

Animal Science II - Food Animal (2026)

Apply leadership and durable employability skills. 1.00

1 Implement leadership skills necessary for employment. 1.01

A Professionalism in the workplace 1.01.A

1 Verbal communication 1.01.A.1

- a** Voice – pitch, quality, articulation, pronunciation, force 1.01.A.1.A
- b** Stage presence – appearance, poise, attitude, confidence, ease before 1.01.A.1.B
- c** Power of expression – fluency, sincerity, emphasis, directness, 1.01.A.1.C
- d** Response to questions – accurate, ability to think quickly. 1.01.A.1.D
- e** General effect – interesting, understandable, convincing, pleasing, 1.01.A.1.E

2 Non-verbal communication 1.01.A.2

- a** Eye contact – maintain during conversations, interviews, and 1.01.A.2.A
- b** Handshake – firm, brief handshake 1.01.A.2.B
- c** Personal appearance – dress appropriately with proper workplace 1.01.A.2.C
- d** Posture – sit/stand upright and appear engaged. 1.01.A.2.D
- e** Body language – use hand gestures and posture to display active 1.01.A.2.E

3 Digital etiquette 1.01.A.3

- a** Email writing – compose an email much like a letter with a subject line, 1.01.A.3.A
- b** Social media – an online presence should be treated as an extension 1.01.A.3.B

B Workplace expectations 1.01.B

1 Best practices for employees 1.01.B.1

a Adhere to organization guidelines. 1.01.B.1.A

b Work toward the organization's goals 1.01.B.1.B

1) Treat everyone with respect 1.01.B.1.B.1

2) Use best effort. 1.01.B.1.B.2

3) Become an expert at the job. 1.01.B.1.B.3

4) Offer value to the workplace. 1.01.B.1.B.4

5) Focus on solutions. 1.01.B.1.B.5

6) Be open to change. 1.01.B.1.B.6

7) Own mistakes. 1.01.B.1.B.7

8) Build relationships. 1.01.B.1.B.8

2 Professional dress 1.01.B.2

a Business professional – for any first meeting, business presentation, 1.01.B.2.A

1) Men – suit with matching jacket and pants with black belt; 1.01.B.2.A.1

2) Women – black skirt or pant suit, other neutral colors (dark gray, 1.01.B.2.A.2

b Business casual – a step down from business profession, usually 1.01.B.2.B

1) Men – pressed, collared, long-sleeved shirt with tie; Dress 1.01.B.2.B.1

2) Women – dress pants, skirt (at or below knee), or dresses. 1.01.B.2.B.2

C Traits of a successful employee 1.01.C

1 Integrity – honesty 1.01.C.1

2 Courage – willing to go forward under difficult conditions. 1.01.C.2

3 Management – using people, resources, and processes to reach a goal. 1.01.C.3

4 Selflessness – placing the desires and welfare of others above yourself. 1.01.C.4

5 Loyalty – reliable support for an individual, group or cause 1.01.C.5

6 Enthusiasm – energy to do a job and the inspiration to encourage others. 1.01.C.6

7 Plan – think through, determine procedures. 1.01.C.7

8 Knowledge – awareness, understanding. 1.01.C.8

9 Tact – saying or doing the right thing without offending. 1.01.C.9

D Employment application skills 1.01.D

1 Resume 1.01.D.1

a Basics of a resume 1.01.D.1.A

- 1) Designed to give the employer information about a candidate's 1.01.D.1.A.1
- 2) Should be tailored for each job applied for 1.01.D.1.A.2
- 3) Purpose is to get an interview 1.01.D.1.A.3
- 4) Should be one page, but no more than two pages 1.01.D.1.A.4
- 5) The Agricultural Experience Tracker is a resource that 1.01.D.1.A.5
- 6) Should be updated frequently to keep up with experience and 1.01.D.1.A.6

b Items to include in resume 1.01.D.1.B

- 1) Name and address 1.01.D.1.B.1
- 2) Objective 1.01.D.1.B.2
- 3) Education 1.01.D.1.B.3
- 4) Experience 1.01.D.1.B.4
- 5) Activities 1.01.D.1.B.5
- 6) Skills 1.01.D.1.B.6
- 7) References 1.01.D.1.B.7

2 Cover letter 1.01.D.2

a Serves as preview to the resume 1.01.D.2.A

b Should be brief ½ page, but not more than one page. 1.01.D.2.B

c Items to include: 1.01.D.2.C

- 1) The position being applied for. 1.01.D.2.C.1
- 2) An outline of key selling points. 1.01.D.2.C.2
- 3) Address the needs of the employer. 1.01.D.2.C.3
- 4) An invitation for the employer to initiate contact. 1.01.D.2.C.4

E Job interview 1.01.E

- 1 Cover letter sent in advance to assist in establishing an interview date. 1.01.E.1
- 2 Follow-up phone call is typically recommended to secure an interview. 1.01.E.2
- 3 Resume is submitted with the job application. Typically suggested that the 1.01.E.3
- 4 Individuals should dress in professional attire. 1.01.E.4
- 5 Prepare for the interview and application process. 1.01.E.5
- 6 Practice common questions asked during interview: 1.01.E.6
 - a “What are your three greatest attributes or strengths?” 1.01.E.6.A
 - b “What are your three biggest weaknesses or areas you would like to 1.01.E.6.B
 - c “Where do you want to be in five years?” 1.01.E.6.C
 - d “What leadership qualities can you bring to our company?” 1.01.E.6.D
 - e “Why are you the best candidate for the job?” 1.01.E.6.E
 - f Situational questions related to ability to work with a team, problem 1.01.E.6.F
- 7 Gather information typically requested during application process. 1.01.E.7
 - a General applicant information – name, date of birth, address, email, 1.01.E.7.A
 - b Education – name of school attended, relevant coursework, degree 1.01.E.7.B
 - c Previous work experience – dates employed, address, name of 1.01.E.7.C
 - d References – name, address, phone, email 1.01.E.7.D

2 Execute meetings using principles of parliamentary procedure. 1.02

- A Parliamentary procedure 1.02.A**
- 1 Definition of parliamentary procedure – using well-defined rules to conduct 1.02.A.1

B Parliamentary procedure abilities 1.02.B

- 1 Main Motion - Used to present a new item of business for consideration and is 1.02.B.1
- 2 Amendment – used to change a motion by striking out, adding or substituting 1.02.B.2
- 3 Division of the House (Assembly) – used to get a re-vote on a “voice” vote or 1.02.B.3
- 4 Refer to a committee – used to place the motion in the hands of a small group 1.02.B.4
 - a Power to act for the group 1.02.B.4.A
 - b Power to investigate and report back 1.02.B.4.B
 - c Power to investigate and make recommendations. 1.02.B.4.C
- 5 Previous Question – the formal motion to stop discussion. (This is not to be 1.02.B.5
- 6 Point of Order – used to correct a parliamentary mistake or enforce rules. The 1.02.B.6
- 7 Appeal – used to ensure that the majority of the group agrees with a ruling of 1.02.B.7
- 8 Suspend the Rules – used to temporarily suspend the rules of an 1.02.B.8
- 9 Adjourn – used to close the meeting. The member upon receiving proper 1.02.B.9
- 10 Lay on the Table – used to lay aside a pending question temporarily in order 1.02.B.10
 - a Member stands and is recognized to make this motion. 1.02.B.10.A
 - b Motion must be seconded. 1.02.B.10.B
 - c Cannot be debated. 1.02.B.10.C
 - d Cannot be amended. 1.02.B.10.D
 - e Requires a majority vote to table. 1.02.B.10.E
 - f Negative vote on the motion may be reconsidered. 1.02.B.10.F
 - g Often used wrongly to postpone indefinitely or to postpone action to a 1.02.B.10.G

- 11** Reconsider – used to bring for further consideration a motion that has already **1.02.B.11**
- a** Member stands and is recognized to make this motion and says, “I **1.02.B.11.A**
 - b** Motion must be seconded. **1.02.B.11.B**
 - c** Can be debated if the motion being reconsidered is debatable. **1.02.B.11.C**
 - d** Cannot be amended. **1.02.B.11.D**
 - e** Requires a majority vote to pass. **1.02.B.11.E**
 - f** Cannot be reconsidered. **1.02.B.11.F**
 - g** Must be made by someone who voted on the prevailing side. **1.02.B.11.G**
- 12** Rescind – used to cancel or countermand a motion previously adopted. **1.02.B.12**
- a** Member stands and is recognized to make this motion and says, “I **1.02.B.12.A**
 - b** Motion must be seconded. **1.02.B.12.B**
 - c** Can be debated and can be on the motion being rescinded itself. **1.02.B.12.C**
 - d** Can be amended. **1.02.B.12.D**
 - e** Requires a majority vote with notice or 2/3 vote without notice. **1.02.B.12.E**
 - f** Negative vote only can be reconsidered. **1.02.B.12.F**
- 13** Take from the Table – used to bring an item back before the assembly that **1.02.B.13**
- a** Member stands and is recognized to make this motion and says “I **1.02.B.13.A**
 - b** Motion must be seconded. **1.02.B.13.B**
 - c** Cannot be debated. **1.02.B.13.C**
 - d** Cannot be amended. **1.02.B.13.D**
 - e** Requires a majority vote to take from the table. **1.02.B.13.E**
 - f** Cannot be reconsidered. **1.02.B.13.F**
-

Apply work-based and experiential learning in animal science. 2.00

1 Apply records used in work-based and experiential learning. 2.01

- A** Financial statement **2.01.A**
- 1** A written record that conveys the financial activities, position, and **2.01.A.1**
 - 2** Often used during auditing by accountants, governing boards, firms, etc. to **2.01.A.2**

B Elements of a financial statement 2.01.B

1 Assets – items owned of value. 2.01.B.1

a Current assets – items that can quickly be converted to cash or that 2.01.B.1.A

b Non-current assets – items that have a useful life of more than one 2.01.B.1.B

1) Depreciation- provides a value to items as age, use and 2.01.B.1.B.1

c Inventory – an itemized list of business or personal assets.
Includes 2.01.B.1.C

2 Liabilities – debts owed. 2.01.B.2

a Current liabilities – accounts and notes payable, this year's part of 2.01.B.2.A

b Non-current liabilities – mortgages and other debts not due this year 2.01.B.2.B

3 Net worth or owner's equity = total assets minus total liabilities 2.01.B.3

4 Debt to equity ratio = total liabilities / net worth 2.01.B.4

5 Balance sheet – the financial status of a business. Generated periodically to 2.01.B.5

C Personal budget – a financial plan that allocates future personal income towards 2.01.C

1 Developing a personal budget 2.01.C.1

a Assess the individual's personal and financial situation (needs, values, 2.01.C.1.A

b Set personal and financial goals. 2.01.C.1.B

c Create a budget and for fixed and variable expenses based on income 2.01.C.1.C

1) Fixed costs – expenses that are constant (rent, employee 2.01.C.1.C.1

2) Variable costs – expenses that changes in proportion to how 2.01.C.1.C.2

d Monitor spending patterns. 2.01.C.1.D

e Compare the budget to what is spent. 2.01.C.1.E

f Review financial progress and revise, if necessary. 2.01.C.1.F

2 Personal and business finance tools 2.01.C.2

a Checking account – a checking account is a service provided by 2.01.C.2.A

b Credit – money that is made available based on the ability of the 2.01.C.2.B

c Individual retirement account (IRA) – a savings account with tax 2.01.C.2.C

3 Non-wage compensation – benefits provided to employees in addition to their 2.01.C.3

4 Taxes – a mandated contribution to local, state, and federal government 2.01.C.4

2 Implement a Supervised Agricultural Experience (SAE). 2.02

A Supervised Agricultural Experience 2.02.A

1 Purpose of SAE 2.02.A.1

- a Explore and identify agricultural interests. 2.02.A.1.A
- b Develop or expand employability skills. 2.02.A.1.B
- c Expand personal financial literacy. 2.02.A.1.C
- d Generate awareness and knowledge of workplace safety. 2.02.A.1.D
- e Develop agricultural literacy. 2.02.A.1.E

2 Components of SAE 2.02.A.2

- a Career alignment – project should change and grow as the students 2.02.A.2.A
- b Student-led – the student creates, and designs project based on 2.02.A.2.B
- c Instructor supervised – the instructor guides project design, 2.02.A.2.C
- d Work-based learning opportunity – students gain employability skills for 2.02.A.2.D
- e Measurable – project is recorded and evaluated. 2.02.A.2.E

3 Steps of the SAE Model 2.02.A.3

- a Be enrolled in agricultural education class. 2.02.A.3.A
- b Select the type of SAE – Foundational SAE or Immersion SAE 2.02.A.3.B
- c Get coaching and feedback from agriculture teacher and employer, 2.02.A.3.C
- d Enjoy the benefits. 2.02.A.3.D
 - 1) Real experience 2.02.A.3.D.1
 - 2) Real earnings 2.02.A.3.D.2
 - 3) Real employability skills 2.02.A.3.D.3
 - 4) College and career ready 2.02.A.3.D.4
 - 5) FFA awards and recognition 2.02.A.3.D.5
- e Maintain SAE records. 2.02.A.3.E
 - 1) Agricultural Experience Tracker – digital platform to maintain 2.02.A.3.E.1
 - 2) Paper copy or digital media platform – designed by student or 2.02.A.3.E.2

B Types of SAEs 2.02.B

- 1 Foundational SAE is a project completed based on exploring passions and 2.02.B.1

a Parts of a Foundational SAE 2.02.B.1.A

- 1) Career exploration and planning – research and explore 2.02.B.1.A.1
 - a Examples – complete an interest inventory and career 2.02.B.1.A.1.A
- 2) Employability skills for college and career readiness – develop 2.02.B.1.A.2
 - a Examples – create a resume and compare skills attained 2.02.B.1.A.2.A
- 3) Personal financial planning & management- learn personal 2.02.B.1.A.3
 - a Examples – create a personal budget and consider 2.02.B.1.A.3.A
- 4) Workplace safety – gain an understanding of the importance of 2.02.B.1.A.4
 - a Example – create a workplace safety risk assessment 2.02.B.1.A.4.A
- 5) Agricultural literacy – understand the nature and role of 2.02.B.1.A.5
 - a Examples – research a policy or issue that impacts a 2.02.B.1.A.5.A

2 Immersion SAEs 2.02.B.2

- a Develops as a student identifies interests and abilities and how these 2.02.B.2.A
- b Types of Immersion SAE Projects 2.02.B.2.B
 - 1) Placement/Internship – the student is in an employment setting 2.02.B.2.B.1
 - a Examples – interning with the livestock extension agent, 2.02.B.2.B.1.A
 - 2) Ownership/entrepreneurship – students operate an individual 2.02.B.2.B.2
 - a Examples – raising a litter of puppies, creating a power 2.02.B.2.B.2.A
 - 3) Research – a student investigates materials, processes, and 2.02.B.2.B.3
 - a There are three types of Research SAEs 2.02.B.2.B.3.A
 - i Experimental – applying the scientific process to 2.02.B.2.B.3.A.I
 - ii Analytical – begins with a question that asks why 2.02.B.2.B.3.A.II
 - iii Invention – applying the engineering design 2.02.B.2.B.3.A.III
 - 4) School-based enterprise – an entrepreneurship project based at 2.02.B.2.B.4
 - a Examples – raising market goats for profit, building dog 2.02.B.2.B.4.A
 - 5) Service learning – investigate, plan, conduct, and evaluate
 - a 2.02.B.2.B.5
 - a Examples – assist with the set-up and tear-down of local 2.02.B.2.B.5.A

Understand anatomy and physiology of food animals. 3.00

1 Explain the anatomy of body systems. 3.01

A Body system structure 3.01.A

- 1** Organisms begin as a single cell created from the fertilized ovum. 3.01.A.1
- 2** As cells divide and grow, they differentiate into various tissues and serve 3.01.A.2
 - a** There are 5 tissues found in the body. 3.01.A.2.A
 - b** Muscle – contractile tissue that allows for movement of the animal. 3.01.A.2.B
 - c** Connective – holds various tissues together such as bone. 3.01.A.2.C
 - d** Nerve – tissue that transmits information to various parts of the body. 3.01.A.2.D
 - e** Epithelial – tissue that covers other tissue such as skin. 3.01.A.2.E
 - f** Fluid – liquid type tissue such as blood. 3.01.A.2.F
 - g** The tissues work together to form the organs that sustain life and serve 3.01.A.2.G
- 3** Each body system will have a variety of different tissues with each depending 3.01.A.3

B Skeletal system anatomy 3.01.B

- 1 Functions – protect vital body organs and give form or shape to the body. 3.01.B.1
- 2 Major parts include bones, cartilage, teeth and joints. 3.01.B.2
- 3 Kinds of bone – based on the different structure of the bone. 3.01.B.3
 - a Cancellous bone – also known as spongy bone. Soft bone tissue filled 3.01.B.3.A
 - b Compact bone – consists of a structure known as the Haversian 3.01.B.3.B
 - c Types of bone – classified based on the shape or structure of the bone. 3.01.B.3.C
 - d Long – long cylindrical shaped bones that support the body.
Example: 3.01.B.3.D
 - e Short – cube shaped bones. Example: carpus/knee. 3.01.B.3.E
 - f Flat- long, wide bones that protect vital organs. Example: scapula. 3.01.B.3.F
 - g Pneumatic – contains sinuses (spaces) that come into contact with the 3.01.B.3.G
 - h Irregular – various shapes that protect and support the nervous 3.01.B.3.H
 - i Sesamoid – flat and round shaped bones. Located along tendons. 3.01.B.3.I

4 Components to the skeletal system 3.01.B.4

- a Axial skeleton – bones that are on or close to the midline of the animal. 3.01.B.4.A
 - b Major bones of the axial skeleton: 3.01.B.4.B
 - 1) Vertebral column – includes 5 sections. 3.01.B.4.B.1
 - 2) Cervical vertebrae – section closest to the skull. 3.01.B.4.B.2
 - 3) Thoracic vertebrae 3.01.B.4.B.3
 - 4) Lumbar vertebrae 3.01.B.4.B.4
 - 5) Sacral vertebrae 3.01.B.4.B.5
 - 6) Coccygeal vertebrae – tail section 3.01.B.4.B.6
 - 7) Ribs 3.01.B.4.B.7
 - 8) Sternum – breastbone 3.01.B.4.B.8
 - 9) Skull 3.01.B.4.B.9
 - c Appendicular skeleton – bones that project from the midline of the 3.01.B.4.C
 - d Major bones of the appendicular skeleton: 3.01.B.4.D
 - 1) Pectoral limb – front limb of the animal. Major bones of pectoral 3.01.B.4.D.1
 - 2) Scapula – shoulder blade 3.01.B.4.D.2
 - 3) Humerus – arm 3.01.B.4.D.3
 - 4) Radius and ulna – forearm 3.01.B.4.D.4
 - 5) Carpals – knees of the forelimb 3.01.B.4.D.5
 - 6) Metacarpals – feet/hoof 3.01.B.4.D.6
 - 7) Phalanges – toes 3.01.B.4.D.7
 - e Pelvic limb – hind limb of the animal. 3.01.B.4.E
 - f Major bones of pelvic limb: 3.01.B.4.F
 - 1) Femur – upper leg bone 3.01.B.4.F.1
 - 2) Tibia and fibula – lower leg bones 3.01.B.4.F.2
 - 3) Tarsals – hocks 3.01.B.4.F.3
 - 4) Metatarsals – feet/hoof 3.01.B.4.F.4
 - 5) Phalanges – toes 3.01.B.4.F.5

C Muscular system anatomy 3.01.C

- 1 Functions – provide movement, form and also generate heat for animals.
Also 3.01.C.1
- 2 Lean portion of the carcass of meat animals used for human food. 3.01.C.2
- 3 Classes of muscles 3.01.C.3
 - a Voluntary – under control of the animals will. 3.01.C.3.A
 - b Involuntary – not under control of the animals will. 3.01.C.3.B
- 4 Types of muscle 3.01.C.4
 - a Striated – voluntary and involuntary muscles that are attached to the 3.01.C.4.A
 - 1) Also known as skeletal muscle. 3.01.C.4.A.1
 - 2) Most meat consumed by humans is striated muscle tissue. 3.01.C.4.A.2
 - 3) Makes up a majority of muscle tissue in the body. 3.01.C.4.A.3
 - b Smooth – involuntary muscle found in internal organs and blood 3.01.C.4.B
 - 1) Acts more slowly than other muscle types. 3.01.C.4.B.1
 - 2) Can react to stimuli other than nerve endings such as chemicals 3.01.C.4.B.2
 - c Cardiac – a type of involuntary muscle found in the heart. 3.01.C.4.C

D Respiratory system anatomy 3.01.D

- 1 Functions – provides oxygen to tissues and removal of carbon dioxide, control 3.01.D.1
- 2 Major organs include: 3.01.D.2
 - a Nostrils – draw in air. 3.01.D.2.A
 - b Nasal cavity – air is warmed and moistened while dust particles are 3.01.D.2.B
 - c Pharynx – site where air and food passages (trachea and esophagus) 3.01.D.2.C
 - d Larynx – cartilage structures that contain vocal cords. 3.01.D.2.D
 - e Trachea – tube that connects larynx to bronchi. 3.01.D.2.E
 - f Bronchi – two branch shaped structures that connect trachea to each 3.01.D.2.F
 - g Bronchioles – smaller branches inside lungs. 3.01.D.2.G
 - 1) Alveoli – thin microscopic sacs located at the terminal end to 3.01.D.2.G.1
 - h Lungs – large lobed organs that contain parts essential for oxygen 3.01.D.2.H
 - i Diaphragm – large muscle which separates the chest from the 3.01.D.2.I

E Circulatory system anatomy 3.01.E

- 1 Functions – supply body tissues with nourishment, collect waste materials 3.01.E.1
- 2 Major organs/parts include: 3.01.E.2
 - a Heart – major involuntary muscle that pumps blood throughout the 3.01.E.2.A
 - b Arteries – small tube-like structures that carry blood from the heart to 3.01.E.2.B
 - c Veins – small tube-like structures that carry blood to the heart from 3.01.E.2.C
 - d Capillaries – vessels that exchange nutrients, oxygen, carbon dioxide, 3.01.E.2.D

F Lymphatic system anatomy 3.01.F

- 1 Works with the circulatory system. 3.01.F.1
- 2 Carries lymph fluid from vessels and glands to the capillaries that feed into 3.01.F.2

G Nervous system anatomy 3.01.G

- 1 Functions – coordinate the physical movement of the body, respond to 3.01.G.1
- 2 Major parts/organs include: 3.01.G.2
 - a Central nervous system – functions to coordinate and control body 3.01.G.2.A
 - b Peripheral nervous system – includes all the nerves that send 3.01.G.2.B
 - 1) Somatic nerves – voluntary process of relaying information 3.01.G.2.B.1
 - 2) Autonomic nerves – involuntary process of relaying information 3.01.G.2.B.2

H Endocrine system anatomy 3.01.H

- 1 Function – works with the nervous system to control internal body functions. 3.01.H.1
- 2 Affects and controls growth, reproductive functions (heat, lactation, birth, etc.), 3.01.H.2
- 3 Hormones are the primary substance involved in functioning of the endocrine 3.01.H.3
- 4 Major organs/parts include: 3.01.H.4
 - a Pituitary gland – major gland of the endocrine system. Secretes 3.01.H.4.A
 - b Ovaries – secrete hormones such as estrogen and progesterone that 3.01.H.4.B
 - c Testicles – secrete hormones such as testosterone that are involved in 3.01.H.4.C
 - d Thyroid gland – secretes the hormone thyroxine that stimulates growth 3.01.H.4.D
 - e Hypothalamus – secretes hormones involved in the reproductive cycle. 3.01.H.4.E
 - f Adrenal glands – secrete hormones such as adrenaline that respond to 3.01.H.4.F

I Urinary system anatomy 3.01.I

- 1 Functions – filter fluid and remove waste. 3.01.I.1
- 2 Major organs/parts include: 3.01.I.2
 - a Kidneys – blood passes through and waste products and water are 3.01.I.2.A
 - b Ureters – the liquid (urine) from the kidneys travel through tube-like 3.01.I.2.B
 - c Bladder – stores urine 3.01.I.2.C
 - d Urethra – tube-like structure that excretes the urine waste 3.01.I.2.D
- 3 Poultry do not have a bladder or urethra. The ureters are directly connected 3.01.I.3

2 Understand the physiology of body systems and its correlation to anatomy. 3.02

A Skeletal system physiology 3.02.A

- 1 Formation of bone 3.02.A.1
- 2 Embryo skeletal development begins as cartilage. 3.02.A.2
- 3 Cartilage is tough yet flexible and elastic connective tissue. 3.02.A.3
- 4 As the mammal develops, most cartilage is replaced as bone tissue. 3.02.A.4
- 5 Bone composition 3.02.A.5
 - a 26% minerals – calcium compounds. 3.02.A.5.A
 - b 50% water 3.02.A.5.B
 - c 4% fat 3.02.A.5.C
 - d 20% protein 3.02.A.5.D
- 6 Transformation of cartilage to bone occurs when specialized cells called 3.02.A.6
- 7 Bone tissue contains blood, lymph vessels and nerve fibers that continue to 3.02.A.7
- 8 Bone tissue requires adequate nutrition to function properly. 3.02.A.8

B Muscular system physiology 3.02.B

- 1 Striated muscle – contains dark bands that cross each muscle fiber. 3.02.B.1
 - a Exist in bundles that are enclosed in connective tissue called the 3.02.B.1.A
 - b Nerve endings are located on every muscle fibril. 3.02.B.1.B
 - c Muscle contracts when stimulated by an impulse from the nerve. 3.02.B.1.C
 - d Energy for muscle contraction comes from ATP (adenosine 3.02.B.1.D
 - e The muscle contraction process generates heat for the body. 3.02.B.1.E
- 2 Smooth muscle – activated by the autonomic nervous system. 3.02.B.2
 - a Do not contain the myofibrils or dark bands found in skeletal muscle. 3.02.B.2.A
 - b The cellular structure of smooth muscle is smaller, and more spindle 3.02.B.2.B
 - c Myofibrils are replaced by bundles of thick filaments. 3.02.B.2.C
- 3 Cardiac muscle – functions like striated muscle except fibers are 3.02.B.3

C Respiratory system physiology 3.02.C

- 1 Animal breathes by using diaphragm and rib muscles to enlarge the chest 3.02.C.1
- 2 Air enters the body through the mouth and nasal cavity. 3.02.C.2
- 3 Passes through the pharynx and larynx. 3.02.C.3
- 4 Larynx contains vocal cords. 3.02.C.4
- 5 As air passes over the vocal cords, sound is produced by the animal. 3.02.C.5
- 6 Air continues down through trachea, bronchi, and bronchioles to clusters of 3.02.C.6
- 7 Alveoli are surrounded by minute blood vessels called capillaries. 3.02.C.7
- 8 The capillaries pick up oxygen through the thin walls of the alveoli. 3.02.C.8
- 9 The oxygen goes into the bloodstream and locks onto red blood cells in the 3.02.C.9
- 10 The heart pumps the oxygen rich red blood cells to other tissues throughout 3.02.C.10
- 11 The bloodstream then picks up carbon dioxide from tissues, carries it to the 3.02.C.11

D Circulatory system physiology 3.02.D

- 1** The heart is the major circulatory system organ and pumps blood throughout 3.02.D.1
- 2** Blood flow through the heart: 3.02.D.2
 - a** Contractions of the heart begin in the atria and proceed to the 3.02.D.2.A
 - b** The contraction and relaxation of the heart forces blood to move 3.02.D.2.B
- 3** Mammals have four chambers: 3.02.D.3
 - a** Left and right ventricles – in the lower part of the heart. 3.02.D.3.A
 - b** Left and right atria- in the upper part of the heart. 3.02.D.3.B
- 4** Valves between the atria and ventricles keep blood flow moving in one 3.02.D.4
- 5** Blood enters the right atrium through: 3.02.D.5
 - a** Cranial/superior/anterior vena cava-head area. 3.02.D.5.A
 - b** Caudal/inferior/posterior vena cava-lower body. 3.02.D.5.B
- 6** This blood is low in oxygen and high in carbon dioxide (deoxygenated blood) 3.02.D.6
- 7** Contraction of the right ventricle forces the blood into the pulmonary artery 3.02.D.7
- 8** Gas exchange takes place in the lungs and then the blood is sent back to the 3.02.D.8
- 9** Pulmonary veins enter the left atrium of the heart. 3.02.D.9
- 10** Then the left atrium contracts and forces blood into the left ventricle. 3.02.D.10
- 11** Then goes to the aorta that carries oxygenated blood to the body. 3.02.D.11

E Blood 3.02.E

- 1 Material that circulates throughout the body through veins and arteries. 3.02.E.1
- 2 Major functions include: 3.02.E.2
 - a Transport nutrients from the digestive system to various body tissue 3.02.E.2.A
 - b Transport oxygen from the lungs to various body tissues 3.02.E.2.B
 - c Transport waste products 3.02.E.2.C
 - d Helps regulate body temperature. 3.02.E.2.D
 - e Transport hormones 3.02.E.2.E
 - f Help protect the body against disease and organisms by transporting 3.02.E.2.F
- F Nervous system physiology 3.02.E.2.F

- 1 Neurons are cells that conduct impulses in the nervous system. 3.02.E.1
- 2 Neurons control different parts of the reaction to stimuli based on their type 3.02.E.2
- 3 Sensory neurons- carries impulses from internal and external stimuli to the 3.02.E.3
- 4 Interneurons – processes the impulses received from sensory neurons inside 3.02.E.4
- 5 Motor neurons – carry the impulses away from the brain and spinal cord. 3.02.E.5
- 6 Stimuli response example 3.02.E.6
 - a Receptors in the skin identify touch or other stimuli. 3.02.E.6.A
 - b Sensory neurons carry stimuli messages to the brain and spinal cord. 3.02.E.6.B
 - c The interneurons in the brain process the “message” and determine a 3.02.E.6.C
 - d Motor neurons transmit a response reaction to the stimulated tissue. 3.02.E.6.D

G Endocrine System Physiology 3.02.G

- 1 Hormones in the animal's body control various body functions such as growth, 3.02.G.1
- 2 Hormones – chemical substances that affect glands and organs in the body. 3.02.G.2
- 3 Glands – cells or groups of cells that secrete fluids. 3.02.G.3
- 4 Hormones are passed into the bloodstream as the blood passes through 3.02.G.4
- 5 The hormones then travel to the “target” organ in the body which stimulates a 3.02.G.5

H Urinary system physiology 3.02.H

- 1 Blood in the animal's body passes through the kidneys. Waste products are 3.02.H.1
- 2 The urine containing the waste products travels through the ureters to the 3.02.H.2
- 3 Urine is stored in the bladder until it is full. 3.02.H.3
- 4 The urethra excretes the urine. 3.02.H.4

**Evaluate animal
genetics and
selection. 4.00**

1 Analyze genetics for selection. 4.01

A Types of cell division 4.01.A

1 Mitosis 4.01.A.1

- a Type of cell division that increases the total number of cells and results 4.01.A.1.A
- b Results in animal growth. 4.01.A.1.B
- c Animals begin as a single cell. 4.01.A.1.C
- d Chromosomes are duplicated in each new cell as division occurs. 4.01.A.1.D

2 Meiosis 4.01.A.2

- a Type of cell division that produces the sex cells or gametes that have 4.01.A.2.A
- b Results in gamete formation 4.01.A.2.B
- c One set of chromosomes come from the sperm and one from the 4.01.A.2.C
- d The zygote that is created during fertilization has chromosomes from 4.01.A.2.D
- e Sex cell formation of the sperm and ova are also produced through 4.01.A.2.E
- f Production of sperm is called spermatogenesis. 4.01.A.2.F
- g Male animals begin production sperm at sexual maturity. 4.01.A.2.G
- h Spermatocytes divide into spermatids through meiosis. 4.01.A.2.H
- i Production of an ovum is called oogenesis. 4.01.A.2.I
- j Females also begin producing ova at sexual maturity. 4.01.A.2.J
- k The oocytes divide and form an ovum. The ovum contains cytoplasm 4.01.A.2.K

B Chromosomes and genes 4.01.B

- 1 Chromosomes – rod-shaped bodies that are in pairs. 4.01.B.1
 - a Cattle – 30 pairs 4.01.B.1.A
 - b Hogs – 19 pairs 4.01.B.1.B
 - c Chickens – 39 pairs 4.01.B.1.C
 - d Sheep – 27 pairs 4.01.B.1.D
- 2 Genes – located on chromosomes, control characteristics that are inherited 4.01.B.2
- 3 Allele – an alternative form of a gene (one member of a pair) that are located 4.01.B.3
- 4 Dominant genes – hide the effect of recessive genes (covers recessive traits). 4.01.B.4
- 5 Recessive genes – masked by dominant genes but can show up when 4.01.B.5
- 6 Homozygous – genes are the same on each allele. For example, PP = polled 4.01.B.6
- 7 Heterozygous – gene pairs that carry two different genes that affect a trait. 4.01.B.7

C Sex determination 4.01.C

- 1 After meiosis, one half of sperm carries an X chromosome, and one half of 4.01.C.1
- 2 All ova carry an X chromosome. 4.01.C.2
- 3 The combination that produces male offspring in mammals is XY, and for 4.01.C.3
- 4 In poultry the chromosome configuration is opposite of mammals. Males are 4.01.C.4

D Sex linked characteristics 4.01.D

- 1 Some traits are carried on only the X chromosome and some on only the Y 4.01.D.1
- 2 Certain genes are expressed only in one sex although they are carried on the 4.01.D.2
- 3 Sex-linked traits are often recessive and are covered by dominate genes 4.01.D.3

E Other genetic examples 4.01.E

- 1 Linkage – the tendency for certain traits to appear in groups in the offspring 4.01.E.1
- 2 Crossover – sometimes the chromosomes cross over one another and split to 4.01.E.2
- 3 Mutation – when a new trait appears which did not exist in the genetics of the 4.01.E.3

F Heritability estimates 4.01.F

- 1 Heritability is the likelihood of a trait being passed on from parent to offspring, 4.01.F.1
- 2 Traits with low heritability estimates are improved most through 4.01.F.2

G Animal production records 4.01.G

- 1 Heritability performance data 4.01.G.1
 - a Encourage producers to select animals based on desired traits 4.01.G.1.A
 - b Vary considerably based on various traits ranging from almost 0 to 70 4.01.G.1.B
 - c Fertility is from 0-10 percent which indicated that management affects 4.01.G.1.C
 - d Carcass traits have higher heritability estimates and therefore can be 4.01.G.1.D
 - e Reproductive performances – records on the breeding animals and the 4.01.G.1.E
 - f Growth and size – provide information on the breeding and marketing 4.01.G.1.F

H Types of livestock production data 4.01.H

1 Reproductive performance data 4.01.H.1

a Conception rate – measures the number of females that conceived 4.01.H.1.A

1) Formula: Conception Rate = number of breeding age females 4.01.H.1.A.1

b Percentage born – the number of offspring born compared to the total 4.01.H.1.B

1) Formula: Percentage born = offspring born/ females exposed to 4.01.H.1.B.1

c Percentage weaned – the number of offspring weaned compared to 4.01.H.1.C

1) Formula: Percentage weaned = offspring weaned/ females 4.01.H.1.C.1

d Expected Progeny Difference (EPD) – the ability of the sire to transmit 4.01.H.1.D

1) Measures the difference between the progeny of the sire (bull, 4.01.H.1.D.1

2) Calculated from the progeny of the sire. Therefore, a sire with 4.01.H.1.D.2

3) Examples of EPD data: 4.01.H.1.D.3

a Birth Weight (BW) – expressed in pounds. Predicts the 4.01.H.1.D.3.A

b Weaning Weight (WW) – expressed in pounds. Predicts 4.01.H.1.D.3.B

c Yearling Weight (YW) – expressed in pounds. Predicts 4.01.H.1.D.3.C

d Maternal milk (Milk) – expressed in pounds. Predicts the 4.01.H.1.D.3.D

e Ribeye Area (RE) – expressed in square inches. Predicts 4.01.H.1.D.3.E

f Number of lambs born (NLB) – expressed as a 4.01.H.1.D.3.F

g Number of Live Pigs Born per litter – compares the 4.01.H.1.D.3.G

2 Growth performance data 4.01.H.2

a Average Daily Gain – measures how much weight the animal gained 4.01.H.2.A

1) Formula: Average Daily Gain = pounds of gain on test/ days on 4.01.H.2.A.1

b Feed efficiency – measures the animal's ability to convert feed into 4.01.H.2.B

1) Formula: Feed Efficiency = amount of feed/ amount of gain 4.01.H.2.B.1

c Types of poultry production data 4.01.H.2.C

1) Past performance – looks at the performance of other birds in 4.01.H.2.C.1

2) Present performance – evaluates the individual and siblings 4.01.H.2.C.2

3) Rate of gain and feed efficiency of broilers 4.01.H.2.C.3

I Uses of poultry production records 4.01.I

1 The type of record used to select poultry by pedigree is past performance. 4.01.I.1

2 The type of record used to select poultry by physical appearance of 4.01.I.2

3 If all the birds in the flock are high performers, the most effective present 4.01.I.3

4 Checking or testing the offspring which is called progeny testing is the only 4.01.I.4

J Punnett Square 4.01.J

1 Used to predict the results of crossing various kinds of animals 4.01.J.1

2 Male gametes are shown across the top of the Punnett Square 4.01.J.2

3 Female gametes are shown down the left side of the square 4.01.J.3

4 Capital and lowercase letters indicate if the trait is dominant or recessive 4.01.J.4

5 Examples of dominant and recessive traits 4.01.J.5

a Polled is dominant to horns. 4.01.J.5.A

b Black in cattle is dominant to red. 4.01.J.5.B

c White face in cattle is dominant to colored face. 4.01.J.5.C

d Color in animals is dominant to albinism. 4.01.J.5.D

e Rose comb in chickens is dominant to single comb. 4.01.J.5.E

f White wool is dominant to black wool. 4.01.J.5.F

g In swine, curly tails are dominant to straight tails. 4.01.J.5.G

K Using the Punnett Square Diagram 4.01.K

- 1 Step one – determine the genetic alleles the male and female carry. 4.01.K.1
 - 2 Step two – set up the Punnett Square by placing the alleles of the male 4.01.K.2
 - 3 Step three – cross the associate allele for the male and female and write the 4.01.K.3
 - 4 Step four – use the information in the square to determine the genotype and 4.01.K.4
-

2 Evaluate animals for selection based on quality standards. 4.02

A General livestock evaluation information 4.02.A

- 1 Consider breed and sex characteristics as animals are evaluated. For 4.02.A.1
- 2 View the animal from a distance and assess the animal from three positions 4.02.A.2
 - a Front view – inspects the leg structure, muscle, and balance of the 4.02.A.2.A
 - b Side view – inspects leg structure, muscle, and balance 4.02.A.2.B
 - c Rear view – inspects leg structure, muscle, and balance 4.02.A.2.C
- 3 As the animal moves and during closer inspection, the evaluator can confirm 4.02.A.3
- 4 Structural soundness – all animals should be structurally sound, but extra 4.02.A.4
 - a Cow Hocked – rear view conformation fault. The hock joints on the 4.02.A.4.A
 - b Bowlegged – rear view and front view conformation fault. The knees or 4.02.A.4.B
 - c Knock kneed – front view conformation fault. The knees of the animal 4.02.A.4.C
 - d Splay footed – front view conformation fault. The hooves and pasterns 4.02.A.4.D
 - e Pigeon toed – front view conformation fault. The hooves of the animal 4.02.A.4.E
 - f Buck kneed – side view conformation fault. The knees of the animal 4.02.A.4.F
 - g Calf kneed – side view conformation fault. The knees of the animal are 4.02.A.4.G
 - h Post legged – side view conformation fault. The angle of the hock is 4.02.A.4.H
 - i Sickie Hocked – side view conformation fault. The angle of the hock 4.02.A.4.I
 - j Weak pasterns – side view conformation fault. The pastern joint of the 4.02.A.4.J
- 5 Take notes on the positive and negative characteristics each animal 4.02.A.5
- 6 Performance records – in addition to physical evaluation, producers also use 4.02.A.6

B Beef cattle, sheep and goats 4.02.B

1 Market animals – the ideal market animal grows quickly and converts feed 4.02.B.1

a Muscling – refers to the flesh the animal carries and is an inherited 4.02.B.1.A

1) Determined through physical touch (handling) in sheep and 4.02.B.1.A.1

b Finish – refers to the amount of fat the animal carries. Market animals 4.02.B.1.B

c Carcass merit and yield – refers to the kind and quantity of carcass the 4.02.B.1.C

d Balance and style – indicates the general structure of the animal and 4.02.B.1.D

1) Balance deals with equal proportions of width, depth, and 4.02.B.1.D.1

2) Style deals with the correctness of the structure and 4.02.B.1.D.2

e Breeding animals – evaluate based on the characteristics the producer 4.02.B.1.E

f Feet, legs and bone – the animal should display strong and straight 4.02.B.1.F

g Body capacity and size – animals should display long well sprung ribs 4.02.B.1.G

h Muscle and condition – the animal should display balanced muscling 4.02.B.1.H

i Breed character – evaluate animal based on breed standards. 4.02.B.1.I

j Sex character- should display characteristics that are ideal to their 4.02.B.1.J

k Performance records – productivity measures such as Expected 4.02.B.1.K

C Swine marketing and breeding evaluation 4.02.C

- 1 Market barrows and gilts – the ideal market hog is a fast growing, firmly 4.02.C.1
 - a Muscle and finish – indicate the amount of flesh and fat the animal 4.02.C.1.A
 - b Evaluate muscle from the rear, side and top of the animal. 4.02.C.1.B
 - 1) From the rear, side and top of the animal. Evaluate the width 4.02.C.1.B.1
 - 2) From the top, the loin and back should be wide and the rump 4.02.C.1.B.2
 - 3) From the side, the hog will form an “arc” shape from head to tail 4.02.C.1.B.3
 - 4) Muscled animals, viewed from the top, will display a butterfly 4.02.C.1.B.4
 - c Type – refers to the conformation of the hog’s body. Evaluates the 4.02.C.1.C
 - d Breeding animals – traits used to evaluate market hogs are also used 4.02.C.1.D
 - 1) Structural soundness – additional emphasis is placed on 4.02.C.1.D.1
 - 2) Udder quality for breeding sows – due to large litter sizes. 4.02.C.1.D.2
 - 3) Performance records – breeding animals are also evaluated 4.02.C.1.D.3

D Dairy cattle evaluation 4.02.D

- 1 The ideal dairy cow or heifer has solid feet and leg structure, with excellent 4.02.D.1
- 2 Evaluate animals from a distance and assess from all three views as with 4.02.D.2
- 3 The Purebred Dairy Cattle Association developed a Dairy Cow Unified 4.02.D.3
 - a Frame – accounts for 15% of the overall score. Evaluates skeletal 4.02.D.3.A
 - b Dairy strength – accounts for 25% of the overall score. A combination 4.02.D.3.B
 - c Rear feet and legs – accounts for 20% of the overall score. Evaluates 4.02.D.3.C
 - d Udder – accounts for 40% of the overall score. Evaluates the udder 4.02.D.3.D

E Live poultry evaluation 4.02.E

1 Commercial broilers and turkeys 4.02.E.1

- a** Most producers of broilers and turkeys have no input in selecting the 4.02.E.1.A
- b** Broilers and turkeys must be healthy and well-fleshed or muscled with 4.02.E.1.B

2 Laying hens 4.02.E.2

- a** Evaluated in reverse or culled based on less desirable characteristics 4.02.E.2.A
- b** Three things are considered when culling layers – present production, 4.02.E.2.B
- c** A hen that is laying has large, bright red, soft and waxy comb and 4.02.E.2.C
- d** Past production is indicated by the amount of yellow pigment left in the 4.02.E.2.D
- e** Pigment bleaches or leaves the body of a laying hen in this order 4.02.E.2.E
 - 1) Vent 4.02.E.2.E.1
 - 2) Eye ring 4.02.E.2.E.2
 - 3) Ear lobe 4.02.E.2.E.3
 - 4) Beak starting at the base 4.02.E.2.E.4
 - 5) Front of the shanks 4.02.E.2.E.5
 - 6) Rear of shanks 4.02.E.2.E.6
 - 7) Tops of the toes 4.02.E.2.E.7
 - 8) Hock joint 4.02.E.2.E.8
- f** A hen that is only bleached in the vent has laid less eggs than a hen 4.02.E.2.F
- g** A soft and pliable abdomen and a moist, enlarged, and bleached vent 4.02.E.2.G

F Grading Ready-to-Cook broilers and turkeys 4.02.F

- 1 United States Department of Agriculture Grades A, B or C are used to 4.02.F.1
- 2 Grades do NOT indicate health or cleanliness 4.02.F.2
- 3 Factors used to determine USDA grades 4.02.F.3
 - a Confirmation 4.02.F.3.A
 - b Fleshing (muscle) 4.02.F.3.B
 - c Fat covering 4.02.F.3.C
 - d Exposed flesh on breast and other parts 4.02.F.3.D
 - e Discoloration 4.02.F.3.E
 - f Disjointed and broken bones 4.02.F.3.F
 - g Missing parts 4.02.F.3.G
 - h Freezing defects 4.02.F.3.H
- 4 General rule – the more things wrong, the lower the grade 4.02.F.4
 - a Larger carcasses can have more exposed flesh and more discoloration 4.02.F.4.A
 - b Grade C is the lowest grade regardless of how bad the carcass is 4.02.F.4.B

G Grading eggs 4.02.G

- 1 The USDA sets standards for weight classes and grades of eggs 4.02.G.1
- 2 General rules for grading eggs 4.02.G.2
- 3 The more things wrong, the lower the grade 4.02.G.3
- 4 Foreign material such as manure, egg yolk, blood etc., makes the egg grade 4.02.G.4
- 5 Grades of eggs are based on four factors: 4.02.G.5
 - a Shell – exterior evaluation of the egg 4.02.G.5.A
 - b Air cell – size of the air cell determines grade and indicates the age of 4.02.G.5.B
 - c White – albumen should be clear and firm instead of weak and watery 4.02.G.5.C
 - d Yolk – should be slightly defined and free from defects. Should not be 4.02.G.5.D
 - e To determine the interior quality of an egg, it is candled. Candling is a 4.02.G.5.E

H Interior quality grades 4.02.H

- 1 AA – air cell 1/8” or less 4.02.H.1
- 2 A – air cell 3/16” or less 4.02.H.2
- 3 B – air cell is larger than 3/16” 4.02.H.3
- 4 If blood is found, it is labeled bloody and rejected for sale and human 4.02.H.4

I Exterior quality grades 4.02.I

- 1 AA – clean, unbroken shell, with a practically normal shape, texture, and 4.02.I.1
- 2 A – clean, unbroken shell, with a practically normal shape, texture, and 4.02.I.2
- 3 B – clean to slightly stained, unbroken but abnormal due to ridges, excess 4.02.I.3
- 4 Dirty – dirt or foreign material present. Prominent stains can also be present 4.02.I.4
- 5 Grades are based on shell cleanliness, shape, texture, thickness, ridges or 4.02.I.5

**Apply requirements to
formulate feeds.** 5.00

1 Implement feed principles to formulate rations. 5.01

A Livestock ration terminology 5.01.A

- 1 Nutrient – chemical element or compound that aids in the support of life. 5.01.A.1
- 2 Ration – the amount and kind of feed given to an animal on a daily basis. 5.01.A.2
- 3 Roughages – feeds that contain more than 18% crude fiber when they are 5.01.A.3
 - a Examples of roughages 5.01.A.3.A
 - 1) Hay 5.01.A.3.A.1
 - 2) Pasture grasses 5.01.A.3.A.2
 - 3) Silage 5.01.A.3.A.3
 - 4) Hulls 5.01.A.3.A.4
 - 5) Straw 5.01.A.3.A.5
 - 6) Fodder 5.01.A.3.A.6
- 4 Concentrates – feeds that contain less than 18% crude fiber when they are 5.01.A.4
 - a Examples of Concentrates 5.01.A.4.A
 - 1) Grain: corn, oats, barley, wheat, etc. 5.01.A.4.A.1
- 5 Processed by-products – wheat bran, middlings, etc. 5.01.A.5
- 6 Liquid supplements – molasses, urea 5.01.A.6
- 7 Animal-based proteins – meat scraps, tankage, fish meal, blood meal 5.01.A.7
- 8 Plant-based proteins – cottonseed meal, soybean meal, peanut meal, linseed 5.01.A.8

B Groups of Nutrients 5.01.B

- 1 Carbohydrates – main energy nutrients made up of sugars, starches, 5.01.B.1
- 2 Fats and Oils – 2.25 times the energy value of carbohydrates, at body 5.01.B.2
- 3 Proteins – organic compounds made up of amino acids and contain carbon, 5.01.B.3
- 4 Vitamins – trace organic compounds, all contain carbon. 5.01.B.4
- 5 Minerals – inorganic materials or compounds needed in small amounts. 5.01.B.5
- 6 Water – makes up 40%-80% of an animal's body. 5.01.B.6

C General Principles of a Good Ration 5.01.C

- 1** Balanced – has all nutrients needed in the right amounts and proportions at 5.01.C.1
- 2** Palatable – tastes good so that animals will eat it. 5.01.C.2
- 3** Variety – mix of feedstuffs to improve palatability and make it easier to 5.01.C.3
- 4** Succulent – makes the feed fresh and appealing. 5.01.C.4
- 5** Bulky – satisfies hunger and helps digestive system function properly. 5.01.C.5
- 6** Slightly laxative – improves feed efficiency and prevents constipation. 5.01.C.6
- 7** Low cost – best nutritional value possible at lowest cost 5.01.C.7
 - a** Feed costs are about 75% of the total costs of raising livestock. 5.01.C.7.A
 - b** Price per pound of energy and digestible protein determines if the 5.01.C.7.B
- 8** Safe – not harmful to health or quality of animal products. 5.01.C.8
- 9** Proper proportions of concentrates and roughages for type and age of animal. 5.01.C.9
 - a** Examples: more roughages for cattle, more concentrate for swine and 5.01.C.9.A
- 10** Uniformly mixed especially with micronutrients and feed additives. 5.01.C.10

D Feeding Livestock on 100% Dry Matter versus As-fed Basis 5.01.D

1 As-fed Basis 5.01.D.1

- a** Feed sample is analyzed in the form it is fed to the animal (as fed to 5.01.D.1.A
- b** Nutrients are analyzed and listed with moisture (water content) 5.01.D.1.B

2 100% Dry Matter Basis 5.01.D.2

- a** All moisture is removed from the feed sample. Nutrient levels are 5.01.D.2.A
- b** Formula: 5.01.D.2.B
 - 1)** Weight of feed on AS FED basis X Percent of dry matter in feed 5.01.D.2.B.1
- c** Relationship—the weight of 100% dry matter basis feed is lower than 5.01.D.2.C
- d** Feed reference tables and feed analyses show % dry matter in most 5.01.D.2.D
- e** Dry matter content of sun-cured hay is about 90% of as-fed basis. 5.01.D.2.E
- f** Dry matter content of most fresh pasture grasses is about 20-30% of 5.01.D.2.F
- g** Dry matter content of most grain corn (not silage) is about 90% of 5.01.D.2.G
- h** Care must be taken in storing high moisture feed materials. These 5.01.D.2.H
- i** Grains that are put into storage while too moist can mold, for example 5.01.D.2.I
- j** Hay that has been rained on or put away with too high moisture 5.01.D.2.J

E Steps in balancing a ration 5.01.E

- 1** Step 1 – identify the kind, age, weight and function of the animal(s) a ration is 5.01.E.1
- 2** Step 2 – consult nutrient requirement reference tables known as feeding 5.01.E.2
- 3** Step 3 – choose feeds to create the ration. Common nutrient contents or 5.01.E.3
- 4** Step 4 – calculate the amounts of each feed to use. Computer programs can 5.01.E.4
- 5** Step 5 – verify the ration meets the nutrient needs of the animal, especially 5.01.E.5

F Using the Pearson Square 5.01.F

- 1 Draw a square and write the nutrient amount needed in the center, then draw 5.01.F.1
- 2 Write the feedstuffs to be used and their nutrient content (a percentage) at the 5.01.F.2
- 3 Follow the diagonal lines across the square and use the two numbers along 5.01.F.3
- 4 Divide the parts of each feedstuff by the total parts to determine the percent 5.01.F.4
- 5 Determine the amount of feed to be mixed and multiply that number by the 5.01.F.5

2 Implement feed requirements based on life stage and production needs. 5.02

A Functions of Good Ration 5.02.A

- 1 Livestock feed rations should be based on the animal's life stage or stage of 5.02.A.1
- 2 Six main functions of a ration 5.02.A.2
 - a Maintenance – basic nutrient requirements to keep vital body 5.02.A.2.A
 - b Growth – increasing the size of bones, muscles, organs, and 5.02.A.2.B
 - c Fattening – storing nutrients not used for maintenance, growth, or 5.02.A.2.C
 - d Production – milk, eggs, wool, etc. 5.02.A.2.D
 - e Reproduction – gestation, parturition, and lactation. 5.02.A.2.E
 - f Work – other needs are met before nutrients are available for work. 5.02.A.2.F
- 3 From 1/3 to 1/2 of the ration fed to most livestock is used for body 5.02.A.3

B Functions and sources of nutrients 5.02.B

1 Carbohydrates – provide energy 5.02.B.1

- a** Common carbohydrate sources include cereal grains such as corn, 5.02.B.1.A
- b** Corn is most commonly grown grain in the United States. 5.02.B.1.B

2 Fats and oils – furnish 2-25 times the energy value of carbohydrates and 5.02.B.2

- a** Often provided by the grains and protein concentrates fed to the 5.02.B.2.A
- b** Animals that are lactating or in a fattening status would need additional 5.02.B.2.B

3 Proteins – supply material to build body tissues such as muscles, skin, and 5.02.B.3

- a** Plant protein sources—include soybean meal, cottonseed meal and 5.02.B.3.A
- b** Animal protein sources—include meat meal, fish meal, dried milk, and 5.02.B.3.B

4 Vitamins – help regulate many body functions and are designated by letters 5.02.B.4

- a** Most vitamins are provided through feed ingredients. 5.02.B.4.A
- b** Pre-mixes can be added to feed to balance vitamin amounts based on 5.02.B.4.B

5 Minerals – provide material for growth of bones, teeth and body tissue and 5.02.B.5

- a** Provided through most feed ingredients, but pre-mixes can be added 5.02.B.5.A

6 Water – helps dissolve other nutrients and carry them to different parts of the 5.02.B.6

- a** Water is considered by many as the most important nutrient. 5.02.B.6.A
- b** Usually supplied separate from other nutrients from water wells. 5.02.B.6.B

7 Feed supplements – added to improve palatability (taste) and reduce feed 5.02.B.7

C Feed additives 5.02.C

- 1 Materials used in animal rations in small quantities to improve or stimulate 5.02.C.1
- 2 Not generally considered nutrients. 5.02.C.2
- 3 Performance stimulants and increase profits because of improved 5.02.C.3
- 4 Widely used in livestock 5.02.C.4
- 5 Regulated by the Food and Drug Administration (FDA) and some require a 5.02.C.5
 - a Feed additives that are antibiotics require Veterinarian Feed Directive 5.02.C.5.A
- 6 Any feed with any drug in it must be labeled as medicated feed. 5.02.C.6
- 7 Many feed additives have withdrawal times where animals must be taken off 5.02.C.7
- 8 Many antibiotic and antibacterial type additives are administered at 5.02.C.8
- 9 Subtherapeutic- medication fed at lower levels to prevent rather than treat 5.02.C.9
- 10 A major health concern of this low-level use is that microorganisms that cause 5.02.C.10
- 11 Many different antimicrobial drugs are used as feed additives to prevent 5.02.C.11

D Mixing feed with additives 5.02.D

- 1 The main rule that includes all other rules is “read and follow the label.” 5.02.D.1
- 2 Uniform mixing of additives in livestock feed is required so that all 5.02.D.2
- 3 To avoid medicated drug contamination of feed, the feed mixer must be 5.02.D.3
- 4 It is important that accurate up-to-date records be kept on the use of 5.02.D.4

E Kinds of feed additives 5.02.E

- 1** Antimicrobial drug additives – antibiotics and antibacterials used to prevent 5.02.E.1
 - a** Aureomycin, Terramycin are common antibiotics for livestock. 5.02.E.1.A
 - b** Broad-spectrum antibiotics when the specific disease is unknown. 5.02.E.1.B
 - c** The class of drug can only be prescribed as outlined by the Food and 5.02.E.1.C
 - d** Guidelines vary for each species of livestock. 5.02.E.1.D
- 2** Hormone additives – feed additives used to improve feed efficiency, 5.02.E.2
 - a** Melengestrol or MGA to suppress estrus. 5.02.E.2.A
 - 1)** Used for some livestock to prevent estrus. 5.02.E.2.A.1
 - 2)** CONTROL used for synchronized breeding programs. 5.02.E.2.A.2
- 3** Antiparasitic additives – used to control internal parasites such as worms. 5.02.E.3
 - a** Piperazine Dichlorvos, and Fenbendazole are worm control additives. 5.02.E.3.A
 - b** Coccidiostats – controls coccidiosis 5.02.E.3.B
- 4** Digestive health additives – support immunity to prevent poor health and 5.02.E.4
 - a** Ionophores- improves efficiency by stimulating the digestive system. 5.02.E.4.A
 - 1)** Important to be species specific. Cannot be feed to equine. 5.02.E.4.A.1
 - b** Probiotics – beneficial bacteria added to improve digestive health 5.02.E.4.B
 - c** Prebiotics – stimulate increased production of existing digestive 5.02.E.4.C
- 5** Other feed additives 5.02.E.5
 - a** Poloxalene – prevents bloat in beef cattle. 5.02.E.5.A
 - b** Fly control – garlic, look up drug names 5.02.E.5.B

F Rules of thumb for feeding livestock 5.02.F

- 1 Beef cattle – fattening ration should include 1½ - 2 pounds of air-dried 5.02.F.1
- 2 Swine – the amount fed depends on size and age of animal and whether 5.02.F.2
- 3 Pigs under 50 pounds and sows that are nursing require higher percent 5.02.F.3
- 4 Poultry – the ration is about 10% of body weight. 5.02.F.4
- 5 Goats and sheep – a doe/ewe nursing triplets will require more nutrients, 5.02.F.5
- 6 Growing animals require a higher percentage of protein in their ration than 5.02.F.6
- 7 For example, an 1100-pound dry beef cow will require ~7% Crude Protein 5.02.F.7
- 8 Gestating animals require a lower percentage of protein in their ration than 5.02.F.8
- 9 For example, an 1100-pound dry beef cow in middle gestation will require 5.02.F.9

Apply practices to maintain healthy food animals. 6.00

1 Apply food animal veterinary practices. 6.01

A Veterinary Medical Terminology 6.01.A

1 Components of medical terminology 6.01.A.1

a Prefix-word part at the beginning of the word indicating number, 6.01.A.1.A

- 1) A-, An- → without, lack of (Analgesic- without pain; drug to 6.01.A.1.A.1
- 2) Anti- → against, opposing (Antibiotic- against microorganisms) 6.01.A.1.A.2
- 3) Hypo- → below, low (Hypocalcemia- low levels of calcium in 6.01.A.1.A.3
- 4) Enter- → intestine (Enteritis- inflammation of the intestine) 6.01.A.1.A.4

b Root word- word part that gives the fundamental meaning of the word. 6.01.A.1.B

- 1) mast- → mammary gland or utters (mastitis- inflammation of the 6.01.A.1.B.1
- 2) rhin- → nose (Rhinitis- inflammation of the nose) 6.01.A.1.B.2
- 3) gastr- → stomach (Gastrostomy- surgical opening of the 6.01.A.1.B.3

c Suffix- word part at the end of the word indicating procedures, 6.01.A.1.C

- 1) -pathy- → (Osteopathy- disease of the bone) 6.01.A.1.C.1
- 2) -osis→ condition of (Coccidiosis- condition caused by coccidia 6.01.A.1.C.2
- 3) -emia→ blood (Anemia- lack of blood flow) 6.01.A.1.C.3

B Directional terminology 6.01.B

- 1 Dorsal plane – divides the body into dorsal and ventral parts that are not 6.01.B.1
 - a Ventral – underside of the body. 6.01.B.1.A
 - b Dorsal – back (toward the spine). 6.01.B.1.B
- 2 Median plane (Midsagittal) – runs through the center of the body lengthwise 6.01.B.2
 - a Medial – toward the midline of the body 6.01.B.2.A
 - b Lateral – away from the midline of the body 6.01.B.2.B
- 3 Transverse plane – divides the body into cranial and caudal parts. 6.01.B.3
 - a Cranial – head area or skull 6.01.B.3.A
 - b Caudal – tail end of the body or towards the tail. 6.01.B.3.B
- 4 Sagittal plane – runs the length of the body and divides into left and right 6.01.B.4
- 5 Proximal – location nearer to the center of the body as related to other 6.01.B.5
- 6 Distal – location farther from the center of the body as related to other 6.01.B.6
- 7 Superficial – location near the surface of the body. 6.01.B.7
- 8 Deep – location within the body away from the surface. 6.01.B.8
- 9 Rostral – position towards, near or at the nose of an animal. 6.01.B.9

C Disease terminology 6.01.C

- 1 Disease – any condition that causes an animal's body systems to function 6.01.C.1
- 2 Infectious disease – caused by a specific disease-causing microorganism 6.01.C.2
- 3 Virus – single celled eukaryotic organism. 6.01.C.3
 - a Has characteristics of both living and nonliving material but cannot 6.01.C.3.A
 - b Antibiotics are not effective in treating viruses. 6.01.C.3.B
- 4 Bacteria – single celled prokaryotic organisms. 6.01.C.4
 - a Survive in various conditions 6.01.C.4.A
 - b Invade the cells of an animal's body. 6.01.C.4.B
- 5 Protozoa – a microorganism that causes disease. 6.01.C.5
- 6 Non-infectious disease – caused by environmental or nutrition factors rather 6.01.C.6
 - a Typically not contagious. 6.01.C.6.A
 - b Examples: faulty nutrition, trauma, toxic substances, congenital 6.01.C.6.B

D Common methods of medicine administration 6.01.D

- 1 Gavage – oral injection where substance is injected directly into the 6.01.D.1
- 2 Balling gun – long plastic syringe like device used to administer large 6.01.D.2
- 3 Gavage needle – metal needle with a rounded ball-like tip used to administer 6.01.D.3
- 4 Drenching syringe – a large syringe fitted with a gavage needle end 6.01.D.4
- 5 Intradermal (ID) – injection administered between the layers of skin 6.01.D.5
 - a Needle angled approximately 10-15 degrees. 6.01.D.5.A
 - b Example- Tuberculosis “TB” test 6.01.D.5.B
- 6 Subcutaneous (SQ) – injection administered just below the skin by “tenting” or 6.01.D.6
- 7 Intramuscular (IM) – injection administered within muscular tissue. Needle is 6.01.D.7
- 8 Intravenous (IV) – injection administered within a vein. 6.01.D.8
- 9 Intranasal (IN) – injection administered within the nostrils using a syringe with 6.01.D.9
- 10 Topical application 6.01.D.10
 - a Drench – often called “pour-on”- liquid medication administered by 6.01.D.10.A
 - b Dip – large pit filled with water and medication. Animals walk/swim 6.01.D.10.B

E Immunity – resistance to developing a disease. 6.01.E

- 1 Active immunity – acquired naturally due to exposure to substances that 6.01.E.1
- 2 Passive – antibodies that are transferred from mother to baby or injected into 6.01.E.2

F Vaccines- substances that develop resistance to disease (immunity). 6.01.F

- 1 Modified live vaccine – vaccines that are alive but are weakened and have 6.01.F.1
- 2 Non-living – vaccines that do not contain living pathogens, but still stimulate 6.01.F.2

2 Apply the process to identify major diseases and health issues along with prevention and treatment. 6.02

A Common diseases of cattle 6.02.A

1 Brucellosis 6.02.A.1

- a** Microorganism that causes abortion during last half of pregnancy, 6.02.A.1.A
- b** Cattle that have brucellosis must be slaughtered and disposed of 6.02.A.1.B
- c** Prevent by vaccinating breeding females, testing animals and 6.02.A.1.C

2 Shipping Fever 6.02.A.2

- a** Disease complex with many symptoms such as closed eyes, fever, 6.02.A.2.A
- b** More common in young cattle during times of stress such as shipping. 6.02.A.2.B
- c** Recommended treatment for cattle with shipping fever is the use of 6.02.A.2.C

3 Blackleg 6.02.A.3

- a** Bacterial disease that lives in soils and infects animals through 6.02.A.3.A
- b** Sudden death, lameness, swollen muscles and high fever are some 6.02.A.3.B
- c** Prevent with vaccine 6.02.A.3.C

4 Mastitis 6.02.A.4

- a** Bacterial infection that causes inflammation in mammary glands. 6.02.A.4.A
- b** More common in the dairy industry. 6.02.A.4.B
- c** Prevent through sanitation and proper milking procedures. 6.02.A.4.C

5 Many others such as pinkeye, leptospirosis, foot rot, and scours 6.02.A.5

B Common diseases of swine 6.02.B

1 Transmissible Gastroenteritis (TGE) 6.02.B.1

- a** Very contagious virus that has symptoms of vomiting, diarrhea with 6.02.B.1.A
- b** Drugs and vaccines are not effective in controlling and treating TGE in 6.02.B.1.B

2 Swine Dysentery 6.02.B.2

- a** Bacterial disease that causes bloody scours. 6.02.B.2.A
- b** Recommended treatment is the use of one of the several 6.02.B.2.B

3 Mycoplasmal Pneumonia 6.02.B.3

- a** Chronic disease that causes coughing in young pigs. 6.02.B.3.A
- b** Reduces feed intake and causes reduced gains. 6.02.B.3.B
- c** Death loss is low. Prevention includes vaccination and sanitation. 6.02.B.3.C

4 Porcine Reproductive and Respiratory Syndrome (PRRS)- 6.02.B.4

- a** Viral disease that causes late term fetal death, abortion, weak pigs and 6.02.B.4.A
- b** No effective treatment. Prevention includes vaccination. 6.02.B.4.B

5 Many others including swine cholera (now eradicated in U.S.), leptospirosis, 6.02.B.5

C Common diseases of poultry 6.02.C

1 West Nile 6.02.C.1

- a Viral disease spread from birds to other mammals by mosquitos. 6.02.C.1.A
- b Poultry typically not affected but can be fatal to dead-end host. 6.02.C.1.B

2 Avian Influenza 6.02.C.2

- a Disease complex of several strains of the influenza virus. 6.02.C.2.A
- b Numerous strains are found in wide range of domesticated poultry and 6.02.C.2.B
 - 1) The low pathogenic forms have low mortality and are often 6.02.C.2.B.1
- c Mutation of some viral strains results in high mortality rates. 6.02.C.2.C
 - 1) Protocols to control spread and stamp out virus are needed for 6.02.C.2.C.1

3 Newcastle Disease 6.02.C.3

- a Virus with symptoms of gasping for air, sneezing, breathing difficulties, 6.02.C.3.A
- b No known cure. 6.02.C.3.B

4 Avian Pox (Fowl Pox) 6.02.C.4

- a Caused by a virus and has symptoms of yellow cankers in the mouth 6.02.C.4.A
- b No known cure 6.02.C.4.B

5 Coccidiosis 6.02.C.5

- a Caused by protozoan parasites and has symptoms of bloody diarrhea, 6.02.C.5.A
- b Affects numerous livestock species 6.02.C.5.B
- c Treat and prevent with drugs called coccidiostats. 6.02.C.5.C

6 Aspergillosis (Brooder Pneumonia) 6.02.C.6

- a Caused by fungus or mold and includes symptoms of loss of appetite, 6.02.C.6.A
- b Prevented by using mold free litter. No effective treatment. 6.02.C.6.B
- c Many others including blackhead, fowl cholera and erysipelas, 6.02.C.6.C

D Common diseases of sheep and goats 6.02.D

1 Tetanus (Lockjaw) 6.02.D.1

- a** Bacteria that live in the soil and enters the animal's body through
a 6.02.D.1.A
- b** All livestock animals can contract tetanus. 6.02.D.1.B
- c** Animals who receive preventative maintenance procedures such
as 6.02.D.1.C

2 Enterotoxemia (Overeating Disease) 6.02.D.2

- a** Bacterial disease that causes sudden death of animals. 6.02.D.2.A
- b** Prevent by vaccination. 6.02.D.2.B

3 Foot Rot 6.02.D.3

- a** Extremely contagious bacterial infection that causes lameness. 6.02.D.3.A
- b** Affects numerous livestock species 6.02.D.3.B

4 Sore Mouth 6.02.D.4

- a** Virus that causes blisters on the mouth lips and nose 6.02.D.4.A
- b** Zoonotic disease 6.02.D.4.B
- c** Prevented by vaccination 6.02.D.4.C

E General management techniques 6.02.E

- 1 Dehorning – removing horns to prevent injury to other animals or workers. 6.02.E.1
 - a Dehorning young animals when horns are in button stage causes less 6.02.E.1.A
 - b Bleeding risk involved with dehorning older animals. 6.02.E.1.B
 - c Methods 6.02.E.1.C
 - 1) Chemical – liquid, pastes or caustic sticks are used to disbud 6.02.E.1.C.1
 - 2) Mechanical – used to dehorn at any stage of horn development. 6.02.E.1.C.2
 - 3) Spoons, cup or tube type – tool with a circular blade is pushed 6.02.E.1.C.3
 - 4) Barnes type – hinged tool placed over the horn that slices 6.02.E.1.C.4
 - 5) Hot irons – a heated tool is held to horn bud to destroy horn 6.02.E.1.C.5
 - 6) Saws- a hand saw, or obstetrical wire is used to saw through 6.02.E.1.C.6
- 2 Castration – removing testicles of male animals. 6.02.E.2
 - a Prevents unplanned breeding. 6.02.E.2.A
 - b Improves ability and ease to manage animals. 6.02.E.2.B
 - c Castrate young animals to reduce stress. 6.02.E.2.C
 - d Castration performed on all livestock species. 6.02.E.2.D
 - e Eliminates source of testosterone production and prevents 6.02.E.2.E
 - f Methods 6.02.E.2.F
 - 1) Surgical – involves splitting or removing the lower third of the 6.02.E.2.F.1
 - 2) Bloodless – a tool such as a Burdizzo castrator or elastrator 6.02.E.2.F.2
- 3 Poultry beak trimming – removing ½ to 1/3 of the beak. 6.02.E.3
 - a Performed to prevent cannibalism. 6.02.E.3.A
 - b Poultry in range systems should not be debeaked. 6.02.E.3.B
 - c Methods 6.02.E.3.C
 - 1) Hot iron tool 6.02.E.3.C.1
 - 2) Infrared tool 6.02.E.3.C.2
- 4 Clipping needle teeth – removal of sharp side teeth on piglets. 6.02.E.4
 - a Prevents injury to sow during nursing and littermates. 6.02.E.4.A
 - b Method 6.02.E.4.B
 - 1) Disinfected clippers 6.02.E.4.B.1

- 5 Docking – removal of a portion of the tail. 6.02.E.5
 - a Improves overall sanitation especially during reproductive procedures 6.02.E.5.A
 - b Performed on sheep, pigs and sometimes dairy cattle 6.02.E.5.B
 - c Prevents tail biting in swine 6.02.E.5.C
 - d Methods for sheep and cattle: 6.02.E.5.D
 - 1) Knife 6.02.E.5.D.1
 - 2) Elastrator 6.02.E.5.D.2
 - 3) Burdizzo 6.02.E.5.D.3
 - 4) Emasculator 6.02.E.5.D.4
 - 5) Electric docker 6.02.E.5.D.5
 - 6) Hot iron docker 6.02.E.5.D.6
 - e Methods for swine 6.02.E.5.E
 - 1) Side-cutting pliers 6.02.E.5.E.1
 - 2) Hot iron dockers 6.02.E.5.E.2
- 6 Urine collection 6.02.E.6
 - a Cystocentesis – collects urine through use of a needle through the 6.02.E.6.A
 - b Catch – collect urine into a container 6.02.E.6.B
- 7 Injectable drug administration – used for to administer vaccines, dewormers, 6.02.E.7
 - a Intravenous 6.02.E.7.A
 - b Intramuscular 6.02.E.7.B
 - c Subcutaneous 6.02.E.7.C
 - d Gavage (2 types) 6.02.E.7.D
- 8 Hoof trimming 6.02.E.8
 - a Hoof trimmer 6.02.E.8.A
 - b Hoof nipper 6.02.E.8.B
- 9 Topical 6.02.E.9

F Internal parasite identification and control 6.02.F

- 1 Other than death, the costliest result of internal parasites in cattle, swine and 6.02.F.1**
- 2 Common internal parasites 6.02.F.2**
 - a Roundworms/Ascarids – stomach worms, pinworms, lungworms. 6.02.F.2.A**
 - 1) Roundworms cause the most damage of any internal parasites 6.02.F.2.A.1**
 - 2) Deworming pregnant sows and gilts about a week before 6.02.F.2.A.2**
 - b Tapeworms- broad tapeworm, beef or pork tapeworm. 6.02.F.2.B**
 - c Flukes- liver fluke. 6.02.F.2.C**
 - d Protozoa – coccidia 6.02.F.2.D**
 - e Barber pole worm 6.02.F.2.E**
 - 1) Sheep and goat industry have major resistance issues. 6.02.F.2.E.1**
 - 2) Causes blood loss, anemia and death. 6.02.F.2.E.2**
- 3 Life cycle – important to understand the typical life cycle to effectively control 6.02.F.3**
 - a Adult female parasite lays eggs inside the host animal that pass out of 6.02.F.3.A**
 - b Eggs hatch and larvae climb onto blades of grass. 6.02.F.3.B**
 - c Animal ingests larvae when grass is consumed. 6.02.F.3.C**
 - d Larvae develop into adult parasites in host organ; stomach, lungs, 6.02.F.3.D**

4 Controlling internal parasites 6.02.F.4

- a The most effective method of control is prevention. 6.02.F.4.A
- b Test individual animals using a fecal egg count to determine if they are 6.02.F.4.B
- c Treat animals with parasite issues. 6.02.F.4.C
- d Use the same dewormer (anthelmintic) until it is no longer effective. 6.02.F.4.D
- e Control methods 6.02.F.4.E
 - 1) Chemical – substances used to kill parasites. 6.02.F.4.E.1
 - a Administered orally or topically. 6.02.F.4.E.1.A
 - b Problems with resistance to chemicals can occur. 6.02.F.4.E.1.B
- f Mechanical – complete or partial removal of parasites. 6.02.F.4.F
 - 1) Example: Removing or breaking up manure contaminated with 6.02.F.4.F.1
- g Biological – non-chemical methods of controlling parasites. 6.02.F.4.G
 - 1) Example: Feeding forages such as lespedeza hay that contains 6.02.F.4.G.1
- h Cultural/environmental – modifies the growing environment of the 6.02.F.4.H
 - 1) Example: pasture rotation. 6.02.F.4.H.1

G External parasite identification and control 6.02.G

- 1 Most external parasites of birds or poultry lower production by sucking blood. 6.02.G.1**
- 2 The major external parasites of swine are lice and mites. 6.02.G.2**
- 3 Common external parasites 6.02.G.3**
 - a Ticks – bloodsuckers 6.02.G.3.A**
 - b Lice – bloodsuckers and biting varieties 6.02.G.3.B**
 - 1) Common in swine 6.02.G.3.B.1**
 - c Mites – cause mange 6.02.G.3.C**
 - 1) More common in swine and poultry 6.02.G.3.C.1**
 - 2) Mites, bedbugs, and fowl ticks hide in cracks and crevices in 6.02.G.3.C.2**
 - d Blowfly – screwworm in larval stage 6.02.G.3.D**
 - e Heel fly – cattle grub in larval stage. 6.02.G.3.E**
 - 1) Greatest financial loss is beef cattle 6.02.G.3.E.1**
 - a Lower rate of gain 6.02.G.3.E.1.A**
 - b Damage hides and meat 6.02.G.3.E.1.B**
 - f Horn fly – smallest, bloodsucking species. 6.02.G.3.F**
 - g Other kinds of flies include horsefly, housefly, and stable fly. 6.02.G.3.G**

- 4 Controlling external parasites – the most effective method of control is 6.02.G.4
 - a Control methods 6.02.G.4.A
 - 1) Chemical – most common method of controlling external 6.02.G.4.A.1
 - a Systemic insecticides absorbed through the animal's skin 6.02.G.4.A.1.A
 - b Methods of administering chemicals: 6.02.G.4.A.1.B
 - i Dip 6.02.G.4.A.1.B.I
 - ii Topical application – pour-on, spray, back rubber, 6.02.G.4.A.1.B.II
 - iii Oral feed additive with chemical that interrupts life 6.02.G.4.A.1.B.III
 - 2) Mechanical 6.02.G.4.A.2
 - a Fly strips and catches 6.02.G.4.A.2.A
 - b Air movement 6.02.G.4.A.2.B
 - 3) Biological 6.02.G.4.A.3
 - a Parasitic wasps 6.02.G.4.A.3.A
 - 4) Cultural/Environmental 6.02.G.4.A.4
 - a Manure removal 6.02.G.4.A.4.A
 - b Sanitation 6.02.G.4.A.4.B
-

Apply best management practices for food animal handling, housing, and facilities. 7.00

- 1 Apply the process to identify facility requirements based on species, geographic location, and life stage. 7.01
 - A Types of beef operations- producers should plan facilities and equipment to suit the 7.01.A
 - 1 Cow-calf producers – This is a method of raising beef cattle in which the 7.01.A.1
 - 2 Seedstock – These are beef cattle raised for genetic improvement. They are 7.01.A.2
 - 3 Cattle feeders 7.01.A.3
 - a Stocker operations – Cattle are brought here after weaning to gain 7.01.A.3.A
 - b Feedlot – Operation where cattle are fed until reaching the specific 7.01.A.3.B

B Types of beef cattle housing 7.01.B

1 Confinement barns 7.01.B.1

a Cold- opens to the environment on one side. 7.01.B.1.A

1) Uses a pole-type building with an open-span structure to make it 7.01.B.1.A.1

2) Can use various solid bedded or slotted floors. 7.01.B.1.A.2

b Warm – closed, insulated, and kept warm. 7.01.B.1.B

1) Most expensive type of facility. 7.01.B.1.B.1

2) Used in colder climates. 7.01.B.1.B.2

3) Can use solid bedded, slotted, or solid flushing floor systems. 7.01.B.1.B.3

2 Open feedlot – no buildings, just windbreak fences and sunshades to protect 7.01.B.2

a Unpaved floors with some concrete around feeding and watering 7.01.B.2.A

b Requires more land area. 7.01.B.2.B

c Floors are typically dirt so drainage and runoff controls are important. 7.01.B.2.C

3 Open barn and feedlot – open front barn and feedlot. 7.01.B.3

a Provides protection from environmental elements. 7.01.B.3.A

b Used in the Midwestern part of the United States. 7.01.B.3.B

c Unpaved floors with some concrete around feeding and watering 7.01.B.3.C

4 Feeding barn and lot – same system as open barn and feedlot except feed 7.01.B.4

5 Pasture – typically used for cow-calf producers and requires minimal facilities. 7.01.B.5

a Important to manage pastures to maximize growth potential of forages, 7.01.B.5.A

b Pasture rotation – cycles animals through a series of pastures. 7.01.B.5.B

c Strip grazing – providing animals with smaller sections of grass every 7.01.B.5.C

C Beef operation considerations 7.01.C

- 1** Number of cattle – determined by the resources available and the type of 7.01.C.1
- 2** Amount of land – varies depending on operation. 7.01.C.2
- 3** General guidelines 7.01.C.3
 - a** Feedlots – 5 acres for every 500 head of cattle. 7.01.C.3.A
 - b** Partial confinement and pasture- depends on location of facilities, 7.01.C.3.B
 - c** Examples: 7.01.C.3.C
 - 1)** Cow with calf – 2 acres of pasture 7.01.C.3.C.1
 - 2)** Stocker – 1 acre of pasture 7.01.C.3.C.2
 - 3)** Finisher – 1.5 acres of pasture 7.01.C.3.C.3
- 4** Location and environmental factors 7.01.C.4
 - a** Easy access to roads. 7.01.C.4.A
 - b** Space for expansion. 7.01.C.4.B
 - c** Movement of cattle. 7.01.C.4.C
 - d** Environmental considerations – odor, wind, dust, runoff. 7.01.C.4.D
 - e** Feed storage and handling – systems vary depending on type of 7.01.C.4.E
- 5** Money and labor 7.01.C.5
 - a** Input costs to build and maintain facilities 7.01.C.5.A
 - b** Feeders, waterers, barns, fencing, handling equipment 7.01.C.5.B
 - c** Investment into quality animals 7.01.C.5.C
 - d** Labor supply – varies on type of operation and herd size 7.01.C.5.D

6 Beef cattle equipment 7.01.C.6

a Corrals – needed for all types of beef cattle enterprises. 7.01.C.6.A

b Parts include 7.01.C.6.B

1) Holding pen – first system cattle are moved into from a larger 7.01.C.6.B.1

2) Sorting pen – workers can separate cattle into smaller groups 7.01.C.6.B.2

3) Working chute – usually includes a crowding pen that again 7.01.C.6.B.3

4) Headgate – holds cattle so workers can perform preventative 7.01.C.6.B.4

a Advantages: 7.01.C.6.B.4.A

i Easier to handle cattle 7.01.C.6.B.4.A.I

ii Reduces labor 7.01.C.6.B.4.A.II

iii Saves time 7.01.C.6.B.4.A.III

iv Safety of workers and animals 7.01.C.6.B.4.A.IV

v Reduces stress on animals. 7.01.C.6.B.4.A.V

D Dairy housing and facilities 7.01.D

1 Types of operations 7.01.D.1

- a** Intensive dairy production – cows are kept in indoors and just provided 7.01.D.1.A
- b** Pasture dairy production – cows are given shelter with food and water 7.01.D.1.B

2 Types of dairy cattle housing 7.01.D.2

- a** Stall barns – cows confined to a stanchion or tie stall. 7.01.D.2.A
 - 1)** Structure at the front of the stall usually serves as a feed bunk 7.01.D.2.A.1
 - 2)** Waste removed in the center aisle by motorized or automated 7.01.D.2.A.2
- b** Free stall barn – cows maneuver throughout the barn. 7.01.D.2.B
 - 1)** Stalls are a bedded area for cattle to rest. 7.01.D.2.B.1
 - 2)** Facility may be fully or partially enclosed and temperature 7.01.D.2.B.2
 - 3)** Floors may be dirt, solid concrete or slatted. 7.01.D.2.B.3
 - 4)** Waste removed by motorized equipment. 7.01.D.2.B.4
- c** Pasture 7.01.D.2.C
 - 1)** Cows kept on pasture continuously or for portions of the day. 7.01.D.2.C.1
 - 2)** Producers often use a combination of pasture and some type of 7.01.D.2.C.2
 - 3)** Replacement heifers are often raised on pasture. 7.01.D.2.C.3
- d** Portable hutches – used to house young calves. 7.01.D.2.D
- e** Heifer barns – used to house replacement heifers after portable 7.01.D.2.E

E Dairy cattle operation considerations 7.01.E

- 1** *Note to Teacher: Use the items listed under beef operation considerations for 7.01.E.1

F Dairy cattle equipment 7.01.F

- 1 Headlocks – modified headgate system where larger numbers of cattle can 7.01.F.1
 - a Typically attached to feed bunks so animals are accustomed to putting 7.01.F.1.A
 - b Routine veterinary care and reproductive related procedures are 7.01.F.1.B
- 2 Headgate and working chute – same system as what is used for beef cattle. 7.01.F.2
- 3 Milking equipment 7.01.F.3
 - a Milking parlors – separate room/area where cattle are milked. 7.01.F.3.A
 - 1) Most common method of milking cows. 7.01.F.3.A.1
 - 2) Includes a pit where workers operate equipment used to milk 7.01.F.3.A.2
 - 3) Most common milking parlor design is the herringbone. 7.01.F.3.A.3
 - 4) Cattle kept in stall barns may use pail, suspension or pipeline 7.01.F.3.A.4
 - b Milkhouse – a room where milk is filtered, cooled, and stored in 7.01.F.3.B

G Swine housing and facilities 7.01.G

- 1 Types of swine operations – producers plan facilities based on type on type of 7.01.G.1
 - a Sow – female hogs are house to be bred, birth piglets, and piglets 7.01.G.1.A
 - b Nursery – piglets are fed and cared here from four weeks for 7.01.G.1.B
 - c Grow-Finish – pigs are here after the nursery for approximately 16 7.01.G.1.C
 - d Farrow-to-Finish – farms that include every step. The entire process 7.01.G.1.D
- 2 Types of swine housing 7.01.G.2
 - a Pasture or outdoors without climate-controlled buildings. 7.01.G.2.A
 - b Confinement houses 7.01.G.2.B
 - 1) Cold – may be open on one or more sides. Used mainly for 7.01.G.2.B.1
 - 2) Warm – controls temperature, moisture, odor, and airborne 7.01.G.2.B.2
 - 3) Most North Carolina swine operations use warm confinement 7.01.G.2.B.3

H Swine operation considerations 7.01.H

1 Location and Environmental Considerations 7.01.H.1

- a Odor is a major problem with swine facilities. 7.01.H.1.A
- b Access to roads, power, and water. 7.01.H.1.B
- c Proximity – swine operations are highly vertically integrated. Need to 7.01.H.1.C
- d Regulations 7.01.H.1.D
 - 1) Some areas have restrictions on the construction of new 7.01.H.1.D.1
- e Feed storage and handling – confinement facilities typically use 7.01.H.1.E

2 Money and labor 7.01.H.2

- a Input costs to build and maintain facilities. 7.01.H.2.A
- b Labor supply 7.01.H.2.B

I Swine equipment 7.01.I

1 Feeding and watering systems – many confinement swine facilities have 7.01.I.1

- a Automatic feeding and watering are more expensive, but they save on 7.01.I.1.A
- b Hand or non-automatic systems cost less but require more labor. 7.01.I.1.B

2 Floors 7.01.I.2

- a Solid – usually made of concrete. 7.01.I.2.A
- b Partially slotted – a portion of the floor is slotted with another section 7.01.I.2.B
- c Totally slotted – entire floor is slotted to allow for continuous removal of 7.01.I.2.C

3 Farrowing hog enterprises require small equipment such as castrating knives, 7.01.I.3

4 Gestation crates/stalls – animals spend 24 hours a day in crates during 7.01.I.4

- a Allows producers to meet specific nutritional needs of each animal and 7.01.I.4.A
- b Very controversial method for housing pregnant animals. Many larger 7.01.I.4.B

5 Farrowing crates 7.01.I.5

- a Animals moved into crates a few days prior to farrowing. 7.01.I.5.A
- b Reduces the number of piglets injured or killed. 7.01.I.5.B

J Poultry housing and facilities 7.01.J

1 Types of poultry operations 7.01.J.1

- a Egg production – operation that consists of layers used to strictly 7.01.J.1.A
- b Broiler Production – chickens that are bred and raised specifically for 7.01.J.1.B
- c Replacement pullet production – pullets to replace hens used in 7.01.J.1.C
- d Egg hatcheries – facility used to raise eggs under controlled 7.01.J.1.D

2 Types of poultry housing 7.01.J.2

- a Broiler and turkey confinement houses 7.01.J.2.A
 - 1) Houses are a clear span structure with insulated ceiling and 7.01.J.2.A.1
 - 2) Usually have dirt floors covered with wood shavings or shaving 7.01.J.2.A.2
 - 3) Lights are on 24 hours a day. 7.01.J.2.A.3
- b Laying flock houses 7.01.J.2.B
 - 1) Use wire cages to save space and to have cleaner eggs. 7.01.J.2.B.1
 - 2) Artificial light controlled by timers are used because laying hens 7.01.J.2.B.2
- c Replacement pullets 7.01.J.2.C
 - 1) Laying pullets may be raised in cages for brooding or until 7.01.J.2.C.1
 - 2) Broiler breeder pullets are raised in confinement houses on dirt 7.01.J.2.C.2
 - 3) Lights are controlled to regulate sexual maturity and egg 7.01.J.2.C.3
- d Range or outside structures – some turkeys and chickens are grown 7.01.J.2.D
 - 1) Some layers are raised in a free-range environment inside of 7.01.J.2.D.1
 - 2) Popular method of housing poultry raised by small scale or 7.01.J.2.D.2
 - 3) Commercial producers must take into consideration land 7.01.J.2.D.3
- e Egg hatcheries – buildings located separately from production facilities. 7.01.J.2.E

K Poultry operation considerations 7.01.K

1 Location and environmental considerations 7.01.K.1

- a Access to roads, electricity, water. 7.01.K.1.A**
- b Odor, waste management and mortality management. 7.01.K.1.B**
- c Proximity – poultry operations are highly vertically integrated. Need to 7.01.K.1.C**
- d Feed storage and handling – confinement facilities typically use 7.01.K.1.D**

2 Money and labor 7.01.K.2

- a Input costs to build and maintain facilities. 7.01.K.2.A**
- b Labor supply 7.01.K.2.B**

L Poultry equipment 7.01.L

1 Brooders – using infrared heat lamps to keep young chicks at optimal 7.01.L.1

- a Chicks are typically brooded on the floor in a section of the poultry 7.01.L.1.A**
- b Uses a hover guard to keep chicks from wandering away from the heat 7.01.L.1.B**
- c Optimum temperature for chicks is 90-95 degrees Fahrenheit. 7.01.L.1.C**
- d Take temperature 3” from the floor to obtain an accurate temperature 7.01.L.1.D**

2 Feeding and watering systems – highly automated in both types of poultry 7.01.L.2

M Animal waste management regulations 7.01.M

- 1 Confined Animal Feeding Operations (CAFO) – used to describe operations 7.01.M.1
- 2 It is a violation of state law for waste to reach surface water. 7.01.M.2
- 3 A \$10,000 per day penalty may be assessed if there is a man-made 7.01.M.3
- 4 It is against the law for anyone to cause a water quality standard violation. 7.01.M.4
- 5 Senate Bill 1217 – mandates the number of animals that require a waste 7.01.M.5
 - a 250 or more swine 7.01.M.5.A
 - b 100 or more confined cattle 7.01.M.5.B
 - c 75 or more horses 7.01.M.5.C
 - d 1,000 or more sheep 7.01.M.5.D
 - e 30,000 or more confined poultry 7.01.M.5.E
- 6 Animal waste management system operators must be certified. 7.01.M.6
- 7 In addition to state regulations, local county, and city regulations such as 7.01.M.7
- 8 In addition to fines and lawsuits brought by governmental agencies, 7.01.M.8
- 9 It is easier to prevent animal waste problems than to correct them. 7.01.M.9

N Types of Waste Management Systems 7.01.N

- 1 Type A Systems – primarily rely on anaerobic lagoon and soil/plant systems 7.01.N.1
 - a North Carolina has legal limitations (moratorium) on permitting 7.01.N.1.A
- 2 Type B Systems – primarily rely on soil/plant systems for the treatment of 7.01.N.2

O Components of a North Carolina Animal Waste Management Plan 7.01.0

- 1 Odor control – from decomposing manure, feed, and carcasses 7.01.0.1
- 2 Insect control – eliminates or reduces causes of insects and uses approved 7.01.0.2
- 3 Animal mortality – approved methods to quickly dispose of dead animals. 7.01.0.3
- 4 Riparian buffers – vegetative buffers. 7.01.0.4
- 5 Waste and soil testing – both the animal waste and the soil on which it is 7.01.0.5
- 6 Record keeping – must be done to include soil and waste analysis reports as 7.01.0.6
- 7 Waste application rates – follow the waste utilization plan. 7.01.0.7
- 8 Emergency management – plan to manage disasters from flood, fire, disease, 7.01.0.8

P Components of a Waste Utilization Plan 7.01.P

- 1 Source of nutrients 7.01.P.1
- 2 Amount of nutrients 7.01.P.2
- 3 Placement of nutrients 7.01.P.3
- 4 Timing of nutrient applications 7.01.P.4
- 5 Best Management Practices – methods that reduce the loss of nutrients 7.01.P.5
- 6 Examples: 7.01.P.6
 - a Buffers- distances from streams, homes, or property lines. 7.01.P.6.A
 - b Grassed waterways – natural or constructed water runoff. Helps control 7.01.P.6.B
 - c Conservation tillage – using a no till drill so soil surface is not 7.01.P.6.C
 - d Strip cropping – growing alternating crops in strips that follow the 7.01.P.6.D
 - e Contour planting – planting across a slope while following the contour 7.01.P.6.E
 - f Crop residue management – any tillage method that leaves crop 7.01.P.6.F
 - g Coastal Bermuda grass is used on much land where animal waste is 7.01.P.6.G

2 Execute appropriate management and handling techniques. 7.02

A Safety and the animal industry 7.02.A

1 Common causes of human injury 7.02.A.1

- a Human error – poor judgment, working when tired, lack of focus, etc. 7.02.A.1.A
- b Improper training – workers are not properly trained on how to handle 7.02.A.1.B
- c Failure to use personal protective equipment (PPE). Injuries occur from 7.02.A.1.C
- d Environmental factors such as poor ventilation. 7.02.A.1.D

2 Chemical safety 7.02.A.2

- a All chemicals must be properly labeled and stored. Material Safety 7.02.A.2.A
- b Workers must be trained on how to use chemicals. 7.02.A.2.B
- c Personal Protective Equipment must be used and properly cleaned 7.02.A.2.C

3 Animal handling 7.02.A.3

- a Facilities – should provide a safe environment for workers and animals. 7.02.A.3.A
- b Safe footing 7.02.A.3.B
- c Adequate space to maneuver animals 7.02.A.3.C
- d Properly working equipment 7.02.A.3.D
- e Adequate lighting 7.02.A.3.E

4 Animal behavior 7.02.A.4

- a Vision – livestock animals have a wider range of peripheral vision 7.02.A.4.A
 - 1) Animal vision causes reaction to movement and contrasting 7.02.A.4.A.1
 - 2) Small objects or movements can distract animals and cause 7.02.A.4.A.2
- b Noise – animals react negatively to loud noises and high-pitched 7.02.A.4.B
- c Animals remember negative experiences. 7.02.A.4.C
- d Companion & livestock animals typically do not attack humans unless 7.02.A.4.D
- e Animals tend to show aggression when cornered and they cannot 7.02.A.4.E
- f Animals will also show aggression when they are protecting their 7.02.A.4.F

B Animal handling recommendations 7.02.B

- 1 “Flight Zone” – the imaginary circle that surrounds an animal or herd.
When 7.02.B.1
- 2 Awareness of animal behavior- watch for behavior of animals that indicate 7.02.B.2
 - a Head raised – could signal frustration and irritation 7.02.B.2.A
 - b Wide eyes – signals fear or anger 7.02.B.2.B
 - c Flaring nostrils – typically startled or angry 7.02.B.2.C
 - d Tense muscles – means anger, frustration, or irritability 7.02.B.2.D
 - e Ear position – up means calm & relaxed while back means fearful or 7.02.B.2.E
- 3 Animal restraint – use recommended equipment to restrain animals: 7.02.B.3
 - a Head gate and squeeze chutes for livestock – design facilities to meet 7.02.B.3.A
 - b Halters – uses halters to tie horses and restrain cattle, sheep, and 7.02.B.3.B
 - c Acclimating animals to human contact – livestock are not accustomed 7.02.B.3.C
 - d Handlers should attempt to make human contact a positive experience. 7.02.B.3.D
 - e Exposure to humans – animals remember both positive and negative 7.02.B.3.E

C Preventative maintenance 7.02.C

- 1** Record keeping – keep accurate breeding records, health protocols, 7.02.C.1
- 2** Feeding practices – provide adequate nutrition to meet the needs of the 7.02.C.2
- 3** Vaccination – utilize a vaccination program and correctly administer and store 7.02.C.3
- 4** Parasite control – follow recommendations and protocol for controlling internal 7.02.C.4
- 5** Animal observation – routinely check animals and be familiar with typical 7.02.C.5
 - a** Isolate new animals. 7.02.C.5.A
 - b** Detect visual signs that indicate disease: 7.02.C.5.B
 - 1)** Open wounds. 7.02.C.5.B.1
 - 2)** Isolation from the group 7.02.C.5.B.2
 - 3)** Lethargic behavior 7.02.C.5.B.3
- 6** Sanitation – maintain clean facilities and sanitize according to 7.02.C.6
- 7** Biosecurity – protection from biological harm from living things including 7.02.C.7
- 8** Limit the number of people who visit the farm. 7.02.C.8
- 9** Disinfect any equipment including footwear that is brought onto the farm from 7.02.C.9
- 10** Sanitize and disinfect facilities, equipment, etc. 7.02.C.10
- 11** Keep adequate distance from one farm facility to the next even when owned 7.02.C.11
- 12** Veterinarian – consult with a veterinarian to establish a viable animal health 7.02.C.12

Understand the process of harvesting food animals and how their products are classified 8.00

1 Understand harvesting and processing procedures. 8.01

A Food safety production regulations 8.01.A

- 1** United States Department of Agriculture and the Food Safety Inspection 8.01.A.1
- 2** The North Carolina Department of Agriculture and Consumer Services is the 8.01.A.2
- 3** All regulations are designed to keep commercial food supply safe while also 8.01.A.3
- 4** Federal inspection of meat began in 1891. This became nationwide on June 8.01.A.4
- 5** The main purpose of meat inspection is to remove any carcass/meat that has 8.01.A.5

B Carcass inspection phases 8.01.B

- 1 Ante Mortem Inspection (before death) – checks for diseases or other 8.01.B.1
- 2 Postmortem Inspection (after death) – checks for irregular and contaminated 8.01.B.2
- 3 Animals that do not pass inspection are labeled U.S. Condemned. 8.01.B.3
- 4 Processing plant sanitation is also inspected. 8.01.B.4
 - a Specific individuals in the processing plant work to maintain proper 8.01.B.4.A
 - b Employed by the different regulatory authorities such as USDA and 8.01.B.4.B

C Federal acts governing meat inspection 8.01.C

- 1 Humane methods of livestock slaughter – sets standards for animal handling, 8.01.C.1
- 2 Federal Meat Inspection Act – provides regulations for inspecting meat 8.01.C.2
- 3 Poultry Products Inspection Act – provides regulations for inspecting poultry 8.01.C.3
- 4 Egg Products Inspection Act – provides regulations for inspecting eggs and 8.01.C.4
- 5 USDA grades have nothing to do with sanitation, just the quality of products. 8.01.C.5

D Consumer food safety 8.01.D

- 1 Food supply in the United States is one of the safest in the world, but 8.01.D.1
- 2 Infants, the elderly, pregnant women, and those with poor immunity are the 8.01.D.2
- 3 Food safety is a rising concern because so many people eat food handled 8.01.D.3
- 4 Foodborne illnesses are caused when food becomes contaminated from 8.01.D.4
- 5 Common foodborne bacterial infections include: 8.01.D.5
 - a Salmonella – causes fever, abdominal cramps, and diarrhea. Often 8.01.D.5.A
 - b E. Coli – causes bloody diarrhea and occasionally kidney failure. 8.01.D.5.B
 - c Campylobacter – causes abdominal cramping, nausea, and vomiting. 8.01.D.5.C

E Foodborne illness prevention 8.01.E

- 1** Wash hands and surfaces with soap and warm water. 8.01.E.1
- 2** Wash all equipment such as dishes and utensils before and after use on each 8.01.E.2
- 3** Use a disposable towel for cleaning surfaces to prevent cross contamination. 8.01.E.3
- 4** Separate raw foods and use different cutting boards for meat versus other 8.01.E.4
- 5** Clean cutting boards with hot soapy water after each use. 8.01.E.5
- 6** Sanitize boards with 1 tablespoon of unscented bleach per gallon of water. 8.01.E.6
- 7** Never defrost food at room temperature. Always use a refrigerator, cold water 8.01.E.7
- 8** Use a food thermometer to ensure food has reached proper temperature to 8.01.E.8
 - a** Beef – 160 degrees F (ground), 145 degrees F (steaks and roasts) 8.01.E.8.A
 - b** Pork – 160 degrees F (ground), 145 degrees F (Pork 8.01.E.8.B
 - c** Poultry – 165 degrees F, eggs should be cooked to 160 degrees F 8.01.E.8.C
 - d** Lamb/Goat – 145 degrees F (for roasts), 160 degrees F (ground) 8.01.E.8.D
- 9** Refrigerate leftovers within 2 hours. 8.01.E.9

F Processing livestock and poultry 8.01.F

- 1 The United States Department of Agriculture, Food Safety Inspection Service 8.01.F.1
- 2 Processing plants considerations 8.01.F.2
 - a Most animals are grown on vertical integration contracts for swine and 8.01.F.2.A
 - b Farms that are in close proximity to the processing plant 8.01.F.2.B
 - 1) Helps decrease stress on the animals 8.01.F.2.B.1
 - 2) Helps to decrease cost of production and processing 8.01.F.2.B.2
 - 3) Helps reduce the Carbon Footprint of Agricultural Production 8.01.F.2.B.3
- 3 The standards processing plants must follow are outlined in the Federal 8.01.F.3
- 4 Livestock federal regulations require that all animals for slaughter be 8.01.F.4
- 5 The Federal Humane Slaughter Act permits three methods of stunning 8.01.F.5
- 6 Methods of stunning livestock 8.01.F.6
 - a Mechanical – the animal is restrained while a captive bolt gun renders 8.01.F.6.A
 - b Electrical – an electrical current is applied to the animal. (Poultry) 8.01.F.6.B
 - c Chemical – animal is asphyxiated (dies from lack of oxygen) with 8.01.F.6.C

G Cattle and swine processing 8.01.G

- 1 After animals are stunned, they are raised up and hung on a rail for further 8.01.G.1
- 2 Animals are then exsanguinated (bled out) by sticking with a knife to cut a 8.01.G.2
- 3 After exsanguination, the hide is typically removed on beef cattle. The hair is 8.01.G.3
- 4 Following hide removal in cattle and hair removal in swine, the carcasses are 8.01.G.4
- 5 The cattle or swine carcass is then processed into various wholesale/primal 8.01.G.5
- 6 During processing, no part of the animal carcass is wasted. Example: Blood 8.01.G.6

H Poultry processing 8.01.H

- 1 Stunning is done to make the bird unconscious, but it must not kill the bird. 8.01.H.1
 - a Chemical or water bath stunning are the two most common methods 8.01.H.1.A
- 2 Certain religious groups require that their poultry NOT be stunned. Instead, a 8.01.H.2
- 3 Bleeding is done by cutting the jugular vein without cutting the windpipe or 8.01.H.3
- 4 Scalding the carcass in hot water is done to loosen feathers for removal. 8.01.H.4
- 5 Picking is done to remove feathers with mechanical picker fingers. 8.01.H.5
- 6 Removing feet, neck skin, and preen gland. 8.01.H.6
- 7 Evisceration is performed to remove entrails. 8.01.H.7
- 8 Carcass is chilled to less than 40° F in ice water. 8.01.H.8
- 9 The carcass is then processed as a whole bird or divided into value-added 8.01.H.9
- 10 Pieces of the carcass are then either packaged as ready to cook or ready to 8.01.H.10

I Sheep and goat processing 8.01.I

- 1 Animals are rendered unconscious before bleeding/sticking (typically by 8.01.I.1
- 2 Animals are then shackled and hung upside down for exsanguination. 8.01.I.2
- 3 Pelt is removed. 8.01.I.3
 - a This can be done using a cradle, or with the carcass hanging, taking 8.01.I.3.A
- 4 The carcass is eviscerated (removal of internal organs) and trimmed. 8.01.I.4
- 5 Carcass is rinsed and then cooled to less than 40 degrees F within 24 hours. 8.01.I.5
- 6 The carcass is then processed into various wholesale and retail cuts. 8.01.I.6
- 7 Most sheep and goat processing is done by small/custom meat processors 8.01.I.7

2 Classify quality grades, carcass traits, and cuts of meat. 8.02

A General meat carcass information 8.02.A

- 1 Livestock that are processed before 2 years of age typically yield higher 8.02.A.1
- 2 After following humane guidelines for stunning an animal, the bovine or swine 8.02.A.2
- 3 Animals are initially processed into wholesale or “primal” cuts. These 8.02.A.3

B Cuts of beef 8.02.B

- 1 Wholesale/primal 8.02.B.1
 - a Loin, rib, round, rump, chuck, brisket, flank, plate or navel, shank 8.02.B.1.A
- 2 Retail 8.02.B.2
 - a Ribeye from rib 8.02.B.2.A
 - b Tenderloin from loin 8.02.B.2.B
 - c Sirloin from loin 8.02.B.2.C
 - d Rump from rump 8.02.B.2.D
 - e T-bone from loin 8.02.B.2.E
 - f Stew beef 8.02.B.2.F
 - g Ground beef 8.02.B.2.G
 - h Cubed steak 8.02.B.2.H
 - i Brisket 8.02.B.2.I

C Cuts of pork 8.02.C

- 1 Wholesale/primal Cuts 8.02.C.1
 - a Loin, leg or ham, picnic shoulder, Boston shoulder or shoulder, Boston 8.02.C.1.A
- 2 High value retail cuts 8.02.C.2
 - a Ham from leg 8.02.C.2.A
 - b Loin 8.02.C.2.B
 - c Pork chops from loin 8.02.C.2.C
 - d Boston butt from shoulder 8.02.C.2.D
 - e Picnic from shoulder 8.02.C.2.E
- 3 Low value retail cuts 8.02.C.3
 - a Hocks, spareribs, belly, bacon, jowl, fatback 8.02.C.3.A

D Cuts of poultry 8.02.D

- 1 Poultry are not classified into wholesale and retail cuts like pork and beef 8.02.D.1
- 2 The USDA sets standards for “ready to cook” chickens and turkeys whether 8.02.D.2
- 3 Parts include – poultry halves, breast, leg thigh, drumstick, wing and 8.02.D.3

E Cuts of lamb 8.02.E

- 1 Wholesale/Primal Cuts – shoulder, rack, shank/breast, loin, leg 8.02.E.1
- 2 Retail cuts – bone-in leg, boneless leg, ground lamb, kabob/stew, loin chops, 8.02.E.2

F Cuts of goat 8.02.F

- 1 Goat meat is called “chevon” and is highly valued by Mediterranean, 8.02.F.1
- 2 The United States National Livestock and Meat Board does not have 8.02.F.2
- 3 Wholesale/primal cuts – shoulder, rack, loin, leg 8.02.F.3
- 4 Retail cuts – bone-in leg, boneless leg, loin chops, stew/kabobs, ground 8.02.F.4

G Quality standards for beef, pork, small ruminants, and poultry 8.02.G

- 1 The United States Department of Agriculture sets forth quality features for 8.02.G.1
- 2 The quality features are classified into grades as determined by the USDA. 8.02.G.2
- 3 Grades indicate quality of the meat, NOT sanitation of the facility in which it 8.02.G.3

H Beef classes 8.02.H

- 1 Beef animals are classified according to their purpose. 8.02.H.1
- 2 Animals are grouped by age and sex. 8.02.H.2
- 3 Age classes 8.02.H.3
 - a Calves – less than one year of age. 8.02.H.3.A
 - b Cattle – one year or older 8.02.H.3.B
 - c Veal calves- less than 3 months old. 8.02.H.3.C
 - d Slaughter calves – 3 months to one year old 8.02.H.3.D
 - e Feeder calves – 6 months to one year old. 8.02.H.3.E
- 4 Sex Classes 8.02.H.4
 - a Steer – male castrated before reaching sexual maturity. 8.02.H.4.A
 - b Heifer – female that has not had a calf or has not matured as a cow. 8.02.H.4.B
 - c Cow – female that has had one or more calves or is mature. 8.02.H.4.C
 - d Bull – uncastrated male 8.02.H.4.D
 - e Stag – male castrated after reaching sexual maturity. 8.02.H.4.E
- 5 Feeder cattle (6 months and older) – graded based on visual appraisal. The 8.02.H.5
- 6 USDA Feeder Steer & Heifer Grades 8.02.H.6
 - a USDA No. 1 8.02.H.6.A
 - b USDA No. 2 8.02.H.6.B
 - c USDA No. 3 8.02.H.6.C
 - d Each USDA grade also has a large, medium and small frame category. 8.02.H.6.D
- 7 Slaughter cattle – also evaluated visually, but they are also graded according 8.02.H.7
- 8 Quality Grades 8.02.H.8
 - a Prime 8.02.H.8.A
 - b Choice 8.02.H.8.B
 - c Select 8.02.H.8.C
 - d Standard 8.02.H.8.D
 - e Commercial 8.02.H.8.E
 - f Utility 8.02.H.8.F
 - g Cutter 8.02.H.8.G
 - h Canner 8.02.H.8.H

9 Yield Grades 8.02.H.9

a Yield Grade 1 8.02.H.9.A

b Yield Grade 2 8.02.H.9.B

c Yield Grade 3 8.02.H.9.C

d Yield Grade 4 8.02.H.9.D

e Yield Grade 5 8.02.H.9.E

- I Feeder steer and heifer grades 8.02.I
 - 1 Animals are divided into three groups – calves, yearlings and older feeders 8.02.I.1
 - 2 Feeder animals weigh between 350 to 1,000lbs. 8.02.I.2
 - 3 Feeder cattle grades are the basis for reporting market prices for cattle. 8.02.I.3
 - 4 Three factors are used to determine the grade of feeder cattle: 8.02.I.4
 - a Thriftiness – the apparent health of the animal and its potential to 8.02.I.4.A
 - b Frame size – the size of the animal’s skeleton (height & body length). 8.02.I.4.B
 - 1) Large – tall and long bodied for their age. 8.02.I.4.B.1
 - 2) Medium – slightly large in size for their age. 8.02.I.4.B.2
 - 3) Small – short bodied and not as tall as medium frame cattle. 8.02.I.4.B.3
 - c Thickness- development of muscle in relation the size of the skeleton. 8.02.I.4.C
 - 5 US No. 1 – slightly thick throughout, moderate width between legs. 8.02.I.5
 - 6 US No. 2 – narrow throughout, legs set close together, back and loin have 8.02.I.6
 - 7 US No. 3 – less thickness and width between legs than No. 2. 8.02.I.7
 - 8 USDA Feeder Cattle Grades – uses the three factors discussed above to 8.02.I.8
 - 9 Large Frame No. 1 – animal that is taller in size compared to others and 8.02.I.9
 - 10 Large Frame No. 2 – same frame size as No. 1 but has slightly less muscling. 8.02.I.10
 - 11 Large Frame No. 3 – same frame size as No. 2 but has less thickness and 8.02.I.11
 - 12 Medium Frame No.1 – animal with a moderate or average frame size and 8.02.I.12
 - 13 Medium Frame No. 2 – same frame size as No. 2, but less muscling as 8.02.I.13
 - 14 Medium Frame No. 3 – same frame size as No. 2, but less thickness and 8.02.I.14
 - 15 Small Frame No. 1 –same size of the animal is smaller than other grades, but 8.02.I.15
 - 16 Small Frame No. 2 – same frame size as No. 1, but less muscled. Back and 8.02.I.16
 - 17 Small Frame No. 3 – same frame size as No. 2, but less thickness and width 8.02.I.17
 - 18 Inferior – feeder cattle that are unthrifty and not expected to grow or fatten 8.02.I.18

J Slaughter steer and heifers quality grades 8.02.J

- 1 Quality grade is determined by: 8.02.J.1
 - a Age or maturity of the animal. 8.02.J.1.A
 - b Muscling or firmness of meat tissue. 8.02.J.1.B
 - c Amount of marbling or fat distribution in the lean meat. 8.02.J.1.C
- 2 Marbling is the dispersal or intermingling of fat among the muscle fiber in the 8.02.J.2
- 3 Cutability is the yield of closely trimmed boneless retail cuts that come from 8.02.J.3
- 4 Maximum age of Standard, Select, Choice or Prime grades is 42 months. 8.02.J.4
- 5 Commercial grade is over 42 months. 8.02.J.5
- 6 Utility, Cutter or Canner grades have no age limit. 8.02.J.6
- 7 There is no Prime grade for slaughter cows. 8.02.J.7
- 8 Adequate marbling must be present for tenderness in the higher quality 8.02.J.8
- 9 Prime grades have maximum marbling. 8.02.J.9
- 10 Low choice or higher grades are the most desirable. 8.02.J.10
- 11 About 80% of grain fed grade beef is graded as choice. 8.02.J.11

K Slaughter steer and heifers Yield Grades 8.02.K

- 1 Yield grade is determined by the percentage of the carcass that is boneless, 8.02.K.1
- 2 Yield grades are affected by muscling and amount of fat. 8.02.K.2
- 3 Yield 1 – best muscling with least fat waste. Highest percentage of retail cuts. 8.02.K.3
- 4 Yield 2, 3, 4 – grades that are in between the highest percentage of yield 8.02.K.4
- 5 Yield 5- worst grade, less muscle and more fat waste. 8.02.K.5

L Swine use classes 8.02.L

- 1 Slaughter – to be killed and sold as meat. 8.02.L.1
- 2 Feeder – to be fed to heavier weights before slaughter. 8.02.L.2

M Swine sex classes 8.02.M

- 1 Barrow – male castrated before sexual maturity. 8.02.M.1
- 2 Gilt – young female that has not had pigs. 8.02.M.2
- 3 Sow – older female that has had pigs. 8.02.M.3
- 4 Boar – uncastrated male. 8.02.M.4
- 5 Stag – male castrated after reaching sexual maturity. 8.02.M.5

N Feeder pig grades 8.02.N

- 1 Potential for feeding out to slaughter weight and thriftiness affects feeder pig 8.02.N.1
- 2 Feeder pig grades 8.02.N.2
 - a USDA No. 1 Feeder Pig – large frame, thick muscled animal that is 8.02.N.2.A
 - b USDA No. 2 Feeder Pig – moderately large frame with moderate 8.02.N.2.B
 - c USDA No. 3 Feeder Pig – slightly smaller frame with thin muscling. 8.02.N.2.C
 - d USDA No. 4 Feeder Pig – small frame with thin muscling. Ham and 8.02.N.2.D
 - e USDA Utility Feeder Pig – animal shows unthriftiness because of 8.02.N.2.E
 - f USDA Cull Feeder Pig – animal is “unthrifty.” It has poor appearance 8.02.N.2.F

O Slaughter barrows and gilts 8.02.O

- 1 Quality grade is determined by quality of lean meat and yield. 8.02.O.1
- 2 Quality of lean is determined by firmness of lean, firmness of fat, and 8.02.O.2
- 3 Yield is evaluated by thickness of backfat and degree of muscling. 8.02.O.3
- 4 Thick muscling helps offset backfat thickness. 8.02.O.4
- 5 United States No. 1 hog must have at least average muscling. 8.02.O.5
- 6 United States No. 1 should yield 60.4% or higher. 8.02.O.6
- 7 Grade is determined by the percent of carcass weight made up of ham, loin, 8.02.O.7
- 8 Backfat and degree of muscling are used to evaluate live hogs for yield. 8.02.O.8

P USDA slaughter barrow and gilt grades: 8.02.P

- 1 U. S. No. 1 8.02.P.1
- 2 U. S. No. 2 8.02.P.2
- 3 U. S. No. 3 8.02.P.3
- 4 U. S. No. 4. 8.02.P.4
- 5 U. S. Utility 8.02.P.5

Q Calculating slaughter barrow and gilt grades 8.02.Q

- 1 The estimated backfat thickness over the last rib and the muscling score are 8.02.Q.1
- 2 Degrees of muscling are thick, average and thin. 8.02.Q.2
 - a Thick Muscle Score = 3.0 8.02.Q.2.A
 - b Average Muscle Score = 2.0 8.02.Q.2.B
 - c Thin Muscle Score = 1.0 8.02.Q.2.C
- 3 The formula used to calculate slaughter barrow and gilt grades is 8.02.Q.3
 - a $\text{Grade} = (4.0 \times \text{backfat}) - (1.0 \times \text{muscling score})$. 8.02.Q.3.A

R Poultry quality factors 8.02.R

- 1 Carcasses or parts that do not meet specifications for C quality are 8.02.R.1

S USDA Ready-to Cook Poultry Grades 8.02.S

- 1 USDA Ready to Cook Poultry Grade A. 8.02.S.1
- 2 USDA Ready to Cook Poultry Grade B. 8.02.S.2
- 3 USDA Ready to Cook Poultry Grade C. 8.02.S.3
- 4 USDA Ready to Cook Poultry: No grade. 8.02.S.4
- 5 Ready-to-cook means the head, feet, feathers, blood and viscera (soft 8.02.S.5