The Pathway Knowledge and Skills Chart describes what all/most learners/workers need to know and be able to do to demonstrate competence within a career pathway. Following the pathway description, there are four sets of knowledge and skill expectations:

A. Foundational Academic Expectations
B. Essential Knowledge and Skills
C. Cluster (Foundation) Knowledge and Skills
D. Pathway Knowledge and Skills

PATHWAY DESCRIPTION

Animal Systems Pathway: People who work in the Animal Systems pathway work to develop better, more efficient ways of producing and processing meat, poultry, eggs and dairy products. They study genetics, nutrition, reproduction, growth and development of domesticated farm animals. Some individuals inspect and grade livestock food products, purchase livestock or work in technical sales or marketing. Others advise agricultural producers on how to upgrade animal housing facilities properly, lower mortality rates, handle waste matter or increase production of animal products, such as milk or eggs. Animal care workers train, feed, water, groom, bathe and exercise animals. They also clean, disinfect and repair their cages.

A. FOUNDATIONAL ACADEMIC EXPECTATIONS

All secondary students should meet their state's academic standards. All Essential Cluster and Pathway Knowledge and Skills are predicated on the assumption that foundational academic skills have been attained. Some knowledge and skill statements will further define critical linkages and applications of academics in the cluster and/or pathway.

A. Foundational Academic Expectations
B. Essential Knowledge and Skills
C. Cluster (Foundation) Knowledge and Skills
D. Pathway Knowledge and Skills

B. ESSENTIAL KNOWLEDGE AND SKILLS

The following Essential Knowledge and Skill statements apply to careers in all clusters and pathways. Persons preparing for careers in this pathway should be able to demonstrate these skills in the context of this cluster and pathway.

A. Foundational Academic Expectations
B. Essential Knowledge and Skills
C. Cluster (Foundation) Knowledge and Skills
D. Pathway Knowledge and Skills

Essential Topic ESS01	ACADEMIC FOUNDATIONS: *Achieve additional academic knowledge and skills required to pursue the full range of career and postsecondary education opportunities within a career cluster.*

ESS01.01 — **Complete required training, education, and certification to prepare for employment in a particular career field.**

ESS01.01.01	Identify training, education and certification requirements for occupational choice.
ESS01.01.02	Participate in career-related training and/or degree programs.
ESS01.01.03	Pass certification tests to qualify for licensure and/or certification in chosen occupational area.

ESS01.02 — **Demonstrate language arts knowledge and skills required to pursue the full range of post-secondary education and career opportunities.**

ESS01.02.01	Model behaviors that demonstrate active listening.
ESS01.02.02	Adapt language for audience, purpose, situation. (i.e. diction/structure, style).
ESS01.02.03	Organize oral and written information.
ESS01.02.04	Compose focused copy for a variety of written documents such as agendas, audio-visuals, bibliographies, drafts, forms/documents, notes, oral presentations, reports, and technical terminology.
ESS01.02.05	Edit copy to create focused written documents such as agendas, audio-visuals, bibliographies, drafts, forms/documents, notes, oral presentations, reports, and technical terminology.
ESS01.02.06	Comprehend key elements of oral and written information such as cause/effect, comparisons/contrasts, conclusions, context, purpose, charts/tables/graphs, evaluation/critiques, mood, persuasive text, sequence, summaries, and technical subject matter.
ESS01.02.07	Evaluate oral and written information for accuracy, adequacy/sufficiency, appropriateness, clarity, conclusions/solutions, fact/opinion, propaganda, relevancy, validity, and relationship of ideas.
ESS01.02.08	Identify assumptions, purpose, outcomes/solutions, and propaganda techniques.
ESS01.02.09	Predict potential outcomes and/or solutions based on oral and written information regarding trends.
ESS01.02.10	Present formal and informal speeches including discussion, information requests, interpretation, and persuasive arguments.

ESS01.03 — **Demonstrate mathematics knowledge and skills required to pursue the full range of post-secondary education and career opportunities.**

ESS01.03.01	Identify whole numbers, decimals, and fractions.
ESS01.03.02	Demonstrate knowledge of basic arithmetic operations such as addition, subtraction, multiplication, and division.
ESS01.03.03	Demonstrate use of relational expressions such as equal to, not equal, greater than, less than, etc.

ESS01.03.04	Apply data and measurements to solve a problem.
ESS01.03.05	Analyze Mathematical problem statements for missing and/or irrelevant data.
ESS01.03.06	Construct charts/tables/graphs from functions and data.
ESS01.03.07	Analyze data when interpreting operational documents.

ESS01.04 **Demonstrate science knowledge and skills required to pursue the full range of post-secondary and career education opportunities.**

| ESS01.04.01 | Evaluate scientific constructs including conclusions, conflicting data, controls, data, inferences, limitations, questions, sources of errors, and variables. |
| ESS01.04.02 | Apply scientific methods in qualitative and quantitative analysis, data gathering, direct and indirect observation, predictions, and problem identification. |

Essential Topic ESS02	**COMMUNICATIONS:** *Use oral and written communication skills in creating, expressing and interpreting information and ideas including technical terminology and information.*

ESS02.01 **Select and employ appropriate reading and communication strategies to learn and use technical concepts and vocabulary in practice.**

ESS02.01.01	Determine the most appropriate reading strategy for identifying the overarching purpose of a text (i.e. skimming, reading for detail, reading for meaning or critical analysis).
ESS02.01.02	Demonstrate use of content, technical concepts and vocabulary when analyzing information and following directions.
ESS02.01.03	Select the reading strategy or strategies needed to fully comprehend the content within a written document (i.e., skimming, reading for detail, reading for meaning or critical analysis).
ESS02.01.04	Interpret information, data, and observations to apply information learned from reading to actual practice.
ESS02.01.05	Transcribe information, data, and observations to apply information learned from reading to actual practice.
ESS02.01.06	Communicate information, data, and observations to apply information learned from reading to actual practice.

ESS02.02 **Demonstrate use of the concepts, strategies, and systems for obtaining and conveying ideas and information to enhance communication in the workplace.**

ESS02.02.01	Employ verbal skills when obtaining and conveying information.
ESS02.02.02	Record information needed to present a report on a given topic or problem.
ESS02.02.03	Write internal and external business correspondence that conveys and/or obtains information effectively.
ESS02.02.04	Communicate with other employees to clarify workplace objectives.

ESS02.02.05	Communicate effectively with customers and employees to foster positive relationships.
ESS02.03	**Locate, organize and reference written information from various sources to communicate with co-workers and clients/participants.**
ESS02.03.01	Locate written information used to communicate with co-workers and customers.
ESS02.03.02	Organize information to use in written and oral communications.
ESS02.03.03	Reference the sources of information.
ESS02.04	**Evaluate and use information resources to accomplish specific occupational tasks.**
ESS02.04.01	Use informational texts, Internet web sites, and/or technical materials to review and apply information sources for occupational tasks.
ESS02.04.02	Evaluate the reliability of information from informational texts, Internet Web sites, and/or technical materials and resources.
ESS02.05	**Use correct grammar, punctuation and terminology to write and edit documents.**
ESS02.05.01	Compose multi-paragraph documents clearly, succinctly, and accurately.
ESS02.05.02	Use descriptions of audience and purpose when preparing and editing written documents.
ESS02.05.03	Use correct grammar, spelling, punctuation, and capitalization when preparing written documents.
ESS02.06	**Develop and deliver formal and informal presentations using appropriate media to engage and inform audiences.**
ESS02.06.01	Prepare oral presentations to provide information for specific purposes and audiences.
ESS02.06.02	Identify support materials that will enhance an oral presentation.
ESS02.06.03	Prepare support materials that will enhance an oral presentation.
ESS02.06.04	Deliver an oral presentation that sustains listeners' attention and interest.
ESS02.06.05	Align presentation strategies to the intended audience.
ESS02.06.06	Implement multi-media strategies for presentations.
ESS02.07	**Interpret verbal and nonverbal cues/behaviors to enhance communication with co-workers and clients/participants.**
ESS02.07.01	Interpret verbal behaviors when communicating with clients and co-workers.
ESS02.07.02	Interpret nonverbal behaviors when communicating with clients and co-workers.
ESS02.08	**Apply active listening skills to obtain and clarify information.**
ESS02.08.01	Interpret a given verbal message/information.
ESS02.08.02	Respond with restatement and clarification techniques to clarify information.

ESS02.09	**Develop and interpret tables, charts, and figures to support written and oral communications.**
ESS02.09.01	Create tables, charts, and figures to support written and oral communications.
ESS02.09.02	Interpret tables, charts, and figures used to support written and oral communication.
ESS02.10	**Listen to and speak with diverse individuals to enhance communication skills.**
ESS02.10.01	Apply factors and strategies for communicating with a diverse workforce.
ESS02.10.02	Demonstrate ability to communicate and resolve conflicts within a diverse workforce.
ESS02.11	**Exhibit public relations skills to increase internal and external customer/client satisfaction.**
ESS02.11.01	Communicate effectively when developing positive customer/client relationships.

Essential Topic ESS03	**PROBLEM-SOLVING AND CRITICAL THINKING:** *Solve problems using critical thinking skills (analyze, synthesize, and evaluate) independently and in teams. Solve problems using creativity and innovation.*
ESS03.01	**Employ critical thinking skills independently and in teams to solve problems and make decisions (e.g., analyze, synthesize and evaluate).**
ESS03.01.01	Identify common tasks that require employees to use problem-solving skills.
ESS03.01.02	Analyze elements of a problem to develop creative solutions.
ESS03.01.03	Describe the value of using problem-solving and critical thinking skills to improve a situation or process.
ESS03.01.04	Create ideas, proposals, and solutions to problems.
ESS03.01.05	Evaluate ideas, proposals, and solutions to problems.
ESS03.01.06	Use structured problem-solving methods when developing proposals and solutions.
ESS03.01.07	Generate new and creative ideas to solve problems by brainstorming possible solutions.
ESS03.01.08	Critically analyze information to determine value to the problem-solving task.
ESS03.01.09	Guide individuals through the process of recognizing concerns and making informed decisions.
ESS03.01.10	Identify alternatives using a variety of problem-solving and critical thinking skills.
ESS03.01.11	Evaluate alternatives using a variety of problem-solving and critical thinking skills.
ESS03.02	**Employ critical thinking and interpersonal skills to resolve conflicts with staff and/or customers.**

ESS03.02.01	Analyze situations and behaviors that affect conflict management.
ESS03.02.02	Determine best options/outcomes for conflict resolution using critical thinking skills.
ESS03.02.03	Identify with others' feelings, needs, and concerns.
ESS03.02.04	Implement stress management techniques.
ESS03.02.05	Resolve conflicts with/for customers using conflict resolution skills.
ESS03.02.06	Implement conflict resolution skills to address staff issues/problems.

ESS03.03   **Identify, write and monitor workplace performance goals to guide progress in assigned areas of responsibility and accountability.**

ESS03.03.01	Write realistic performance goals, objectives and action plans.
ESS03.03.02	Monitor performance goals and adjust as necessary.
ESS03.03.03	Recognize goal achievement using appropriate rewards in the workplace.
ESS03.03.04	Communicate goal achievement with managers and co-workers.

ESS03.04   **Conduct technical research to gather information necessary for decision-making.**

ESS03.04.01	Align the information gathered to the needs of the audience.
ESS03.04.02	Gather technical information and data using a variety of resources.
ESS03.04.03	Analyze information and data for value to the research objectives.
ESS03.04.04	Evaluate information and data to determine value to research objectives.

Essential Topic ESS04	**INFORMATION TECHNOLOGY APPLICATIONS:** *Use information technology tools specific to the career cluster to access, manage, integrate, and create information.*

ESS04.01   **Use Personal Information Management (PIM) applications to increase workplace efficiency.**

ESS04.01.01	Manage personal schedules and contact information.
ESS04.01.02	Create memos and notes.

ESS04.02   **Employ technological tools to expedite workflow.**

ESS04.02.01	Use information technology tools to manage and perform work responsibilities.

ESS04.03   **Operate electronic mail applications to communicate within a workplace.**

ESS04.03.01	Use email to share files and documents.
ESS04.03.02	Identify the functions and purpose of email systems.
ESS04.03.03	Use email to communicate within and across organizations.

ESS04.04   **Operate Internet applications to perform workplace tasks.**

ESS04.04.01	Access and navigate Internet (e.g., use a web browser).
ESS04.04.02	Search for information and resources.
ESS04.04.03	Evaluate Internet resources for reliability and validity.

ESS04.05   **Operate writing and publishing applications to prepare business communications.**

ESS04.05.01	Prepare simple documents and other business communications.
ESS04.05.02	Prepare reports and other business communications by integrating graphics and other non-text elements.
ESS04.05.03	Prepare complex multi-media publications.

ESS04.06   **Operate presentation applications to prepare presentations.**

ESS04.06.01	Prepare presentations for training, sales and information sharing.
ESS04.06.02	Deliver presentations with supporting materials.

ESS04.07   **Employ spreadsheet applications to organize and manipulate data.**

ESS04.07.01	Create a spreadsheet.
ESS04.07.02	Perform calculations and analyses on data using a spreadsheet.

ESS04.08   **Employ database applications to manage data.**

ESS04.08.01	Manipulate data elements.
ESS04.08.02	Manage interrelated data elements.
ESS04.08.03	Analyze interrelated data elements.
ESS04.08.04	Generate reports showing interrelated data elements.

ESS04.09   **Employ collaborative/groupware applications to facilitate group work.**

ESS04.09.01	Facilitate group work through management of shared schedule and contact information.
ESS04.09.02	Facilitate group work through management of shared files and online information.
ESS04.09.03	Facilitate group work through instant messaging or virtual meetings.

ESS04.10   **Employ computer operations applications to manage work tasks.**

ESS04.10.01	Manage computer operations.
ESS04.10.02	Manage file storage.
ESS04.10.03	Compress or alter files.

ESS04.11   **Use computer-based equipment (containing embedded computers or processors) to control devices.**

ESS04.11.01	Operate computer driven equipment and machines.
ESS04.11.02	Use installation and operation manuals.
ESS04.11.03	Troubleshoot computer driven equipment and machines.
ESS04.11.04	Access support as needed to maintain operation of computer driven equipment and machines.

Essential Topic ESS05	**SYSTEMS:** *Understand roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment. Identify how key organizational systems affect organizational performance and the quality of products and services. Understand global context of industries and careers.*

ESS05.01   **Describe the nature and types of business organizations to build an understanding of the scope of organizations.**

ESS05.01.01	List the types and functions of businesses.

| ESS05.01.02 | Describe the types and functions of businesses. |
| ESS05.01.03 | Explain the functions and interactions of common departments within a business. |

ESS05.02 **Implement quality control systems and practices to ensure quality products and services.**

| ESS05.02.01 | Describe quality control standards and practices common to the workplace. |

| **Essential Topic ESS06** | **SAFETY, HEALTH AND ENVIRONMENTAL:** *Understand the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance. Follow organizational policies and procedures and contribute to continuous improvement in performance and compliance.* |

ESS06.01 **Implement personal and jobsite safety rules and regulations to maintain safe and healthful working conditions and environments.**

ESS06.01.01	Assess workplace conditions with regard to safety and health.
ESS06.01.02	Align safety issues with appropriate safety standards to ensure a safe workplace/jobsite.
ESS06.01.03	Identify safety hazards common to workplaces.
ESS06.01.04	Identify safety precautions to maintain a safe worksite.
ESS06.01.05	Select appropriate personal protective equipment as needed for a safe workplace/jobsite.
ESS06.01.06	Inspect personal protective equipment commonly used for selected career pathway.
ESS06.01.07	Use personal protective equipment according to manufacturer rules and regulations.
ESS06.01.08	Employ a safety hierarchy and communication system within the workplace/jobsite.
ESS06.01.09	Implement safety precautions to maintain a safe worksite.

ESS06.02 **Complete work tasks in accordance with employee rights and responsibilities and employers obligations to maintain workplace safety and health.**

| ESS06.02.01 | Identify rules and laws designed to promote safety and health in the workplace. |
| ESS06.02.02 | State the rationale of rules and laws designed to promote safety and health. |

ESS06.03 **Employ emergency procedures as necessary to provide aid in workplace accidents.**

ESS06.03.01	Use knowledge of First Aid procedures as necessary.
ESS06.03.02	Use knowledge of CPR procedures as necessary.
ESS06.03.03	Use safety equipment as necessary.

ESS06.04 **Employ knowledge of response techniques to create a disaster and/or emergency response plan.**

ESS06.04.01	Complete an assessment of an emergency and/or disaster situation.
ESS06.04.02	Create an emergency and/or disaster plan.

Essential Topic ESS07	**LEADERSHIP AND TEAMWORK:** *Use leadership and teamwork skills in collaborating with others to accomplish organizational goals and objectives.*

ESS07.01   **Employ leadership skills to accomplish organizational goals and objectives.**

ESS07.01.01	Analyze the various roles of leaders within organizations (e.g. contribute ideas; share in building an organization; act as role models to employees by adhering to company policies, procedures, and standards; promote the organization's vision; and mentor others).
ESS07.01.02	Exhibit traits such as empowerment, risk, communication, focusing on results, decision-making, problem solution, and investment in individuals when leading a group in solving a problem.
ESS07.01.03	Exhibit traits such as compassion, service, listening, coaching, developing others, team development, and understanding and appreciating others when acting as a manager of others in the workplace.
ESS07.01.04	Exhibit traits such as enthusiasm, creativity, conviction, mission, courage, concept, focus, principle-centered living, and change when interacting with others in general.
ESS07.01.05	Consider issues related to self, team, community, diversity, environment, and global awareness when leading others.
ESS07.01.06	Exhibit traits such as innovation, intuition, adaptation, life-long learning and coachability to develop leadership potential over time.
ESS07.01.07	Analyze leadership in relation to trust, positive attitude, integrity, and willingness to accept key responsibilities in a work situation.
ESS07.01.08	Describe observations of outstanding leaders using effective management styles.
ESS07.01.09	Participate in civic and community leadership and teamwork opportunities to enhance skills.

ESS07.02   **Employ organizational and staff development skills to foster positive working relationships and accomplish organizational goals.**

ESS07.02.01	Implement organizational skills when facilitating others' work efforts.
ESS07.02.02	Explain how to manage a staff that satisfies work demands while adhering to budget constraints.
ESS07.02.03	Describe how staff growth and development to increase productivity and employee satisfaction.
ESS07.02.04	Organize team involvement within a group environment.
ESS07.02.05	Work with others to develop and gain commitment to team goals.
ESS07.02.06	Distribute responsibility and work load fairly.
ESS07.02.07	Model leadership and teamwork qualities to aid in employee morale.
ESS07.02.08	Identify best practices for successful team functioning.

ESS07.02.09	Explain best practices for successful team functioning.
ESS07.03	**Employ teamwork skills to achieve collective goals and use team members' talents effectively.**
ESS07.03.01	Work with others to achieve objectives in a timely manner.
ESS07.03.02	Promote the full involvement and use of team member's individual talents and skills.
ESS07.03.03	Employ conflict-management skills to facilitate solutions.
ESS07.03.04	Demonstrate teamwork skills through working cooperatively with co-workers, supervisory staff, and others, both in and out of the organization, to achieve particular tasks.
ESS07.03.05	Demonstrate teamwork processes that provide team building, consensus, continuous improvement, respect for the opinions of others, cooperation, adaptability, and conflict resolution.
ESS07.03.06	Develop plans to improve team performance.
ESS07.03.07	Demonstrate commitment to and a positive attitude toward team goals.
ESS07.03.08	Take responsibility for shared group and individual work tasks.
ESS07.03.09	Assist team members in completing their work.
ESS07.03.10	Adapt effectively to changes in projects and work activities.
ESS07.03.11	Negotiate effectively to arrive at decisions.
ESS07.04	**Establish and maintain effective working relationships with all levels of personnel and other departments in order to accomplish objectives and tasks.**
ESS07.04.01	Build effective working relationships using interpersonal skills.
ESS07.04.02	Use positive interpersonal skills to work cooperatively with co-workers representing different cultures, genders and backgrounds.
ESS07.04.03	Manage personal skills to accomplish assignments.
ESS07.04.04	Treat people with respect.
ESS07.04.05	Provide constructive praise and criticism.
ESS07.04.06	Demonstrate sensitivity to and value for diversity.
ESS07.04.07	Manage stress and control emotions.
ESS07.05	**Conduct and participate in meetings to accomplish work tasks.**
ESS07.05.01	Develop meeting goals, objectives and agenda.
ESS07.05.02	Assign responsibilities for preparing materials and leading discussions.
ESS07.05.03	Prepare materials for leading discussion.
ESS07.05.04	Assemble and distribute meeting materials.
ESS07.05.05	Conduct meeting to achieve objectives within scheduled time.
ESS07.05.06	Demonstrate effective communication skills in meetings.
ESS07.05.07	Produce meeting minutes including decisions and next steps.
ESS07.05.08	Use parliamentary procedure, as needed, to conduct meetings.
ESS07.06	**Employ mentoring skills to inspire and teach others.**
ESS07.06.01	Use motivational techniques to enhance performance in others.
ESS07.06.02	Provide guidance to enhance performance in others.

Essential Topic ESS08	ETHICS AND LEGAL RESPONSIBILITIES: *Know and understand the importance of professional ethics and legal responsibilities.*
ESS08.01	**Apply ethical reasoning to a variety of workplace situations in order to make ethical decisions.**
ESS08.01.01	Evaluate alternative responses to workplace situations based on legal responsibilities and employer policies.
ESS08.01.02	Evaluate alternative responses to workplace situations based on personal or professional ethical responsibilities.
ESS08.01.03	Identify personal and long-term workplace consequences of unethical or illegal behaviors.
ESS08.01.04	Explain personal and long-term workplace consequences of unethical or illegal behaviors.
ESS08.01.05	Determine the most appropriate response to workplace situations based on legal and ethical considerations.
ESS08.01.06	Explain the most appropriate response to workplace situations based on legal and ethical considerations.
ESS08.02	**Interpret and explain written organizational policies and procedures to help employees perform their jobs according to employer rules and expectations.**
ESS08.02.01	Locate information on organizational policies in handbooks and manuals.
ESS08.02.02	Discuss how specific organizational policies and procedures influence a specific work situation.

Essential Topic ESS09	EMPLOYABILITY AND CAREER DEVELOPMENT: *Know and understand the importance of employability skills. Explore, plan, and effectively manage careers. Know and understand the importance of entrepreneurship skills.*
ESS09.01	**Identify and demonstrate positive work behaviors and personal qualities needed to be employable.**
ESS09.01.01	Demonstrate self-discipline, self-worth, positive attitude, and integrity in a work situation.
ESS09.01.02	Demonstrate flexibility and willingness to learn new knowledge and skills.
ESS09.01.03	Exhibit commitment to the organization.
ESS09.01.04	Identify how work varies with regard to site, from indoor confined spaces to outdoor areas, including aerial space and a variety of climatic and physical conditions.
ESS09.01.05	Apply communication strategies when adapting to a culturally diverse environment.
ESS09.01.06	Manage resources in relation to the position (i.e. budget, supplies, computer, etc).
ESS09.01.07	Identify positive work-qualities typically desired in each of the career cluster's pathways.

ESS09.01.08	Manage work roles and responsibilities to balance them with other life roles and responsibilities.
ESS09.02	**Develop a personal career plan to meet career goals and objectives.**
ESS09.02.01	Develop career goals and objectives as part of a plan for future career direction.
ESS09.02.02	Develop strategies to reach career objectives.
ESS09.03	**Demonstrate skills related to seeking and applying for employment to find and obtain a desired job.**
ESS09.03.01	Use multiple resources to locate job opportunities.
ESS09.03.02	Prepare a résumé.
ESS09.03.03	Prepare a letter of application.
ESS09.03.04	Complete an employment application.
ESS09.03.05	Interview for employment.
ESS09.03.06	List the standards and qualifications that must be met in order to enter a given industry.
ESS09.03.07	Employ critical thinking and decision-making skills to exhibit qualifications to a potential employer.
ESS09.04	**Maintain a career portfolio to document knowledge, skills and experience in a career field.**
ESS09.04.01	Select educational and work history highlights to include in a career portfolio.
ESS09.04.02	Produce a record of work experiences, licenses, certifications and products.
ESS09.04.03	Organize electronic or physical portfolio for use in demonstrating knowledge, skills and experiences.
ESS09.05	**Demonstrate skills in evaluating and comparing employment opportunities in order to accept employment positions that match career goals.**
ESS09.05.01	Compare employment opportunities to individual needs and career plan objectives.
ESS09.05.02	Evaluate employment opportunities based upon individual needs and career plan objectives.
ESS09.05.03	Demonstrate appropriate methods for accepting or rejecting employment offers.
ESS09.06	**Identify and exhibit traits for retaining employment to maintain employment once secured.**
ESS09.06.01	Model behaviors that demonstrate reliability and dependability.
ESS09.06.02	Maintain appropriate dress and behavior for the job to contribute to a safe and effective workplace/jobsite.
ESS09.06.03	Complete required employment forms and documentation such as I-9 form, work visa, W-4 and licensures to meet employment requirements.
ESS09.06.04	Summarize key activities necessary to retain a job in the industry.
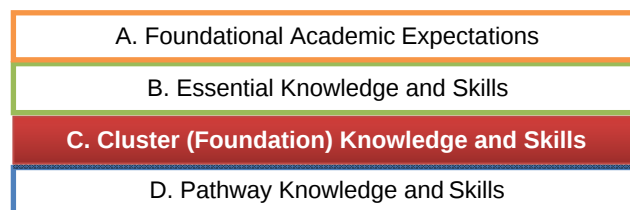
ESS09.06.05	Identify positive work behaviors and personal qualities necessary to retain employment.
ESS09.07	**Identify and explore career opportunities in one or more career pathways to build an understanding of the opportunities available in the cluster.**
ESS09.07.01	Locate and identify career opportunities that appeal to personal career goals.
ESS09.07.02	Match personal interest and aptitudes to selected careers.
ESS09.08	**Recognize and act upon requirements for career advancement to plan for continuing education and training.**
ESS09.08.01	Identify opportunities for career advancement.
ESS09.08.02	Pursue education and training opportunities to acquire skills necessary for career advancement.
ESS09.08.03	Examine the organization and structure of various segments of the industry to prepare for career advancement.
ESS09.08.04	Research local and regional labor (workforce) market and job growth information to project potential for advancement.
ESS09.08.05	Manage employment relations to make career advancements.
ESS09.09	**Continue professional development to keep current on relevant trends and information within the industry.**
ESS09.09.01	Use self assessment, organizational priorities, journals, Internet sites, professional associations, peers and other resources to develop goals that address training, education and self-improvement issues.
ESS09.09.02	Read trade magazines and journals, manufacturers' catalogues, industry publications and Internet sites to keep current on industry trends.
ESS09.09.03	Participate in relevant conferences, workshops, mentoring activities and in-service training to stay current with recent changes in the field.
ESS09.10	**Examine licensing, certification and credentialing requirements at the national, state and local levels to maintain compliance with industry requirements.**
ESS09.10.01	Examine continuing education requirements related to licensing, certification, and credentialing requirements at the local, state and national levels for chosen occupation.
ESS09.10.02	Examine the procedures and paperwork involved in maintaining and updating licensure, certification and credentials for chosen occupation.
ESS09.10.03	Align ongoing licensing, certification and credentialing requirements to career plans and goals.
ESS09.11	**Examine employment opportunities in entrepreneurship to consider entrepreneurship as an option for career planning.**
ESS09.11.01	Describe the opportunities for entrepreneurship in a given industry.

Essential Topic ESS10	**TECHNICAL SKILLS:** *Use of technical knowledge and skills required to pursue careers in all career cluster, including knowledge of design, operation, and maintenance of technological systems critical to the career cluster.*

ESS10.01   **Employ information management techniques and strategies in the workplace to assist in decision-making.**

ESS10.01.01   Use information literacy skills when accessing, evaluating and disseminating information.

ESS10.01.02   Describe the nature and scope of information management.

ESS10.01.03   Maintain records to facilitate ongoing business operations.

ESS10.02   **Employ planning and time management skills and tools to enhance results and complete work tasks.**

ESS10.02.01   Develop goals and objectives.

ESS10.02.02   Prioritize tasks to be completed.

ESS10.02.03   Develop timelines using time management knowledge and skills.

ESS10.02.04   Use project-management skills to improve workflow and minimize costs.

C. CLUSTER (FOUNDATION) KNOWLEDGE AND SKILLS

The following Cluster (Foundation) Knowledge and Skill statements apply to all careers in the Agriculture, Food and Natural Resources Cluster. Persons preparing for careers in the Agriculture, Food and Natural Resources Cluster should be able to demonstrate these skills in addtion to those found on the Essential Knowledge and Skills Chart.

A. Foundational Academic Expectations
B. Essential Knowledge and Skills
C. Cluster (Foundation) Knowledge and Skills
D. Pathway Knowledge and Skills

Cluster Topic AGC01	**ACADEMIC FOUNDATIONS:** *Achieve additional academic knowledge and skills required to pursue the full range of career and postsecondary education opportunities within a career cluster.*
	No additional statements in this topic beyond those found in the Essential Knowledge and Skills Chart.

Cluster Topic AGC02	**COMMUNICATIONS:** *Use oral and written communication skills in creating, expressing and interpreting information and ideas including technical terminology and information.*

AGC02.01   **Use oral and written communication skills in creating, expressing and interpreting information and ideas including technical terminology to communicate technical information within AFNR.**

AGC02.01.01   Write clearly to communicate written ideas, results and questions to all types of people.

Sample Indicators	Write with effective language to produce written communications for journals, newsletters, or other informative articles.
	Explain aspects of the industry to people not involved in it, and discuss its components.
AGC02.01.02	Model the use of strategies and techniques for enhancing the clarity and effectiveness of oral communication in order to engage in dialogue with members of an example career field.
Sample Indicators	Monitor different kinds of behavior in order to improve communication.
	Prepare presentations to explain to both large groups and individuals issues of concern to the industry.
	Discuss aspects of the industry competently to an audience of both professionals and people not involved in the industry.

AGC02.02   **Employ the use of technical information effectively to maintain and communicate records and reporting procedures commonly used in the AFNR cluster.**

AGC02.02.01	Document work and processes using technical communication methods and protocols.
Sample Indicators	Record technical information.
	Compose technical reports.
	Communicate documentation to others.

Cluster Topic AGC03	**PROBLEM-SOLVING AND CRITICAL THINKING:** *Solve problems using critical thinking skills (analyze, synthesize, and evaluate) independently and in teams. Solve problems using creativity and innovation.*

AGC03.01   **Access and utilize suitable resources to identify and study public policies, issues and regulations impacting AFNR management.**

AGC03.01.01	Review regulations and major laws to evaluate their impact on AFNR management.
Sample Indicators	Describe the major impacts of AFNR legislation.
	Describe the major regulations impacting the management of an individual resource.
	Identify situations that violate regulations.
AGC03.01.02	Read appropriate written material to stay abreast of current issues impacting AFNR management.
Sample Indicators	Identify significant issues that impact work assignment.
AGC03.01.03	Gather public input for AFNR management decision-making.
Sample Indicators	Conduct a local survey of public perceptions and desires concerning AFNR issues.
AGC03.01.04	Use critical thinking skills to identify, organize alternatives, and evaluate public policy issues related to AFNR.
Sample Indicators	Identify alternatives to an issue's potential solution.
	Evaluate alternatives for strengths and weaknesses.
	Recommend a solution based on research and analysis.

Cluster Topic AGC04	**INFORMATION TECHNOLOGY APPLICATIONS:** *Use information technology tools specific to the career cluster to access, manage, integrate, and create information.*

AGC04.01 — **Access, manage, integrate and create information using information technology tools specific to AFNR in order to facilitate people, machines, and logistics.**

AGC04.01.01 — Use Geographic Information System/Global Positioning System (GIS/GPS) applications.

Sample Indicators
Create maps.
Locate people or things.
Identify best route for travel.

Cluster Topic AGC05	**SYSTEMS:** *Understand roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment. Identify how key organizational systems affect organizational performance and the quality of products and services. Understand global context of industries and careers.*

AGC05.01 — **Examine and summarize roles within teams, work units, departments, organizations, interorganizational systems, and the larger environment to understand the nature and scope of AFNR organizations and the AFNR industry.**

AGC05.01.01 — Examine company performance and goals within AFNR organizations and the AFNR industry.

Sample Indicators
Examine the role and major functions of AFNR organizations to better utilize AFNR guidelines.
Explain the major guidelines used by AFNR organizations to manage and improve performance.
Examine economic, social and technological changes to spotlight their impact on AFNR organizations and the industry.
Explain technological changes to reveal their impact on information technology and transportation.

AGC05.02 — **Identify how key organizational systems affect organizational performance and the quality of products and services to demonstrate an understanding of how AFNR systems are managed and improved.**

AGC05.02.01 — Manage and improve organizational systems to better serve customers.

Sample Indicators
Evaluate customer needs to manage relationships with both internal and external customers.
Develop and manage plans and budgets to accomplish organizational goals and objectives.
Develop plans to improve organizational performance including customer satisfaction and service/operations performance.
Develop plans to maintain compliance with organizational policies and government laws and regulations.

AGC05.02.02 — Summarize the components and maintenance requirements of each agricultural, natural resource, and environmental system.

Sample Indicators	Develop management plans to improve the agricultural and natural resource systems.
	Determine goals and objectives for each system to manage organizational activities more effectively.
	Prepare and operate systems and technical tools to access, manage, integrate, evaluate and create information.
AGC05.02.03	Research geographical data to recognize the types of systems used in various geographical areas.
Sample Indicators	Evaluate the effects of implementing practices to advance a system.
	Explore multi-area trends to explain how systems differ across geographical areas.

Cluster Topic AGC06	**SAFETY, HEALTH AND ENVIRONMENTAL:** *Understand the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance. Follow organizational policies and procedures and contribute to continuous improvement in performance and compliance.*

AGC06.01	**Maintain safe and healthful working conditions and environment that adhere to employee rights and responsibilities and employer obligations in order to promote well-being in the AFNR workplace.**
AGC06.01.01	Assess workplace conditions with regard to safety and health.
Sample Indicators	Identify the types of risk of injury/illness at work.
	Identify those who are susceptible to risk of injury/illness at work.
	Describe ways to positively impact occupational safety and health.
	Describe ways to positively impact occupational safety and health.
AGC06.01.02	Demonstrate application of rules and laws designed to promote safety and health.
Sample Indicators	Identify key rights of employees related to occupational safety and health.
	Identify the responsibilities of employers related to occupational safety and health.
	Explain the role of government agencies in providing a safe workplace.
AGC006.01.03	Apply safety/health precautions to participation in natural resource projects.
Sample Indicators	Wear personal protective equipment.
	Demonstrate how to avoid placing oneself in hazardous work situations.
AGC006.01.04	Demonstrate recognized first aid knowledge and procedures to show how they are used by natural resource industries.
Sample Indicators	Complete recognized industry-level first aid training program.
AGC006.01.05	Identify health/safety policies and procedures for natural resource occupations.
Sample Indicators	Participate in safety meetings.
	Describe the health and safety policies and procedures relevant to the worksite and assignment.
AGC06.02	**Assess and control types and sources of workplace hazards common to the AFNR industry in order to demonstrate a working understanding of key health and safety concerns.**
AGC06.02.01	Demonstrate methods to correct common hazards.

Sample Indicators	Identify and describe common hazards in the workplace.
	Identify and describe major sources of information about hazards in the workplace (e.g., MSDS, work procedures, exposure control plans, training materials, labels, and signage).
	Identify sources of combustible/flammable materials, fire and emergencies to establish a fire safe environment.
	Interpret safety signs and symbols.
AGC06.02.02	Demonstrate application of personal and group health and safety practices.
Sample Indicators	Identify procedures necessary for maintaining a safe work area.
	Identify methods to correct common hazards.
	Identify methods for disposing of hazardous materials.
	Demonstrate principals of safe physical movement to avoid slips, trips, and spills.
	Inspect and use protective equipment (PPE).

AGC06.03 — Examine and summarize importance of health, safety, and environmental management systems in AFNR organizations to express their importance to organizational performance and regulatory compliance.

AGC06.03.01	Examine required regulations to maintain/improve safety, health and environmental management systems.
Sample Indicators	Study appropriate resources to identify the major regulatory areas (e.g., personal protective equipment) and government laws and regulations.
	Examine the major system components to realize benefits of health, safety and environmental management systems in AFNR organizations.
	Measure or estimate benefits to explain how government agencies promote compliance and improved health, safety and environmental performance to AFNR organizations.
	Examine logistics, distribution and transportation organizations to explain how AFNR organizations promote improved health, safety and environmental performance.
AGC06.03.02	Develop a plan to maintain and improve health, safety and environmental compliance and performance.
Sample Indicators	Make a personal commitment to safety, health and environmental policies and procedures.
	Develop plans to improve health, safety and environmental performance.
	Educate and orient other workers.
AGC06.03.03	State the importance of safety, health and environmental responsibilities in the workplace to provide operating guidelines.
Sample Indicators	Establish a set of safety, health and environmental principles to ensure a high level of performance.
	Develop a pollution/waste prevention plan to contribute to the total productivity improvement.
AGC06.03.04	Examine health risks associated with a particular skill to better form personnel safety guidelines.
Sample Indicators	Define what level of possible contamination or injury is considered a risk in order to set safety priorities.
	Assess mental and physical stresses to determine all aspects necessary to perform well and what health risks are associated with both the mental and physical aspects.

AGC06.03.05	Develop response plans to handle emergencies.
Sample Indicators	Identify various emergency response plan requirements for a facility.
	Develop an emergency response plan for natural disasters.
AGC06.03.06	Identify hazards and acquire first aid skills to promote environmental safety.
Sample Indicators	Identify general workplace safety hazards.
	Apply general workplace safety precautions/procedures.
	Acquire and maintain first aid certification.
	Acquire and maintain cardiopulmonary resuscitation (CPR) certification.
	Respond to medical emergencies.
	Explain purpose of pollution control systems.
	Describe procedures to comply with environmental regulations.
	Maintain environmental health and safety facilities.
	Handle chemicals and safety equipment appropriately.
	Explain ergonomic procedures.
	Assess workplace safety.
	Assess a safety-training plan.
	Observe all regulatory and safety standards.

Cluster Topic AGC07	**LEADERSHIP AND TEAMWORK:** *Use leadership and teamwork skills in collaborating with others to accomplish organizational goals and objectives.*
	No additional statements in this topic beyond those found in the Essential Knowledge and Skills Chart.

Cluster Topic AGC08	**ETHICS AND LEGAL RESPONSIBILITIES:** *Know and understand the importance of professional ethics and legal responsibilities.*
AGC08.01	**Demonstrate workplace ethics specific to AFNR occupations in order to reflect effective stewardship of resources.**
AGC08.01.01	Demonstrate evidence of interest and concern for natural resource stewardship and ethics.
Sample Indicators	Explain how personal choices are related to natural resource sustainability.
AGC08.01.02	Exercise personal habits and actions to demonstrate workplace ethics.
Sample Indicators	Explain how personal workplace actions can affect the resource.

Cluster Topic AGC09	**EMPLOYABILITY AND CAREER DEVELOPMENT:** *Know and understand the importance of employability skills. Explore, plan, and effectively manage careers. Know and understand the importance of entrepreneurship skills.*
AGC09.01	**Explain written organizational policies, rules and procedures common the AFNR workplaces to ensure employees perform job functions effectively.**
AGC09.01.01	Locate appropriate information on organizational policies in handbooks and manuals.
Sample Indicators	Identify the contents of various organizational publications.
	Select the appropriate document(s) as reference for the situation.

AGC09.01.02	Discuss how specific organizational policies and rules influence a specific work situation.
Sample Indicators	Locate and identify specific organizational policy, rule or procedure to assist with a given situation.
	Explain specific organizational policy, rule or procedure to improve a given situation.

AGC09.02	**Select, research and examine critical aspects of career opportunities in one or more AFNR career pathways in order to gain an understanding of the breadth of occupations within this cluster.**
AGC09.02.01	Locate and identify career opportunities that appeal to personal career goals.
Sample Indicators	Locate and interpret career information for at lest one career cluster.
	Identify job requirements for career pathways.
	Identify educational and credentialing requirements for career cluster and pathways.
AGC09.02.02	Match personal interest and aptitudes to selected careers.
Sample Indicators	Identify personal interests and aptitudes.
	Identify job requirements and characteristics of selected careers.
	Compare personal interests and aptitudes with job requirements and characteristics of career selected.
	Modify career goals based on results of personal interests and aptitudes with career requirements and characteristics.

Cluster Topic AGC10	**TECHNICAL SKILLS:** *Use the technical knowledge and skills required to pursue the targeted careers for all pathways in the career cluster, including knowledge of design, operation, and maintenance of technological systems critical to the career cluster.*
AGC10.01.01	Use technological systems to accomplish objectives in transportation.
Sample Indicators	Evaluate transportation needs to explain the role and function of critical transportation-related technological systems.
	Measure and manage the reliability and performance of technological systems to establish use and maintenance guidelines.
	Manage major health, safety and environmental risks to minimize their potential impact on technological systems.
AGC10.01.02	Select and improve utilization of technological systems to improve production and products.
Sample Indicators	Develop acceptable criteria to evaluate and select technological systems.
	Participate in efforts to improve the utilization and performance of technological systems.
AGC10.01.03	Identify technical skills needed to run an industry efficiently.
Sample Indicators	Identify types of skills needed to succeed in a desired industry.
	Explore methods available to develop technical skills.
	Correctly operate the tools associated with a specific skill.
AGC10.01.04	Establish criteria to identify areas that have special needs for technical
	Classify workplace occupations to determine what types of skills are considered technical

Evaluate processes and products to determine what areas most often use technical skills.

AGC10.02	**Use tools, equipment, machinery and technology to work in areas related to AFNR.**
AGC10.02.01	Select the appropriate tool to perform a given task.

Sample Indicators
Select tools and equipment.
Identify standard tools, equipment, and safety procedures.
Follow operating instructions.
Set up/Adjust tools and equipment.
Maintain tools.
Store tools.

AGC10.02.02	Maintain the working order of natural resources and tools for efficient work use.

Sample Indicators
Demonstrate how to check tool condition before use.
Describe the characteristics of a tool in need of maintenance.
Demonstrate how to replace tool parts and components as needed.

AGC10.02.03	Wear protective equipment and handle natural resource tools and equipment with skill to demonstrate safe use of tools and equipment.

Sample Indicators
Wear appropriate personal protective equipment (PPE).
Demonstrate proper spacing distance from others when using tools.
Check tools for safety before using.
Store tools with appropriate safety precautions.
Demonstrate the proper usage of a tool or piece of equipment.
Describe regulations for the use of tools and equipment.

AGC10.02.04	Use tools and technology devices to assist in expanding human capacity for natural resource tasks.

Sample Indicators
Use appropriate tools to assist in lifting and moving.
Demonstrate use of knots, ropes, lines and attachments.
Use geo-spatial and mapping techniques (GIS/GPS).

AGC10.03	**Compare and contrast issues affecting the AFNR industry including biotechnology, employment, safety, environmental and animal welfare to demonstrate an understanding of the trends and issues important to careers in this industry.**
AGC10.03.01	Select solutions for different environmental issues.

Sample Indicators
Identify issues affecting the industry.
Research history and policies related to the issue.
Identify conflicting points of view.
Determine effects of the issue on the industry.
Determine potential resolutions to the issue.

AGC10.03.02	Analyze solutions for different environmental issues.
AGC10.03.03	Present solutions for different environmental issues.
AGC10.03.04	Learn economic principles in order to apply them to natural resource systems (i.e., supply, demand and profit).
AGC10.04	**Envision emerging technology and globalization and project its influence on widespread markets to demonstrate an understanding of technologies and trends that will impact the AFNR industry.**

AGC10.04.01	Examine new technologies to project their impact in the global market of technology.
Sample Indicators	Convert drawings from US Standard to metric.
	Identify ways that global regulations impact system designs.
	Identify and discuss use of new technologies (such as lasers and robotics) and their impact on agricultural systems.
	Discuss the importance of new communication systems and how they impact ag systems.
AGC10.04.02	Discuss the relationship between the advancement of technology and the need for continuing education/ career development.
Sample Indicators	Research and discuss emerging technologies and the skills they require.
	Discuss history of systems over the last century and discuss how emerging technology and career training will be essential to meet market demands.
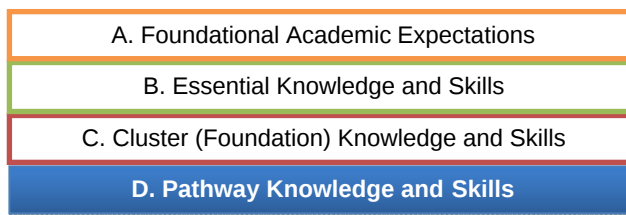
D. PATHWAY KNOWLEDGE AND SKILLS

The following knowledge and skill statements apply to all careers in the Animal Systems Pathway.

A. Foundational Academic Expectations
B. Essential Knowledge and Skills
C. Cluster (Foundation) Knowledge and Skills
D. Pathway Knowledge and Skills

Pathway Topic AGPC01	**ANIMAL SYSTEMS**
AGPC01.01	**Produce and/or manage animals in domesticated and/or natural environments using an application of knowledge regarding anatomy and physiology to enhance animal production.**
AGPC01.01.01	Explain basic functions of animal anatomy and physiology using classification systems.
Sample Indicator	Describe functional differences in animal structures and body systems.
	Classify animals according to anatomy and physiology.
AGPC01.01.02	State how body structures interact and affect animal health.
Sample Indicator	Identify selected animal parts from a diagram or on a real animal.
	Identify ways that an animal's health can be affected by anatomy/physiology problems.
AGPC01.01.03	Analyze a subject animal to determine the nature of its health status.
Sample Indicator	Perform simple procedures in evaluating an animal's health status.
	Identify symptoms of diseases, illnesses, parasites, and other health-related problems.
	Diagnose animal ailments.
	Implement disease prevention and health improvement program.
	Identify and implement treatment options.

AGPC01.02   Recognize and interpret animal behaviors and execute protocols for safe handling to facilitate safety for both animals and humans.

AGPC01.02.01   Develop a safety plan for working with a specific animal.

Sample Indicator
     Explain factors which serve to stimulate or discourage given types of animal behavior.
     Recognize the normality curve of animal behavior.
     Perform safe handling procedures when working with animals.
     Identify strengths and weaknesses of an animal safety handling plan.
     Operate animal facilities to insure safety of animals.

AGPC01.03   Provide proper nutrition using accepted protocols and processes to maintain animal performance.

AGPC01.03.01   Examine animal developmental stages.
Sample Indicator
     Recognize the different phases of an animal's life cycle.
     Select diets which provide the appropriate quantity of nutrients for each animal developmental stage.

AGPC01.03.02   Explain why nutrient requirements are different throughout an animal's life cycle.

AGPC01.03.03   Analyze feedstuffs and the animal nutrient requirement and determine if the ration is adequate.
Sample Indicator
     Identify the differences between good and poor quality feedstuffs.
     Create a balanced ration for a given animal.

AGPC01.03.04   Assess whether the nutritional requirements of a given animal are being met by recording performance and comparing feed variations.
Sample Indicator
     Use different types of feedstuffs (e.g., roughage, concentrates) to create a feed ration containing the appropriate amounts of required nutrients.
     Use different forms of feedstuffs (e.g., pellets, cracked, rolled, ground) to create a diet that meets the needs of a specific animal.

AGPC01.04   Analyze and summarize factors that influence an animal's reproductive cycle to demonstrate an understanding of the species response.

AGPC01.04.01   Analyze the reproductive cycle based upon differences between male and female reproductive systems.
Sample Indicator
     Identify the parts of male and female reproductive tracts on example animals.
     Analyze the reproductive cycle of a given animal.
     Evaluate animal readiness for breeding.

AGPC01.04.02   Compare and contrast differences in reproductive cycles from species to species.

Sample Indicator
     Discuss the pros and cons of breeding through natural cover and artificial insemination.
     Discuss the implications of genetic variation.
     Describe techniques of artificial insemination.

     Identify reproduction management practices (e.g., male to female ratios, age and weight for breeding, fertility and soundness for breeding, heat synchronization, flushing).

AGPC01.04.03   Evaluate the breeding soundness of an animal.
Sample Indicator
     Describe the procedure for determining an animal's breeding readiness.
     Identify and prevent problems associated with reproduction.

Select animals based on breeding soundness.

AGPC01.05 **Evaluate environmental factors affecting animal performance and implement procedures for enhancing performance to demonstrate an effective application of principles to optimize performance.**

AGPC01.05.01 Recognize optimum performance for a given animal species.
Sample Indicator Identify good performance for a given animal species.
Identify reasons why some animals perform better than others.

AGPC01.05.02 Create a program to develop an animal to its highest potential performance.

Sample Indicator Identify factors that can be manipulated to control a given animal's performance.
Generate ways to increase an animal's performance.

AGPC01.05.03 Assess an animal to determine if it has reached its optimum performance level.
Make appropriate changes in an animal's environment in order to achieve optimum
Sample Indicator performance.
Use appropriate tools in manipulating animal performance.

AGPC01.05.04 Develop efficient procedures to produce consistently high-quality animals, well-suited for their intended purpose.
Identify a given species' desirable production numbers (e.g., birth weight, rate of gain,
Sample Indicator age of maturity, age of sexual maturity).
Evaluate desired traits (e.g., production) of animals.
Evaluate the role that economics plays in animal production.
Design facilities appropriate for the production of a given species of animal.
Make decisions on using new techniques and methods in the production facility so that both profit and animal safety are maximized.