The basics of the beef industry.

Jacquelyn Prestegaard-Wilson, PhD | Livestock 101 | May 7th, 2025

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MAY
NATIONAL
BEEF
MONTH
USDA NIFA

Terminology

- ***Bull:*** **intact male, non-castrated**

Terminology

- *Cow:* mature female

- *Calf:* young
  - birth to weaning
- *Wean:* does not rely on maternal milk for nutrition

Terminology

- ***Heifer:*** **young female**

Terminology

- ***Steer:*** **castrated male**

Beef production for selected countries

Veal/beef production rank	Country	Volume *(in thousands of metric tons)*	Percent change from 2023	Percent of world beef production	Beef cattle rank	Beef cattle *(1,000 head)*	Percent change from 2023	Beef/veal exported rank	Beef/veal exported *(1,000 metric tons)*	Percent change from 2023	Beef cattle slaughtered rank	Beef cattle slaughtered *(1,000 head)*	Percent change from 2023
		2024				**2024**			**2024**			**2024**	
1	**United States**	12,057	-1.9%	20.0%	4	87,157	-1.9%	4	1,272	-7.7%	4	32,029	-3.6%
2	**Brazil**	11,210	2.4%	18.6%	2	192,572	-0.9%	1	2,930	1.1%	2	45,300	2.0%
3	**China**	7,700	2.3%	12.8%	3	105,090	2.9%	22	18	0.0%	1	51,400	2.3%
4	**European Union**	6,430	-0.5%	10.7%	5	74,500	-0.4%	7	600	-3.5%	5	22,330	-1.0%
5	**India**	4,570	2.2%	7.6%	1	307,420	0.0%	3	1,600	3.1%	3	40,980	2.0%
6	**Argentina**	3,140	-4.8%	5.2%	6	52,900	-2.2%	5	920	4.3%	6	13,500	-6.9%
7	**Australia**	2,395	7.7%	4.0%	7	27,071	4.9%	2	1,705	9.2%	7	8,100	9.4%
8	**Mexico**	2,265	2.3%	3.8%	8	17,840	0.4%	11	365	8.0%	8	7,050	2.0%
9	**Russia**	1,380	1.1%	2.3%	9	17,160	-1.6%	15	48	0.0%	9	6,650	1.5%
10	**Canada**	1,305	-2.6%	2.2%	11	11,055	-2.1%	8	560	-2.1%	11	3,425	-4.0%
11	**South Africa**	1,006	0.7%	1.7%				16	47	2.2%			
12	**United Kingdom**	902	0.1%	1.5%	13	9,375	-0.5%	14	140	0.7%	12	2,775	0.3%
13	**New Zealand**	760	1.6%	1.3%	12	9,800	-1.7%	6	690	0.6%	10	4,740	0.6%
14	**Colombia**	720	0.1%	1.2%				17	38	8.6%			
15	**Uruguay**	590	-1.7%	1.0%	10	11,366	-3.6%	9	475	-2.1%	13	2,220	-3.7%
16	**Paraguay**	550	1.9%	0.9%				10	450	2.0%			
Total of selected countries		56,980	0.7%	94.4%		923,306	-6.7%		11,858	-1.5%		240,499	0.1%

Source: USDA Foreign Agricultural Service

Global Beef Production

- *$68 billion/year*
- *39% of animal agriculture*

Where does the **world's cattle meat** come from?

US	18% at 11-12 million ton
Brazil	16.8% at 9.9 million ton
EU	13% at 10 million ton
Mainland China	9.8% at 5 million ton
Africa	8.6% at 5.5 million ton
India	6.8% at 3.9 million ton
Argentina	4.7% at 2.8 million ton
Australia	3.3% at 2.1 million ton
Russia	2.5% at 1.6 million ton
Rest of the world	13% at 10 million ton

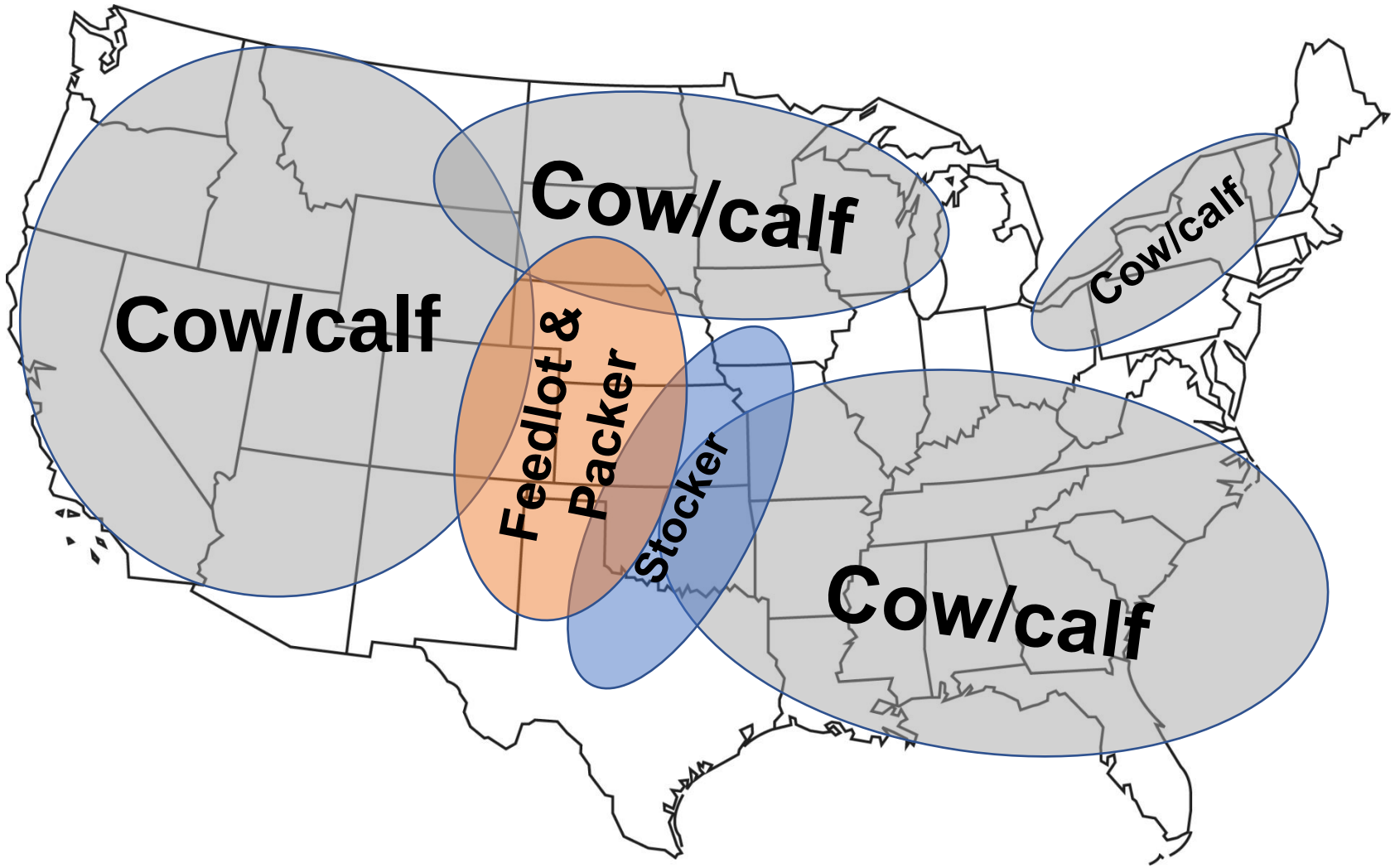
US Department of Agriculture and the FAO (Food and Agriculture Organisation.)

USA Cattle Inventory

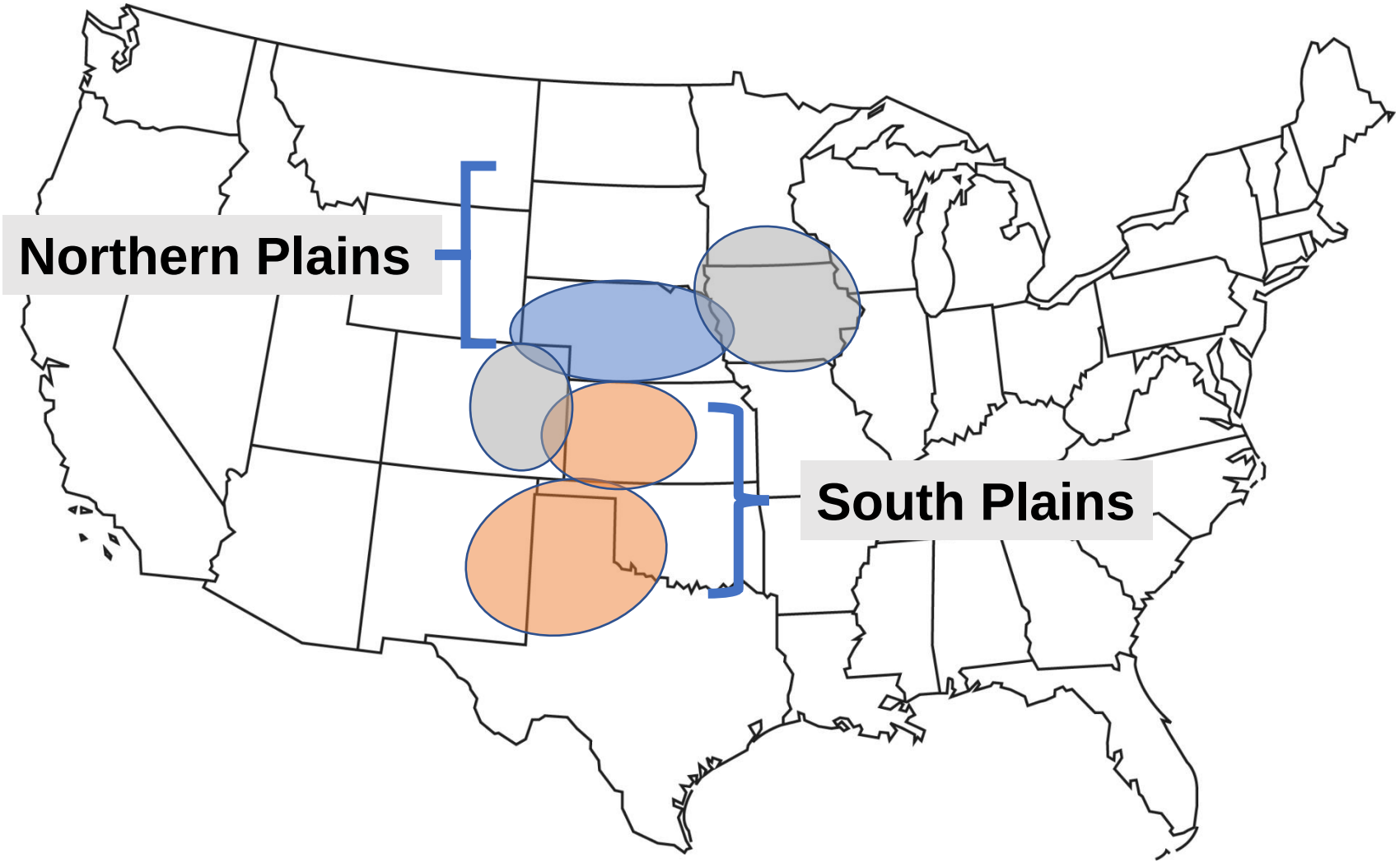
94.4 million head of cattle

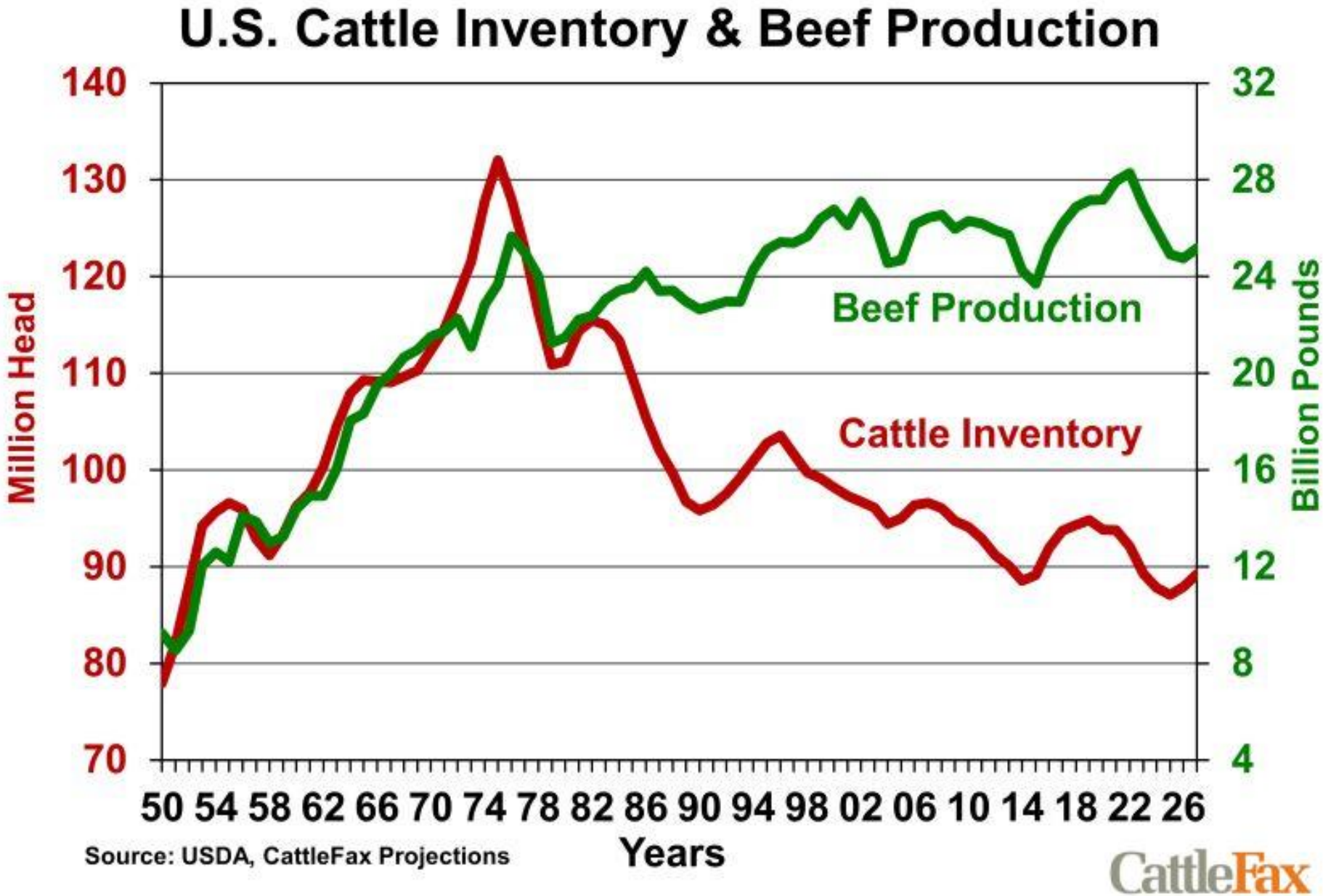
- ***31.7 million beef cows***
- ***2.25 million beef bulls***
- ***15.4 million beef heifers***
- ***16.4 million beef steers***
- ***14.4 million beef calves***

Beef Industry Sectors



Feedlot Industry Locations




U.S. Cattle Inventory & Beef Production
Million Head
140
130
120
110
100
90
80
70
Billion Pounds
32
28
24
20
16
12
8
4
Beef Production
Cattle Inventory
50 54 58 62 66 70 74 78 82 86 90 94 98 02 06 10 14 18 22 26
Years
Source: USDA, CattleFax Projections
CattleFax

Outline

1. Structure of beef industry and reproduction management
2. Nutrition/Body condition scoring
3. Grazing/runoff management
4. Handling and biosecurity basics

1. Structure of beef industry/reproduction management

Bos taurus

- *Originally from Europe*
- *Adapted to temperate and cold weather*
  - *Early maturity*
  - *Superior carcass traits*
- *British*
- *Continental*

Adapted from V. Mercadante

Bos taurus

- *British*
  - Smaller mature size
  - Early maturing
  - Superior carcass traits

- *Angus*

- *Hereford*

- *Shorthorn*

Adapted from V. Mercadante

Bos taurus

- *Continental*
  - **Larger mature size**
  - **Later maturing**
  - **Inferior carcass traits**

- *Charolais*

- *Limousin*

- *Simmental*

Adapted from V. Mercadante

Bos indicus

- *Originally from South Asia*
- *Adapted to warm and humid weather*
  - *Late maturity*
  - *Inferior carcass traits*
  - *Increased parasite resistance*
  - *Increased heat tolerance*

Adapted from V. Mercadante

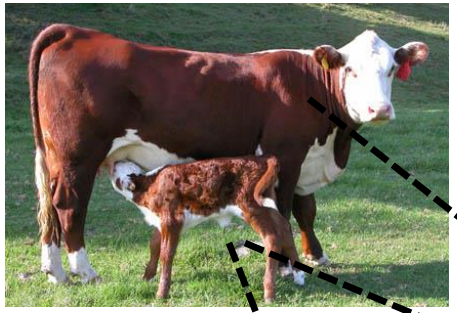
Bos indicus

- *Nelore*

- *Brahman*

Adapted from V. Mercadante

Path to the Plate



100%

75%

25%

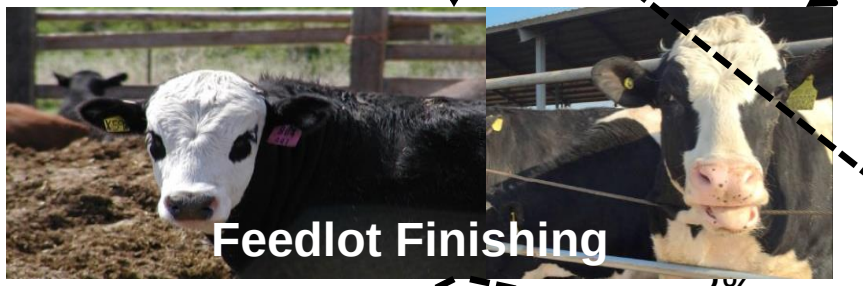
25%

95%

75%

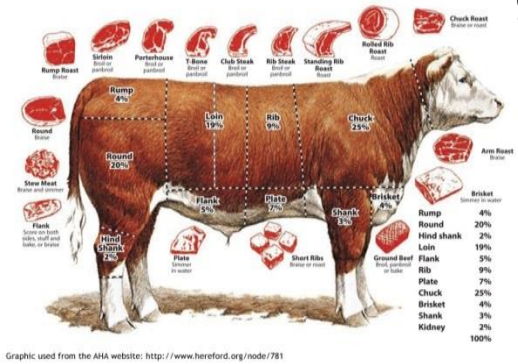
5%

100%



98%

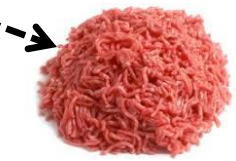
2%

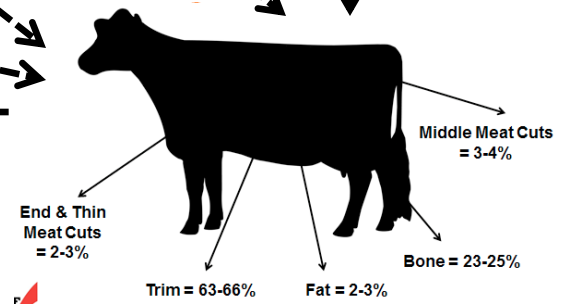


75%

25%

AAMP
AMERICAN ASSOCIATION OF MEAT PROCESSORS





Grain Fed
Beef Packers

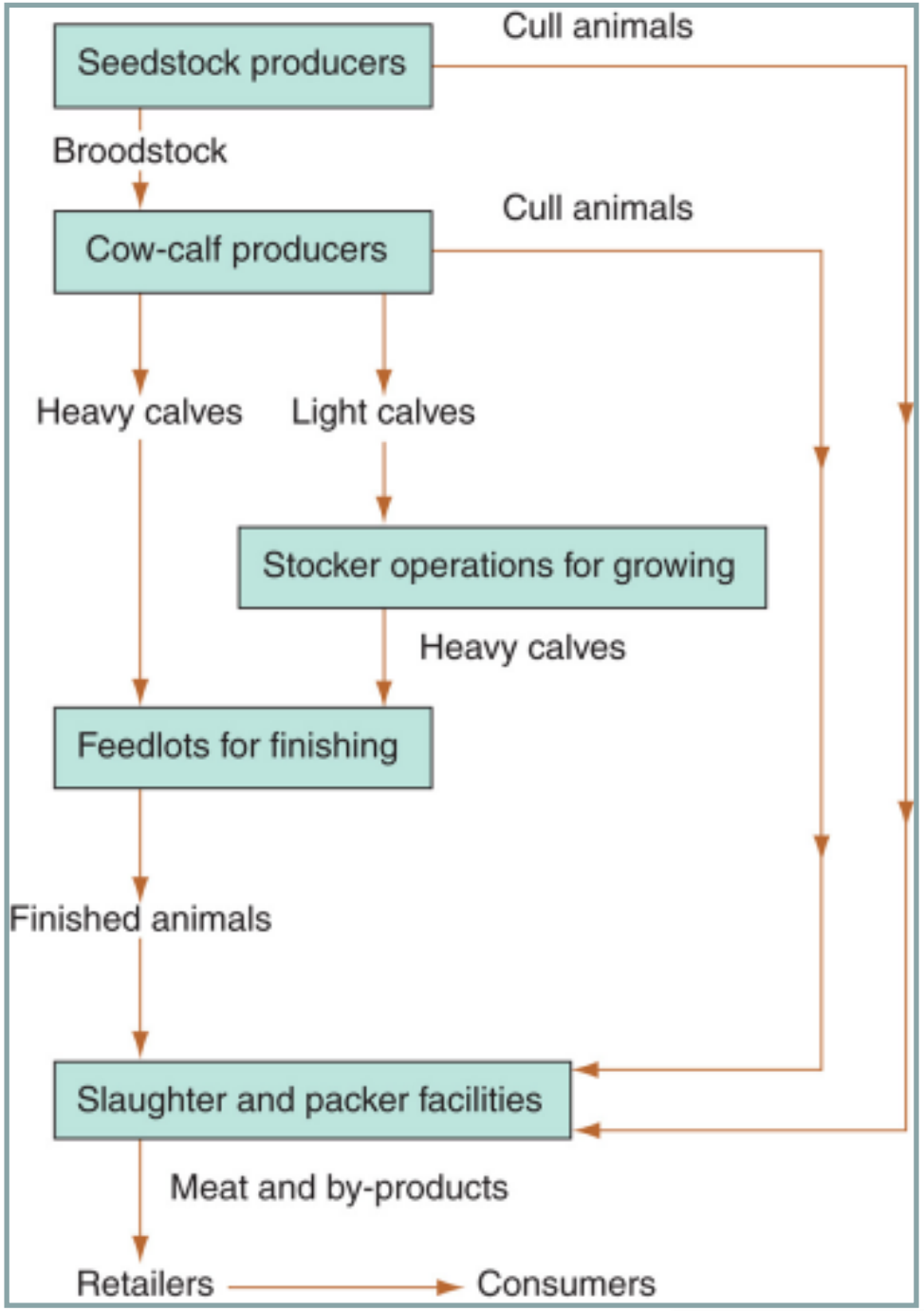
Pasture Fed
Beef Packers

Adapted from J. Cleere

Beef Industry Structure

Adapted from V. Mercadante

Beef Industry Structure



Adapted from V. Mercadante

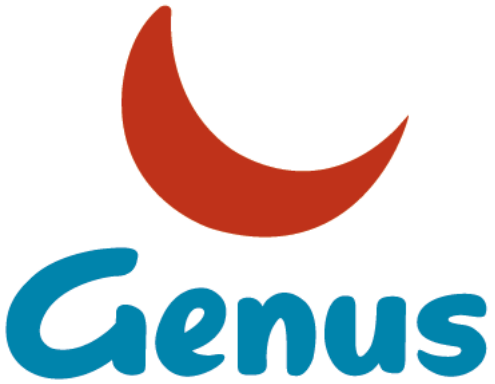
Beef Industry Sectors Seed Stock

- Genetic supplier for entire industry

Adapted from V. Mercadante

Beef Industry Sectors — Seed Stock

- Genetic companies – *Semen* and *Embryos*



Adapted from V. Mercadante

Beef Industry Sectors Cow-calf

- Produce calves
  - *Birth to weaning – 45 lbs to 500 lbs*
- USA
  - 35 to 50 head
  - Secondary source of income
  - Large operations – 300 to 35,000 head
    - Professional cattlemen
    - First source of income

Adapted from V. Mercadante

Beef Industry Sectors Cow-calf

- Goal
  - One calf per cow
  - One heavy calf per cow, every year
  - One heavy, healthy calf per cow every year
  - One heavy, healthy calf with the greatest genetic potential to perform per cow, every year

Adapted from V. Mercadante

Beef Industry Sectors — Cow-calf

- *Breeding Season – 45 to 120 days*
- *Calving Season*
- *Weaning Season – calf sales*

- *2 breeding seasons*
  - *Income twice a year*

Adapted from V. Mercadante

Beef Industry Sectors Cow-calf

Breeding Season

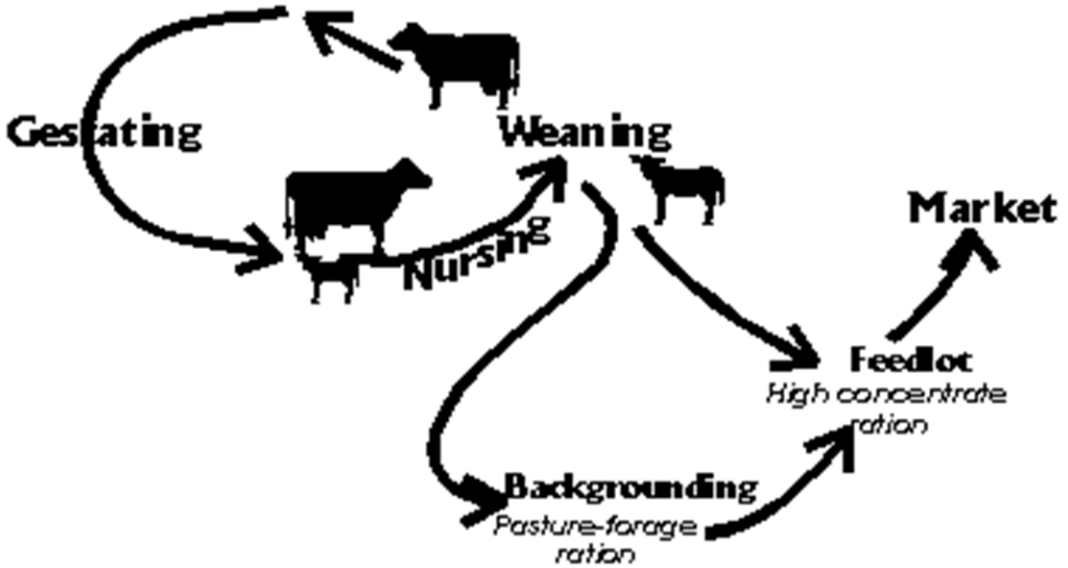
- Maximize the number of cows pregnant in the beginning of the Breeding Season

- Maximize the number of calves born in the beginning of the calving season

Adapted from V. Mercadante

Fixed Breeding Seasons

- Avoid year-round calving season
- Maintain 365d calving interval
  - Maximum 80d postpartum period
- Keep the herd on track!



The Beef Production Sequence

Adapted from B. Wilson

2. Nutrition/Body Condition Scoring

US Cattle and what they eat

Classification	Head, million	% of US beef cattle herd	Primary feedstuff consumed
Cows, Calves, Replacement heifers, bulls[1]	69	84.1	Grass/hay
Feedlot cattle[2]	13.1	15.9	Grain/Byproducts

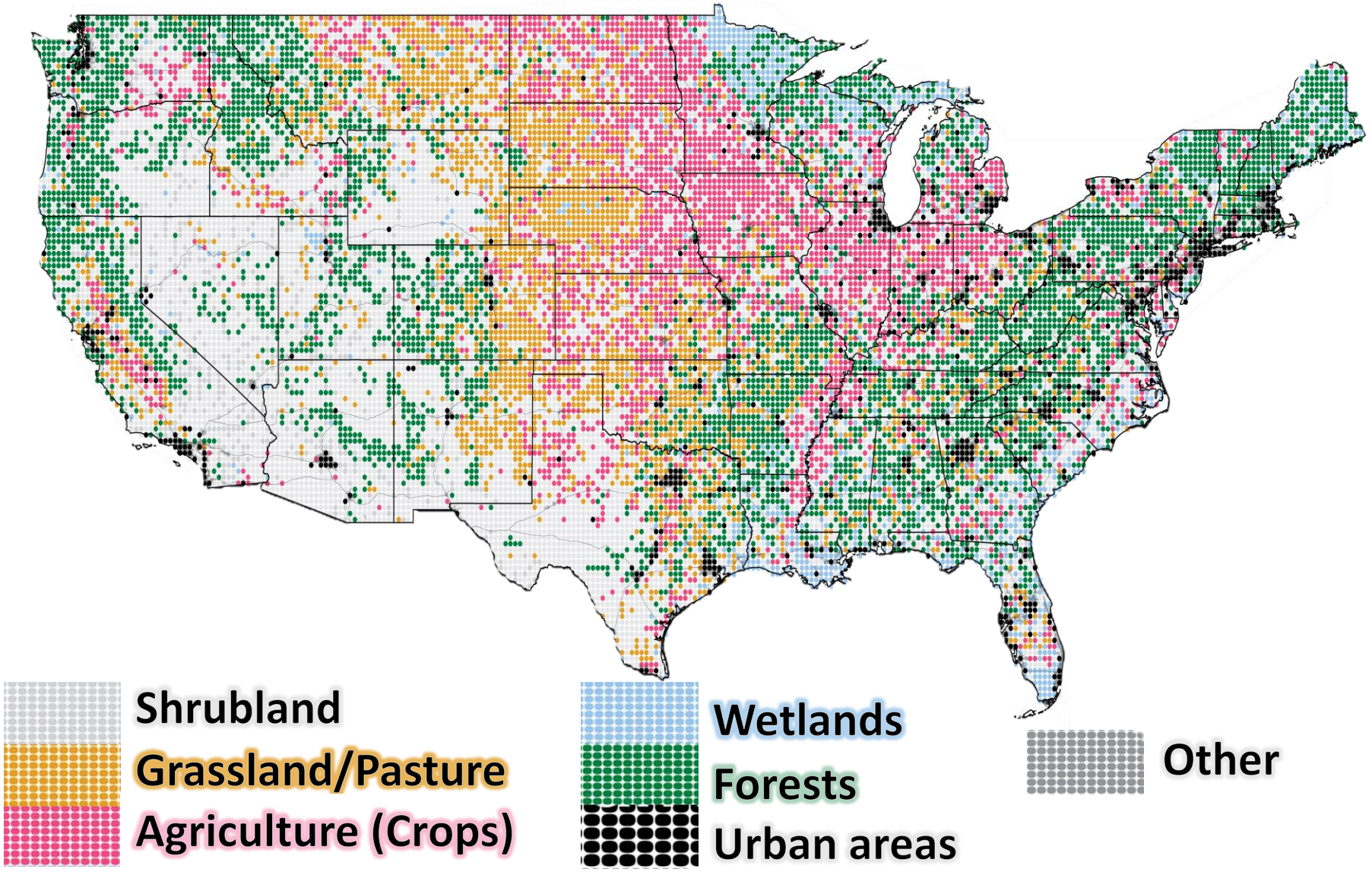
[1]Based on 29.4 million cows, 4.05 million replacement heifers, 7.3 million "other" heifers, 1.9 million bulls, 26.3 million calves under 500 lbs.

[2]Based on 13.1 million cattle/calves on feed over 500 lbs.

Globally, 86% of livestock feed is not in competition with human food

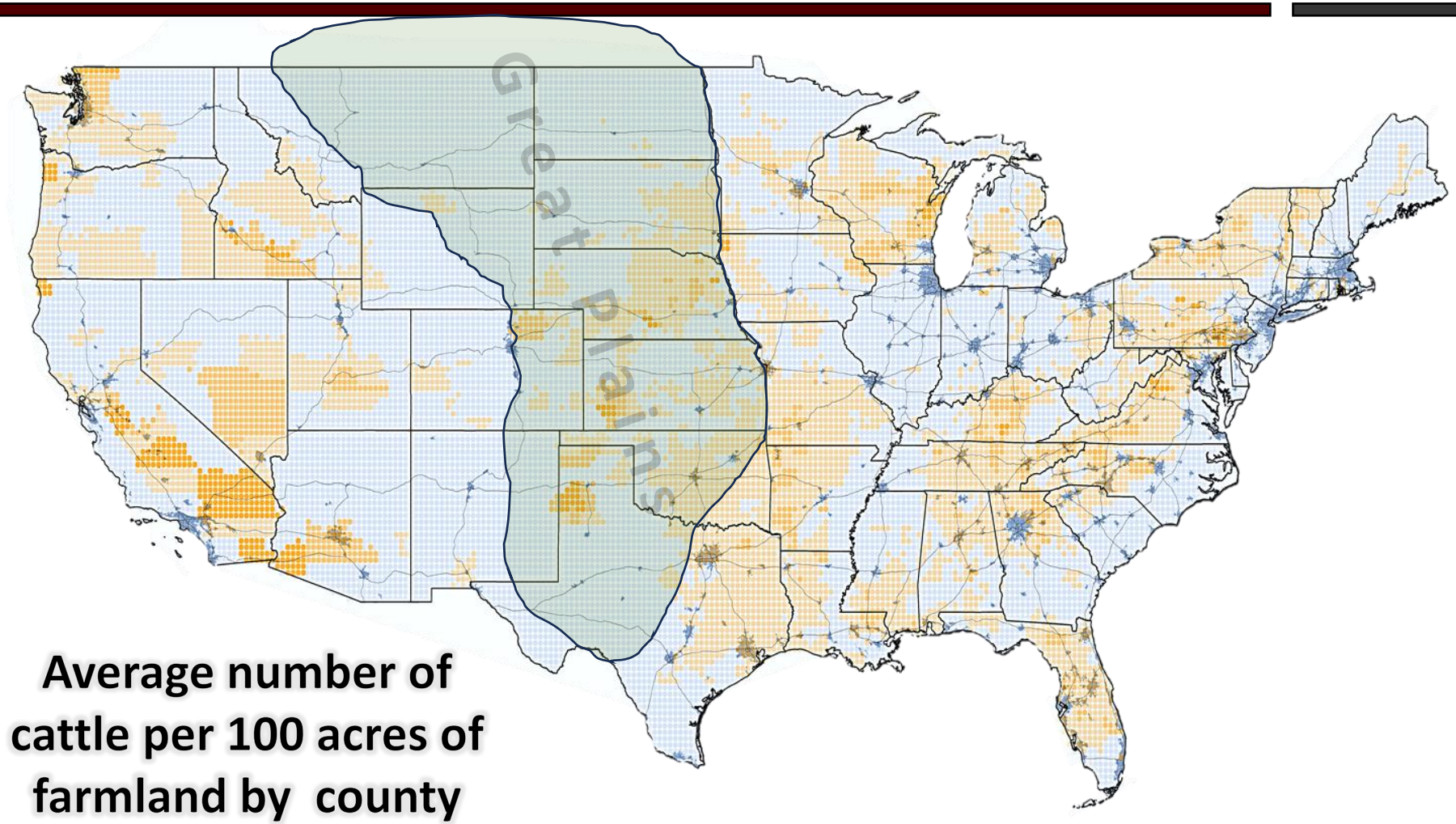
USDA NASS 2023

Land use, % of total land area



Adapted from The 2100 Project

US Beef production



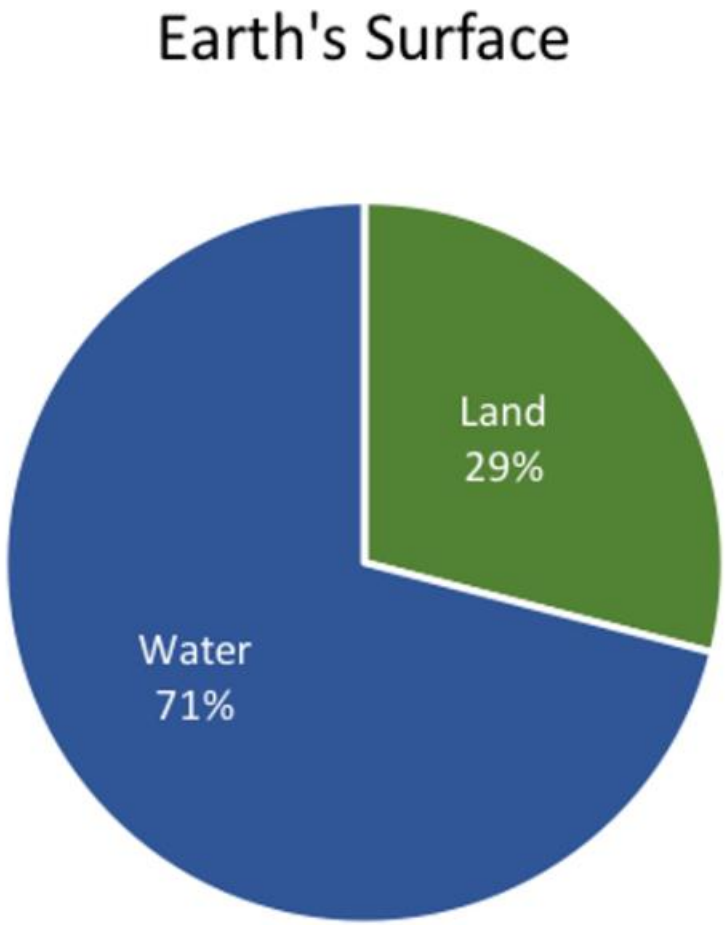
Average number of cattle per 100 acres of farmland by county

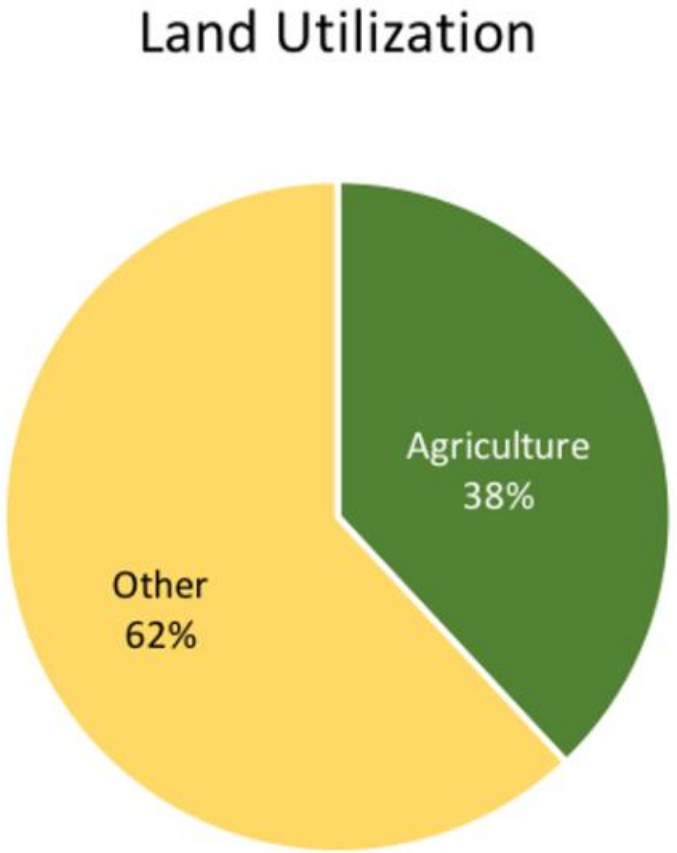
< 10 **> 50**

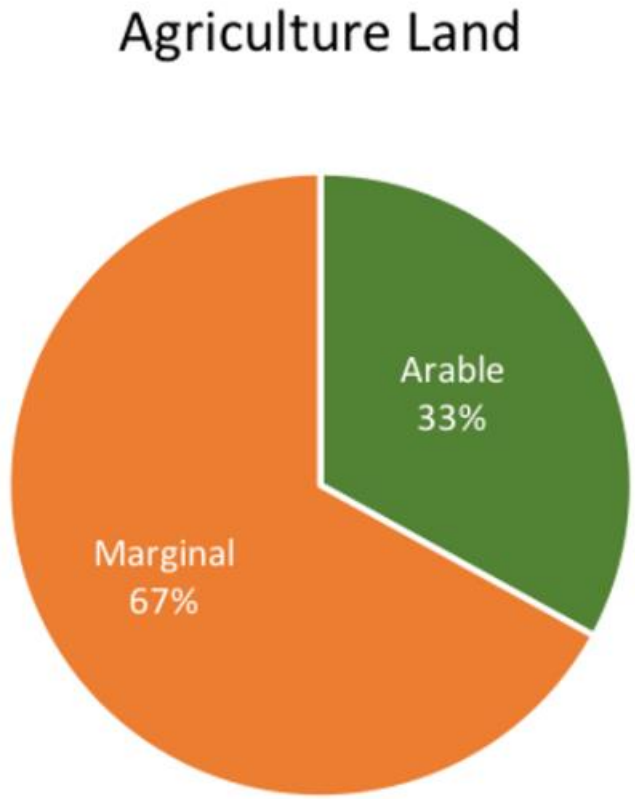
Adapted from The 2100 Project

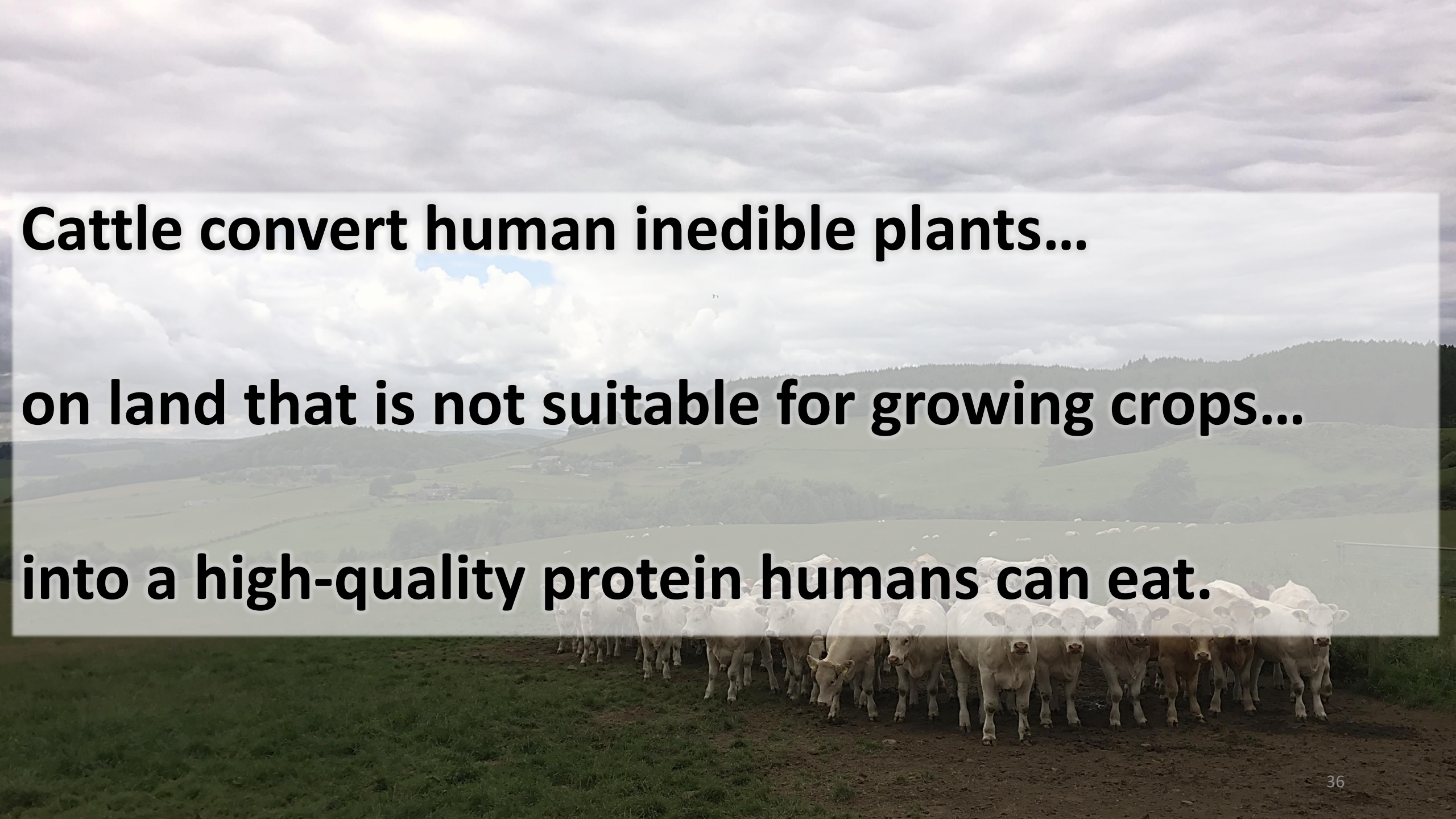

20

Cattle utilize marginal lands







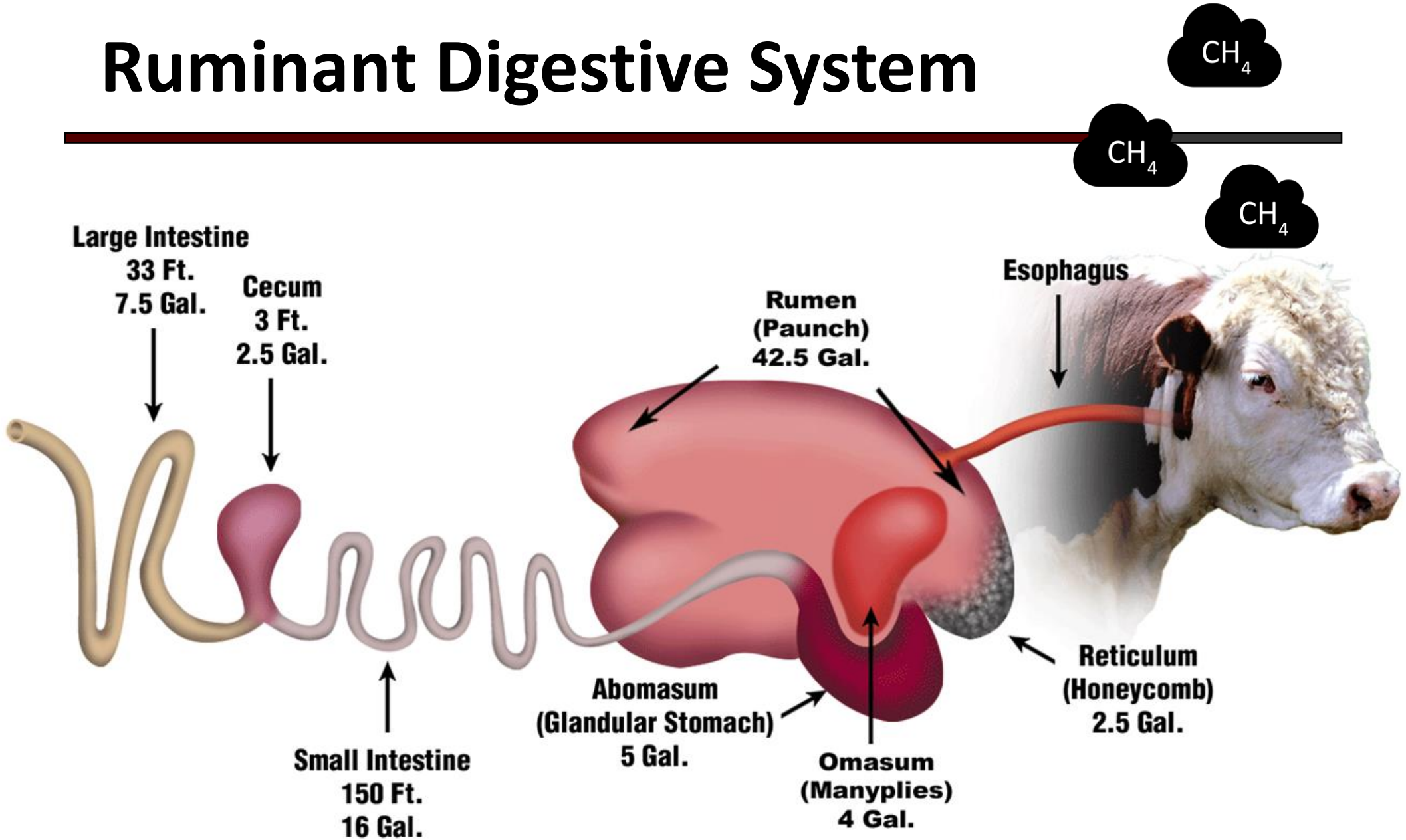


Cattle convert human inedible plants…

on land that is not suitable for growing crops…

into a high-quality protein humans can eat.

Ruminant Digestive System



Adapted from Wilson 2023

Beef Cow Rations

- **Forage Based**
  - Pasture
  - Corn Silage
  - Hays
    - Legumes
    - Grass
    - Grass – legume mixes
  - Crop Residue
    - Cornstalks
    - Soybean hay
    - Peanut vine hay

Adapted from B. Wilson

Beef Cow Rations

- Dry and Pregnant cows
  - Dry matter intake (DMI) = 1.5-2.5% BW
  - Total digestible nutrients (TDN) = 50-65%: > 8-13 lb./day
  - Crude protein (CP) = 7-9%; > 1.1-1.7 lb./day
- Lactating Cows
  - DMI = 2.0-3.5% BW
  - TDN = 55-68%; >10.5-16 lb./day
  - CP= 9.5-12.5%; >1.8-2.9 lb./day

Adapted from B. Wilson

Seasonal Feeding of Beef Cows

Spring:

- **Forages = Pasture, Corn silage, hay**
- **Energy = if needed: Corn, CGF, DDGS, Oats, Barley**
- **Protein = if needed: commercial supplement, coproducts, urea**
- **Mineral = Free-choice**
  - **High Mg**

Adapted from B. Wilson

Seasonal Feeding of Beef Cows

Summer:

- **Forages = Pasture, hay (drought), warm-season annuals**
- **Energy = Pasture**
- **Protein = Pasture**
- **Mineral = Free-choice**

Fall:

- **Forages = Stockpiled pasture, hay, crop residue, annual forages, corn silage (when needed)**
- **Energy = Forages**
- **Protein = Forages**
- **Mineral = Free-choice**

Adapted from B. Wilson

Seasonal Feeding of Beef Cows

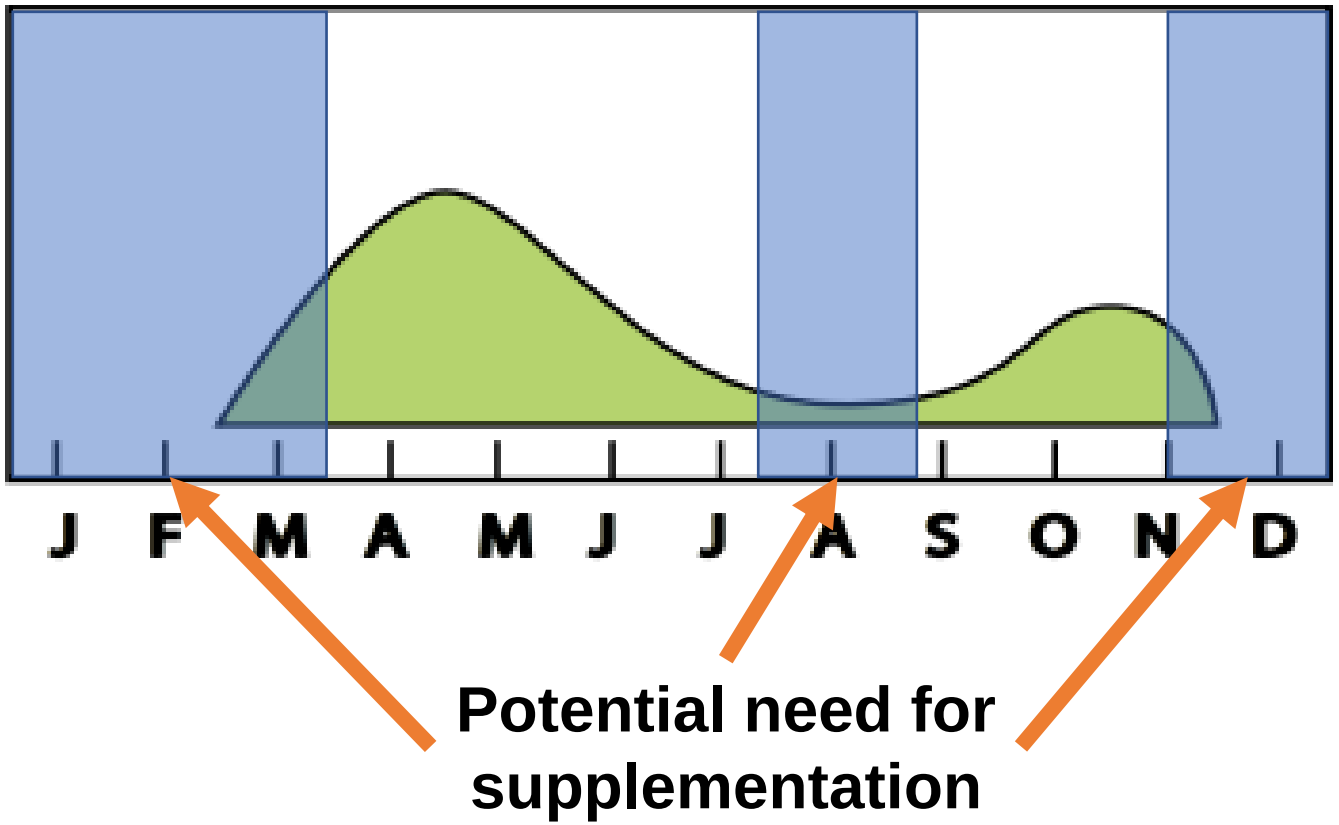
Winter:

- **Forages = Corn Silage, hay, crop residue**
- **Energy = Corn, coproducts, oats, barley**
- **Protein = Supplement, NPN**
- **Mineral = Free-choice**
- **“Cold Stress”**
  - **18°F – lower critical temperature (LCT)**
  - **Rule of Thumb: “For every 1° below LCT, increase the feed 1%”**
    - **Example: 0° F = 18% increase**

Adapted from B. Wilson

Forage Growth

Yield distribution of cool-season perennial grasses:



Adapted from B. Wilson

Indicators of Success

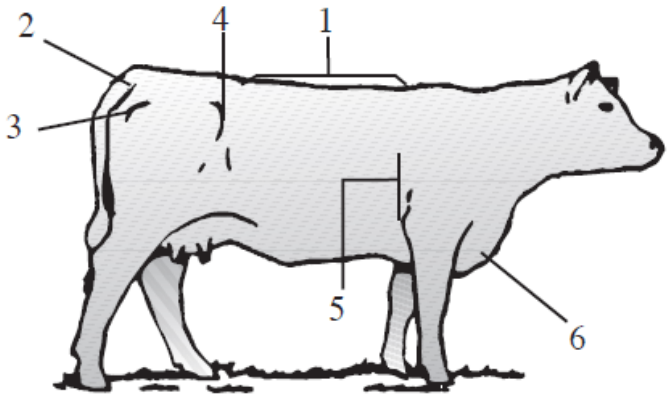
Body Condition Score (BCS)

- Indicator of nutritional status
- Ideal BW varies, ideal condition does not
- 1 BCS ≈ 100 lb. BW
- Visual appraisal or palpation chute-side

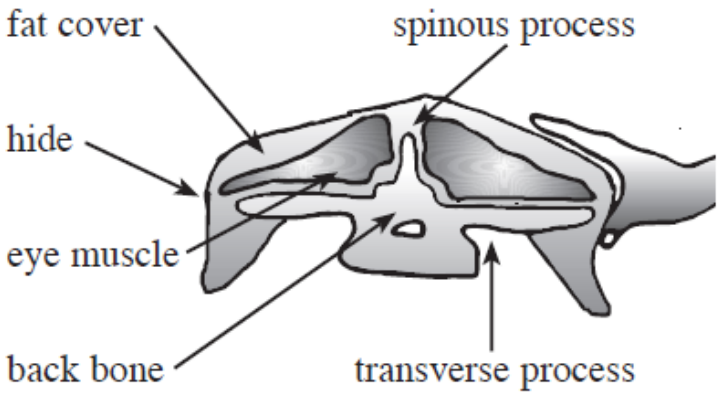
Adapted from B. Wilson

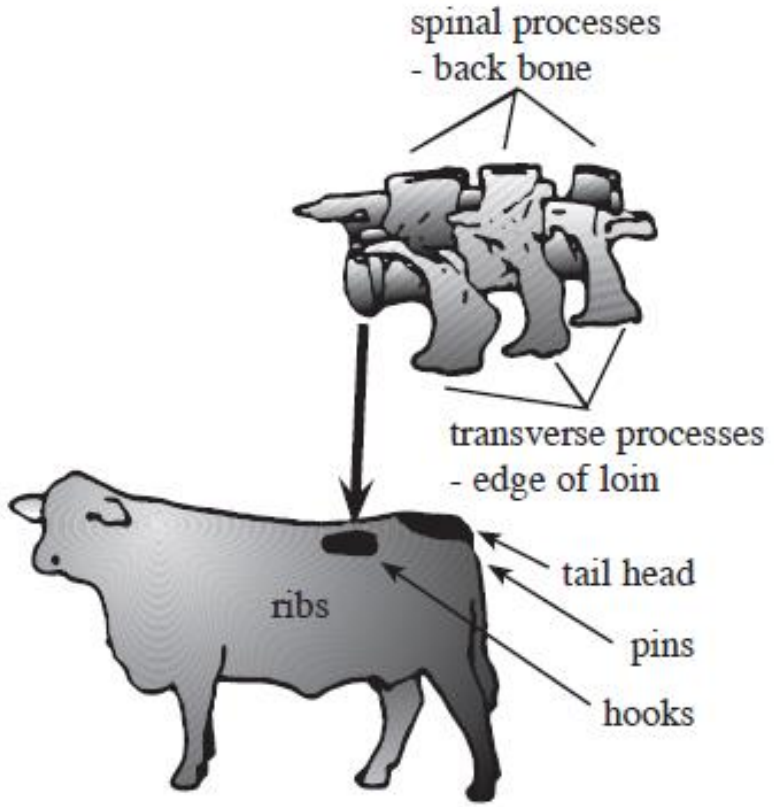
Adapted from Wilson 2023

Body Condition Score



1. Back
2. Tail Head
3. Pins
4. Hooks
5. Ribs
6. Brisket





Virginia Cooperative Extension

Adapted from B. Wilson

Why BCS cows?

- Easy and free
  - Cheaper than ultrasound
- More accurate than weight
- Calving cows in adequate condition may override other nutritional strategies

Adapted from B. Wilson

Body Condition Scoring

BCS 4 – “Borderline”

BCS 6 - “Good”

BCS 5 – “Moderate”

BCS 7 - “Fleshy”

Adapted from Wilson 2023

More information on Body Condition Scoring:
https://extension.missouri.edu/media/wysiwyg/Extensiondata/Pub/pdf/agguides/ansci/g02230.pdf

Body Condition Scores - Thin

BCS 1

BCS 2

BCS 3

BCS 4

Adapted from B. Wilson

Body Condition Scores - Overweight

BCS 7

BCS 8

BCS 9

Adapted from B. Wilson

Feedlot Cattle Nutrition

- Growing-Finishing program
  - Grow calves (450-750 lbs.) with ADG 1.8-2.3 lb./d
    - Goal: Growth, not fattening
  - Finish calves (750-1350) with ADG 3.0-4.0 lb./d

- Finishing program
  - Heavy feeder cattle (yearlings) to finish weights (750-1350 lbs.)
  - 90% concentrate diets
  - Highest NE_m and NE_g

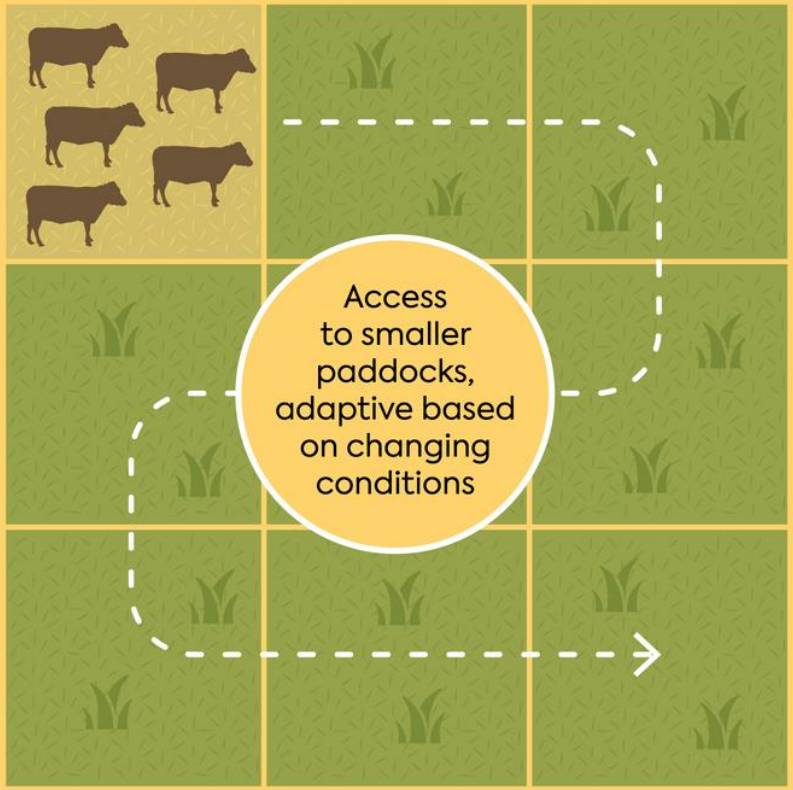
Adapted from B. Wilson


3. Grazing/runoff management

Continuous grazing vs managed grazing

- Less wildlife habitat
- More exposed soil
- Reduced forage diversity
- Increased rainfall runoff
- Less healthy animals
- More parasites

Continuous grazing vs managed grazing



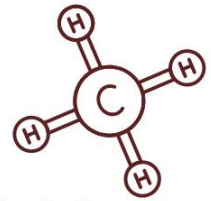
- Better wildlife habitat
- More microbial diversity
- Increased rainfall absorbtion
- More carbon sequestration
- Healthier animals
- Fewer parasites

The Biogenic Carbon Cycle

METHANE OXIDATION

After about 12 years, methane is broken down in a process called oxidation. Most is converted to CO_2.

METHANE



Ruminants exhale and belch both carbon dioxide (CO_2) and methane (CH_4). Their manure also produces CH_4, which is released into the air as a gas.

PHOTOSYNTHESIS

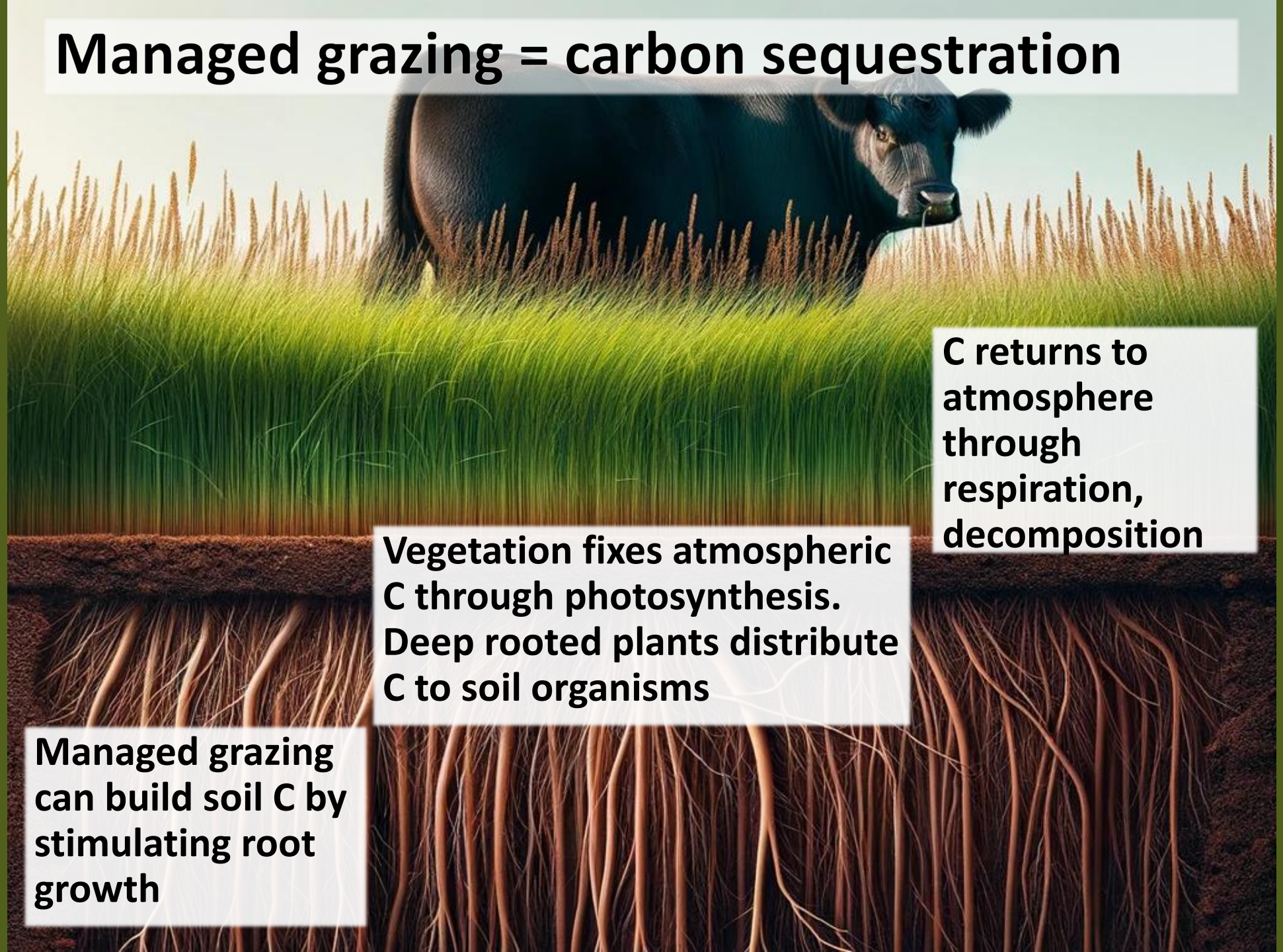
Plants absorb CO_2 as part of their metabolism.

BIOMASS CARBON

Carbon is stored into plant and soil mass in many forms. The plant mass is eaten by ruminants and many other life forms.

Texas A&M AgriLife Extension

Managed grazing = carbon sequestration



C returns to atmosphere through respiration, decomposition

Vegetation fixes atmospheric C through photosynthesis. Deep rooted plants distribute C to soil organisms

Managed grazing can build soil C by stimulating root growth

…but overgrazing can make the problem worse

Brazos River Delta

Brazos River Authority, Texas Coastal Geology

Brazos River Delta

Brazos River Authority, *Texas Coastal Geology*

SERC 2023


Do you need a permit to store manure or discharge wastewater from your operation?
Do you qualify as a Concentrated Animal Feeding Operation?

Do you qualify as a Concentrated Animal Feeding Operation?

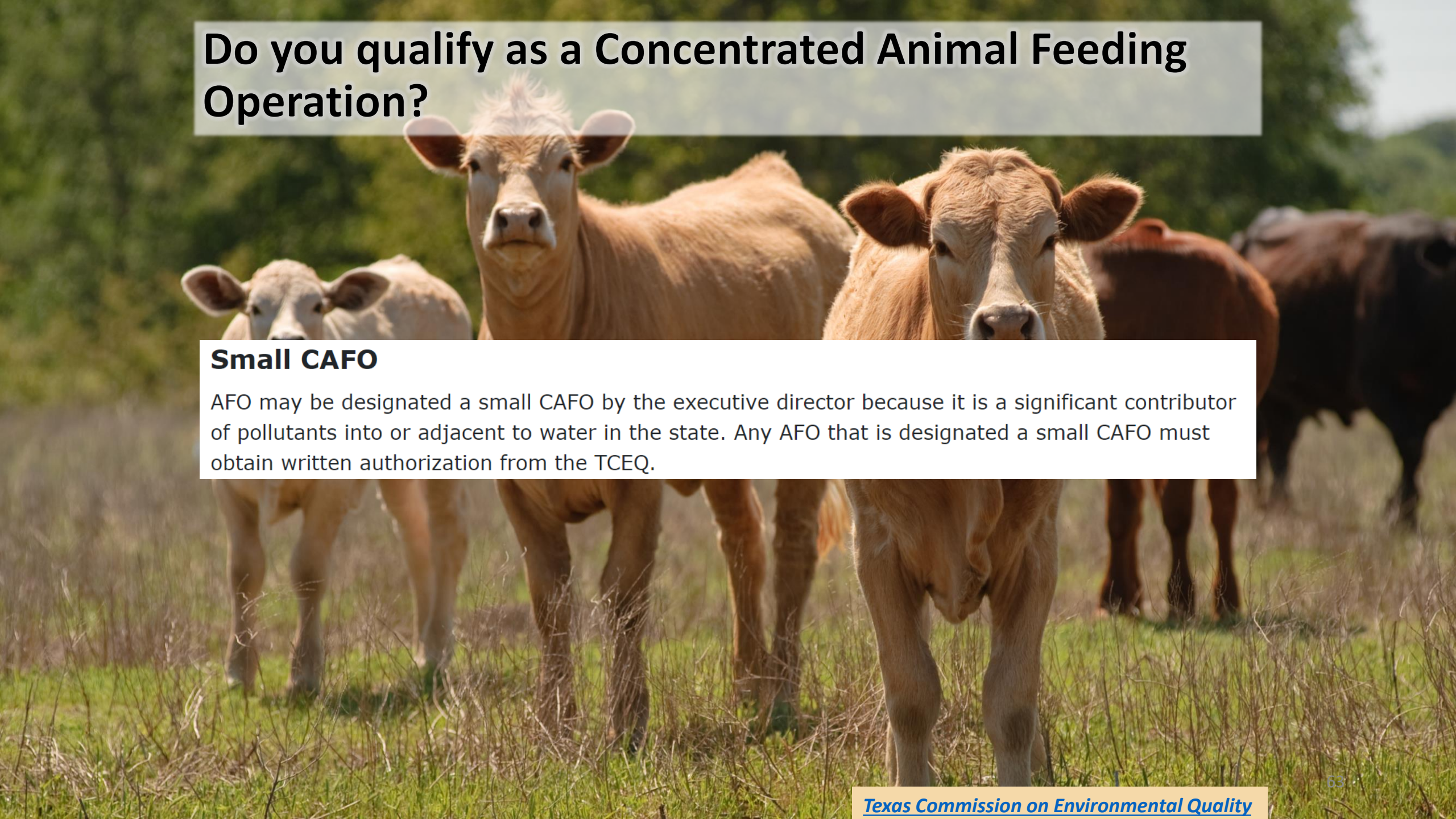
Large Concentrated Animal Feeding Operation (CAFO)

An AFO with the number of animals in the following table, is considered a large CAFO and must obtain written authorization from the TCEQ.

HEAD	ANIMAL TYPE
1,000	veal calves and cattle other than mature dairy cattle
700	mature dairy cattle (whether milking or dry cows)

Texas Commission on Environmental Quality

Do you qualify as a Concentrated Animal Feeding Operation?



Small CAFO

AFO may be designated a small CAFO by the executive director because it is a significant contributor of pollutants into or adjacent to water in the state. Any AFO that is designated a small CAFO must obtain written authorization from the TCEQ.

Texas Commission on Environmental Quality

4. Animal Handling and Biosecurity Basics

Proper Cattle Handling Techniques

What are they?
Handling practices that impact cattle health, welfare, and productivity

Why are they important?
Ensures the welfare for both animals and producers while improving beef quality and producer profitability

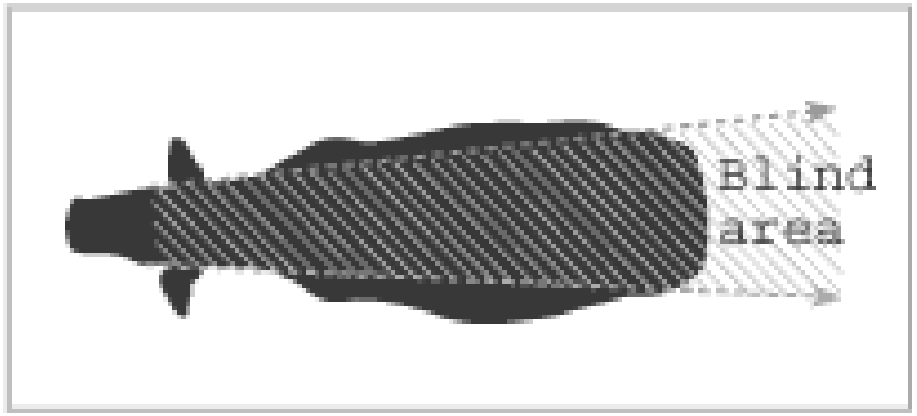
Who should be responsible?
Any and all individuals who work with livestock

When do you use them?
Whenever cattle are gathered for husbandry procedures (i.e. health care, weighting, sorting, weaning, transportation)

Where should it be applied?
Pastures, working facilities, feedlots, and livestock markets

Vision

- Wide angle vision field more than 300 degrees
- Solid walls on loading ramps and handling chutes prevents animal from seeing distractions
- Eliminate shadows and have animals move from dark to light to encourage easier handling



Hearing

- Loud noises should be avoided near working facilities. However, small amounts of noise are appropriate to move cattle.

Curved Chutes and Solid Fences

- There are two important aspects of using these facilities:
  - Prevents animals from seeing the end of the chute
  - Takes advantage of cattle's natural tendency to circle around a handler

Remember:

- **Patience is a virtue when handling cattle!**

Avoid injury to animals (and people!) by handling cattle in a quiet, calm manner.

Biosecurity

What is Biosecurity?

"Biosecurity is a system of management procedures designed to prevent or greatly reduce the risk for introduction of new disease to a cattle operation."

- Mid Atlantic Beef Quality Assurance Producer Certification Manual

An effective biosecurity plan will involve the producer, employees, a veterinarian, and possibly other specialists.

A plan will require education of farm visitors and may include physical barriers.

Sources of New Disease

- **New disease can enter your herd in a variety of ways:**

Contact with Other Cattle
(i.e. shows, fairs, replacements, bulls, neighboring cattle across the fence)

Humans
moving between herds or farms

Manure
on footwear, clothing, equipment tires, trailer

Non-Livestock
including pets, birds, deer, coyotes, rodents, ticks, and other insects

Water
accessible to cattle (such as ponds or pools of standing water)

Feed
contaminated with feces, urine, mold, or ruminant by-products

Animals New to Your Herd

- Know the herd health status of herds supplying replacements
- Obtain health/vaccine history of new cattle
- Isolate new animals from herd for 2-4 weeks (no contact through feed, water, or nose-to-nose during this time)
- Observe health status of new herd each day
- Use your veterinarian as a resource to learn about health at the farm of origin

Essentially, the goal is to prevent disease from ever entering the operation and to minimize the risk of infection if it does occur.

Go to BQA.org to get certified for free

Handling, health, injections, nutrition, management and more

The Texas A&M

Extension Livestock Sustainability Program

To find us, go to:

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Thank you!

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