

Classifying Digestive Systems and Process in Domesticated Animals

CTE Lesson Aligned with TN State Standards for Literacy in Science and
Technology

This resource is best for:

Teachers of:	Agriscience	Career Cluster:	Agriculture, Food and Natural Resources
Addressing Standard(s):	Standard 13	Grade-Band:	9-10
In alignment with CTSO:	FFA: www.tnffa.org Click here for specific guidelines.	CTSO Event: (if applicable)	Agriscience Fair

Learning Objective: The goal of this activity is to develop a student’s understanding of anatomical and physiological differences in the digestive process of domestic animals. At the end of this lesson, students should have the ability to classify animals according to their digestive system and explain the digestion process and stages for each digestive system. Students will complete these tasks by developing an informative narrative. Discussions in class, reading, researching, and writing exercises are coordinated in class to help students construct technical meaning.

The following should be used during this teaching:

- Essays should be evaluated using the Tennessee 9-12 Literacy Informational/Explanatory Rubric, found at http://www.tncore.org/literacy_in_science_and_technology/assessment/scoring_resources.aspx.
- For information on how to develop text-dependent questions for rich classroom discussion, visit http://www.tncore.org/literacy_in_science_and_technology/curricular_resources/text_dependent_questions.aspx.

Tennessee State Standards for Literacy in Technical Subjects addressed by task	
Strand	Grades 9-10
TN Reading for Technical Subjects: Craft and Structure	4. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 texts and topics.
TN Reading for Technical Subjects: Integration of Knowledge and Ideas	9. Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts.
TN Writing for Technical Subjects: Text Types and Purposes	<p>2. Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.</p> <p>a. Introduce a topic and organize complex ideas, concepts, and information to make important connections and distinctions; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension.</p> <p>b. Develop the topic with well-chosen, relevant, and sufficient facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience’s knowledge of the topic.</p> <p>c. Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among complex ideas and concepts.</p> <p>d. Use precise language, domain-specific vocabulary to manage the complexity of the topic and convey a style appropriate to the discipline and context as well as to the expertise of likely readers.</p> <p>e. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.</p> <p>f. Provide a concluding statement or section that follows from and supports the information or explanation presented (e.g., articulating implications or the significance of the topic).</p>
TN Writing for Technical Subjects: Production and Distribution of Writing	4. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
Tennessee CTE Standards addressed by task	
Agriscience	13. Classify the types of digestive systems in domestic animals, and compare and contrast their anatomical and physiological differences. Synthesize research on animal nutrition (using academic journals or publications from Tennessee Extension Service) to produce an informative narrative, including defining and applying nutrition specific terminology, to examine the stages of digestion and associated processes.
Tennessee Human Anatomy and Physiology Standards addressed by task	

Tennessee Human Anatomy and Physiology	5. The digestive system takes in food and changes it to a usable form. The urinary system removes wastes and maintains osmotic balance.
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<u>Tennessee Approved Textbooks</u>	
Cengage – Thompson Learning	Agriscience Fundamentals and Applications, 5 th Edition, Unit 25 pages 532-547
Pearson – Prentice Hall	Agriscience, 6 th Edition, Unit 15 – 16 pages 438 – 442
CEV Multimedia - Online	Animal Anatomy, Physiology and Health, Section 5: Digestive Systems

Additional Resources
<p>Suggested Additional Website References:</p> <ul style="list-style-type: none"> • https://utextension.tennessee.edu/publications/Pages/default.aspx • http://4h.tennessee.edu/projects/activities/Beef-W178.pdf • Communities of Practice • http://www.cevmultimedia.com/ • University of Minnesota – College of Veterinary Medicine • Science Daily

Potential Lesson Plan Design:

Day 1:

- Display the following items for the class to see (not touch) and have them record what they believe each item has to do with the digestive system. Items to be displayed: Apple, rubber tubing, funnel, beaker, hydrochloric acid/vinegar, sponge, mallet, paper towels. Inform the students that each item may play a role or represent something in the digestive system. Allow them 1-2 minutes to think about this and record their response. (This is referred to later on in this lesson as an interest approach).
- Have the students share their responses for the items in a class discussion. Then explain we are going to explore the digestive system and learn how each of these items represents some part of our own digestive system.
- Read the information from their respective textbook and corresponding chapter individually.
- Have students complete notes, a graphic organizer, or some other form of note-taking to capture take-always from the textbook during their reading.

- After completing their notes, ask the student’s text-dependent questions to check for understanding and ability to cite textual evidence. These sample text-dependent questions can be used or serve as a guide.

Text-Dependent Questions
<ol style="list-style-type: none"> 1. Why did the author choose to arrange the technical information in this format to differentiate the different types of digestive systems? 2. All farm animals need some type of fiber and/or forage in their diet. Explain why the fiber and/or forage intake percentage is so different between species. What does the author say about the percentage of fiber and forage? 3. Cows are noted to chew a cud. How is chewing a cud different from other animals?

- Have students submit an exit-slip at the conclusion of class to gauge student understanding. For example, have each student list how three of the items on the table relate to the digestive system.

Day 2:

- Open class by using the Digestion Dilemma on page one and the Intestinal I.D. on page two from the [University of Tennessee Extension 4-H Beef Advanced Activity Page](#). This activity should take a maximum of two minutes.
- Review the key points from the activity and yesterday’s lesson, connecting to prior knowledge.
- Divide the class into groups of four.
- Within their groups, have each student select an animal (cow, swine, horse and chicken).
- Instruct each group to sketch an outline of their animal and draw major organs of digestive system using their notes from the previous class.
- Students will need to label and follow food through each process.
- Students will share their work with their group to check for accuracy of content.
- Each group will present in a class discussion, citing evidence from the text, the digestive system and digestive process for one species of animal. The teacher will select which animal each group will present. If the class has more than 20 students, have fifth group of students to be the content auditors for each presentation.
- Students will develop a chart to identify species of domesticated animals according to the type of digestive system and to compare and contrast monogastric and polygastric digestive systems citing evidence from textbooks, notes and the class discussion.

Day 3:

- Open class with a short review to answer questions students may have from the previous lesson.

- Have students get back in their groups from the previous lesson and introduce the digestion laboratory activity using the Digestion Laboratory Procedures Laboratory Sheet.
- Using their notes and discussion, present the class the original items used in the interest approach on the first day and have them match each component up with a function/organ in the digestive system.
- Students will turn in their lab sheets.

Digestion Laboratory Procedures

Materials need for each group	<u>Student Laboratory Procedures: Instructor Key</u>
Small pieces of apple 1 plastic straw 1 funnel 2 plastic cups Distilled white vinegar (instead of HCL) 1 sponge 1 utensil paper towels water 1 eye dropper	<p>Before you begin, label one of your plastic cups #1 and the other plastic cup #2 using a permanent marker.</p> <ol style="list-style-type: none"> 1. In cup #1, crush the pieces of the apple with the utensil and add a little water to the mixture using the eye dropper. (teeth and saliva) 2. Using the funnel, carefully pour the mixture into the plastic straw and using your hands, squeeze it into cup #2. Set aside cup #1. (esophagus and peristalsis) 4. Add a small amount of distilled white vinegar to the mixture in cup #2 using the eye dropper. (stomach) 5. Carefully pour the mixture onto the sponge and allow the liquid portion to be absorbed. (small intestine) 6. Carefully scrape the solid pieces off of the sponge and place them on the paper towel to absorb the remaining water. (large intestine) 7. Then dispose of all wastes into the trashcan. (rectum)

My Name: _____ **Date:** _____

My Partner(s): _____

Student Laboratory Procedures:

After each procedure, record what you observed and how this step is directly related to the digestive process and which organs are represented.

Before you begin, label one of your plastic cups #1 and the other plastic cup #2 using a permanent marker.

1. In cup #1, crush the pieces of the apple with the utensil and add a little water to the mixture using the eye dropper.
2. Using the funnel, carefully pour the mixture into the plastic straw and using your hands, squeeze it into cup #2. Set aside cup #1.
3. Add a small amount of distilled white vinegar to the mixture in cup #2 using the eye dropper.
4. Carefully pour the mixture onto the sponge and allow the liquid portion to be absorbed. The nutrients are enclosed in the liquid, while the waste is the solid material.
5. Carefully scrape the solid pieces off of the sponge and place them on the paper towel to absorb the remaining water.
6. Dispose of all wastes into the trashcan.

Day 4

- Open class with questions students may have about the results from the lab.
- Using their textbook, class notes, and/or research from professional journals or extension publications, students will individually develop an informational narrative, including defining and applying nutrition specific terminology, to examine the stages of digestion and associated processes.

Discussion: Close-reading questions, graphic-organizer or notes-sheet could be developed in advance in order to drive student understanding of the material while also practicing reading skills. For information on how to develop questions for this type of discussion, visit http://www.tncore.org/literacy_in_science_and_technology/curricular_resources/text_dependent_questions.aspx.

Scaffolding and support for students with special needs, English language learners, and struggling readers: Consider pre-teaching synonyms of difficult vocabulary words. Lower-level readers and ELL students can still be challenged without being overloaded with difficulty. This strategy can also be used to differentiate for stronger readers by introducing new, and more challenging, vocabulary. Struggling readers would also benefit from visual aids to illustrate many of the ideas presented. Pictures, diagrams, and charts alongside the text will go far to aid students as they dissect the articles.

Note: Social, ethnic, racial, religious, and gender bias is best determined at the local level where educators have in-depth knowledge of the culture and values of the community in which students live. TDOE asks local districts to review these materials for social, ethnic, racial, religious, and gender bias before use in local schools.