Judd-Murray Agricultural Literacy Instrument
Information and Instructions for Measuring the 9-12
National Agricultural Literacy Outcomes

The Judd-Murray Agricultural Literacy Instrument (JMALI) was developed (2019) by educators and agricultural experts to measure the National Agricultural Literacy Outcomes (NALOs) (Spielmaker & Liesing, 2014). The JMALI instrument was created using the method of domain analysis to measure three proficiency levels: 1) Limited or developing agricultural *exposure*, 2) Functional agricultural *literacy*, and 3) Practical & applicable agriculture *proficiency*.

Background Information for Users

Using two committees of teaching and agricultural experts, multiple questions were developed through several rounds of responses and shared expertise. Those questions were then statistically validated using a large group of young college students at a Northern Utah university. The NALOs are banded by grade level and each assessment is a cumulative outcome for the grade level band, meaning the 9-12 instrument measures the agricultural literacy aligned to what a student should know at the conclusion of twelfth grade. Two valid 15-item instruments were developed for the 9-12 grade band. The JMALI assessments provide stakeholders and teachers with a reliable instrument to measure agricultural literacy related to the National Agricultural Literacy Outcomes for formative and summative assessment.

How to Administer the LMALI Instruments

Each of the 15 item instruments typically takes less than 15 minutes to complete. When items have multiple correct responses, the items are considered correct only when all the correct items are selected. Partially correct items can be evaluated to inform classroom instruction in formative ways. Validated and reliable scoring measures are *only* appropriate when a student completes all 15 items on the same assessment. There are two grade 9-12 assessments. These may be taken in a paper/pencil format ***or*** students may take the assessment online using a Google form. There are two options to consider when using the Google Forms.

> **Option 1:** Use the Google Forms on the National Center for Agricultural Literacy (NCAL) website, Instrument 1: http://bit.ly/HSForm1, **or** Instrument 2: http://bit.ly/HSForm2 Students will be able to see their scores on the screen upon completion, but the data is stored in the NCAL Google Drive account.
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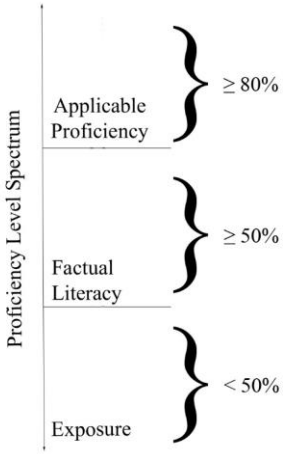
> **Option 2:** Copy/Download a copy of the Google Forms to your own Google Drive, Instrument 1: https://bit.ly/hsform1download, **or** Instrument 2: https://bit.ly/hsform2download. You can then share a link to your copy with students and see the data for an entire class or group within your own Google account. A Google account is required for making copies of the instruments.

Scoring

Scoring the proficiency levels should be done carefully. The proficiency level score is based on the total number of correct responses. The level of proficiency can be determined by using the proficiency scale. Educators can identify learner stages by identifying those with a score ≥ to 12 as *proficient*, those with a score ≥ 8 as factually *literate*, and those with a score ≤ 7 as *exposure* or developing level. Teachers and stakeholders can then use the average number of participants in each proficiency stage to evaluate student agricultural literacy based on the NALO themes. Additionally, partial scoring techniques should be examined for formative classroom use. It is possible that some exposure or literacy-level students could be nearly proficient, if the additional concepts are explained. Partial scoring has promise as a significant support for formative assessment of learning.



Assessment Key

JMALI Instrument 9-12: 1

1. T (NALO: T1- Exposure)
2. F (NALO: T1- Literacy)
3. Reduction of world hunger; Protection of food supply; Conservation of natural resources (NALO: T1 - Proficient)
4. Dead/decaying animals; Lawn/grass clippings; Manure (NALO: T2 - Exposure)
5. All answers (NALO: T2 - Literacy)
6. Integrated pest management; Using robots, drones, and GPS; Using radio frequency identification chips (NALO: T2 - Proficient)
7. 150 = calories; 2% = Calcium; 4 = Grams of protein in two servings; 1 = Number of servings in this package (NALO: T3 - Exposure)
8. Washing hands; Cooking meat thoroughly (NALO: T3 - Literacy)
9. T (NALO: T3 - Proficient)
10. T (NALO: T4 - Exposure)
11. F (NALO: T4 - Literacy)
12. Biotechnology; Genetic Engineering; Refrigeration; Mechanization of equipment and implements (NALO: T4 - Proficient)
13. T (NALO: T5 - Exposure)
14. All answers (NALO: T5 - Literacy)
15. All answers (NALO: T5 – Proficient)

JMALI Instrument 9-12: 2

1. T (NALO: T1- Exposure)
2. Selecting drought-tolerant crop species: Water
   Using a methane digester: Air
   Reduce tillage: Soil
   (NALO: T1- Literacy)
3. Eliminate or reduce soil tillage (NALO: T1 - Proficient)
4. T (NALO: T2 - Exposure)
5. Local food system: Food produced, processed, and distributed in a limited geographic area, often connects farms and consumers at the point of sale.
   Community-supported agriculture: Consumers share the benefits and risks of food production by purchasing shares of a farm operation.
   Organic food system: Production promotes biodiversity, food is grown and processed using little or no synthetic fertilizers or pesticides.
   Conventional food system: The prevailing agricultural production system uses technological innovation for maximum efficiency. (NALO: T2 - Literacy)
6. Integrated pest management; Using robots, drones, and GPS; Using radio frequency identification chips (NALO: T2 - Proficient)
7. 150 = calories; 2% = Calcium; 4 = Grams of protein in two servings; 1 = Number of servings in this package (NALO: T3 - Exposure)
8. Chocolate; Peanut butter; Yogurt (NALO: T3 - Literacy)
9. Cage-free; Non-GMO (NALO: T3 - Proficient)
10. T (NALO: T4 - Exposure)
11. All answers (NALO: T4 - Literacy)
12. Determining topsoil depth; Variable-rate pesticide application (NALO: T4 - Proficient)
13. T (NALO: T5 - Exposure)
14. All answers (NALO: T5 - Literacy)
15. All answers (NALO: T5 - Proficient)

Teachers using this assessment as a formative tool should refer to the NALOs to inform their instruction and consider using the instructional resources found in the National Agricultural Literacy Curriculum Matrix (https://www.agclassroom.org/matrix).

Citation Recommendation

Judd-Murray, R. (2019). *Development and validation of an agricultural literacy instrument using the national agricultural literacy outcomes*. (Doctoral dissertation). Utah State University. Retrieved from ProQuest.

More information on https://www.agliteracy.org/research/assessment

1. Determine if the statement is true or false: *Sustainable agriculture is the practice of producing food, fiber, and fuel in a way that is profitable to the producer, supports quality of life, and protects natural resources.*
   - ☐ The statement is true
   - ☐ The statement is false

2. Determine if the statement is true or false: *There are few incentives for agriculturists to protect the environment and natural resources.*
   - ☐ The statement is true
   - ☐ The statement is false

3. **Select all** the potential outcomes of practicing sustainable agriculture.
   - ☐ Reduction of world hunger
   - ☐ Protection of food supply
   - ☐ Wildlife habitat loss
   - ☐ Conservation of natural resources

4. **Select all** the examples of organic nutrients.
   - ☐ Dead/decaying animals
   - ☐ Synthetic nitrogen
   - ☐ Lawn/grass clippings
   - ☐ Manure
   - ☐ Silt

5. **Select all** the factors that affect food choices for people.
   - ☐ Cost
   - ☐ Culture
   - ☐ Convenience
   - ☐ Access and/or availability
   - ☐ Taste

6. **Select all** the following practices that provide the best balance for agricultural production, while maintaining balance with natural resources.
   - ☐ Integrated pest management
   - ☐ Using robots, drones, and global positioning systems
   - ☐ Using radio frequency identification chips
   - ☐ Using advertising strategies

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7. Interpret the information given on this food label and match the value with the correct description.

Value	*Description*
a. 150	___ Grams of protein in two servings
b. 2	___ Percent of the daily requirement for Calcium per serving
c. 4	___ Number of calories per serving
d. 1	___ Number of servings in this package

8. **Select all** the ways that consumers can prevent food-borne illness.
   - ☐ Washing hands
   - ☐ Cooking meat thoroughly
   - ☐ Keeping most food products at room temperature
   - ☐ Using the same knife for cutting meat and vegetables
   - ☐ Thawing frozen meat on the kitchen counter

9. Determine if the statement is true or false: *The American food supply is among the safest in the world.*
   - ☐ The statement is true
   - ☐ The statement is false

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10. Determine if the statement is true or false: *An adequate global food supply is dependent upon the continued development and appropriate use of science, technology, and engineering*.
    - ☐ The statement is true
    - ☐ The statement is false

11. Determine if the statement is true or false: *All types of scientific discoveries and applications of technology are accepted by consumers if they increase food production.*
    - ☐ This statement is true
    - ☐ This statement is false

12. **Select all** the technological advancements in agriculture that contribute to the ability to feed a growing population with a smaller number of producers.
    - ☐ Biotechnology
    - ☐ Availability of organic labeling
    - ☐ Genetic engineering
    - ☐ Animal-powered equipment
    - ☐ Refrigeration
    - ☐ Mechanization of equipment and implements
    - ☐ Reduction of conservation practices

13. Determine if the statement is true or false: *The geographic location of your food source plays a part in determining the price of the food.*
    - ☐ The statement is true
    - ☐ The statement is false

14. **Select all** factors that affect a country's production and distribution of food.
    - ☐ Economics
    - ☐ Geography
    - ☐ Population size

15. A farmer has 50 acres of land to grow a crop; which factors would need to be considered before making a choice about what to plant? **Select all** the correct choices.
    - ☐ Geographic location
    - ☐ Soil composition
    - ☐ Consumer demand
    - ☐ Climate change

End

1. Determine if the statement is true or false: *Sustainable agriculture is the practice of producing food, fiber, and fuel in a way that is profitable to the producer, supports quality of life, and protects natural resources.*
   - ☐ The statement is true
   - ☐ The statement is false

2. Match the natural resource with the corresponding sustainability practice/letter.

___ Water	a. Selecting drought-tolerant crop species
___ Soil	b. Using a methane digester
___ Air	c. Reduced tillage

3. **Select all** examples of sustainable agricultural practices.
   - ☐ Unregulated water use
   - ☐ Intensive grazing along stream banks
   - ☐ Continuous planting of the same crop
   - ☐ Eliminate or reduce soil tillage

4. Determine if the statement is true or false: *The inspection of meat and poultry, for wholesomeness, is mandatory in the United States of America.*
   - ☐ The statement is true
   - ☐ The statement is false

5. Match the name of the production system with its appropriate description/letter.

Production System

___ Local food system	___ Community-supported agriculture
___ Organic food system	___ Conventional food system

Description

a. Consumers share the benefits and risks of food production by purchasing shares of a farm operation.
b. The prevailing agricultural production system uses technological innovation for maximum efficiency.
c. Food produced, processed, and distributed in a limited geographic area, often connects farms and consumers at the point of sale.
d. Production promotes biodiversity, food is grown and processed using little or no synthetic fertilizers or pesticides.

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6. **Select all** the following practices that provide the best balance for agricultural production, while maintaining balance with natural resources.
   - ☐ Integrated pest management
   - ☐ Using robots, drones, and global positioning systems
   - ☐ Using radio frequency identification chips
   - ☐ Using advertising strategies

7. Interpret the information given on this food label and match the value with the correct description.

Value	*Description*
a. 150	___ Grams of protein in two servings
b. 2	___ Percent of the daily requirement for Calcium per serving
c. 4	___ Number of calories per serving
d. 1	___ Number of servings in this package

8. **Select all** the processed foods.
   - ☐ Chocolate
   - ☐ Apple
   - ☐ Peanut butter
   - ☐ Artichoke
   - ☐ Yogurt

9. **Select all** the marketing terms that are used to influence consumer choices.
   - ☐ Barn-free
   - ☐ Non-vaccinated
   - ☐ Cage-free
   - ☐ Non-GMO

10. Determine if the statement is true or false: *An adequate global food supply is dependent upon the continued development and appropriate use of science, technology, and engineering*.
   - ☐ The statement is true
   - ☐ The statement is false

11. **Select all** the following technologies that are frequently used in agricultural production systems.
   - ☐ Unmanned aerial systems (drones)
   - ☐ Robotics
   - ☐ Global positioning systems
   - ☐ Cloning

12. Which of the following practices is benefitted using precision agriculture?
   - ☐ Wildlife levels
   - ☐ Determining topsoil depth
   - ☐ Variable-rate pesticide application
   - ☐ Animal stocking rates

13. Determine if the statement is true or false: *The geographic location of your food source plays a part in determining the price of the food.*
   - ☐ The statement is true
   - ☐ The statement is false

14. **Select all** factors that affect a country's production and distribution of food.
   - ☐ Economics
   - ☐ Geography
   - ☐ Population size

15. **Select all** the following jobs related to agriculture.
   - ☐ Bioengineer
   - ☐ Timber grader
   - ☐ Mechanic
   - ☐ Biologist
   - ☐ Nutritionist

End