

Agricultural Science 2

Exam Information	Description
Exam number 183 Items 53 National Career Cluster Agriculture, Food & Natural Resources Certification available Yes	The Agricultural Science 2 industry certification exam assesses learners' understanding and proficiency across a diverse spectrum of foundational principles in animal and plant sciences. Topics include genetics, anatomy, physiology, nutrition, disease management, pest control, and effective agricultural management practices. Additionally, learners are tested on their comprehension of basic agribusiness principles relevant to both plant and animal production. The exam also evaluates learners' knowledge of career opportunities within these fields and their readiness for further educational pursuits.

Exam Blueprint and Performance Skills

Standard	Percentage of exam score
1. Candidate Organization Participation (optional)	0%
2. Supervised Agricultural Experience	3%
3. Opportunities & Current Topics	2%
4. Principles Of Animal Science	38%
5. Meat Science	5%
6. Soil Science Concepts	7%
7. Principles Of Plant Science	16%
8. Agronomy Practices	12%
9. Agricultural Business Management	12%
10. Marketing, Sales, & Purchasing	3%

11. Computer Application Skills	2%
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*Includes performance skill evaluation

Standard 1 - Candidate Organization Participation (optional)

Candidates will develop personal, leadership, and career skills through candidate organization participation.

Objective 1 Assess the role of candidate organization participation in developing personal and leadership skills.

1. Identify important personal skills and the strategies to use in developing the skills.
2. Identify important leadership skills and the role of candidate organization participation in developing the skills.

Objective 2 Assess the role of candidate organization participation in developing career skills.

1. List and describe proficiency awards appropriate in agricultural science.
2. List and describe career development and leadership development events appropriate in agricultural science.
3. Relate the importance of supervised agricultural experience to candidate organization achievement.
4. Utilize candidate organization and supervised agricultural experience participation to gain advanced degrees of candidate organization membership.

Optional: Standard performance evaluations on the final page of this document

Standard 2 - Supervised Agricultural Experience

Candidates will explain the maintenance and expansion of supervised agricultural experience (SAE) programs in agricultural education.

Objective 1 Maintain and use SAE records.

1. Explain how SAE records are maintained from year to year.
2. Explain how to summarize and analyze SAE records.

Objective 2 Devise long-range plans for expanding SAE programs.

1. Evaluate the overall quality of a current SAE and determine how to make it more productive or profitable.

2. Explain factors that should be considered in expanding an SAE program.
3. Explain how placement SAE and ownership SAE programs may be expanded.

Standard 3 - Opportunities & Current Topics

Candidates will identify career opportunities and current topics in agricultural science.

Objective 1 Appraise career opportunities in agricultural science.

1. Use available handbooks, career information, and computerized career information delivery systems to formulate tentative career choices.
2. Match personal interests and aptitudes to an occupational area in agricultural science.
3. Identify career opportunities and the education needed in agricultural science.
4. Identify the skills, education, and preparation needed for an occupational area.
5. Interview agricultural science professionals to learn more about careers.

Objective 2 Identify current topics in agricultural science.

1. Identify legal and ethical aspects of animal well-being, animal welfare, and animal rights.
2. Examine regulatory issues and agencies associated with biotechnology.
3. Discuss ethical, legal, social, and cultural issues in modern biotechnology

Standard 4 - Principles Of Animal Science

Candidates will explain principles of animal science.

Objective 1 Determine nutritional requirements of ruminant and non-ruminant animals.

1. List essential nutrients (proteins, carbohydrates, fats, water, minerals, vitamins) and describe the importance of each.
2. Compare and contrast common feedstuffs in the diets of ruminant and non-ruminant animals.
3. Identify sources of nutrients and classes of feed.
4. Relate the role of nutrition to the age and condition of animals.
5. Formulate feed rations for specific species, ages, and conditions of animals.

Objective 2 Discuss genetic inheritance in agricultural animals.

1. Explain the uses of genetics in animal agriculture.

2. Explain the benefits of using genetically superior animals in the production of animals and animal products.
3. Identify common agricultural animals on the basis of breed.

Objective 3 Describe the anatomy and physiology of animal organ systems.

1. Describe the anatomy of animal reproductive systems.
2. Identify important factors in breeding readiness.
3. Describe natural and artificial breeding of agricultural animals.
4. Relate the reproduction cycle in female mammals to reproductive efficiency.
5. Explain current technologies in animal reproduction.

Standard 5 - Meat Science

Candidates will discuss meat science.

Objective 1 Explain concepts related to meat grading.

1. Recognize signs of meat spoilage.
2. Describe the various characteristics that determine grade.
3. Describe the influence grade has on preparation procedures and retail price.
4. Identify and grade wholesale and retail cuts of beef and pork.

Optional: Standard performance evaluations on the final page of this document

Standard 6 - Soil Science Concepts

Candidates will explain soil science concepts.

Objective 1 Describe basic biological, physical, and chemical properties of soil.

1. Explain the roles of parent material, topography, organisms, time, weathering, and climate in soil formation.
2. Diagram biogeochemical cycles and explain the processes.
3. Describe the biodiversity found in soil and the contribution of biodiversity to the physical and chemical characteristics of soil.
4. Explain the roles of organic matter, soil depth, surface slope, soil organisms, and nutrient balance in soil productivity.

Optional: Standard performance evaluations on the final page of this document.

Standard 7 - Principles Of Plant Science

Candidates will explain principles of plant science.

Objective 1 Describe the anatomical structures of a plant and their functions.

1. Describe the structures of a typical plant cell and their functions.
2. Describe the structures of a seed, the types of seeds, and the function of seeds.
3. Describe the components of a root, the types of roots, and the functions of roots.
4. Relate the active and passive transport of minerals into and through the root system.
5. Describe the structures of a stem, the types of stems, and the functions of stems.
6. Describe the processes of translocation.
7. Describe the structures of a leaf, the types of leaves, and the functions of leaves.
8. Describe the major parts of a flower, their functions, and the types of flowers and flower forms.
9. Describe the structures of fruit, the types of fruit, and the purposes of fruit.

Objective 2 Determine the influence of environmental factors on plant growth.

1. Describe the functions of water in plant growth.
2. Explain plant responses to a shortage or excess of water.
3. Explain the qualities of light that affect plant growth, including color, intensity, and duration.
4. Explain plant responses to light.
5. Describe the effects of temperature on plant growth.
6. Describe the functions of plant nutrition (e.g., nitrogen, phosphorus, potassium, micronutrients) on plant growth.
7. Describe plant responses to temperature extremes.

Objective 3 Explain plant reproduction

1. Compare and contrast sexual and asexual reproduction.
2. Explain pollination, cross-pollination, and self-pollination of flowering plants.
3. Diagram the process of plant fertilization.
4. Describe the process of seed germination.
5. Explain the conditions required for seed germination.
6. Explain the importance of seed viability and vigor.
7. Describe optimal conditions for asexual propagation.
8. Demonstrate techniques used to propagate plants asexually.

Objective 4 Explain the control of plant growth and development.

1. Identify the five groups of naturally occurring plant hormones and explain their functions.
2. Explain plant tropisms.
3. Describe synthetic growth regulators.
4. Describe commercial uses of plant growth regulators.

Optional: Standard performance evaluations on the final page of this document.

Standard 8 - Agronomy Practices

Candidates will describe agronomy practices.

Objective 1 Demonstrate skills related to crop production.

1. Explain the reasons for preparing the soil before planting.
2. Describe crop scheduling.
3. Describe proper planting procedures and post-planting care.
4. Describe stages of crop development.
5. Explain proper techniques to control and manage plant growth through mechanical, biological, cultural, or chemical means.
6. Explain harvesting methods.
7. Determine storage methods for crops.

Optional: Standard performance evaluations on the final page of this document.

Standard 9 - Agricultural Business Management

Candidates will explain basic agricultural business management practices.

Objective 1 Examine agricultural credit.

1. Explain credit and its role in agribusiness.
2. Analyze and compare credit sources and types, calculate repayment ability, and figure costs of credit.

Objective 2 Maintain agricultural records.

1. Describe record-keeping procedures, including accounting and bookkeeping systems.
2. Explain inventory and depreciation procedures commonly used in production agriculture and agribusiness.
3. Maintain and complete a set of financial records based on an SAE project or a simulated class activity.

Objective 3 Interpret financial statements, planning, and analysis.

1. Explain agricultural budgeting, cash-flow analysis, balance sheet, variable costs and the use of records for planning and analysis.
2. Prepare an enterprise budget and a cash-flow statement.
3. Determine how to make management decisions based on financial and production records.

Optional: Standard performance evaluations on the final page of this document.

Standard 10 - Marketing, Sales, & Purchasing

Candidates will investigate marketing, sales, and purchasing.

Objective 1 Explain commodities and marketing

1. Explain marketing functions and concepts in agribusiness management.
2. Identify and describe the major legal and insurance concerns of an agribusiness.
3. Design a marketing plan for an agricultural product or service.

Objective 2 Ascertain purchasing options

1. Explain purchasing and leasing options involved in agriculture.
2. Analyze and compare costs of options, such as leasing versus purchasing, new versus used, and volume buying.

Optional: Standard performance evaluations on the final page of this document

Standard 11 - Computer Application Skills

Candidates will demonstrate computer application skills.

Objective 1 Apply computer operations in agricultural science

1. Demonstrate the use of computers in agribusiness for decision-making and office management.
2. Perform business operations using database, word-processing, and spreadsheet software.

Performance Skills Evaluation

Exam name: Agricultural Science 2

Candidate Name: _____

Performance assessments may be completed and evaluated any time before the certification is issued. The following performance skills can be used in connection with the associated standards and exam. The evaluator will function as the subject matter expert to determine if the candidate meets the skills requirements with a Yes/No for passing.

Standard 1 – Candidate Organization Participation • Recite and explain a candidate organization's creed • Attend a candidate organization's meeting	Pass:
Standard 2 – Supervised Agricultural Experience • Prepare and plan for a long-term SAE • In an approved record book, record all transactions and activities on an SAE	Pass:
Standard 4 – Principles of Animal Science • Illustrate one of the following: skeletal, muscular, respiratory, digestive, or circulatory systems of animals • Identify vital signs and normal behavior in livestock • Identify sources of nutrients and classes of feeds • Formulate feed rations • Analyze the reproductive system	Pass:
Standard 5 – Meat Science • Grade wholesale and retail cuts of beef and pork	Pass:
Standard 6 – Soil Science Concepts • Analyze soil fertility	Pass:
Standard 7 – Principles of Plant Science • Classify soil texture • Demonstrate different plant adaptations for protection • Identify plant parts	

- Demonstrate control methods for plant growth and development
- Demonstrate methods of plant reproduction

Standard 8 – Agronomy Practices

- Make management decisions based on financial and production records
- Determine the tax obligations for an agribusiness

Standard 10 – Marketing, Sales, and Purchasing

- Analyze and compare credit sources and types, calculate repayment ability, and costs of credit
- Design a marketing plan for an agricultural product or service.

Evaluator Name:**Date:**