

 **Activity 4.3.4 Raising the Beat****Purpose**

How does the respiration rate, heart rate, and blood pressure of an animal influence the way they should be raised? Maintaining elevated respiration and heart rates over a period of time requires energy. If the rates are normal, the energy may be expended elsewhere, such as for growth or work. Elevated rates can also be determining factors in illnesses or disorders in animals. Producers should know how to monitor vitals of their animals.

One method of determining the respiration rate of an individual, human or domestic animal is by counting the breaths per minute. You should not count your own breaths; the thought associated with counting alters your breathing pattern. Pulse is determined by counting heartbeats per minute. On people, you count the beats by placing your index and middle fingers over the radial artery in the wrist. It is located in the groove under the thumb. You may also use a stethoscope to listen to the heartbeats.

Blood pressure is necessary to force blood through small vessels and to fight the effects of gravity. Blood pressure is greatest closer to the heart and nearly nonexistent in the small capillary beds. Veins have very low blood pressure. Blood pressure is measured with a sphygmomanometer, or blood pressure cuff, and stethoscope. When the cuff is inflated, the flow of blood through the arm is blocked. When air is released, sounds are created by turbulence as the blood begins to flow through the arteries. The first sound heard is the systolic pressure, which represents the pressure at the peak of the heartbeat. When the sound ceases, the diastolic pressure is determined, which represents the pressure when the heart is resting between beats. Blood pressure is read as systolic pressure over diastolic pressure. Blood pressure is measured in millimeters of mercury (written as mmHg). Normal resting blood pressure for adults is 120/80 mmHg. Blood pressure is influenced by activity, diet, health, and many other factors.

Reading the vital signs of an animal is similar to taking vitals on a human. Can you accurately take vitals?

**Materials****Per team of three students:**

- Stethoscope
- Sphygmomanometer
- Stopwatch
- Jump rope

**Per student:**

- Pencil
- *Agriscience Notebook*
- *Lab Report Template*

**Procedure**

In this activity, you will test the effects of a variable on heart rate, respiratory rate, and blood pressure. You will be working with two other students to design and test an experiment addressing heart rate, respiratory rate, and blood pressure.

**Part One – Practice Taking Vitals**

1. Practice determining the respiration rate and taking the pulse and blood pressure of your teammates until each of you has tried all three tests at least once.

### **Procedure for Determining Respiration Rate**

- Divide the responsibilities among your team.
  - The person being tested should be seated.
  - One teammate will be the counter.
  - One teammate will be the timer.
- The counter will count the number of breaths the teammate being tested takes in one minute.
- The timer will use the stopwatch to determine when one minute has passed and will tell the counter when to begin counting and when to stop counting.

### **Procedure for Taking Pulse**

- Divide the responsibilities among your team.
  - The person being tested should be seated.
  - One teammate will be the counter.
  - One teammate will be the timer.
- The counter will count the beats by placing your index and middle fingers over the radial artery in the wrist of the patient. It is located in the groove under the thumb. Do not use your thumb to take a pulse as it has a pulse of its own.
- Once you can feel the pulse, count the beats for one minute to determine the beats per minute.
- The timer will use the stopwatch to determine when one minute has passed and will tell the counter when to begin counting and when to stop counting.

### **Procedure for Taking Blood Pressure**

- To measure blood pressure, the person should be sitting comfortably and relaxed. Sleeves are pushed up and the cuff of the sphygmomanometer is placed on the upper arm.
- Place the cuff on the arm above the elbow approximately level with the heart. Wrap the cuff snugly around the arm.
- Put the earpieces of the stethoscope in your ears.
- Using your index and middle fingers, feel for the pulse in the bend of the elbow. This is the brachial artery. You will feel the pulse beating when you find it.
- Put the diaphragm of the stethoscope over the brachial artery pulse. Listen for the heartbeat.
- Tighten the screw on the bulb of the sphygmomanometer and quickly squeeze and pump the bulb. This will cause the cuff to tighten.
- Keep squeezing the bulb until the scale on the gauge reads 180.
- Slowly loosen the screw to let air escape from the cuff. Carefully look at the gauge and listen to the sounds. Remember the number on the gauge where you first heard the thumping sound.
- Continue to listen and read the gauge at the point where the sound stops.
- The number of the first sound is the systolic pressure.
- The second number is the diastolic pressure.

### **Part Two – Experimenting With Vitals**

1. Working with your team, develop a hypothesis that you believe will cause changes in the respiration rate, pulse, and blood pressure of an individual.
2. Design an experiment testing your hypothesis on the effect of your variable on the respiratory and circulatory systems. You will need to collect evidence that indicates whether or not your hypothesis is correct.
3. Write out step-by-step procedures your group will follow. Make sure the procedure is stated clearly enough that other teams may repeat your investigation.

