

# GRAZING ANIMALS 101

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## OBJECTIVES

- Introduce basics of
  - Pasture Based Livestock Production in PIA
  - Herbivore Anatomy and Physiology
  - Livestock Nutrition
  - Animal Units



# PASTURE BASED LIVESTOCK PRODUCTION

## PASTURE BASED PRODUCTION IN PIA

- Today, mostly beef-cattle
- Some dairy, sheep, goats and horses
- Recently some pasture based pigs and chickens and alpacas



## PASTURE BASED PRODUCTION IN PIA

- Most operations are selling a weaned calf/kid/lamb
- Some are producing seed-stock, or animals for breeding
- Some are grass-finishing animals
- Some are harvesting fiber (wool)
- Pasture management needs depend on the market goal.

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## WEANED ANIMAL SYSTEMS

- Usually comprised of:
  - Herd of mother animals (cows, ewes, does)
  - Males for breeding (bulls, rams, bucks)
  - Replacement mother animals (heifers, ewes, doelings)
  - Weaned animals (calves, lambs, kids)

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## MOTHERS

- Age to reproductive maturity varies
- Age at first breeding important\*
  - Cattle – usually 18-24 months
  - Sheep/Goats – usually 12-18 months
- Have an effective breeding life-span\*
  - Cattle – typically about 10 years
  - Sheep/Goats – typically 7-8 years
- Gestation varies
  - Cattle: ~283 days (9.5 months)
  - Sheep/Goats: ~142-151 days (5 months)



\*Will depend on the producer, genetics, nutrition, & management

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## MALES

- Have a big influence on the livestock operation
- Selection of male is very important as he can make up 50% of the genetic base of herd
- Proper male:female ratio essential to ensuring optimal production.

Reproduction Characteristics*			
Species	Heat Period	Heat Cycle (days)	Females : male**
Cattle	12-18 hours	19.5	25 avg
Sheep	29-36 hours	17	25+
Goats	24-26 hours	20-22	25+

\*NRPB Table6-11

\*\* Will depend on producer, genetics, system, etc

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## MALES

- Libido affects serviceability. Males are (should be) kept as long as they are able to fulfill their purpose.
- In order to be successful, their health and welfare need to be managed to ensure they are strong and vigorous.
- In herds with more than one male, they will often fight to establish hierarchy



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## GRASS-FINISHING & DAIRIES

- Herd compositions and harvest/milking rotations will vary
- Major emphases on:
  - Pasture quality
  - Low-stress environments
  - Age
  - Breed selections – not all breeds will finish equally on grass
  - Usually more intensive grazing management

Producer will be concerned with ADG (Average Daily Gain). All these things have the potential to affect ADG.

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# ANATOMY & PHYSIOLOGY

But first a quick quiz

## ANATOMY & PHYSIOLOGY

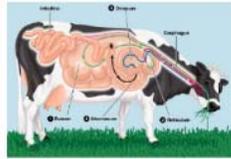
- Digestion takes place in the mouth and digestive tract of animals
- Process of physical (chewing) and chemical (breakdown of food by acids and enzymes)
- Two types:
  - Ruminant Digestion
  - Monogastric Digestion



# ANATOMY & PHYSIOLOGY

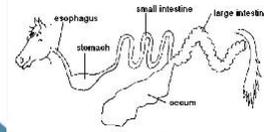
## Ruminant

- 4 chambered stomach
- Absorption function within stomach
- Microorganisms breaks down food within stomach to gain food



## Monogastric

- One stomach
- Digestion of simple carbohydrates only
- Efficient users of feed
- Energy is primarily gained from the food stuffs.



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# ANATOMY & PHYSIOLOGY

## Ruminants

- Four Stomachs
- Ability to digest Cellulose and lignin
- Can improve the quality of the protein in the diet
- “Ruminate” the feed after grazing
- Some of the energy in the feed is lost as burped gas during the process of digestion (methane)
- The animal can die from bloat
- Takes six or seven hours to harvest the daily feed requirements from good quality pastures

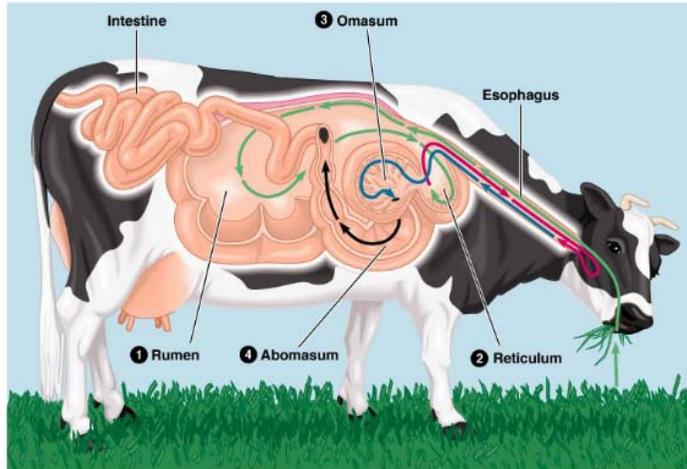
Ruminant  
Microorganisms

## Monogastrics

- One stomach
- Digestion of simple carbohydrates only
- All vitamins and proteins are taken directly from the source of food
- Dependence on enzymes produced in their own digestive glands
- All energy gained from food stuffs is released into the blood stream excluding the energy used to walk, drink etc.
- Eat daily feed requirements quickly

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## ANATOMY & PHYSIOLOGY - RUMINANT



\*Fore-gut fermenter

### Parts & function:

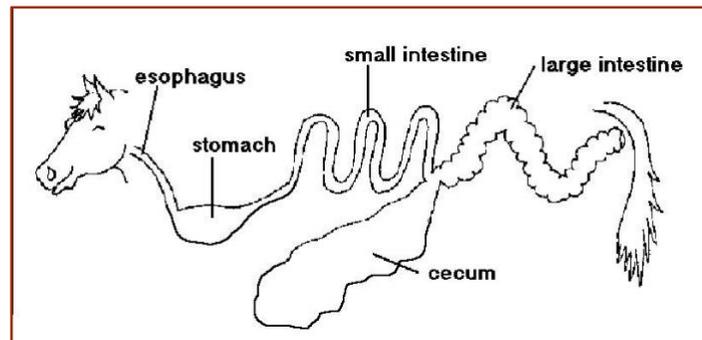
- Rumen & Reticulum:
  - Microorganisms break down cellulose and lignin (bacterial fermentation)
  - Carbohydrate and protein digestion
  - Protein synthesis occurs
- Omasum: grinds/squeezes to remove liquid
- Abomasum: like a "true stomach" releases gastric juices to aid in digestion
- Small intestine: absorbs nutrients
- Large intestine: absorbs water
- Examples of ruminants: Cattle, sheep, goats, deer

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## ANATOMY & PHYSIOLOGY - MONOGASTRIC

### Parts & function:

- Stomach: releases gastric juices to aid in digestion
- Small intestine: absorbs nutrients
- Cecum: "blind gut", breaks down any leftover protein, bacterial fermentation aids digestion of fiber (large in horses)
- Large intestine: absorbs water, stores waste until excreted.
- Examples of monogastric herbivores: horses, donkeys, rabbits. Omnivores: humans, pigs, dogs, rats.



\*Hind-gut fermenter

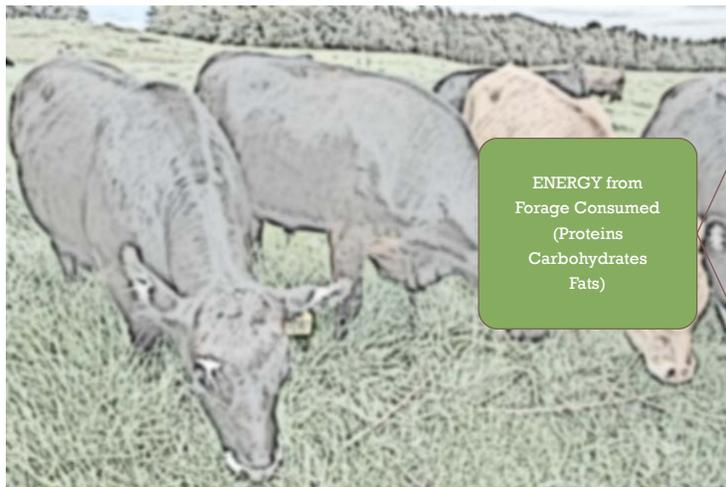
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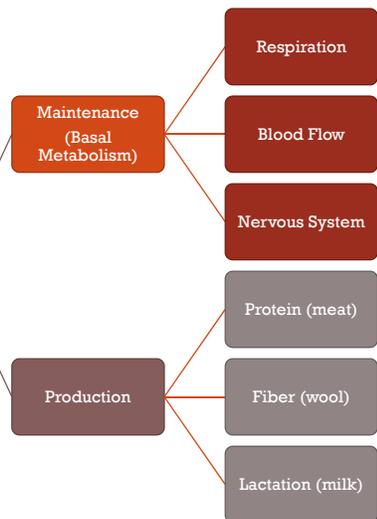
# LIVESTOCK NUTRITION

But first a quick quiz

## LIVESTOCK NUTRITION



ENERGY from Forage Consumed (Proteins Carbohydrates Fats)



# LIVESTOCK NUTRITION

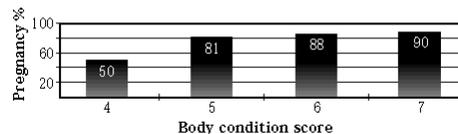
- Factors that affect Basal Metabolism (Maintenance) and Voluntary Intake
  1. Physical factors
  2. Physiological State
  3. Environmental Factors
  4. Forage quality

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# PHYSICAL FACTORS

- Different breeds have different maintenance requirements, mostly due to size and .
- Age of the animal
  - Younger animals = higher basal metabolism
  - Older animals = lower basal metabolism
- Sex of the animal = Intact males > non-pregnant females > castrated males
- Body Condition (BCS of the animal) – best used at calving
  - Climatic conditions
  - Stage of production
  - Age
  - Genetics
  - Calving date
  - Weaning date
  - Forage Management

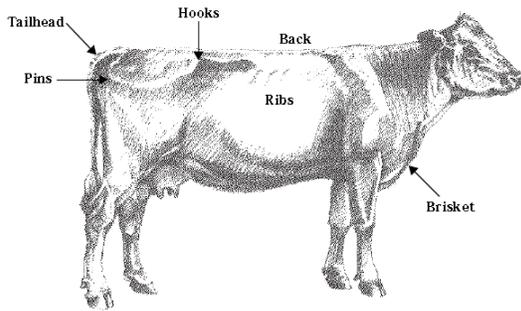
**Figure 6-3** Relationship between BCS and pregnancy percentage



NRPH, CH 6

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# PHYSICAL FACTORS - BCS



Reference points for body condition score

Body condition score	Description of cow
1	Severely emaciated. Bone structure of shoulder, ribs, hooks and pins is sharp to the touch and easily visible. Little evidence fat deposits or muscling
2	Emaciated. Little evidence of fat deposition but some muscling in the hindquarters. The backbone feels sharp to the touch.
3	Very thin, no fat on the ribs or brisket, and some muscle still visible. Backbone easily visible.
4	Thin, with ribs visible but shoulders and hindquarters still showing fair muscling. Backbone visible.
5	Moderate to thin. Last two or three ribs can not be seen unless animal has been shrunk. Little evidence of fat in brisket, over ribs or around the tailhead.
6	Good smooth appearance throughout. Some fat deposits in brisket and over the tailhead. Ribs covered and back appears rounded.
7	Very good flesh, brisket full. Fat cover is thick and spongy and patchiness is likely. Ribs very smooth.
8	Obese, back very square, brisket distended, heavy fat pockets around tailhead. Square appearance.
9	Rarely observed. Very obese. Animals mobility may actually be impaired by excessive fat.

# EXAMPLES OF BODY CONDITION SCORES

1	2	3
<p>Photo 1: BCS 1. Emaciated with muscle atrophy and no detectable fat. Tail head and ribs project predominantly. Animal physically weak.</p>	<p>Photo 2: BCS 2. Poor condition with muscle atrophy and no detectable fat. Tail head and ribs prominent.</p>	<p>Photo 3: BCS 3. Thin condition. Slight muscle atrophy. All ribs visible. Very little detectable fat.</p>

\*images from "Body Condition Scoring Beef Cows" Virginia Cooperative Extension, VSU 400-795

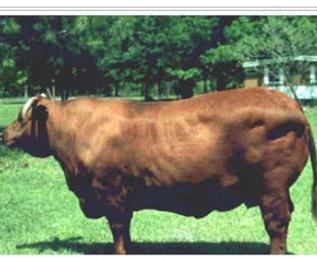
# EXAMPLES OF BODY CONDITION SCORES

4	5	6
 <p>Photo 4: BCS 4. Borderline condition. Outline of spine slightly visible. Outline of 3 to 5 ribs visible. Some fat over ribs and hips.</p>	 <p>Photo 5: BCS 5. Moderate, good overall appearance. Outline of spine no longer visible. Outline of 1-2 ribs visible. Fat over hips but still visible.</p>	 <p>Photo 6: BCS 6. High moderate condition. Ribs and spine no longer visible. Pressure applied to feel bone structure. Some fat in brisket and flanks.</p>

\*images from "Body Condition Scoring Beef Cows" Virginia Cooperative Extension, VSU 400-795

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# EXAMPLES OF BODY CONDITION SCORES

7	8	9
 <p>Photo 7: BCS 7. Good, fleshy appearance. Hips slightly visible but ribs and spine not visible. Fat in brisket and flanks with slight udder and tail head fat.</p>	 <p>Photo 8: BCS 8. Fat, fleshy and overconditioned. Bone structure not visible. Large patchy fat deposits over ribs, around tail head and brisket.</p>	 <p>Photo 9: BCS 9. Extremely fat, waxy and patchy. Mobility possibly impaired. Bone structure not visible. Extreme fat deposits over ribs, around tail head and brisket.</p>

\*images from "Body Condition Scoring Beef Cows" Virginia Cooperative Extension, VSU 400-795

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## PHYSIOLOGICAL STATE

- **Pregnancy**
  - Pregnant animals > non-pregnant animals
  - Most critical in the 3<sup>rd</sup> trimester
  - Nutritional deficiencies (protein) will affect mother, not calf.
- **Physical activity**
  - ↑ physical activity = ↑ maintenance requirement
  - Animals that graze larger areas or steep slopes have ↑ energy need
  - Animals walking uphill expend 12-20 times more energy than those on slopes <15%
- **Lactation**
  - Second greatest source of nutritional stress.
  - All nutrient needs increased when lactating, especially water.
  - In cows, lactation peaks at 30-45 days after parturition.

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## ENVIRONMENTAL FACTORS

- **The Thermoneutral zone (TNZ)**
  - Energy is not spent trying to cool animal off or keep warm
  - Low temperatures, depending on precipitation can increase or decrease intake.
    - Wet, cold and muddy = ↓ intake
    - Dry cold conditions = ↑ intake
  - High temperatures can also decrease intake. If nights are cooler, animals may shift grazing activity to night. If its too hot, they won't eat.

**Table 6-4** Typical thermoneutral zones

Species	Temperature (°F)
Cattle	41 - 68
Calves	50 - 68
Sheep	70 - 88
Goats	50 - 68

NRPH, CH 6



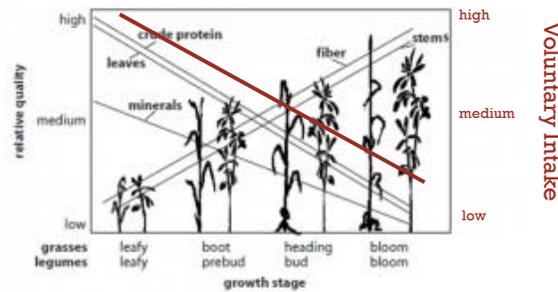
Cattle seeking shade in the shadow of a windmill

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# FORAGE QUALITY

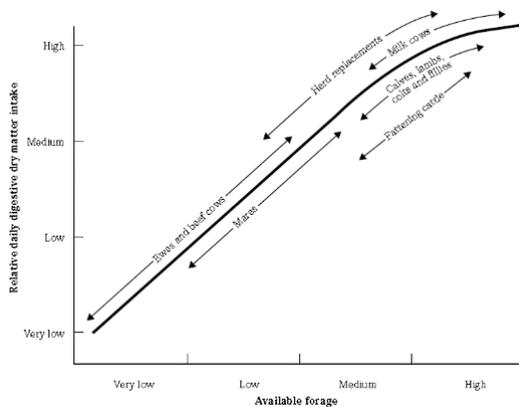
- *Quality* – has greatest influence on intake
- As quality declines, intake declines.
- Higher the fiber, the lower the digestibility.

Higher Fiber  
Lower Digestibility  
= Decreased  
Voluntary Intake



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# MATCHING LIVESTOCK WITH AVAILABLE FORAGE



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# THE “ANIMAL UNIT”

But first a quick quiz

## ANIMAL UNITS

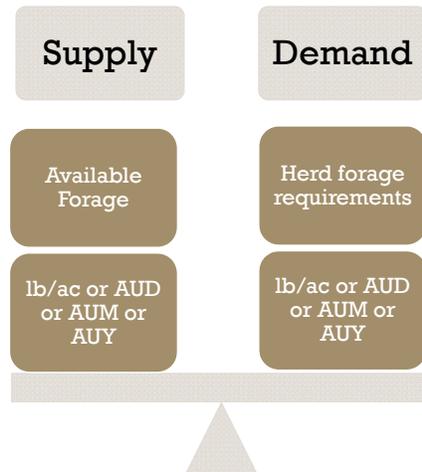
- 1 AU = 1 mature cow (1,000 lb) + calf
- 1 AUD = the amount of forage for 1 AU for 1 day.
- 1 AUM = the amount of forage for 1 AU for 1 month.
- NRCS uses 2.6% BW = 26 lb OD or 30 lb AD weight.
- Actual amount consumed depends on several factors:

- Forage Quality
- Age of animal
- Supplementation
- Topography
- Breed
- Physiological stage
- Weather
- Water

**Table 6-5** Animal-unit equivalents guide

Kinds / classes of animals	Animal-unit equivalent	Forage consumed		
		day	month	year
Cow, dry	0.92	24	727	8,730
Cow, with calf	1.00	26	790	9,490
Bull, mature	1.35	35	1,067	12,811
Cattle, 1 year old	0.60	15.6	474	5,694
Cattle, 2 years old	0.80	20.8	632	7,592
Horse, mature	1.25	32.5	988	11,862
Sheep, mature	0.20	5.2	158	1,898
Lamb, 1 year old	0.15	3.9	118	1,423
Goat, mature	0.15	3.9	118	1,423
Kid, 1 year old	0.10	2.6	79	949

# FORAGE ANIMAL BALANCE



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## SUMMARY

- Producer's market objectives are important for grazing management
- Understanding animal physiology helps us understand forage quality implications
- Livestock's nutritional needs can and do vary based on several factors
- Ability for livestock to meet their nutritional needs affects performance
- Animal Units is a term used to reference forage demand across species.
  
- There is LOTS more we could talk about related to animal behavior, diet selection, grazing behavior etc. Hopefully can offer some "advanced" topics in the future.
- Recommended additional reading:
  - National Range and Pasture Handbook (NRPH)
  - Intensive Grazing Management: Forage, Animals, Men, Profits, by Smith, Leung, Love
  - Grass Productivity, by Voisin

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