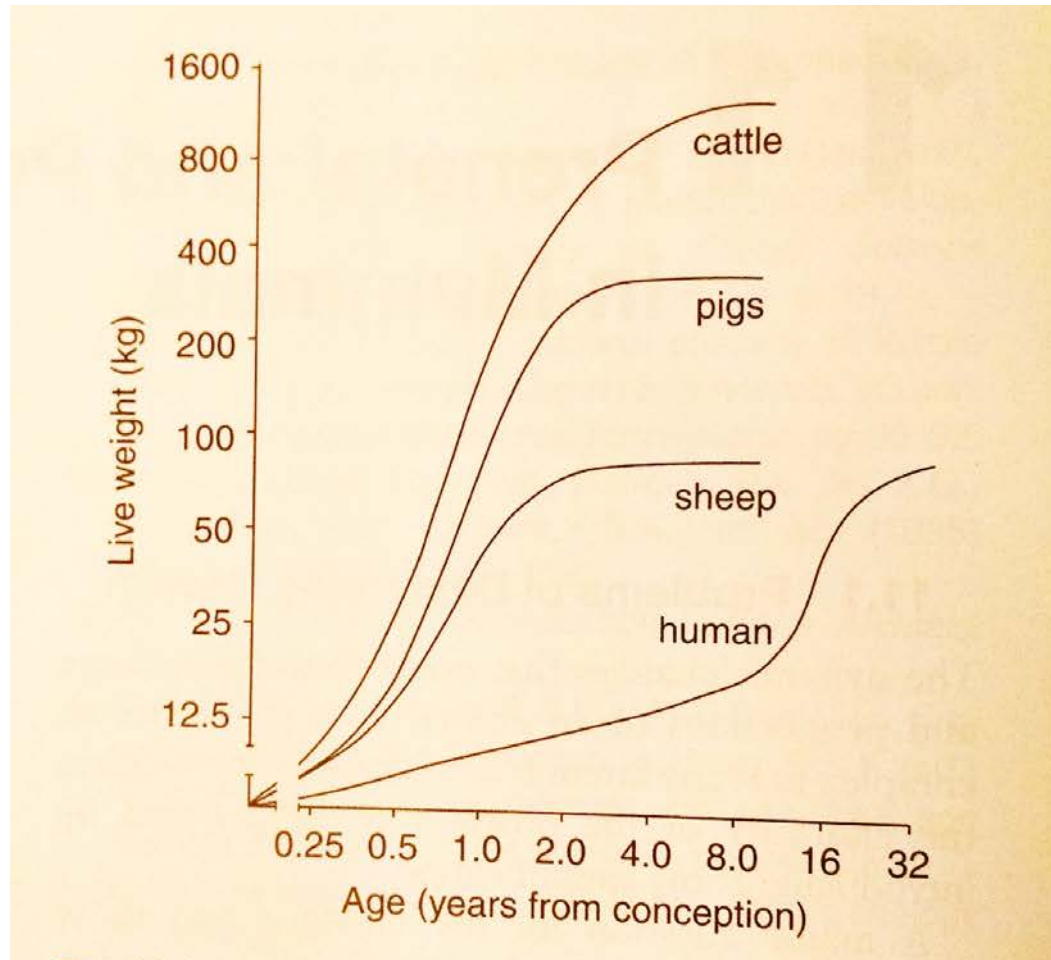


# Understanding Nutrition

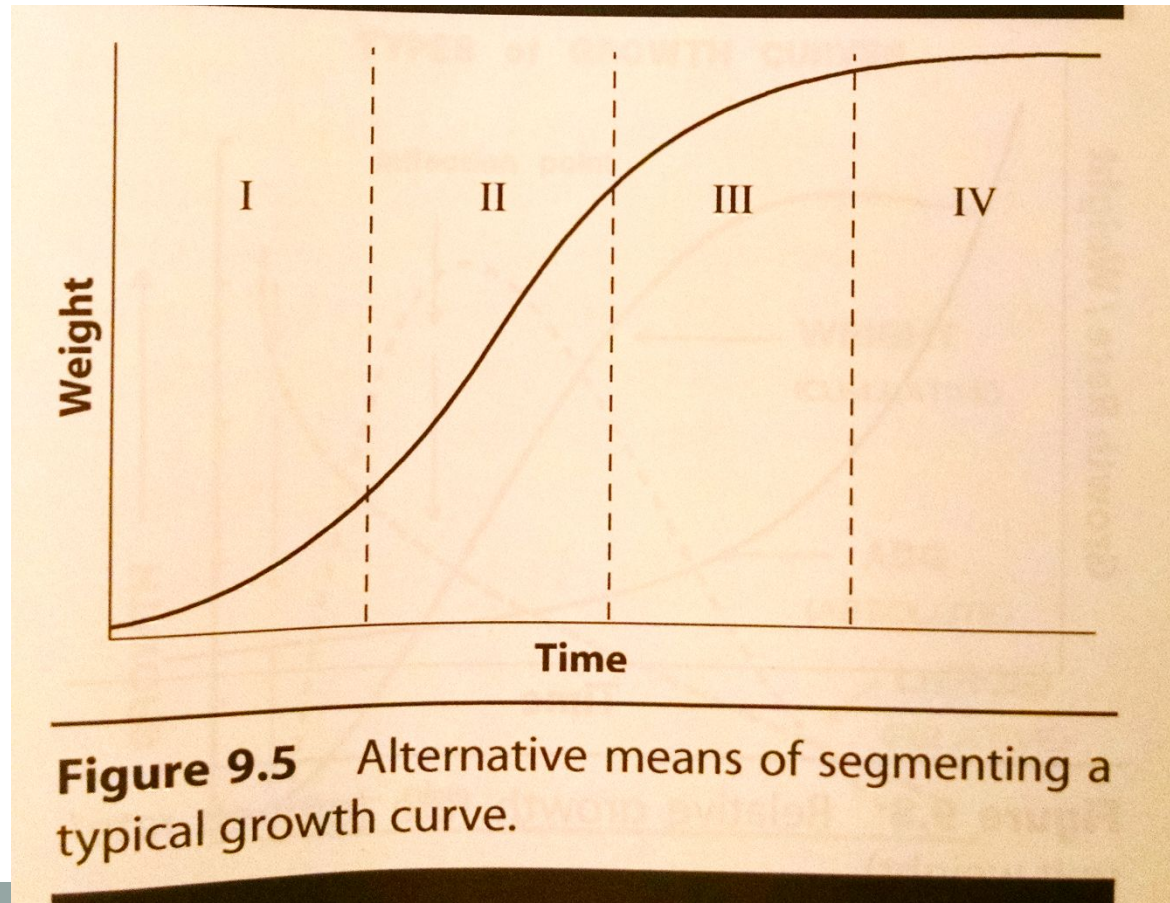
Craig Gifford

Extension Beef Cattle Specialist

# Growth Curve



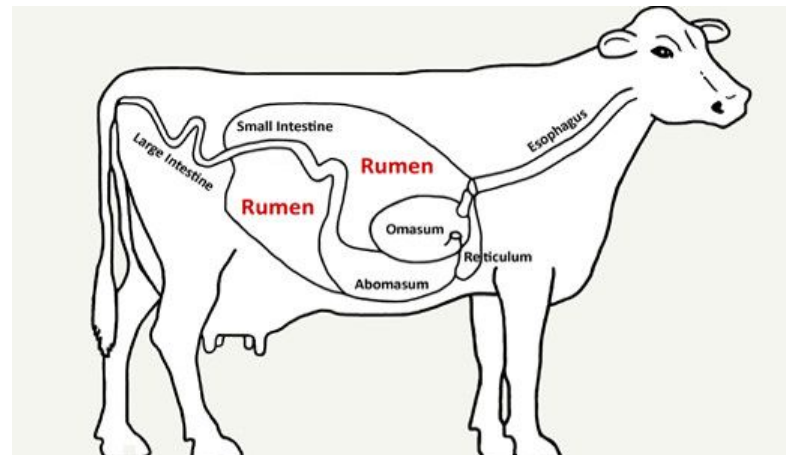
# 4 Phases of Growth Curve



# Phases of Growth Curve

- Phase I 15%-20% total growth. Tissue growth order is organs > bone > muscle
- Phase II 75% of total growth; organs reach mature size; bone growth complete; muscle growth maximal; fat accumulation slows
- Phase III 80-90% of growth has been attained. Rapid fat accumulation.
- Phase IV 90-95% of additional growth is fat. 5-10% of gain is muscle.

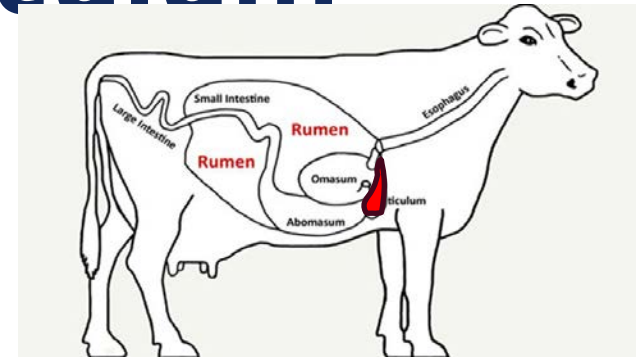
# Four Compartments



Each compartment has a  
different function  
Converts fiber to energy Large  
microbial

population

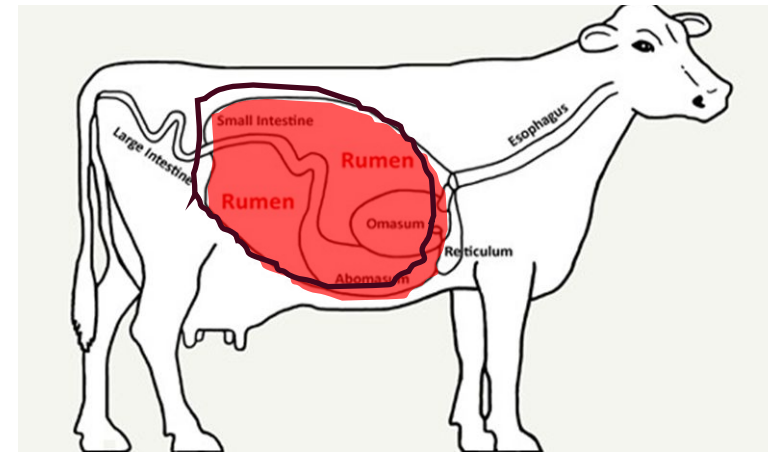
# The Reticulum



- THE HONEYCOMB ORGAN
- GRINDING FORMS CUD  
“HARDWARE DISEASE”

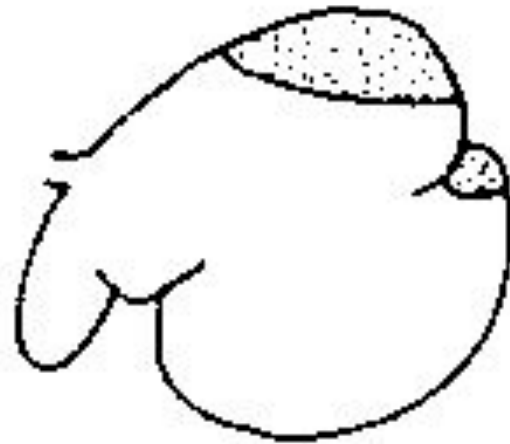
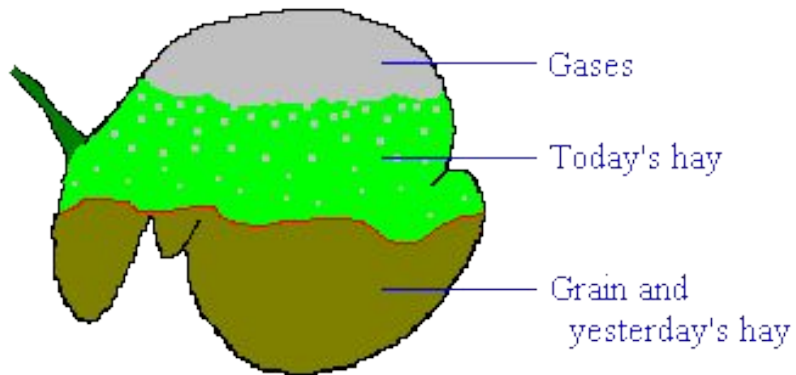


# The Rumen



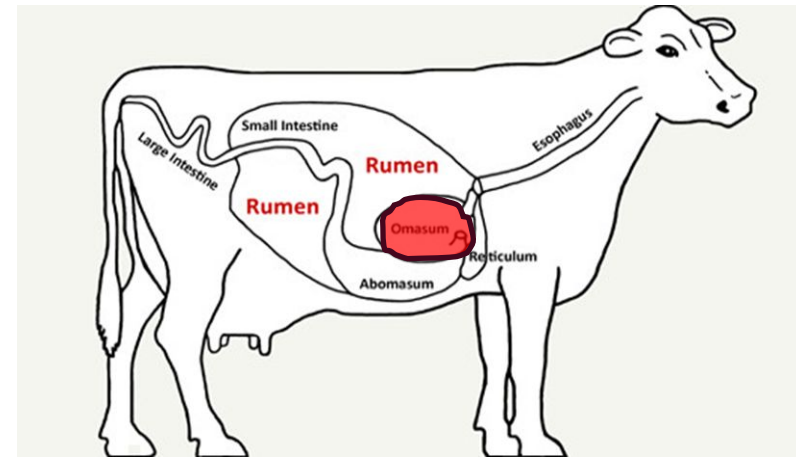
- Largest compartment
- Up to 50 gal. capacity  
Microbial population,  
Fiber digestion, energy, protein, and vitamin production.
- Carpet lining = papillae  
Nutrient absorption  
If the rumen dies, the animal will die

# The Rumen



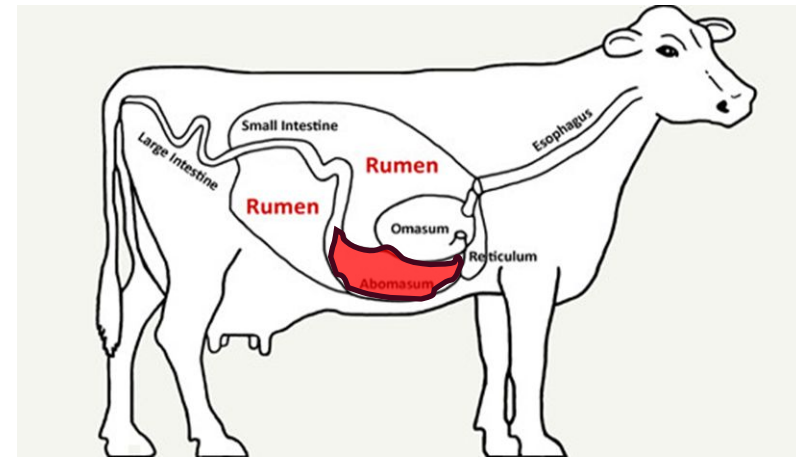


# The Omasum



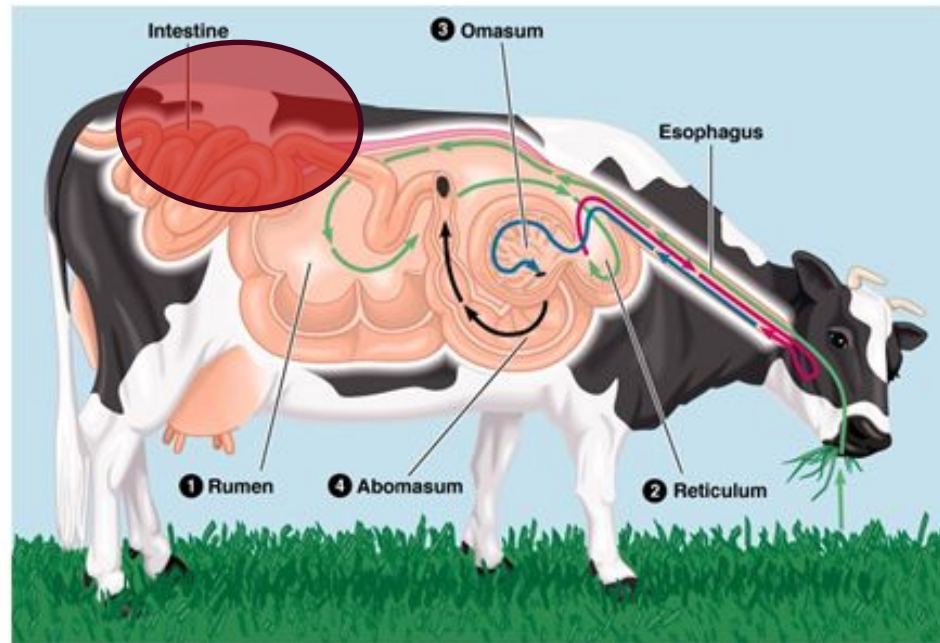
- Removes the water from the digesta
- Book leaves
  - Multiple layers

# The Abomasum



- The “true” stomach  
Glandular
- Excretes HCL  
Gastric Juices

# Site of digestion and nutrient absorption



©1999 Addison Wesley Longman, Inc.



**Gross Energy (GE)**



**Fecal energy**

**Digestible Energy (DE)**



**Urinary and gas energy**

**Metabolizable Energy (ME)**



**Heat increment**

**Net Energy (NE)**

# FEED THE RUMEN FIRST!

## Production Systems

- ✓ Forage Based
- ✓ Moderate Gains
- ✓ Minimal Health Issues
- ✓ Watch starch supplementation

## Rapid Gain Systems (Feedlot)

- ✓ High Grain (up to 90%)
- ✓ Short duration
- ✓ Rapid Gain
- ✓ Increased Management

# WHAT ALL FEED CONTAINS

- Water (except fats, oils, and minerals)
- Energy
  - Net Energy (NE) = Mcal (calories)
  - TDN (Total Digestible Nutrients) = % or lbs
- Protein
  - CP (Crude Protein) = % or lbs
  - MP (Metabolizable Protein) = Dig. Protein in Rumen (by microbes) + By Pass Protein
- Fiber
  - CF (Crude Fiber) = % or lbs
  - NDF, ADF, Lignin = %

# Grains



- High Energy
- Low Protein (10 – 14)
- Rapid Gains
- Most need processing
- Can cause digestive upset
- Reduces forage use



# Protein



- High in CP (28% +)
- High in energy
- Expensive
- Many sources
  - Vary in digestibility (MP)
- Needed to balance energy and feed the rumen
- Grass alone usually adequate in spring and summer months

# Fiber



- Low in energy
- Can be moderate in protein
- Required for rumen integrity
- Many varieties and sources

# Starting Calves

- Free choice good quality hay
- Start with 0.5% animal's body weight for concentrate ( $600\text{lbs} \times 0.005 = 3\text{ lbs concentrate}$ ).
- Increase to full feed over 2 to 3 weeks

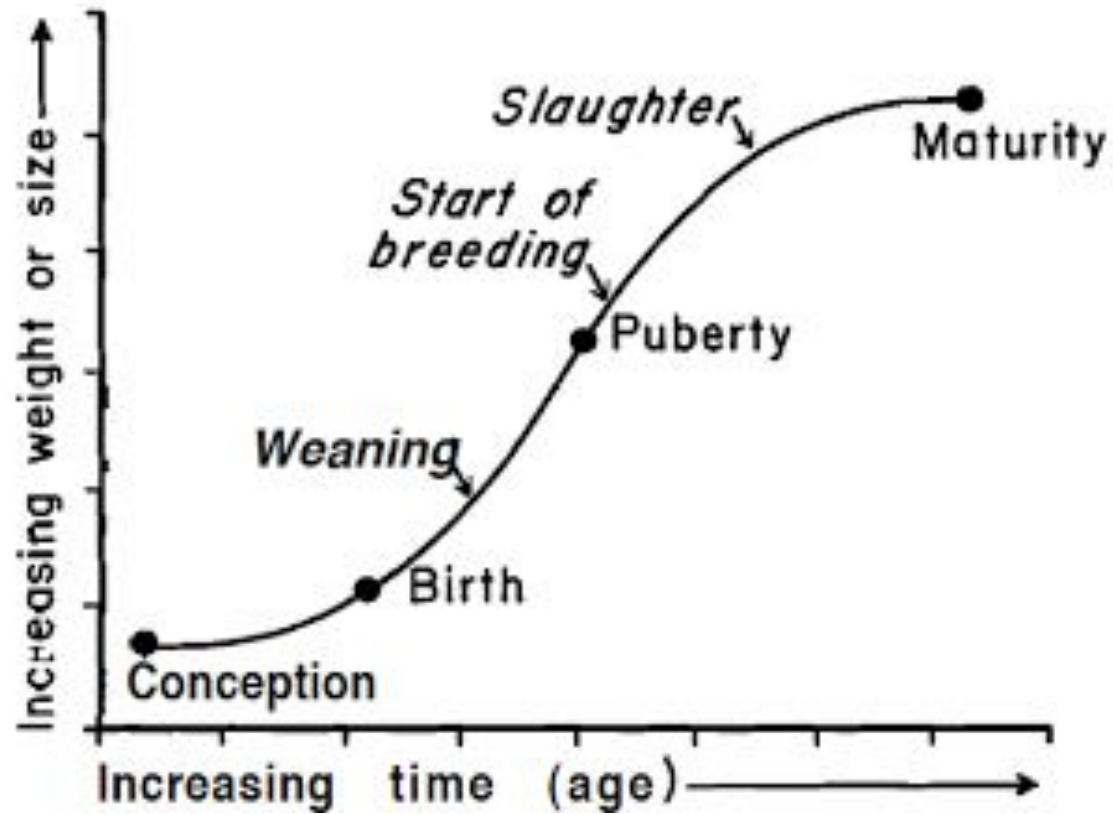
**Table 3. Example diets with varying roughage and fat levels.**

Type Diet Diet ID	Starter A	Growers		Finishers			
		B	C	D	E	F	G
<b>Ingredients, percentage</b>							
Corn	35	46	51	57	62	57.5	57
Cottonseed hulls	39	30	25	20	15	18	18
Cottonseed meal	8	7	7	6	6	6	6
Soybean meal	8	7	7	7	7	7	7
Alfalfa dehy	5	5	5	5	5	5	5
Molasses	3	3	3	3	3	3	3
Limestone	1.25	1.25	1.25	1.4	1.4	1.4	1.4
Salt	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Dicalcium phosphate	0.25	0.25	0.25	0.1	0.1	0.1	0.1
Vitamin A, D, E	+	+	+	+	+	+	+
Fat	0	0	0	0	0	1.5	1.0
Protected fat	0	0	0	0	0	0	1.0
Trace mineral	+	+	+	+	+	+	+
Ionophore	+	+	+	+	+	+	+
<b>Nutrient content (as-fed basis)</b>							
NEM, Mcal / lb	61	66	69	72	76	76	76
NEG, Mcal / lb	36	41	44	47	50	50	50
TDN, %	59	62	65	67	69	69	69
Crude protein, %	12.4	12.1	12.4	12.3	12.5	12.2	12.2
Crude fiber, %	20	16	14	12	11	12	12
Fat, %	2.2	2.5	3.6	2.7	2.8	4.2	4.6
Calcium, %	0.67	0.66	0.65	0.67	0.66	0.66	0.66
Phosphorus, %	0.32	0.33	0.34	0.31	0.32	0.31	0.31
<b>Predicted performance based on 1,100-pound steers</b>							
Feed Intake, lb	-	-	26.1	25.6	24.9	24.9	24.7
Avg. Daily Gain, lb	-	-	2.59	2.75	2.85	2.85	2.86
Feed/lb ADG, lb	-	-	10.05	9.32	8.75	8.74	8.63
<b>Predicted performance based on 800-pound steers</b>							
Feed Intake, lb	20.7	20.7	20.5	20.2	19.6	19.6	19.4
Average daily gain, lb	1.95	2.40	2.59	2.75	2.85	2.85	2.86
Feed/lb ADG, lb	10.62	8.64	7.92	7.34	6.89	6.87	6.80
<b>Predicted performance based on 500-pound steers</b>							
Feed Intake, lb	15.5	15.5	15.3	-	-	-	-
Average daily gain, lb	2.08	2.54	2.73	-	-	-	-
Feed /lb ADG, lb	7.43	6.10	5.61	-	-	-	-

# Considerations

- Group feeding
- Feeding twice a day
- Don't "slug" feed
- Watch bunks closely
- "Mash" near show?

## Young vs. Old: Does it Matter?





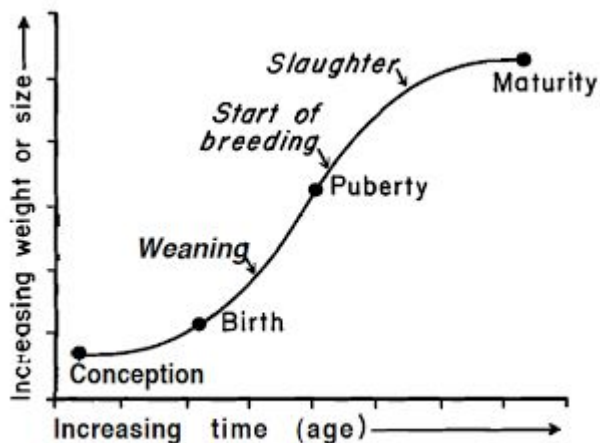
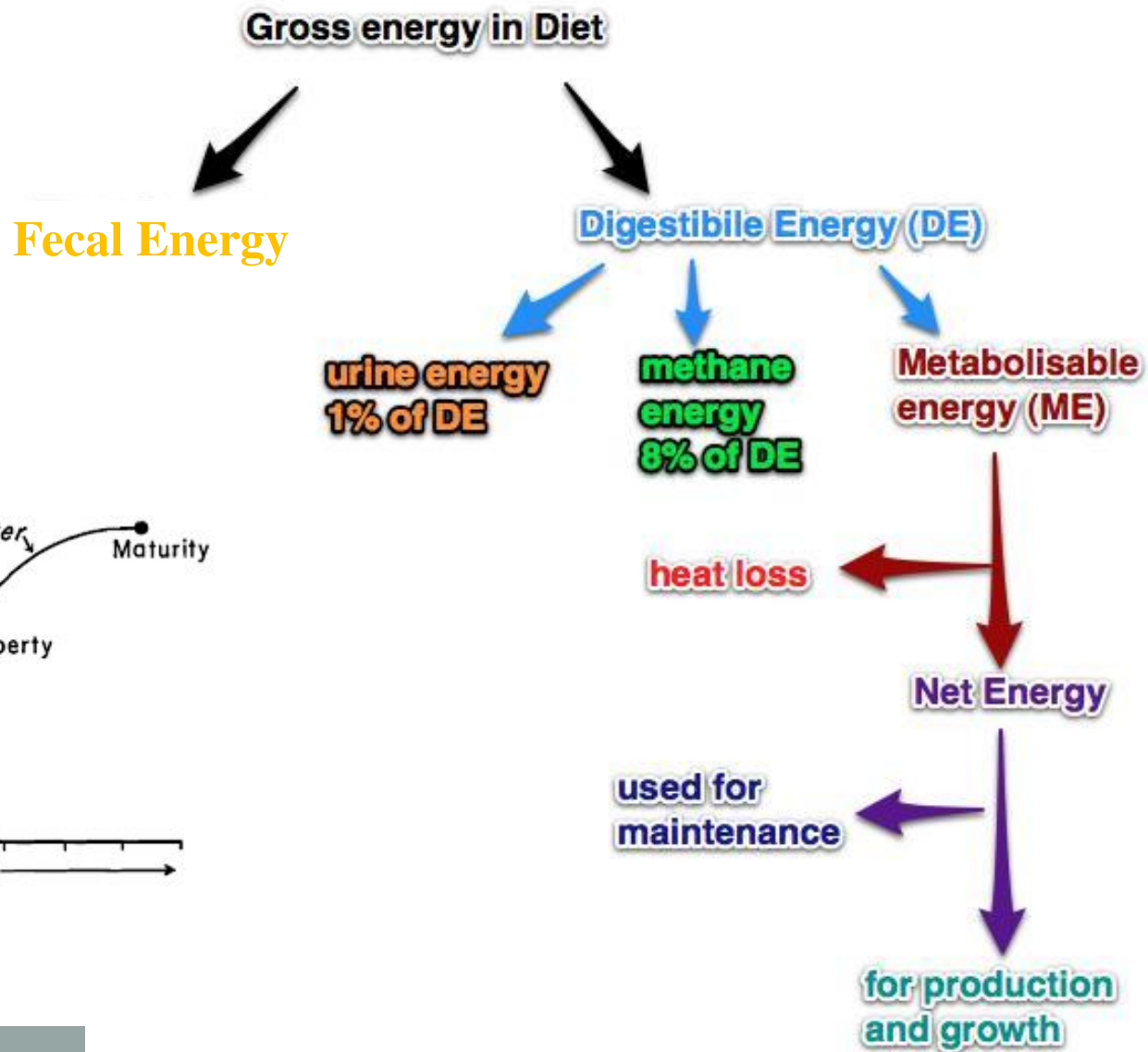


Fig.2 Simplified growth curve

# In a nutshell

- You are asking a cow to maintain body condition (perhaps lose slightly), produce milk/raise calf, and develop new calf.
- You are asking a heifer to do all of that **AND** attain another 20-25% of her body weight.
- You are asking yearlings to attain puberty, breed, and grow.
- *You aren't asking the same thing of each group, so you can't feed them same in a limiting environment.*

# Example: May

- First calf heifer and mature cow
- Dry spring so forage is marginal but not limited
- Calved in February = approximately 3 months into lactation
- TDN = Total Digestible Nutrients
- NEm = Net Energy Maintenance
- CP = Crude Protein

lbs or Mcal	1100 lb mature cow (mod milk)	1 <sup>st</sup> calf heifer (800 lbs)	1100 lb mature cow (mid 1/3)	Supplied by range
<b>TDN</b>	<b>16.5</b>	<b>14.1</b>	<b>9.7</b>	<b>11</b>
<b>NEm</b>	<b>15.8</b>	<b>14.3</b>	<b>8.5</b>	<b>9.5</b>
<b>CP</b>	<b>2.7</b>	<b>2.5</b>	<b>1.4</b>	<b>1.5</b>

Remember: heifer still needs to gain weight in addition to lactating and getting pregnant. Assuming 0.5lbs/day.

NRC

# In General...

- Pay attention to stage/age of the animals you are feeding.
- Pay attention to your range condition (quantity and quality).
- Tailor your supplement to the deficiency
  - Energy, Protein, Mineral, etc.

## How Do I Know If My Feed Program Is Meeting Cow Demands?

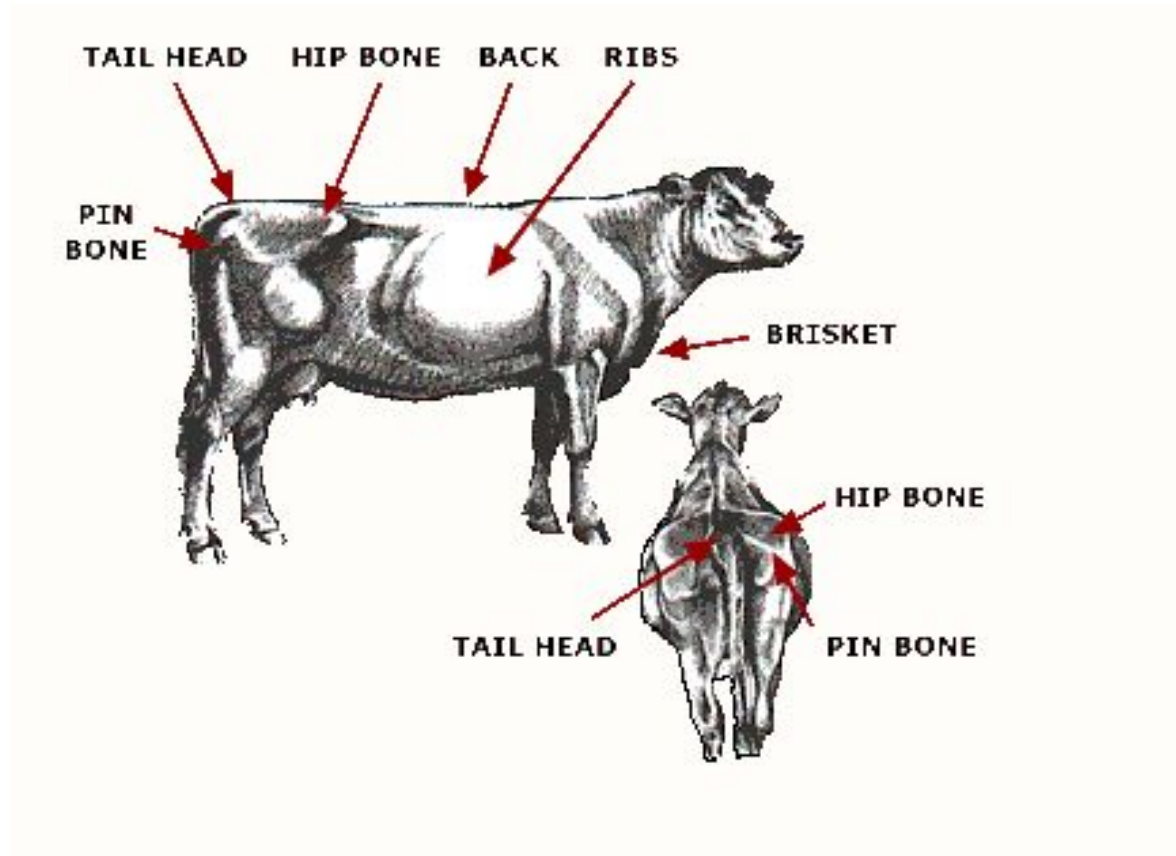
# BCS!

# Body Condition Score: BCS

- Relative fatness or body condition of cow.
- 9 point scale
  - 1 = extremely thin
  - 5 = average
  - 9 = obese



# BCS



# BCS = 2



**Figure 3. BCS 2: Ribs and bone structure easily visible, but no signs of physical weakness.**

# BCS = 3



**Figure 4. BCS 3: Very thin. No visible fat is on the ribs or brisket. Individual muscles in the hindquarters are easily visible and spinous processes are very apparent.**

# BCS = 4



**Figure 5. BCS 4: Thin. Ribs and pin bones are easily visible, and fat over the ribs is not apparent. Two to five ribs are visible. Individual muscles in the hindquarters are apparent.**

# BCS = 5



**Figure 6. BCS 5: Ribs are less apparent than in 4, and there is less than 0.2 inches of fat over the ribeye. Last one or two ribs may be apparent. No fat is present in the brisket. Individual muscles in the hindquarters are not apparent.**

# BCS = 6

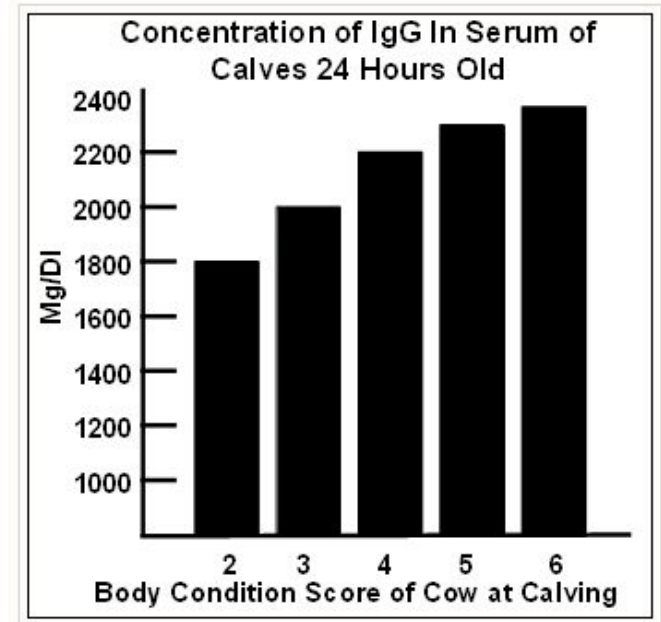


**Figure 7. BCS 6: Appearance is smooth throughout. Some fat deposition is apparent in the brisket. Individual ribs are not visible.**

# BCS Impacts Many Aspects of Production

BCS	Post-Partum Interval Days
3	89 (+285 = 374)
4	70
5	59
6	52
7	31

Houghton et al., 1990



Odde, K.G. 1997



# BCS: When

- 2-3 months before calving
- Weaning
- More frequently in dry conditions
- Managing the cow's nutritional status to get her to reproduce

# If You Choose to Feed

- Energy vs. Protein
- Likely need a roughage source
  - Hay, Soy Hulls, Cottonseed Hulls etc.
- CALCULATE COST BASED ON QUALITY AND TONNAGE NOT TONNAGE ALONE
- NMSU CES can always help with ration development, feeding strategies, etc.

# SHEEP NUTRITION AND MANAGEMENT

## Goals:

- **95% Conception rate**
- **175% Lambing rate** (Dependent on breed and resources)
- **Less than 10% mortality**
- **Longevity of breeding flock**

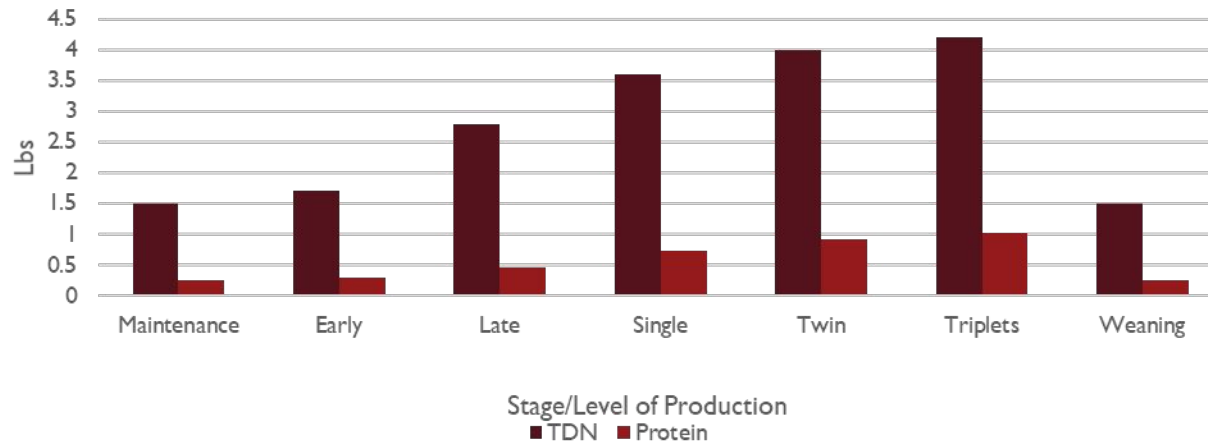
# SHEEP NUTRITION AND MANAGEMENT



- Divide the Management into the various stages of production
- Energy and Protein vary with productions stage and the number of lambs born

# THE EWE

## Ewe Requirements



## EXTRA NUTRITION IS NEEDED.

- To support fetal growth.
- To support mammary tissue development.
- To prevent pregnancy toxemia (ketosis).
- To ensure the birth of strong, healthy lambs of proper birth weight.



# SHEEP NUTRITION AND MANAGEMENT

## Pre-breeding

- Sort for gummer or broken mouths and bad udders
- Do body condition scoring on ewes and rams
- Trim feet if necessary
- Flush ewes with good pasture or add .25 lbs of grain per day 14 days prior to breeding

# SHEEP MANAGEMENT CALENDAR

## Breeding Season

- Keep flushing ewes
- Leave rams in for 60 days maximum





## SHEEP MANAGEMENT CALENDAR

Early Pregnancy thru 4 months

- Stop flushing but avoid rapid weight loss
- Vaccinate for *Vibrio* and *Chlamydia*
- Condition score ewes



# WHAT IS FLUSHING?

## **Definition:**

Increasing the nutrient density of the diet

## **Why?**

To increase body condition and improve ovulation rates



# SHEEP MANAGEMENT CALENDAR

## Last 30 Days Prior to Lambing

- Feed one to two pounds of grain per day
- Give Enterotoxemia Injection to new ewes
- Shear ewes

# DO NOT UNDERFEED EWES

EVEN THE FAT ONES!

- Inadequate nutrition can result in:
  - Pregnancy toxemia (ketosis)
  - Small and weak lambs
  - Higher lamb mortality



# DO NOT UNDERFEED EWES

- Inadequate nutrition can result in:
  - Reduced quality and quantity of colostrum.
  - Poor milk production.
  - Reduced wool production (in offspring) due to fewer secondary follicles.



# DO NOT OVERFEED EWES

- Because ...
  - Fat ewes are more prone to pregnancy toxemia
  - Fat ewes experience more lambing difficulties (dystocia).
  - Fat ewes are more likely to prolapse.
  - Large fetuses can cause dystocia.
  - Oversized lambs have a higher mortality.
  - Fat is expense to put on.



# TWO COMMON HEALTH PROBLEMS

## Pregnancy toxemia

- Inadequate energy intake during late gestation.
- Treat with propylene glycol or IV glucose (or c-section).

## ■ Milk fever

- Low blood calcium caused by not enough or too much calcium in diet.
- Treat with IV or sub-Q calcium solution.



Similar symptoms

# NUTRITION LIABILITIES

## SELENIUM

*Narrow Margin*

*Deficiency*  
*< 2.5 ppm*

White Muscle Disease  
Retained Placentas  
Poor Immunity

*Requirement*  
*2.5ppm*

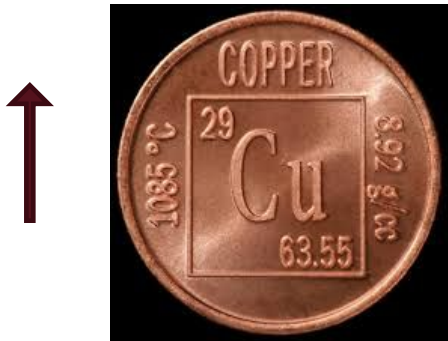
Immunity  
Reproduction  
Growth

*Toxicity*  
*5ppm*

Alkali Disease  
Blind Staggers  
Death



# THINGS TO CONSIDER



Requirement = Up to 5 ppm/d

=



Toxicity = As low as 6 ppm/d



Toxicity = As low as 6 ppm/d

FEED & SUPPLY STORE

## LOCAL 12 FEED

For weaned beef cattle on pasture and feedlot animals,  
and maintenance of mature horses

### GUARANTEED ANALYSIS

Crude Protein Min.....	12.00%
Crude Fat Min.....	3.00%
Crude Fiber Max.....	6.50%
Acid Detergent Fiber Max.....	8.50%
Calcium (Ca) Min.....	0.80%
Calcium (Ca) Max.....	1.30%
Phosphorus (P) Min.....	0.40%
Salt Min.....	0.40%
Salt Max.....	0.90%
Potassium Min.....	0.50%
Copper Min.....	10.0 ppm
Copper Max.....	15.0 ppm
Selenium (Se) Min.....	0.30 ppm
Zinc (Zn) Min.....	75.0 ppm
Vitamin A. Min.....	3,500 IU/lb

## THINGS TO CONSIDER

Feed Stuff	Cu levels (ppm)
Soybean Meal	22.4
Dried Distillers Grains	83.9
Molasses	21.6-65.7
Cotton Seed Cake	7.9
Protein Tub	300-1800

**INTAKE MATTERS!!!**

# Summary

- Know what you are feeding
- Be aware of toxicities
- Manage groups if possible

# Questions?

Craig Gifford

**Extension Beef Cattle Specialist**

**Department of Extension Animal Sciences and Natural  
Resources**

**New Mexico State University**

**P.O. Box 3000, MSC 3AE**

**Las Cruces, NM 88003**

**[cgifford@nmsu.edu](mailto:cgifford@nmsu.edu)**

**Phone: 575-646-6482**

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