University of Idaho Extension
www.uidaho.edu/extension/4h

Monogastric Nutrition

Nikola Dalton, Extension Educator

Goal (learning objective)

Youth will:

- Understand basic vocabulary as it relates to monogastric nutrition
- Undserstand the different growth stages of monogastrics
- Understand why there are different nutritional requirements during different growth stages

Supplies

- Handout 1 - "Vocabulary Definitions" (make enough copies for the group)
- Microwave

Supplies listed below are for each group (kitchen and treats), adjust accordingly if working as one large group

Kitchen supplies

- 1 large microwave safe bowl
- 1 medium microwave safe bowl
- 1 9x13 cake pan
- 1 spatula or wooden spoon
- Tin foil
- Cooking spray (i.e. Pam)

Treat supplies

- 4 cups "Rice Krispies" type cereal
- 2 cups "Cheerios" type cereal
- 1 cup "Trix" type cereal
- 1 cup "Fruit Loops" type cereal
- 1 bag (10 1/2 ounce) miniature marshmallows
- 1/4 cup butter or margarine

Pre-lesson preparation

- Be able to discuss vocabulary relative to monogastric nutrition - roughage, concentrate, salt, vitamins, fats, carbohydrates, minerals, energy, proteins and water.
- Read "Digestive System" in *Swine Resource Handbook for Market and Breeding projects,* chapter 7, page 7-1.
- Review "Classifying Feed Ingredients Into Nutrient Groups" in *Swine Resource Handbook for Market and Breeding projects,* chapter 8, page 8-5.
- Read "Feeding Your Growing Pigs" in *Swine Resource Handbook for Market and Breeding projects,* chapter 8, pages 8-11 through 8-13.
- Practice activity with family members.

Lesson directions and outline.

Proper nutrition in a monograstrics is the foundation to a healthy animal. This lesson will lead members to understand nutritional requirements for different growth and reproductive stages as it relates to monogastric nutrition. For all animals there are five essential nutrients that are required and that feed can be classified. They include: carbohydrates (or energy), protein, fats, vitamins and minerals, and water. In the lesson these will be discussed more in depth

A monogastric is defined as an animal with a simple stomach or as a non-ruminant. Monogastrics can be omnivores or carnivores. An omnivore is an animal that eats both plant and animal materials. A carnivore is defined as an animal that eats other animals. Examples of a monogastric include swine, poultry, cats and dogs. Swine and poultry are considered omnivores while cats and dogs are both carnivores. Some special monogastrics such as rabbits and horses have a complex large intestine that allows them to digest plant materials. Rabbits and horses are herbivores; animals that only eat plants. To understand more about the differences between a monogastric and ruminants please see: Digestive Systems (Level 2, 3) Animal Science Lesson Plan under Nutrition.

The understanding of the nutritional requirements for the varied growth stages of a monogastric is important due to the complicated concept of creating a balanced feed ration (discussed in later lessons).

With this lesson youth should have a solid foundation to build upon and begin to evaluate feeding requirements as well as recognizing the differences in nutritional requirements in relation to the growth stages.

Conducting the activity (DO)

1. Discuss the order of nutrition needs for a monogastric (for this lesson we will be referencing swine: as our monogastric):
   a. Water - is an essential nutrient for all stages of growth. Different amounts of water are required at different stages of growth but usually a swine drinks about 2-3 pounds of water per pound of feed. A sow in lactation would require more water due to her production of milk. Water intake can also be dependent on environmental temperatures and stressors. Water should be clean and cool and have animals should have access at all times.
   b. Fats – should be found in normal ingredients in pig feed and are essential to their diet. Fats are found in binders and palatability enhancers such as molasses or corn oil.
   c. Maintenance –keeps the animal's body functioning at normal levels. Roughly 50% of the animal's food intake is used just for maintenance. This ration is comprised mainly of ENERGY feedstuffs.
   d. Growth – This food intake is used to grow muscle, bone, and other body parts. This ration has mainly ENERGY feedstuffs in it, but also contains a small amount of PROTEIN. This is in addition to the Maintenance ration.
   e. Reproduction - nutrition is important to health of the sow or gilt and for the proper development of the piglets during gestation. The reproduction ration has higher levels of PROTEIN as well as MINERALS & VITAMINS. This is in addition to the Maintenance and Growth rations.
   f. Lactation - nutritional rations are used once a sow or gilt has farrowed. Lactation requires increased levels of PROTEIN and MINERALS & VITAMINS. This is in addition to the Maintenance and Reproduction rations.
2. Have youth get into groups of 3 or 4:
3. Provide each group a set of the kitchen and treat supplies.
4. Explain the activity to the members before start-

ing:

a. Show members the cereal representations of the growth stages:
   - Maintenance - Rice Krispies type cereal
   - Growth - Cherrios type cereal
   - Reproduction - Fruit Loops type cereal
   - Lactation - Trix type cereal
   - Vitamins & Minerals - Marshmallows and butter

b. Sample Question: Your breeding sow has farrowed and is lactating. What stage(s) of growth is she in? How many rations should be included in her daily feed ration?

5. For the above scenario all of the rations. Members should include small amounts of each ingredient (not all at once) over the course of the questions, all items should be in the pan by the last question.
6. Have members line pans with tin foil.
7. Scenario 1: Your market barrow is 100 pounds. What stage of growth is she in? How many rations should be included in her daily feed ration? (Maintenance and Growth)
8. Scenario 2: Your breeding gilt is at 220 pounds (assume this is your "ideal" weight for this animal). What stage of growth is he in? How many rations should be included in his daily feed ration? (Maintenance and Reproduction)
9. Scenario 3: Your sow has farrowed and lactating. What stage of growth is she in? How many rations should be included in her daily feed ration? (All - add all remaining cereals to pan)
10. Place butter and marshmallows into medium microwave bowl and cook until marshmallows are melted, stir well. These items represent minerals and vitamins which should be added (and mixed) to cereals in pan
11. Let cool for 10 minutes and enjoy!

What did we learn? (REFLECT)

- Ask: How many growth stages are there for monograstics and what are they called?
- Ask: What are the 5 nutrient groups that feed can be classified into?

Why is that important? (APPLY)

- Ask: Why is it important for us to know the different growth stages? (Proper nutrition is the foundation to a healthy animal)
- Ask: Why should we care about feeding different rations in the separate growth stages?
- Are there other areas where this information can be applied? (Future careers, other monogastric animal nutritional needs)

Resources

Branch, A.(n.d.). *Beef nutrition web quest.* Ag 310 Applied Livestock Management Beef Nutrition. Retrieved March 25, 2015 from http://communities.naae.org/thread/4170

National 4-H Council. (2004). *The Incredible Pig* (pages 19-20).

National 4-H Council. (2004). *Putting the Oink in Pig.* (page 20).

Ohio State University Extension. (2011). Nutrition. *Swine resource handbook for market and breeding projects.*(pages 8-1 through 8-18).

U.S. Food and Drug Administration. (2014). *Animal Feed: See, Touch and Do A Hands-On Lesson Plan on the Basics of Animal Nutrition.* Retrieved March 25, 2015 from http://www.fda.gov/AnimalVeterinary/ResourcesforYou/AnimalHealthLiteracy/ucm280837.htm

NUTRITION: MONOGASTRIC NUTRITION – HANDOUT 1

Vocabulary Definitions

Water: The most essential nutrient and the cheapest nutrient. Pigs need access to clean, cool water at all times.

Proteins: Pigs need to contain feeds with essential amino acids. Amino acids are considered the building blocks of protein. The most important protein feeds for pigs are oil bearing feeds like soybean and linseed. Proteins found in approved animal by-products are also useful in pig diets. Cereal grains like corn, oats and wheat can be fed but must be feed with oil bearing feeds or approved animal by-products

Energy: Is not technically a nutrient but is a result of carbohydrates and fats that are in pigs diets. Energy is required in large amounts to provide for growth and maintenance

> Fats: Fat furnishes two and one-fourth times more energy than equal amounts of carbohydrates. Cereal grains contain fats.
>
> Carbohydrates: Sugar, starch, and fiber are carbohydrates and are found in most cereal grains

Vitamins: They are compounds that assist the body in the assimilation and use of the other nutrients. They are described as water soluble and fat soluble.

Minerals: Needed in body tissues and to assist in some of the body's chemical reaction. Calcium is important in bone formation. Phosphorus also helps in bone building and assists in energy utilization.

> Salt: Is an important mineral for maintaining a good appetite and water consumption

Roughage: Is not fed to pigs because they have a monogastric, simple stomach. Roughages need to be broken down through digestion in a ruminant stomach. Hay is considered a roughage.

Concentrate: A concentrate is typically made from feedstuffs like wheat, corn, soybeans. A concentrate diet includes vitamins and minerals combine together with the other feedstuffs to make a ration easily digested by pigs.