Blood Supply and Analysis

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THE BODY of an organism must have an adequate blood supply to function and be healthy. If an animal is unhealthy, the blood may be analyzed to determine potential causes of the illness.

Objectives:
1. Explain how an organism maintains a supply of blood.
2. Identify the uses of blood analysis in animal production.

Key Terms:
- anemia
- bleeding
- blood analysis
- blood count
- blood poisoning
- blood transfusion
- blood typing
- coagulation
- fibrin
- marrow
- pathogen

How an Organism Maintains a Supply of Blood

The production of blood cells and materials is regulated by hematopoietic growth factors. These involve complex processes that occur in the body. In general, three processes are involved in maintaining a supply of blood. The processes are regulation of amount, replacement of worn cells, and control of bleeding.

REGULATION OF AMOUNT

The amount of blood and the proportions of materials in blood are continuously being adjusted to meet the demands of the body. For example, an animal that is diseased will produce increased white blood cells.
REPLACEMENT OF WORN CELLS

Damaged or worn cells and platelets must be replaced. Blood cells and platelets are produced in bone marrow. Marrow is the soft substance in the middle of bones. Marrow may be red or yellow. Red and white cells and platelets are made by different processes. All begin as similar cells but develop differently depending on needs of the body.

CONTROL OF BLEEDING

Bleeding is the loss of blood because of injury or disease. Bleeding may be on the skin due to a scratch or cut, or it may be internal due to injury or disease of the organs or tissues.

Blood plasma contains clotting factors. These cause the blood to coagulate. Coagulation is a complex process initiated by injured tissues that give off signals that bleeding is occurring. The clotting factors result in the formation of sticky strands known as fibrin. The fibrin fibers crisscross each other, creating a blockage that stops the loss of blood from the wound.

Blood also contains substances that dissolve clots. Occasionally a clot will occur where it is not needed, such as in an artery. The clot disrupts blood flow and can result in disease and death, especially if the clot causes a heart attack or stroke.

Organisms that lose blood in an accident or medical procedure may be given blood taken from another animal with the same blood type. This process is known as a blood transfusion. It is more common in humans than in domesticated animals. Transfusions can transmit disease from one organism to another. Blood transfusions should be done only by trained individuals.

The Uses of Blood Analysis in Animal Production

Blood analysis is the process of testing blood to determine its characteristics. Samples are collected and then tested for various...
attributes. Blood analysis is primarily used in determining the health condition of an animal.

Blood analysis may be used to determine the nutritional adequacy of an animal’s diet. Samples of blood are taken and examined. For example, the size of the red blood cells of an animal indicates adequacy of nutrition. A deficiency of iron results in smaller than normal red blood cells. This condition, caused by inadequate iron, is known as **anemia**.

Blood analysis may be used to determine the presence of pathogens. A **pathogen** is a microscopic organism that causes disease. Bacteria and viruses are common pathogens. Analysis also reveals the proportions of red and white blood cells. Higher numbers of white cells indicate that the body is fighting an infection.

**Blood poisoning** is a condition in the blood caused by the presence of bacteria or fungi. The microorganisms enter the blood through an infection or wound. Good sanitation helps prevent blood poisoning in case of an injury.

Other diseases can be determined with blood analysis. For example, too few white cells in blood is a sign of a disease in the bone marrow. A very high white blood cell count is a sign of leukemia in humans.

**Blood typing** is a kind of analysis used in genetics studies. Genetic markers in the blood can be used to determine the parents of offspring. For example, the identity of the sire of a calf can be determined by blood typing the calf. Newer DNA analysis procedures may be replacing some uses of blood typing.

**Blood count** is a type of analysis that determines the number of red and white cells and the amount of hemoglobin in blood. Only a drop is needed for a blood count. A substance is added to the blood to prevent coagulation so that it will flow over a grid slide. Visual counts are made using a microscope.
Animals require an adequate blood supply to function and be healthy. The blood supply in animals is maintained through three processes—regulation of amount, replacement of worn cells, and control of bleeding. Blood analysis is the process of testing blood to determine its characteristics. In addition, blood analysis can be used to evaluate the nutritional adequacy of an animal’s diet, determine the presence of pathogens, provide genetic information, and reveal other details about an animal’s health.

Checking Your Knowledge:

1. Name the three processes involved in maintaining a supply of blood.
2. Where are blood cells and platelets produced?
3. Why would an animal’s body increase the production of white blood cells?
4. Give one example of why blood typing may be utilized.
5. How can the size of red blood cells be indication of animal health?

Expanding Your Knowledge:

Interview a veterinarian and determine how he or she utilizes blood analysis procedures to diagnose animal diseases.

Web Links:

How Blood Works
http://www.howstuffworks.com/blood4.htm

What Are Blood Types?
http://gslc.genetics.utah.edu/units/basics/blood/types.cfm

Blood Types Tutorial
http://wwwbiology.arizona.edu/Human_Bio/problem_sets/blood_types/Intro.html

Formation of Blood Cells
http://www.merck.com/mmhe/sec14/ch169/ch169c.html