

## **Unit C:** Meeting Nutritional Needs of Animals

### **Lesson 5:** Understanding Feedstuffs

#### **Student Learning Objectives:**

Instruction in this lesson should result in students achieving the following objectives:

1. Identify plant and animal origin feedstuffs fed in cattle production.
2. Identify roughages fed in cattle production.
3. Identify concentrates fed in cattle production.

#### **Recommended Teaching Time:** 1 hour

**Recommended Resources:** The following resources may be useful in teaching this lesson:

Naseri, Alimuddin. *Animal Nutrition Training Manual*.

<http://www.atnesa.org/docs/Alimuddin-Naseri-Animal-Nutrition-Manual.pdf>

#### **List of Equipment, Tools, Supplies, and Facilities:**

- Writing surface
- PowerPoint Projector
- PowerPoint Slides
- Transparency Masters

**Terms:** The following terms are presented in this lesson (shown in bold italics and on PowerPoint Slides 2):

- Agricultural by-products
- Animal origin
- Cereal grains
- Conserved roughage
- Fodder crops
- Grasses
- Industrial roughage
- Legumes
- Miscellaneous feedstuffs
- Plant origin
- Pulses

## Interest Approach:

Ask students what types of food they consume? How do we categorize the different types of food we eat? How does the type of food we eat relate to that which we feed to cattle? What are possible classifications of cattle feedstuffs? Use these questions and discussion to transition into the first objective.

## SUMMARY OF CONTENT AND TEACHING STRATEGIES

**Objective 1:** Identify plant and animal origin feedstuffs fed in cattle production.

*Anticipated Problem:* What are plant and animal origin feedstuffs fed in cattle production?

### (PowerPoint Slide 3)

- I. Feedstuffs are classified in many different ways. One classification system is by origin and includes two categories:
  - A. **Plant origin** – include primarily roughages, with some concentrates
    1. Farm products
      - a. High moisture content – grass, tubers, roots, silage.
      - b. Moderate moisture content – wilted silage.
      - c. Low moisture content – hay, straw, stover.
      - d. Miscellaneous – fruits and pulp.

### (PowerPoint Slide 4)

2. By-products from agricultural industries
  - a. From the sugar industry – pulp and bagasse.
  - b. From the brewing industry – brewers and distillers grains
  - c. From the fruit juice and packing industry – fruit pulps.
3. Artificial dried fodders
  - a. Not often fed
  - b. Some use dried pellets, especially for horse breeding.

### (PowerPoint Slide 5)

- B. **Animal origin** – feedstuffs high in energy and protein; generally considered concentrates
  1. Milk and milk by-products
  2. Products from the meat and carcass industry – meatmeal, bonemeal, blood meal and feather meal
  3. Products from the fish industry – fish meal and shrimp meal
  4. Manure of poultry – can be used in ruminant rations

**Use TM: 5-1 to assist in classifying feedstuffs by origin. Determine the types of feedstuffs fed to cattle raised in the local area. Show examples if possible. Discuss how the type of feedstuffs may vary from one Province to another. .**

**Objective 2:** Identify roughages fed in cattle production.

*Anticipated Problem:* What roughages are fed in cattle production?

**(PowerPoint Slide 6)**

II. Roughages can be divided into seven groups:

A. **Grasses** (pastures) – main supplier of roughage

1. Abundantly available
2. Good quality
  - a. If poor quality, usually because of
    - 1) Type of grass – some grasses in temperate climates have less protein and lower NFE, while the Crude Fiber is much higher in some temperate grasses
    - 2) Maturity – can be reached earlier depending on the climate and soil
    - 3) Management factors – including fertilizer use and harvesting method
    - 4) Conservation methods – climates can provide for poor silage making

**(PowerPoint Slide 7)**

3. Cheapest source of feed
4. Low digestibility – can cause
  - a. Poor production
  - b. Lower fertility
  - c. High disease incidence
  - d. Disappointment
5. Can be used in many methods
  - a. Grazing
  - b. Selective grazing
  - c. Silage

**(PowerPoint Slide 8)**

B. **Legumes** – includes lucerne, alfalfa, and clovers

1. Higher protein and mineral
2. Lower Crude Fiber
3. Does not allow close grazing
4. May require irrigation
5. May be used for hay
6. Less suitable for silage

**(PowerPoint Slide 9)**

C. **Fodder crops** – roots, beets, carrots, cassava, turnips, Swedes, mangolds, tubers, fodder grains (maize, sorghum, oats, rye), and Brassica species (kale, cabbages, rape)

1. Produces high yields
2. Often irrigated
3. Can be used fresh or as silage

**(PowerPoint Slide 10)**

4. Roots, tubers, and Brassica species
  - a. Low Dry Matter%
  - b. Rich in energy
  - c. Low Crude Fiber

- d. High digestibility and palatability
- e. Low protein, mineral, and vitamins
- 5. Fresh/green fodder crops
  - a. Important in high roughage rations
  - b. May cause diarrhea
  - c. May decrease the digestibility of other fiber in the ration

**(PowerPoint Slide 11)**

- 6. Fodder grains
  - a. High in energy
  - b. Quality depends on quantity and maturity of the seed
  - c. Sometimes used for human consumption
  - d. Low protein
- 7. Sorghum
  - a. Should not be grazed the first 3-4 weeks after cutting
  - b. May cause poisoning because of prussic acid

**(PowerPoint Slide 12)**

- D. ***Agricultural by-products*** – agricultural products that cannot be utilized by humans
  - 1. Most important parts are the stems and leaves
  - 2. Utilized fresh or dry, cut or grazed, in the field or in the stable/barn
  - 3. Straw and legumes
    - a. High nutritive value if properly handled and stored after harvest

**(PowerPoint Slide 13)**

- 4. Cereal grains give straw, stubble, stovers, and chaff
  - a. Generally quite low amounts
  - b. Low Phosphorus
  - c. Calcium is difficult for animals to absorb
  - d. High Silicium decreases digestibility

**(PowerPoint Slide 14)**

- 5. Sugar beet tops and residues
  - a. Used to balance energy
  - b. Often from sugar factories
  - c. Includes transport costs
- 6. Low feeding value
- 7. Need supplementation

**(PowerPoint Slide 15)**

- E. ***Conserved roughage*** – hay or silage
  - 1. Loose 30-50% of Dry Matter through continued respiration, leaching by rain, mechanical handling and self-heating
  - 2. Energy and DCP losses are even higher – up to 75%
  - 3. Must determine extra costs for equipment

**(PowerPoint Slide 16)**

- F. ***Industrial roughage*** – by-products from agricultural industries
  - 1. Disadvantage – high water content
    - a. Makes transportation difficult
    - b. Feeding value is extremely variable

2. Generally limited to farming operations in close proximity to industrial plants

**(PowerPoint Slide 17)**

G. **Miscellaneous feedstuffs** – chicken manure or litter

1. Includes excrement of poultry – undigested parts of feed, high NPN products, wasted feed and bedding material
2. Variable feed value

**Use TM: 5-2 to assist in categorizing roughages used in cattle production. Determine the types of roughages fed to cattle raised in the local area. Show examples if possible. Determine how the type of roughages may vary from one Province to another.**

**Objective 3:** Identify concentrates fed in cattle production.

*Anticipated Problem:* What concentrates are fed in cattle production?

**(PowerPoint Slide 18)**

III. Concentrates fed in cattle production include the following:

A. **Cereal grains**

1. Have Dry Matter 85-90%
2. Low levels of Crude Fiber
3. Low fat content
4. Main function – provide energy
5. Disadvantages
  - a. Strong competition for human needs and the feeding of animals
  - b. High priced

**(PowerPoint Slide 19)**

B. **Pulses** are the edible seeds of legumes, like lentils, beans, peas and chickpeas. They are annual leguminous crops yielding from one to twelve grains or seeds of variable size, shape, and color within a pod. Pulses are used for food and animal feed. The term "pulse", as used by the Food and Agricultural Organization (FAO), is reserved for crops harvested solely for the dry grain. Each of these pulse crops come in a wide range of colors and sizes.

1. High protein content
2. May contain high levels of fat
3. Crude Fiber is decreased if hulls are removed

C. Other seeds and parts

1. Examples: sunflower seeds and cotton seeds
2. High energy content when dehulled

**(PowerPoint Slide 20)**

D. By-products from agricultural industries – 6 main groups

1. Residues from oil and fat industries
  - a. Examples: cakes and meal
2. By-products from milling industries
  - a. Examples: bran, pollard, polishing, corncob meal

3. By-products from starch industries
  - a. Examples: gluten and potato residues
4. By-products from sugar industries
  - a. Examples: beet pulp and molasses
5. By-products from the fruit industries
  - a. Examples: citrus pulp, pineapple pulp
6. Miscellaneous products
  - a. Examples: bean curd residue

**(PowerPoint Slide 21)**

- E. Animal products
  1. Milk and milk by-products
  2. Slaughter house by-products
  3. Fish products
- F. Industrial feedstuffs
  1. Source of NPN
  2. Examples: urea and biuret

**Use TM: 5-3 to assist in categorizing concentrates used in cattle production. Determine the types of concentrates fed to cattle raised in the local area. Show examples if possible. Determine how the type of concentrates may vary from one Province to another.**

**Review/Summary:** Focus the review and summary of the lesson around the student learning objectives. Use the questions on **PowerPoint Slide 22** to have students explain the content associated with the objectives.

**Evaluation:** Evaluation should focus on student achievement of the objectives for the lesson. Various techniques can be used, such as having students assist with the collection of feedstuffs, roughages, and concentrates fed to Cattle in the local area. A sample written test is included.

## Answers to Sample Test:

### *Matching*

1. G
2. A
3. D
4. E
5. C
6. B
7. G

### *Fill-in-the-blank*

1. Agricultural by-products
2. Conserved roughage
3. Industrial roughage
4. Miscellaneous feedstuffs

### *Short Answer*

See Objective One.

## Understanding Feedstuffs

Name: \_\_\_\_\_

**Matching:** Match each word with the correct definition.

- |                  |                 |
|------------------|-----------------|
| a. Animal origin | e. Legumes      |
| b. Cereal grains | f. Plant origin |
| c. Fodder crops  | g. Pulses       |
| d. Grasses       |                 |

- \_\_\_\_\_ 1. Includes primarily roughages, with some concentrates.
- \_\_\_\_\_ 2. Feedstuffs high in energy and protein; generally considered concentrates.
- \_\_\_\_\_ 3. Also called pastures; main supplier of roughage.
- \_\_\_\_\_ 4. Includes Lucerne, alfalfa, and clovers.
- \_\_\_\_\_ 5. Includes roots, beets, carrots, and many others.
- \_\_\_\_\_ 6. Have 85-90% Dry Matter, low levels of Crude Fiber, and low fat content.
- \_\_\_\_\_ 7. High protein content, may have high levels of fat, and Crude Fiber is decreased if hulls are removed.

**Fill-in-the-blank:** Complete the following statements.

1. \_\_\_\_\_ are agricultural products that cannot be utilized by humans.
2. \_\_\_\_\_ includes hay or silage.
3. \_\_\_\_\_ are by-products from agricultural industries.
4. \_\_\_\_\_ includes chicken manure or litter.

**Short Answer:** Answer the following question.

What are three plant origin feedstuffs? What are three animal origin feedstuffs?



## **ORIGIN CLASSIFICATIONS**

- Plant Origin
  - Farm Products
  - By-products from agricultural industries
  - Artificial dried fodders
- Animal Origin
  - Milk and milk by-products
  - Products from meat and carcass industry
  - Products from the fish industry
  - Manure of poultry

# ROUGHAGES

- Grasses
- Legumes
- Fodder crops
- Agricultural by-products
- Conserved roughage
- Industrial roughage
- Miscellaneous feedstuffs

# CONCENTRATES

- Cereal grains
- Pulses
- Other seeds and parts
- By-products from agricultural industries
- Animal products
- Industrial feedstuffs