



5.0 Apply scientific skills and principles in animal science. Students who demonstrate learning can:

- 5.01 Distinguish correct terminologies for livestock species and conditions (e.g. - age, sex, use, etc.) within those species.

Species	Young	Castrated Male	In Tact Male	Young Female	Mature Female
Cattle	Calf	Steer	Bull	Heifer	Cow
Ovis	Lamb	Wether	Ram	Ewe Lamb	Ewe
Goats	Kid	Wether	Buck	Doe Kid	Doe
Swine	Piglet	Barrow	Boar	Gilt	Sow
Equine	Foal	Gelding	Stallion	Filly	Mare
Fish	Fry				
Poultry (chicken)	Chick	Capon	Rooster		Hen

- 5.02 Recognize commercially important livestock variations distinguishable in breed characteristics (e.g. - cattle, swine, sheep, goats, poultry, etc.).

Major Beef Breeds and Variations

Bos Taurus-

Domesticated cattle species
Typically from European origins
Originated from Zebus cattle
Known for quality of meat
Cold tolerant

Bos Indicus-

Domesticated cattle species
Typically from Asia (India) origins
Known for heat tolerance and hardiness

Bos indicus and Bos taurus is one of the few examples of two different species that can cross and produce fertile offspring. Donkeys and Horses can cross, but mules are not able to reproduce

Important Beef Breeds and Variations

Angus

Good mothering, good milk production. High Quality carcass. Not well adapted to hot climates.

Charolais

Efficient feeders, Very large, light color.

Limousin

Early maturing, High carcass quality.

Shorthorn

Dual purpose breed for milk and beef.

Brahman

Well adapted to heat, often used in crossbreeding, horns

Brangus

Crossbreed. Heat tolerant black cattle. Unpredictable disposition.

Hereford

Early maturing, docile, high rate of gain.

Holstein

Most common dairy breed. Most milk production.

Jersey

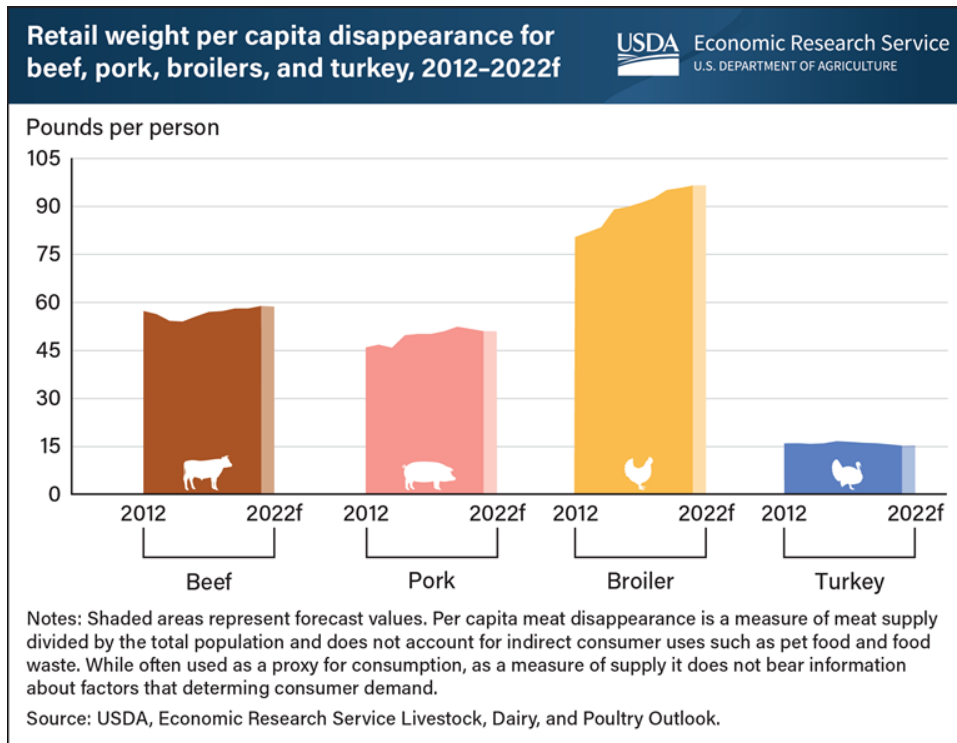
Smallest of all breeds. Highest milk fat %.

Crossbreed cattle are prevalent in production applications

Brahma influence in crosses is popular due to heat tolerance

Black color is preferred because it can be marketed as angus

- 5.03 Examine production and consumption trends of commercially important livestock species.



Vertical integration- One company owns all or most of the stages only the production and processing chain

Example- A poultry company owns chicken breeding facility, hatchery, grower operation, processing, and marketing (could also include value added products)

Vertical integration is popular in poultry (chicken and turkey) and pork production. Beef relies on horizontal integration where independent cow-calf producers sell cattle to feedlots

- 5.04 Model safe animal handling practices using proper safety procedures.

Cattle and Livestock-

Flight zone

Balance point

Haltering

Squeeze chute

Loading into trailers

Poultry-

Do not chase live poultry. Place hands on each side of the chicken and pick up securely.

Domestic Dogs-

Approaching correctly- Avoid petting immediately or picking up a strange dog. Hold out the back of your hand and let the dog sniff you before touching it.

Reading behavior signs-

Ears up and tail wagging indicate excitement.

Tail tucked under and ears down indicate nervousness

Ears back and showing teeth indicate aggression

Domestic Cats-

Avoid loud noises that could startle the cat.

Do not stand over them, sit in the floor to put yourself on their level.

Invite cat into your space.

Avoid chasing the cat.

- 5.05 Examine products and by-products produced by commercially important livestock species.

Main product of most species is meat

US Consumption-

Broiler- 100lbs per year

Beef- 60lbs per year

Pork- 50lbs per year

Turkey- 15lbs per year

<https://www.ers.usda.gov/data-products/chart-gallery/gallery/chart-detail/?chartId=103767#:~:text=The%20latest%20USDA%20forecast%20indicates,per%20capita%20retail%20weight%20basis.>

Main byproducts

Include a wide variety of products other than meat. They include blood, bones, tendons, meat trimmings, fat, or tallow, hides, hooves, horns, organs, and others

- 5.06 Identify methods of proper disposal of animal waste materials and biohazards.

Common approaches-

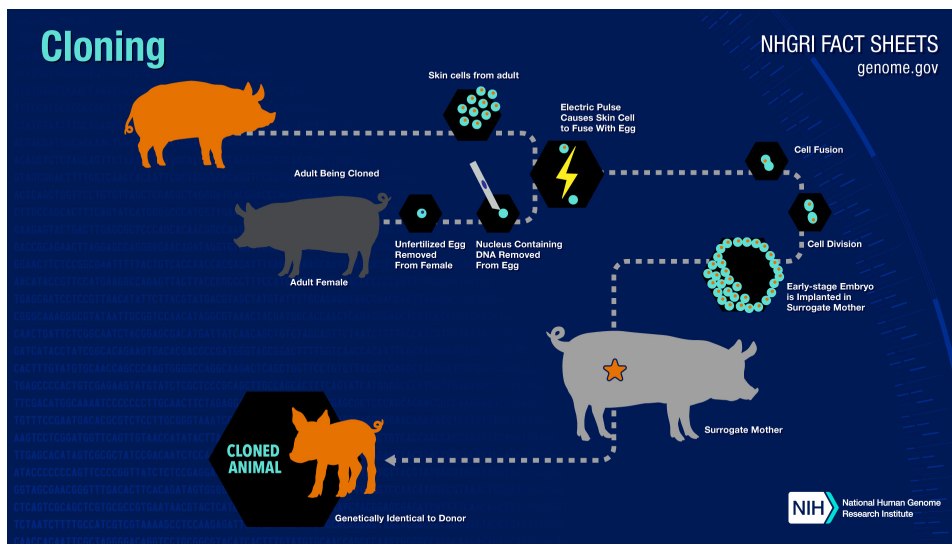
Land application- spreading the waste on agricultural land as fertilizer. This must be done in a way to minimize run off and to ensure food safety

Lagoons- animal waste is stored in a large, shallow pond where the waste is allowed to decompose. These are most common in swine and dairy production

Anaerobic digestion- Involves using bacteria to break down waste. Methane is produced as a byproduct and used as a fuel to provide electricity
Composting- Can be done on smaller operations where the manure and old bedding is converted to a nutrient rich soil amendment

- 5.07 Evaluate advances in animal biotechnology that impact consumer and production decisions (e.g. - cloning, selective breeding, pharmaceuticals, etc.).

Cloning:



According to a report in 2008, FDA scientists concluded that meat and milk from cows, pig, and goat clones and their offspring are as safe as the food we eat every day.

Selective Breeding:

process by which humans control the breeding of plants or animals in order to exhibit or eliminate a particular characteristics

Useful in crossbreeding programs to select traits passed onto offspring.

Animal Pharmaceuticals:

FDA Information: <https://www.fda.gov/animal-veterinary/resources-you/fda-regulation-animal-drugs>

- 5.08 Apply genetic principles to improve animal husbandry practices.

DNA- Deoxyribonucleic Acid.

Contains the instructions for cells

Made up of four base pairs

Humans have around 250 million base pairs in 23 pairs of chromosomes

Bos Taurus cattle have 30 pairs chromosomes

Laws of inheritance (single-gene diseases)

Autosomal dominant

Autosomal recessive

Mitochondrial

X-Linked Dominant

X-Linked Recessive

Explore common genetic diseases in cattle-

<http://extension.msstate.edu/publications/publications/managing-genetic-defects-beef-cattle-herds>

- 5.09 Compare and contrast animal welfare issues.

Animal rights- Animals should not be used as food, clothing, entertainment, or experimentation.

Animal welfare- Animals can be used as long as humane and ethical guidelines are followed.

Five freedoms

- Freedom from hunger and thirst
- Freedom from discomfort
- Freedom from pain, injury, or disease
- Freedom to express normal behavior
- Freedom from fear and distress

Example discussion question- Swine raised in confinement operations typically have their tails docked. Docking tails prevent tail biting, where other pigs will bite the tail of the other animals cause bleeding, pain, and potential infection which can cause other major health problems. How should producers balance the freedom of expressing normal behavior with the freedom from pain, injury, or disease/freedom from discomfort?

- 5.10 Manage animal facilities, equipment and supplies with a safety mindset.

Basic needs of animals

Dependent on species. All animal species need water, food, room to move.

Cattle:

Light

Food

Water

Space

Rest

Horses:

Water

Food

Companionship

Shelter

- 5.11 Explore employment and entrepreneurship opportunities and identify potential paths to careers in animal science.

Cornerstone Task

An investor has come to you with the opportunity of a lifetime. They are willing to give you the money to start an animal production operation. Before they give you the money, you must create a plan for your operation. Your plan must include the following:

- Type of animal operation you plan to start- be sure to include common breed and species terms
- Demonstrate a need for this operation (is there a demand for the product?)
- What type of facilities do you need?
- How will you ensure you and your employees handle the animals safely?
- How will you ensure the animals are treated humanely?
- What is your plan to prevent genetic diseases in your animals?