

Agriscience Recruitment Lesson Plans

Master of Arts Impact Project
Michigan State University

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Chapter 1

Being from the Western Upper Peninsula, I was thrilled when the job opening for Career Technical Education (CTE) Agriculture Instructor for the Gogebic Ontonagon Intermediate School District (GOISD) opened in the summer of 2020. Since the day the job opened my passion to contribute to agricultural education has grown immensely. After completing my first two years of teaching, I have a confident grasp on what improvements can be made in my program and FFA chapter, mainly being increasing enrollment and participation. The purpose of the Agriscience recruitment lesson plan is to develop an interest in the GOISD Food Systems and Natural Resources CTE course and FFA chapter among junior high students. The objective is to counteract the lack of interest in agricultural education opportunities for students in the Western Upper Peninsula. This course is taught at three different locations over two counties, while Ontonagon County enrollment is excellent, Gogebic County enrollment is extremely lacking. While other methods of recruitment have helped, experimental and engaging learning is the key to increasing enrollment in Gogebic County.

Chapter 2

Middle school age was the targeted age group for this curriculum for a few reasons. Most obviously, it is because these students will be entering my program in the near future. I believe it is so much more than that. Agriculture education is an incredible outlet for youth to find passion and create positive experiences and the formative years of middle school is a great window to start. This passage from The Agriculture Education Magazine explains the importance of agriculture education to middle school learners, “Middle school learners are unique, and middle school agricultural education programs help students navigate one of the most challenging developmental stages of their lives.” (Golden & Mulkey, 2022) Many educators recognize the

importance of middle school agriculture education but the resources and curriculum are not nearly as developed as their high school counterparts. Taking the first steps to create an agriculture education space for junior high students in the Western Upper Peninsula is important. “Middle school agricultural education programs benefit middle school students. It is crucial to continue the programs and establish them in middle schools that do not offer agriculture. Offering opportunities to explore interests and careers in agriculture can provide lifelong benefits for all students.” (Golden & Mulkey, 2022)

Chapter 3

When preparing these lesson plans there is an emphasis placed on lesson plans containing introductory level content as these lesson plans are likely the first agricultural education that the students have been exposed to. Although the Western Upper Peninsula is very rural, there is not a strong agricultural presence in the communities. Another emphasis was placed on incorporating hands-on activities to engage students in the lesson material. I spent a lot of time thinking about what hands-on experiences that I was exposed to in my collegiate agriculture education, what hands-on experiences I was implementing in my classroom, and surfed the web for more ideas as well. The materials that would be used for the lessons needed to be readily available to a general education teacher as well. For example, while if I was teaching these lessons I would be able to utilize more materials such as the greenhouse or live chickens, I wanted to make sure that the lessons would be equally effective if those resources were not available. Throughout the lesson plans, I also wanted to make sure that some sample inquiry questions were utilized to engage students. This curriculum needed to be easy to use for all types of teachers, therefore the teachers I asked to review the material were elementary and middle school teachers.

Chapter 4

The Agriscience recruitment lesson plan contains four introductory lessons covering plant science, animal science, forestry science, and food science. Each of the lessons that were created include an accompanying Google Slides presentation to guide the educators as well as a lesson plan to follow along. In the creation of these lessons an emphasis was placed on hands-on experiences and implementing inquiry questions throughout the lesson for increased student involvement. Within each of the lessons are hands-on activities that have guides for implementation, instructions, and materials in the attached lesson plan artifacts. The lesson plans, artifacts, and slides are all attached below.

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6th - 8th Grade

By

Lori Wardynski

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Artifacts

Title of Lesson: Learning Soil and Plant Science

Situation: This lesson is part one of a four part lesson for recruiting junior high students into the GOISD Food Systems and Natural Resources course. The lesson is designed to be an interactive and experiential learning experience to engage students in agricultural sciences. This lesson has a Google Slides to go with it to aid instruction.

Google Slides: [LEARNING SOIL & PLANT SCIENCE](#)

Objective(s): The objective of this lesson is to introduce students to soil and plant science through hands-on experience to promote experiential learning.

Materials: worksheets, print outs, soil samples, paper towel, sample items listed below, blank paper, glue or tape,

Interest Approach: During this lesson we will be going over soils, plant function, and plant anatomy. Each of these three sections will have a hands-on approach. For discussing soil make up there will be multiple damp soil samples for students to feel and determine which would be the best for plant growth. For plant function we will be looking at the importance of plants to our food system, but also emphasizing other ways that we use plants to improve the quality of our lives, like to make fiber, fuel, and cosmetics. Plant anatomy will be identifying basic anatomy of plants and building a plant anatomy diagram.

Student/Teacher Planning:

Bold font: lecture outline, what you do/say

Yellow highlight: inquiry questions proposed to the students

Italicized font: conclusions hopefully proposed by students and/or explained

Part 1 Soil

Soil is made out of sand, silt, clay, water, microorganisms, and air

Sand, silt, and clay are different sizes

Sand is the largest

Silt is the middle

Clay is the smallest

The different soil mediums have different ratios of sand, silt and clay

Soil texture triangle is a tool used to determine the type of soil based on the ratios of sand, silt, and clay

Artifact A & Artifact B: Soil Sample Observations - Students will make observations about the soil samples that are available and record them. Reveal actual soil type after they have gone through all the samples

Plants can grow in all types of soil!

Which of the soil samples do you think would be the best for plant growth?

If sand is not a good growth medium, what else can it be used for?

Part 2 Plant Uses

The main importance of plants is obviously food!

But we are able to utilize plants in many other ways as well

Hold up pictures of the following images and have students guess what plant the products is derived from

Products (use actual products to hand out, or use the slide with pictures)

- aloe vera jelly - aloe
- Soy candles - soy beans
- Essential oils - lavender, mint, citrus, etc
- Rope - cotton or hemp
- Cotton shirt - cotton
- Pencil - wood
- Towel - cotton
- Lotion - chamomile

Ask students if they can think of any other non food items that are derived from plants

Offer up more ideas as well: Ethanol, biodiesel,

Part 3 Plant Anatomy

There are a few basic plant anatomy terms to know

Roots - obtains nutrients from the soil

What kind of nutrients do plants need from the soil?

Stem - transfers nutrients to the rest of the plant

Leaves - location of photosynthesis

What is photosynthesis?

Flower - location of reproduction

BUILD-A-PLANT ACTIVITY Students can go outside and find an example of the four plant parts and tape them to a piece of paper

TIPS

- The plant parts do not need to be from the same plant, it is recommended that they come from different plants to see the diversity in the shapes and sizes of each of the plant organs.
- Get roots from weeds as they are beneficial to be pulled up
- If it is not a flowering season substitute for a pinecone

- If it is the winter you can use a variety of things to build a plant (construction paper, straws, pipecleaner, etc)
- What is the “stem” of a tree or what is the “flower” of grass?

Problem Solution:

For these three topics that are covered in this lesson the students provide problems that require solutions:

What is the best soil? Students get hands on to learn the differences in soil textures. They can learn that while all soil is useful, it is not always useful for every type of plant growth

Understanding that many products come from plants is an important connection for young students to make. Similarly to how we emphasize to students that “food doesn’t come from the grocery store” we can emphasize how plants are also utilized for non-food uses.

Making connections between the plant organs of all plants is a helpful tool to aid in the identification and make connections to the roles that all plant organs have no matter the size of the plants.

Title of Lesson: Learning Forestry Science

Situation: This lesson is part two of a four part lesson for recruiting junior high students into the GOISD Food Systems and Natural Resources course. The lesson is designed to be an interactive and experiential learning experience to engage students in agricultural sciences.

Google Slides: [LEARNING FORESTRY SCIENCE](#)

Objective(s): The objective of this lesson is to introduce students to forestry science through hands-on experience to promote experiential learning.

Materials: tree cookie printouts or actual tree cookies, writing utensil, tacks(for real tree cookies, hot glue guns, extension cords, popsicle sticks, cardboard materials, paper,

Interest Approach: During this lesson we will be going through the history and current state of forestry and logging. Many students in the western Upper Peninsula have an interest in forestry and natural resources because it is an important part of their lives in many ways.

Student/Teacher Planning:

Bold font: lecture outline, what you do/say

Yellow highlight: inquiry questions proposed to the students

Italicized font: conclusions hopefully proposed by students and/or explained

Tree Cookies

How can we tell the age of trees after they are cut down?

Count the rings to determine the age of the tree when it was cut down

We can tell a lot about a trees life by examining its rings

Thin rings means the tree had limited growth in that year

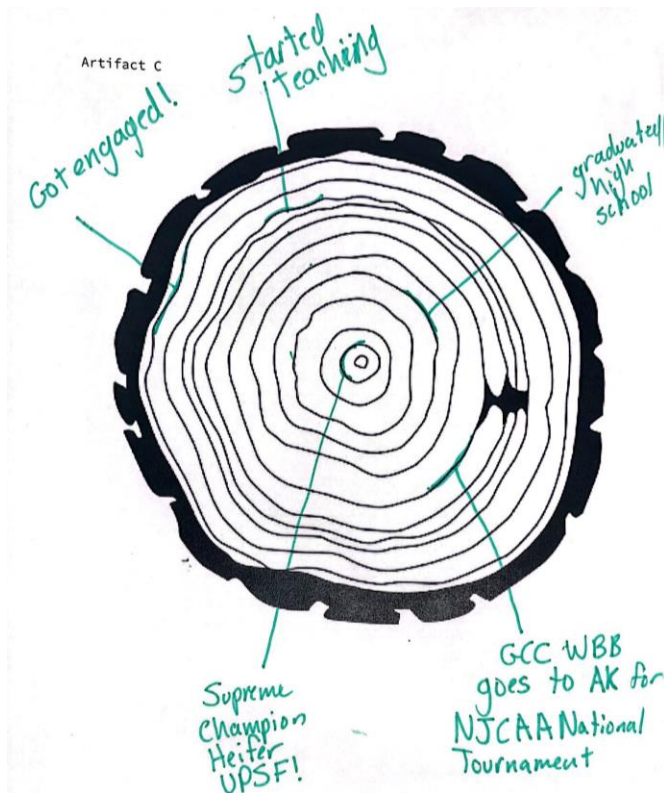
Thick rings means the tree has lots of growth in that year

Light parts of the tree indicate spring growth

Dark parts of the tree indicate fall growth

Activity: Use the tree cookies as a timeline to document 5 events that are memorable in their lives. You can use real tree cookies if you can have someone cut them for you or use a printable that is provided as artifact 3.

Example:



Make a class tree cookie: Go through each ring and see if you can find an event from that year from the students, it can be from their cookie, other events that have happened, or notable events you looked up online.

The Upper Peninsula of Michigan is home to two National forests

Do you know what they are?

Hiawatha National Forest - central UP

Ottawa National Forest - western UP

Logging in the UP dates back almost 200 years!

What do you all think logging was like for the first settlers in Michigan?

Logging was one of the most physically demanding jobs, logging camps were all over the UP and Michigan.

Still today, logging is one of the most important industries in the Upper Peninsula

Logging today is almost exclusively done with heavy equipment

Chances are that some of you know someone who works in forestry or logging.

What percentage of the Upper Peninsula is forest?

84% of the Upper Peninsula is forest

What careers are available in forestry?

Logger

Park ranger

Sawyer

Surveyor

Forester

What are trees used for?

Providing oxygen

Wood

Sap for maple syrup

Habitat for animals and insects

Landscaping

Fruits and nuts

Tourism(fall colors)

What is wood used for?

Building

Furniture

Flooring

Paper Products

Musical Instruments

Charcoal**Pencils****Students will now get into groups to build structures with hot glue guns and wood products**

Popsicle sticks, cardboard, paper, sticks, anything made of wood!

TIPS:

- Encourages students to put forth their best effort by offering a prize for the best structure
- If students have a hard time thinking of ideas for structures you can make suggestions(log cabin, livestock barn/chicken coop,

Problem Solution: Logging is an important industry in the Upper Peninsula, students understanding the role that forestry and logging play in the economy. Students understanding the vast industrial use of wood helps them understand that forestry and logging is a sustainable career venture if they choose to pursue it.

Title of Lesson: Learning Food Science

Situation: This lesson is part three of a four part lesson for recruiting junior high students into the GOISD Food Systems and Natural Resources course. The lesson is designed to be an interactive and experiential learning experience to engage students in agricultural sciences.

Google slides: [LEARNING FOOD SCIENCE](#)

Objective(s): The objective of this lesson is to introduce students to nutrition science for humans as well as bring an awareness of animal nutrition as well. Using hands-on experience students will learn about nutrients that are present in agricultural commodities.

Materials: Small beakers or glasses, milk, lemon juice, spoons, bucket to dump the waste

iodine solution(link to solution <https://www.amazon.com/Grams-Iodine-Solution-30mL-Collection/dp/B07JM4NH1S>)
plastic or glass dropper, various fruits and vegetables ranging in starch content, cutting boards, knives, paper plates

Interest Approach: Nutrition is important in our everyday lives as humans as well as in food production. Food science is a great subject because everybody loves to eat!

Student/Teacher Planning:

Bold font: lecture outline, what you do/say

Yellow highlight: inquiry questions proposed to the students

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Nutrition and Food Science is important for animals and humans

Human nutrition is important so we can fuel our bodies to be healthy and nourished

Animal nutrition is important so animals meet their nutrient requirement to produce food products for us to eat

Humans and livestock all need varying amounts of these nutrients

Nutrient classes

Water

Carbohydrates

Protein

Fats

Vitamins

Minerals

This venn diagram shows the similarities and differences between animal diets and humans diets

(explain the differences and similarities)

What are other differences or similarities in the way that humans and animals eat?

continuous feeding vs meal times, raw vs cooked

Where do nutrients come from on the farm

Dairy products

Comes from milk of dairy cows or dairy goats to make milk, cheese, ice cream, sour cream, butter

One of the most important food safety protocol in our food system is pasteurization

Pasteurization involves heating liquids at high temperatures for short amounts of time.

Pasteurization kills harmful microbes in milk without affecting the taste or nutritional value

What important nutrients can we get from consuming dairy products?

Calcium

Phosphorous

Vitamins A, D, and B12.

Protein

Potassium

Zinc

Milk also is a good source of protein

See artifact D and complete activity

Meat and protein products come from cows, hogs, lambs, and chickens!

What other animals can we consume protein from?

Deer, turkey, etc

What other nutrients do we get from eating meat?

iodine, iron, zinc, vitamins, essential fatty acids

Fruits and vegetables

Fruits and vegetables are a great sources of vitamins, minerals, fiber

Fruits and vegetables are great sources of carbohydrates!

Testing Carbohydrates in Fruits and Veggies Activities

There are 3 different forms of carbohydrates

Sugars - most readily available to digest

Starches - in the middle

Fiber - most complex to digest

See artifact E and complete activity

Grain products:

What are examples of grain products?

Corn, soybeans, wheat, oats

What are examples of products made from grains?

Grain to feed livestock

Cereal

Vegetable oil

Corn syrup

Corn starch

Flour

What nutrients do we get from consuming grains?

Carbohydrates, minerals, fats

Meeting your nutrient requirements comes from eating a balanced diet!

TIPS:

- Have a snack available to the students since the topic is food science! Crackers, meat, and cheese slices are a great option.
- Have as many materials available as possible so the groups can be smaller.
- Encourage students to answer the inquiry questions, this lesson is the 3rd in the curriculum and they should be gaining confidence

Problem Solution: Students are able to explore what nutrients come from agricultural products. Students conduct experiments on the energy content of foods and make connections between nutrition of humans and animals and the role we all play in the food system.

Title of Lesson: Learning Animal Science

Situation: This lesson is part four of a four part lesson for recruiting junior high students into the GOISD Food Systems and Natural Resources course. The lesson is designed to be an interactive and experiential learning experience to engage students in agricultural sciences.

Google Slides: [LEARNING ANIMAL SCIENCE](#)

Objective(s): The objective of this lesson is to introduce students to uses of agricultural animal products and byproducts as well as introduce them to the subject matter of animal science.

Materials: Highlighters, artifact F handouts, dry erase boards and markers for groups

Interest Approach: To create interest in learning about animal science this lesson is heavily constructed around teacher led inquiry. The end of this lesson is a short trivia session that covers topics pertaining to different species of farm animals. The trivia competition will keep students engaged in the subject matter at hand.

Student/Teacher Planning:

Bold font: lecture outline, what you do/say

Yellow highlight: inquiry questions proposed to the students

Italicized font: conclusions hopefully proposed by students and/or explained

What is animal science?

Animal behavior and management

Genetics and reproductions

Veterinary science

Nutrition

Many careers are available in this field!

What careers are available in the field of animal science?

Livestock producer, veterinarian, animal nutritionist

Animals in agriculture are all used for the following...

Food

Hide

Fiber

Companionship

Food products

What are the three main categories of animal food products?

Meat, milk, eggs

What animals does beef come from?

cows

What animal does pork come from?

hogs

Besides a cow, what other animal could produce milk for human consumption?

Goats, sheep

Hide products from animals

What are hide products?

Leather, hide rugs, hide dog treats

Fiber products

What is animal fiber and what is it used for?

Sheep produce wool that is made into yarn to make sweaters, socks, mittens, hats

Hair from horses and pigs is used in many types of brushes

Companionship Animals

Used for companion to humans

Most animals can be a companion animal

Do any of you have companion animals at home? (pets)

What is an animal by product?

Parts or waste of an animal that are not directly consumed by humans

Print and pass out all infographics from Artifact F

Instruct students to evaluate each list of byproducts and highlight or mark byproducts that they have used before.

Animal Science Trivia!

Students can compete in groups with a dry erase marker and board

Each answer will be elaborated on

Question 1: How many days does it take for a fertilized chicken egg to hatch once it is put in an incubator?

Correct Answer: 21

When incubating chicks...

Temperature must stay 99.5–100.5 degrees F

Humidity must stay between 57-60 % and the last three days over 65%

Eggs must be rotated often

Note the incubator in the slides is an automatic egg turner

Question 2: Cows, Sheep, and Goats digestive system is made up of how many stomach compartments?

Correct Answer: Ruminants

Cows, sheep and goats are RUMINANTS which means they have a complex 4 compartment stomach to break down grass and hay.

Horses and rabbits are HINDGUT FERMENTERS which means they have one stomach, but a chamber in the hindgut to ferment their feed for better absorption.

Pigs are MONOGASTRIC which means they have one stomach with acids to break down food, just like humans!

Question 3: What is the proper name for a baby horse?

Correct Answer: Foal

Baby horse = foal

Baby cow = calf

Baby pig = piglet

Baby sheep = lamb

Baby goat = kid

Baby chicken = chick

Question 4: How is the gestation period of sheep? (pregnancy)

Correct Answer: 5 months

Gestation period lengths

Horses - 11 months

Cows - 9 months

Sheep - 5 months

Goats - 5 months

Pigs - 3 months, 3 weeks, 3 days

Question 5: Between the 5 farm animals we learned about, which one of them CANNOT SWEAT?

Correct Answer: pigs

Pigs do not have sweat glands, therefore cannot sweat. They instead cool off in the mud!

TIPS:

- Have a prize for the winning group of trivia
- give a point for the correct answer or for the group with the closest answer if no group was correct.
- During the byproduct highlighting activity encourage student to look for products they can try in the future

Problem Solution: Some of the material that is covered might not be engaging given in a lecture setting. During the trivia games students are learning information about all species of animals though a competitive game. Utilizing a game type activity is a great way to give instruction in small tidbits for students to absorb information.

Artifact A: Soil Sample Observations

Set up for instructor: Get 4 types of soil that are across the soil spectrum (heavy clay to sand) and put them in a container and add water



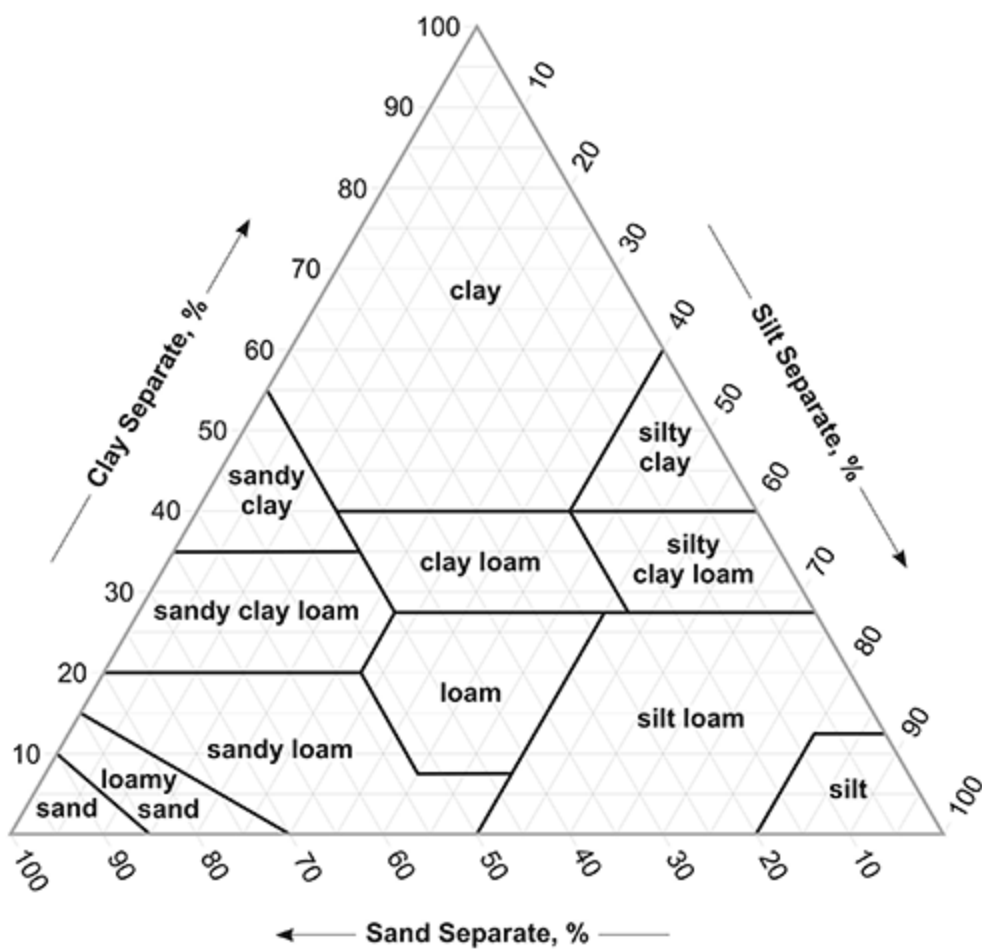
Soil Sample Observations

Instructions: make observations about the soil samples that are available and record your observations on your worksheet about each of the soil samples

	Soil 1	Soil 2	Soil 3	Soil 4
Describe the feeling of the soil (gritty, smooth, sticky)				
Describe the color of the soil				
What do you think this soil could be used for?				
What is your prediction of this soil textural class?				

Artifact B

Soil Textural Triangle



Artifact C



Artifact D: Seeing the protein in the Milk

Materials needed:

Small beakers or glasses, milk, lemon juice, spoons, bucket to dump the waste

Instructions:

Pour $\frac{1}{2}$ cup milk into each of the glass beakers

Go around with lemon juice and pour a splash(Tablespoon) into each of the beakers

Instruct students to stir

Explain that the acidity of the lemon juice is causing the milk to curdle, the curdles of solid at the top is casein protein which makes up 80% of milk protein

Artifact E: Starch Testing in Fruits and Vegetables

Materials needed: iodine solution(link to solution <https://www.amazon.com/Grams-Iodine-Solution-30mL-Collection/dp/B07JM4NH1S>) plastic or glass dropper, various fruits and vegetables ranging in starch content, cutting boards, knives, paper plates

High starch: potatoes, squash

Medium starch: apples, bananas

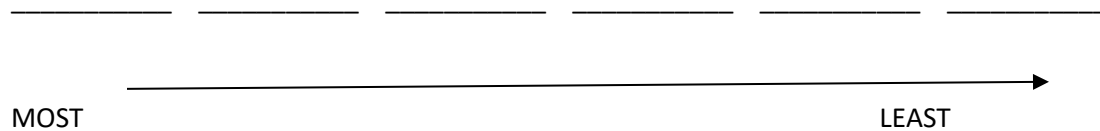
Low starch: cucumber, eggplant, carrot, peppers

Instructions:

Slice each of the fruits and vegetables so each group has one of each.

Distribute one of each sample to students

Predictions: Rank the fruits and vegetables in order from the most starchy to the least starchy

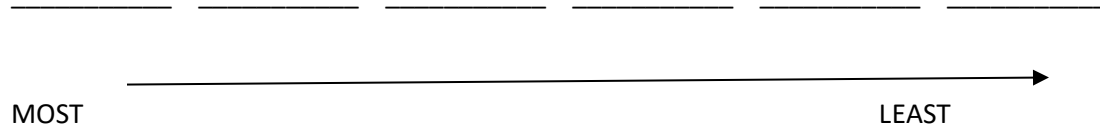


Use the dropper to apply two drops of iodine to each sample slice

Wait for the reactions to take place

After a few minutes document which samples have the most **BLUE**, the more blue the more starch. If there is no blue there is very little to no starch

Based on your results, rank the samples on starch again.



Artifact F: Animal Byproduct Infographics

Source: Farm Credit of Virginia

https://drive.google.com/drive/folders/1zS8kafjnHbQEZa6cz4uNS9N67vdiQ9R4?usp=drive_link

Print all the infographics from the link above

Have students get a highlighter and go through each of the sheets to highlight products that they use!

Chapter 5

In the evaluation of my project, I regret I did not have the opportunity to use these lessons in the classroom. These lesson plans have not been implemented in a classroom setting yet, but in the future, I will have opportunities to teach them myself. Eventually, my goal is that this curriculum can be taught by teachers all over the GOISD in a junior high classroom, after-school program, or summer school program. Although the goal of this project is to see increased enrollment in the high school program, a great benefit will be the impact that this project has on junior high students, ideally, this positive change might increase awareness of the benefits of a junior high agriculture class in the schools of the GOISD.

References

Golden, B., & Mulkey, F. (2022, May-June). Interesting Thoughts from an 8:00 A.M. Class and Beyond. *The Agricultural Education Magazine*, 94 (6), pp. 22-24. Retrieved from https://www.naae.org/profdevelopment/magazine/archive_issues/Volume94/2022%2005%20--%20May%20June.pdf