb/100 mL of erythrocytes
 $Hb \text{ concentration (pg)} \times 100 / PCV (\%) = MCHC \text{ (g/dL)}$
4. Red cell distribution width (RDW) can be determined automated cell counters. It is an index of the degree of anisocytosis or variation in size of the erythrons
 $RDW = (SD_{MCV} / MCV) \times 100$.
 - Anemias with significant microcytosis or macrocytosis have an increased RDW.
 - Reticulocytosis may result in an increased RDW.

c-Staining and examination of the blood smear

Stains e.g.; Wright ' s stain, Diff - Quik ® , Hemacolor ® , Gimza stain, Leishman stain etc.