Testing for carbohydrates, lipids and proteins

How might we compare feed for different animals?

All living things contain organic macromolecules: lipids, carbohydrates, proteins and nucleic acids. All of these basic building blocks are made up of only a small number of elements: carbon, hydrogen, oxygen and nitrogen, sulfur and phosphorous. They are called macromolecules because they are made of long chains of carbon and hydrogen atoms and are often made of repeating smaller molecules bonded together in a repeating pattern called a polymer. This activity will not test nucleic acid presence.

Macromolecule	**Building block**
proteins	amino acids
carbohydrates	monosaccharides
lipids	glycerol + fatty acids

The goal of this activity is to compare the relative amounts of macromolecules between two types of animal feed.

Materials
digital scale
3g samples of chosen feed to test
test tubes
LabAids tray or small plastic cup
mortar and pestle
disposable pipettes
Sudan III
Lugol's Iodine solution
Biuret reagent solution
Benedict's solution
distilled water
600 ml beaker for water bath
thermometer
hot plate
safety goggles

Procedure

Lipid Test (fats and oils)

1. Put 1 g of a crushed dry sample on brown paper. The presence of a "greasy" spot indicates lipids. Measure the diameter of your spot after 10 minutes.
2. If you have a liquid sample, drop one drop on the brown paper and measure the spot after 10 minutes. You are looking for translucence.
3. Test your liquid sample by putting 2 ml of the sample in a test tube with 2 ml of water. If you have a solid sample, grind it, measure out about 2 g and add 2 ml of water to it in a test tube. Add 3 drops of Sudan indicator to the test tube and shake. If lipids are present, you should see stained molecules.

Animal Digestion and Nutrition

For each of the following tests...

Crush the dry food sample using a mortar and pestle.

Mix 2 g of your crushed, dry food sample with 5 ml of distilled water in a test tube and mix well. This may take up to 2 minutes to mix thoroughly.

Simple sugars test

*Wear safety goggles for this procedure.

1. Add 1mL of the liquid from the food sample mix to a test tube.
2. Add 0.25mL drops of Benedict's solution to the test tube; carefully heat in a hot water bath at 40-50˚C for 5 minutes.
3. If sugar is present the solution will change color. The scale shows relative amounts of sugars present, but **not** which specific sugars are present. (nothing) blue Nj green Nj yellow Nj orange Nj red (lots)

Starch test

*Use a tray or small plastic cup for this test.

1. Place sample in small cup or tray.
2. Add 2 drops of Lugol's Iodine solution to the sample.
3. If carbohydrates are present, the color will change from a yellowish brown to a dark purple, black.

Protein test

1. Place 1mL of liquid food sample to be tested in a test tube.
2. Add 3 drops of Biuret reagent solution to the test tube. Shake gently to mix.
3. The presence of proteins will be indicated by a color change to purple. A color change to pink indicates peptides (short chains of amino acids).

Make a data table below or in your notebook, to collect your information.