



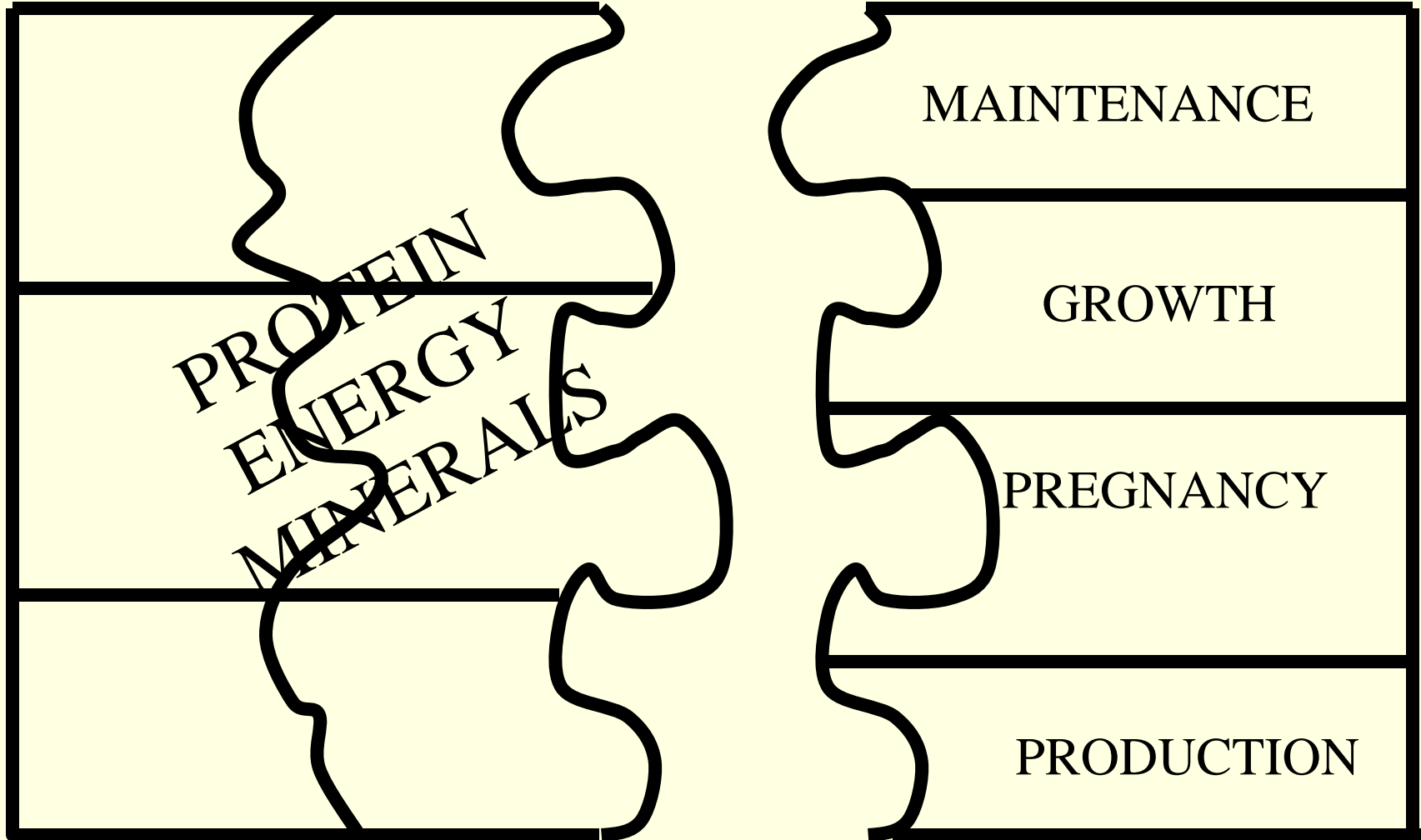
# Goat Nutrition Feeds & Feeding

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Oregon State University Extension Service**

# The Nutrition Puzzle

FEED  
NUTRIENTS

ANIMAL  
REQUIREMENTS



# Factors Effecting the Nutrient Requirements of Goats

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## ■ Animal Productivity

- Maintenance and activity level
- Stage of Pregnancy, kidding rate
- Stage of lactation/milk production
- Growth or weight gain

## ■ Animal Biotype

- Meat, Dairy, Fiber
- Full blood or crossbred



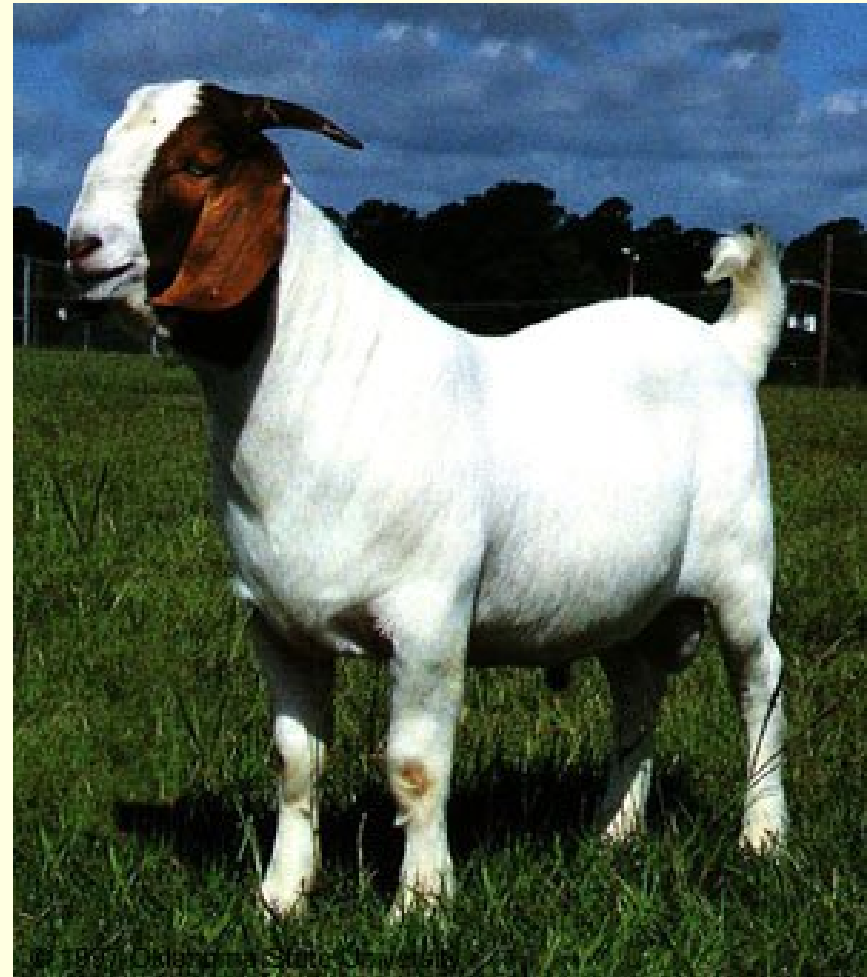
**These animals have different needs**



# Other Factors Important in Assessing Animal Needs

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- Weight
- Maturity
- Sex
- Body Condition
  
- Goals
  - Market
  - Breeding
  - Showing
  - Pet

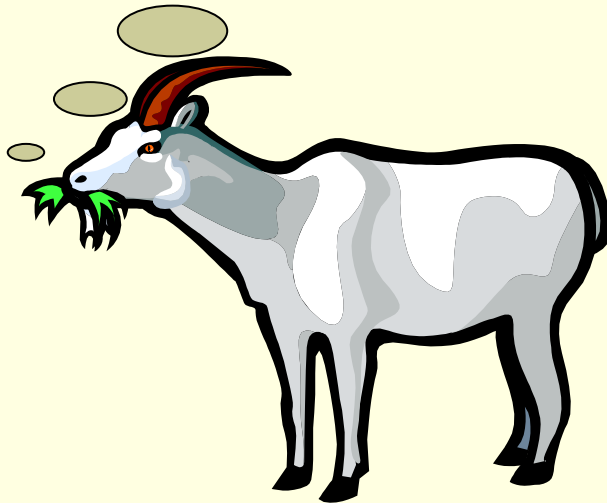


# Animal Requirements

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In ration balancing we use percentages, but...

nutrients are required as lbs or units



- Animals need to eat the proper amount of nutrients
- Monitor feed intake and nutrient content of feeds. Poor quality feeds can limit intake.
- Don't be misled by percentages...

## Requirements: Mature Does Maintenance, 110 vs. 132 lb

Body Weight (lb)	Feed Intake (lb/day)	Energy as TND (lb/day)	Energy % TDN (%)	Protein (lb/day)	Protein (%)
110	2.2	1.17		0.15	
132	3.2	1.32		0.17	

Source: Nutrient Requirements of Small Ruminants (NRC 2006)

## Requirements: Mature Does Maintenance, 110 vs. 132 lb

Body Weight (lb)	Feed Intake (lb/day)	Energy as TND (lb/day)	Energy % TDN (%)	Protein (lb/day)	Protein (%)
110	2.2	1.17	53.2	0.15	6.8
132	3.2	1.32	41.3	0.17	5.3

Source: Nutrient Requirements of Small Ruminants (NRC 2006)

# Important Points

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- Smaller does eat less, therefore require feeds higher in protein and energy on a percentage basis than larger does.



## Requirements: mature does (132 lb) at different productivity levels

Productivity	Feed Intake (lb)	Energy as TDN (lb/d)	Energy as TDN (%)	Protein (lb/d)	Protein (%)
Maintenance	3.2	1.3	40.6	0.17	5.3
Late Pregnancy (twins)	4.3	2.8	65.1	0.47	11.0
Early Lactation (twins)	4.1	2.2	53.7	0.23	5.7

Source: Nutrient Requirements of Small Ruminants. NRC 2006)

# Nutrition of Newborn Kids

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- Colostrum – first milk produced by doe
- Within first hour after birth; gut closure at 6 hr
- Contains passive immunity



# Important Points

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- The highest nutrient requirement time for the doe is late pregnancy.
- This is different than with the ewe and the cow.
- Watch feed intake carefully with pregnant does.
- Don't let does get too fat.



## Requirements: 275 lb Mature Buck at Maintenance and Pre-breeding

Activity	Feed Intake (lb/day)	Energy as TND (lb/day)	Energy as TDN (%)	Protein (lb/day)	Protein (%)
Maint.	5.0	2.65	52.9	0.32	6.4
Pre-breeding	5.5	2.91	52.9	0.35	6.5

Source: Nutrient Requirements of Small Ruminants. NRC 2006)

# Requirements: Growing Doelings and Male Castrates gaining 0.22 lb/day

Body Weight (lb)	Feed Intake (lb/day)	Energy as TND (lb/day)	Energy as TDN (%)	Protein (lb/day)	Protein (%)
44	1.43	0.97	67.8	0.21	15.3
77	2.65	1.27	48.3	0.27	10.0

Source: Nutrient Requirements of Small Ruminants. NRC 2006)

# Requirements: Growing Doelings and Male Castrates gaining 0.45 lb/day

Body Weight (lb)	Feed Intake (lb/day)	Energy as TND (lb/day)	Energy as TDN (%)	Protein (lb/day)	Protein (%)
44	1.46	1.30	89.4	0.34	23.4
77	2.43	1.63	67.1	0.39	16.2

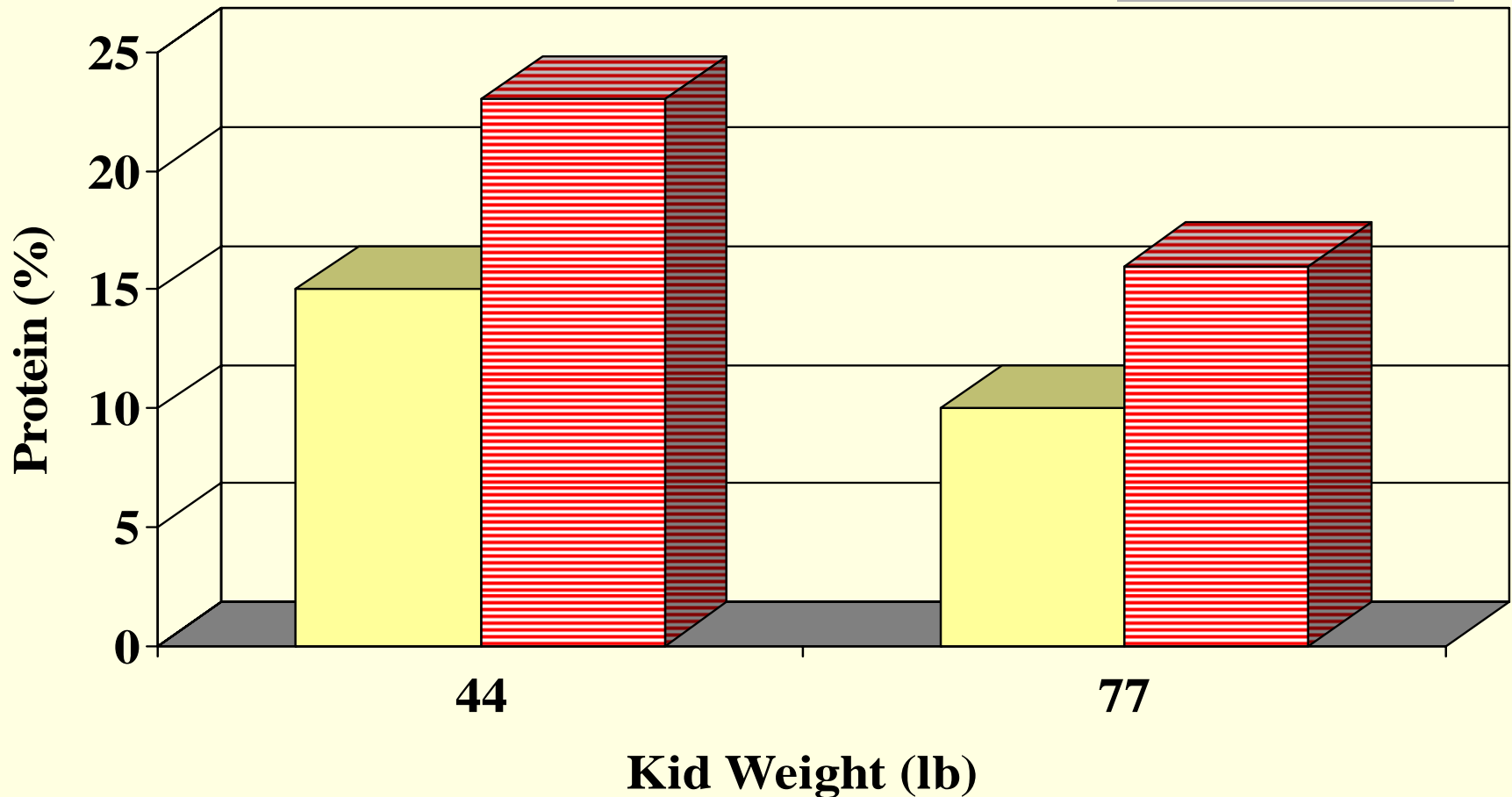
Source: Nutrient Requirements of Small Ruminants. NRC 2006)

# Important points

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- Percent protein and energy required in the diet are lower for larger animals.
- Total pounds of protein and energy required by the animal are higher for larger goats.
- Higher amounts of protein and energy are required for higher rates of gain (both on a percentage basis and as total pounds).

# Protein requirement of growing doelings and male castrates (yellow = .22, red = .45 lb/day gain)

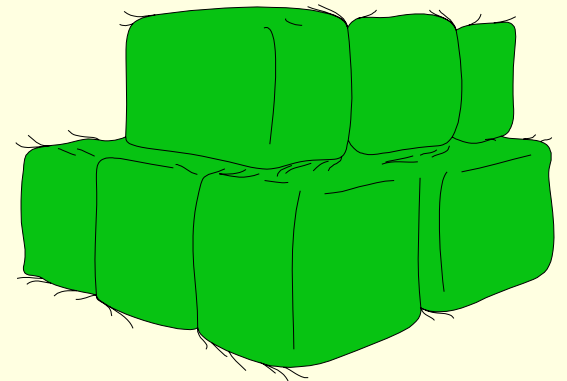
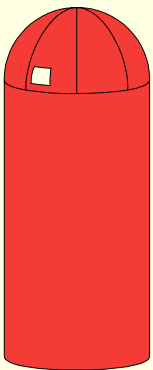
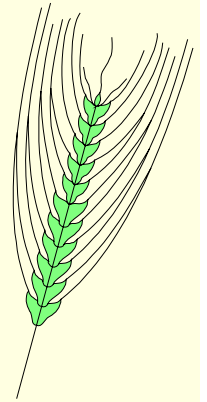


Protein (lb/d) = 0.21 0.27 0.34 0.39

# Technical Notes on Protein Requirements

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- Not all proteins are created equal.
- Different protein sources (feeds) influence amount of protein required in the diet.
- To accurately balance rations, protein source needs to be considered.



# Technical Notes on Protein Requirements

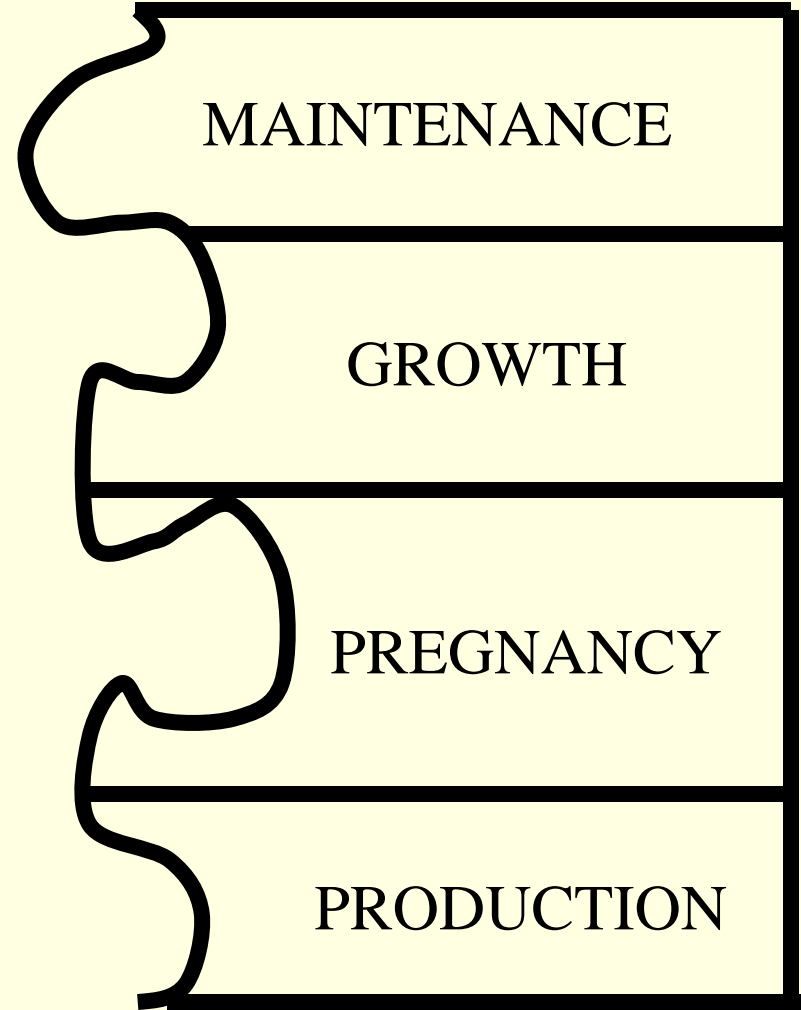
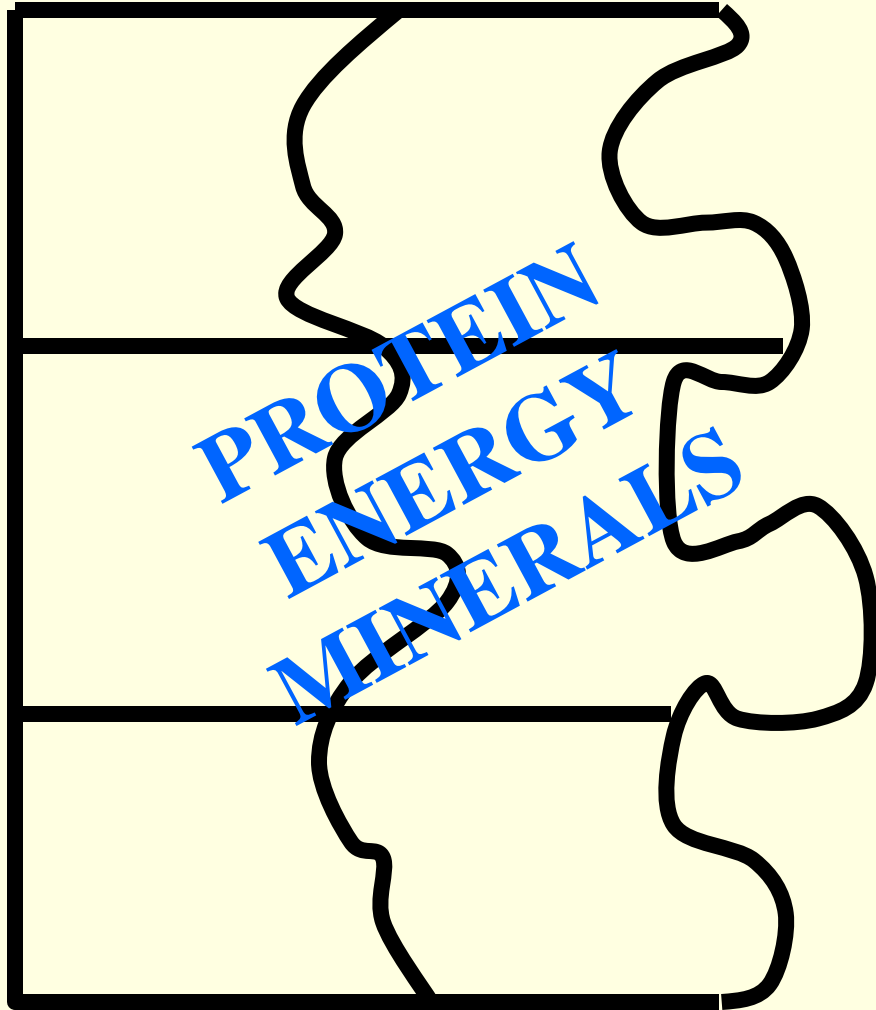
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- Requirements listed here are for crude protein based on a ration containing alfalfa hay and corn.
- Pasture-based diets will require greater amounts of crude protein for the animal.
- Soy-corn based diets will require lesser amounts of crude protein for the animal.

# The Nutrition Puzzle

**FEED VALUE**

ANIMAL  
REQUIREMENTS



# Grass/Clover Hay

	<b>LOW- PROTEIN (5-8.9%CP)</b>	<b>MID- PROTEIN (9-11.9%CP)</b>	<b>HIGH- PROTEIN (12-16%CP)</b>
<b>CRUDE PROTEIN (%)</b>	<b>6.9</b>	<b>9.9</b>	<b>12.5</b>
<b>TOTAL DIGESTIBLE NUTRIENTS (%)</b>	<b>56</b>	<b>58</b>	<b>60</b>
<b>% OF SAMPLES</b>	<b>64</b>	<b>28</b>	<b>8</b>

# Grass/Alfalfa Hay

	<b>ALFALFA/ GRASS MIX</b>	<b>ALFALFA</b>
<b>CRUDE PROTEIN (%)</b>	<b>17 - 20</b>	<b>16 - 24</b>
<b>TOTAL DIGESTIBLE NUTRIENTS (%)</b>	<b>59 - 61</b>	<b>56 - 65</b>

# Hay Values

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Test your hay!



# Pasture Grasses

<b>MATURITY</b>	<b>CP</b>	<b>TDN</b>
<b>VEG-BOOT</b>	>18	70 - 85
<b>BOOT-EARLY HEAD</b>	13-18	65 -70
<b>HEAD-MILK</b>	8-12	60 – 65
<b>DOUGH</b>	<8	<60

Clover and other legumes have high nutrients pre-bloom, lower post-bloom

# Forage Value & Plant Maturity

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As plants mature:

- Fiber increases
- Protein & energy decrease
- Digestibility decreases
- Feed intake decreases



# Herbage and Browse Utilization

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- Preference for shrubs & tree leaves & grass heads
- Select from a wide array of plants
- Will eat more of preferred species
- Browse (leaves & twigs) contain higher levels of protein & phosphorous during growing season than grasses
- Some browse is unpalatable
  - High lignin, silica, essential oils, etc.

# Nutrient Content of Browse

Browse	Protein (%)	Energy (%TDN)
Blackberry - July	8.6	72
- Sept	8.2	73
Oak	11 - 17	-
Myrtle	9	70
Elm	7.8	-
Mesquite	16.2	45
Bamboo	17	59
Grapevine leaves	9	72
Source: Nutrient Requirements of Small Ruminants (NRC 2006)		

# Protein Supplements

<b>Description</b>	<b>Protein %</b>	<b>Energy (TDN%)</b>
<b>Alfalfa hay</b>	18 - 24	60 - 65
<b>Cottonseed meal</b>	46	80
<b>Soybean meal</b>	44	84
<b>Peas</b>	25	86
<b>Pellets</b>	Varies (see tag)	
<b>Blocks</b>	Varies (see tag)	

# Energy Supplements

<b>Grain</b>	<b>Protein %</b>	<b>Energy (TDN%)</b>
<b>Corn</b>	9	88
<b>Oats</b>	13	76
<b>Barley</b>	12	84
<b>COB</b>		



# Other Nutrient Sources

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- Minerals are provided through feeds & supplement mixes (loose or blocks)
- Especially check for selenium and copper included
- Grass hay also contributes some protein, energy, and minerals to the diet

# Trace Mineral Supplements

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- ❑ A complete goat mineral, trace mineralized salt with selenium, should be offered free choice year-around.
- ❑ Trace minerals are involved in vital processes & functions in the body

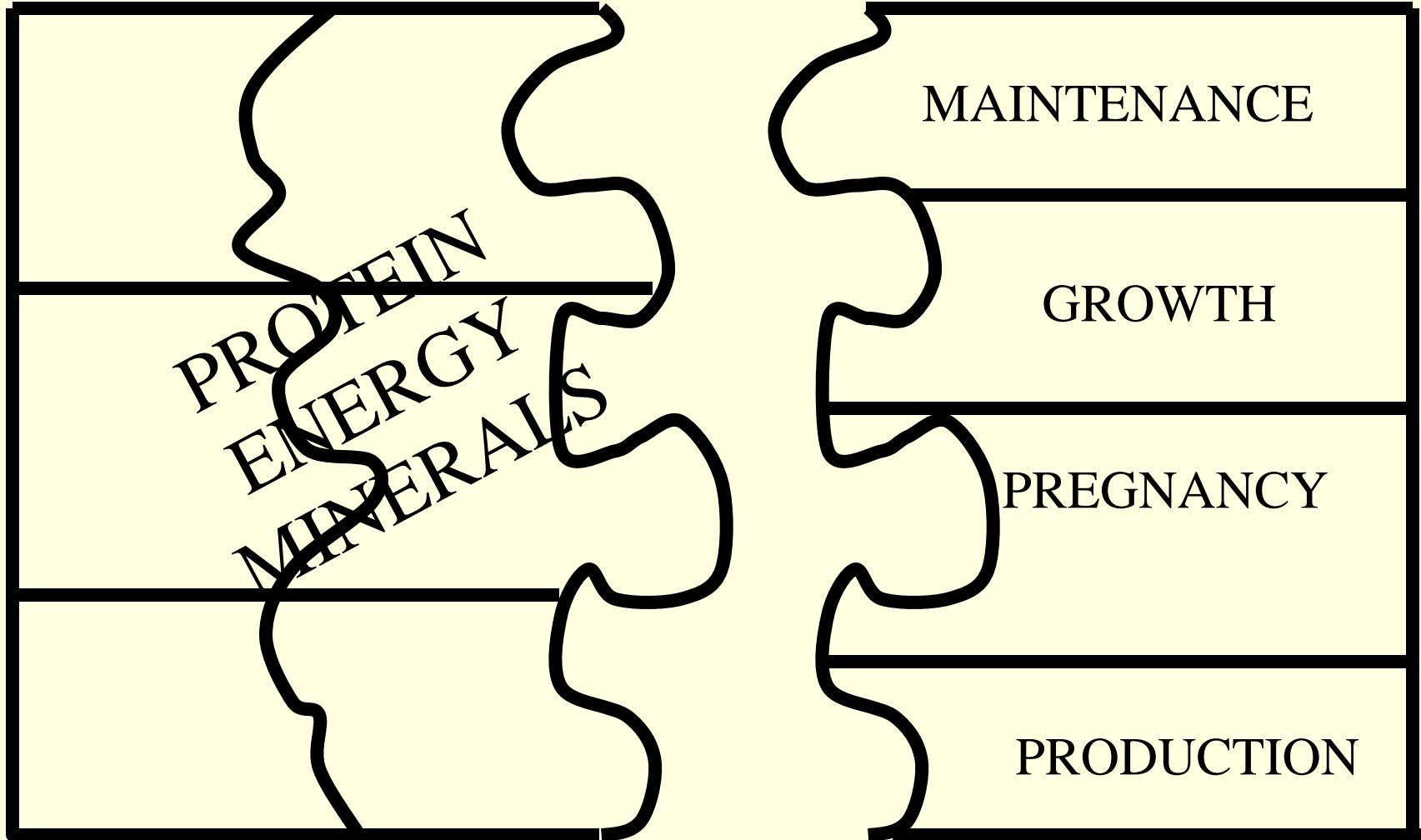
- Copper
- Selenium
- Manganese
- Cobalt
- Iodine
- Zinc



# The Nutrition Puzzle

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# Pasture in Peak Growing Season

- Vegetative growth, sufficient quantity
- Meets requirements for
  - Protein
  - Energy
  - Vitamins
- Usually low cost
- Feed mineral supplement
- Goats prefer browse to grass



# Steps to effective grazing management

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- Graze to desired stubble height
- Allow adequate rest periods for grass regrowth
- Don't regraze pastures until your key species has reached the desired height



# Feed

- ❑ Low quality grass hay will not meet nutrient requirements of pregnant, lactating, or growing goats
- ❑ Supplementation!
- ❑ Clean, fresh water available at all times
- ❑ Weigh feed to know how much you're feeding



# Balancing the Ration

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Langston University  
Goat Research Extension

- <http://www2.luresext.edu>
- Click on goats
- Click on nutrient calculators

~ or ~

**Pearson Square** method to balance ration



# Example Ration for Late Pregnancy Doe (132 lb.)

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<b>Alfalfa hay</b>	0.5 lb/day As fed
<b>Grass hay</b>	0.6 lb/day
<b>Corn</b>	1.25 lb/day

# Example Ration for Weight Gain

55 lb Doeling gaining 0.22 lb/day

<b>Alfalfa hay</b>	1.8 lb/day As fed
<b>Grass hay</b>	0.0 lb/day
<b>Corn</b>	0.5 lb/day

# Bucks

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- Protein
- Over feeding
- 1 lb grain/day plus forages
- Adjust grain to body condition



# Changing Feed

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- Any changes should be done slowly
- Changing type or amount feed takes time
- Introduce new feeds  $\frac{1}{4}$  lb/day
- Rumen microbes need time to adapt
- Feed at the same time each day
- Feed twice per day

# Nutrition impacts on Reproduction

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- Nutrition affects...
  - Ovulation rate - flushing
  - Embryo survival – continue flushing
  - Fetal health
  - Kid survivability
  - Kid health
  - Kid weaning weight

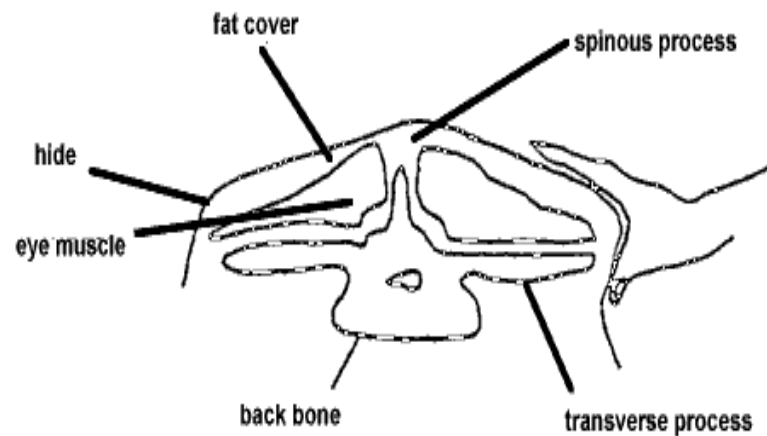
# Flushing

- Feed breeding age goats extra protein and/or energy 30 days before & after introduction of bucks
- Improves fertility & increases conception and multiple births
- Dependent on quantity and quality of available forage and condition of does



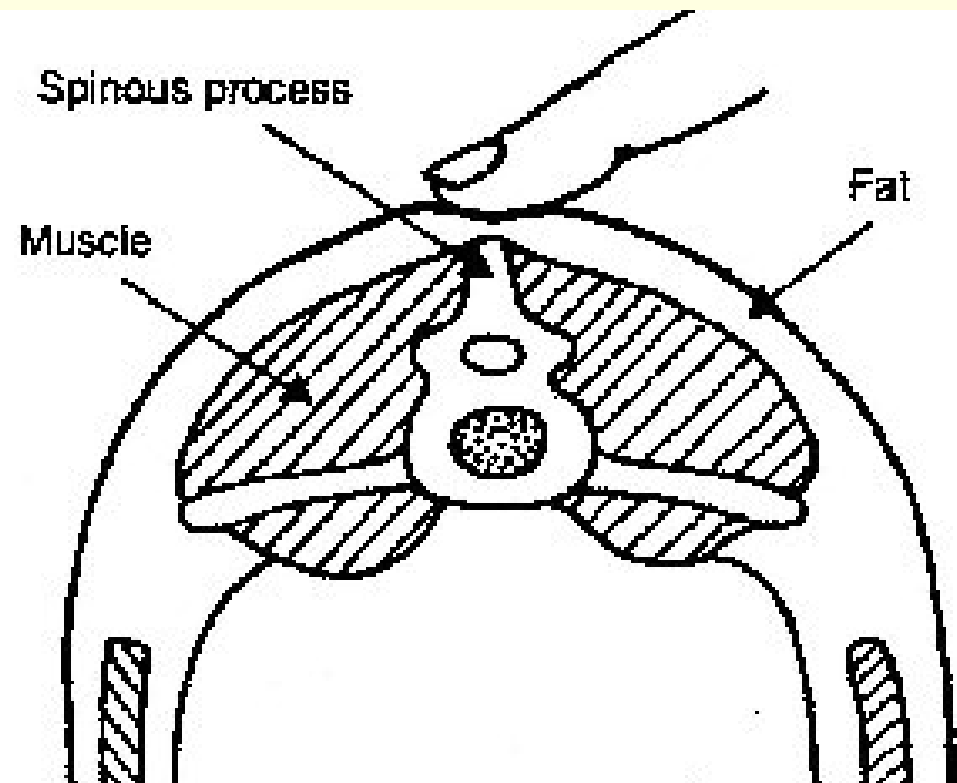
# Body Condition Scoring

- A measure of energy reserves
- Refers to fleshiness of an animal
- Scale of 1 – 5 (emaciated to obese)
- Effectiveness of feeding management



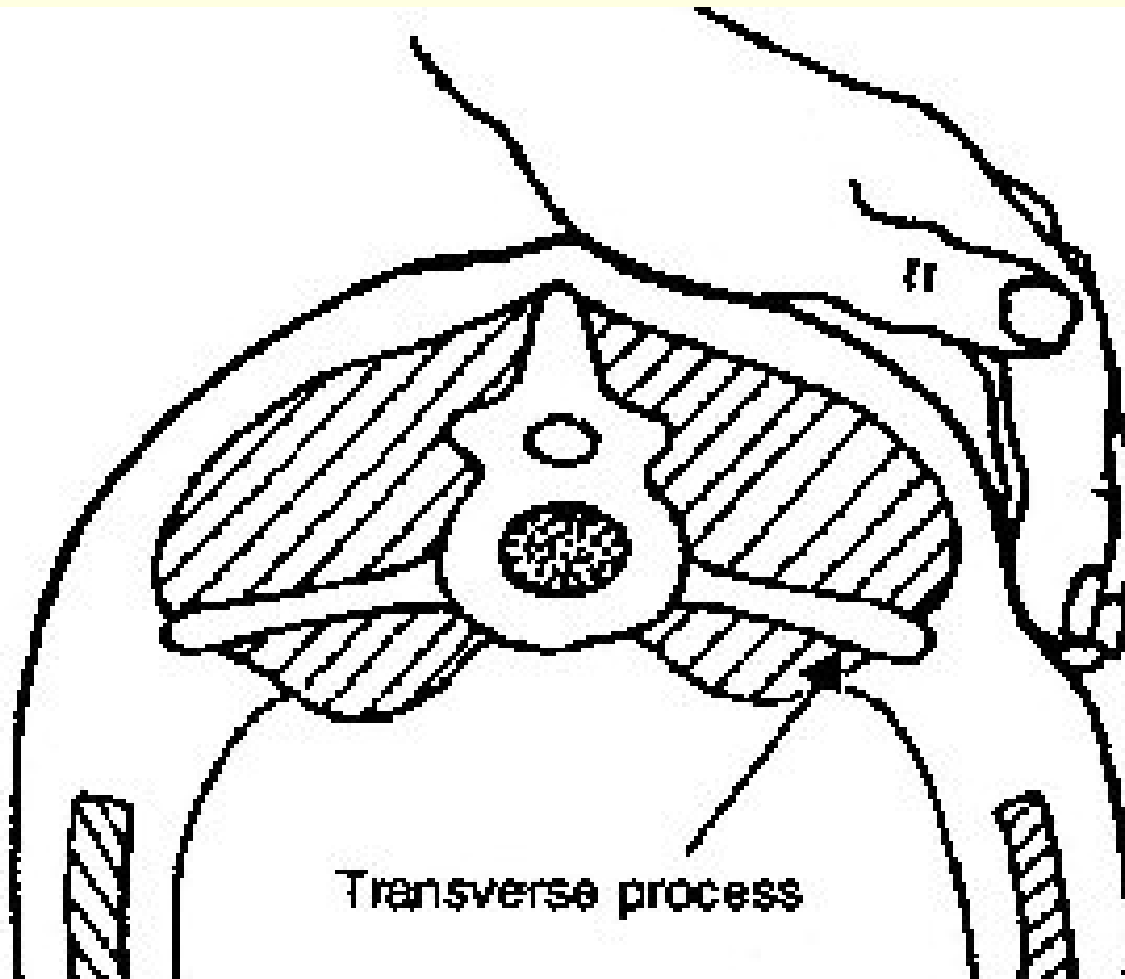
Feel for the spine in the center of the animal's back, behind its last rib and in front of its hip bone.

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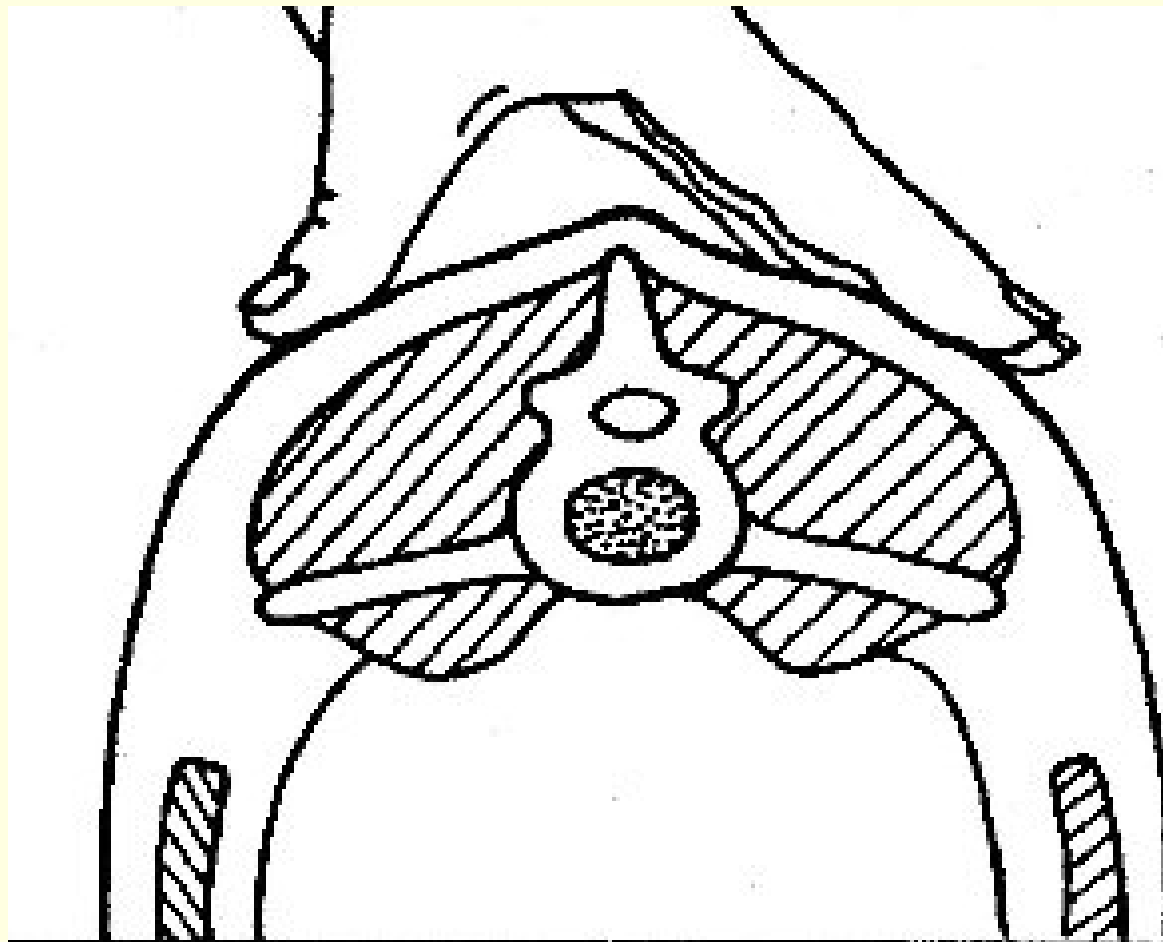
Feel for the tips of the transverse processes

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Feel for fullness of muscle and fat cover.

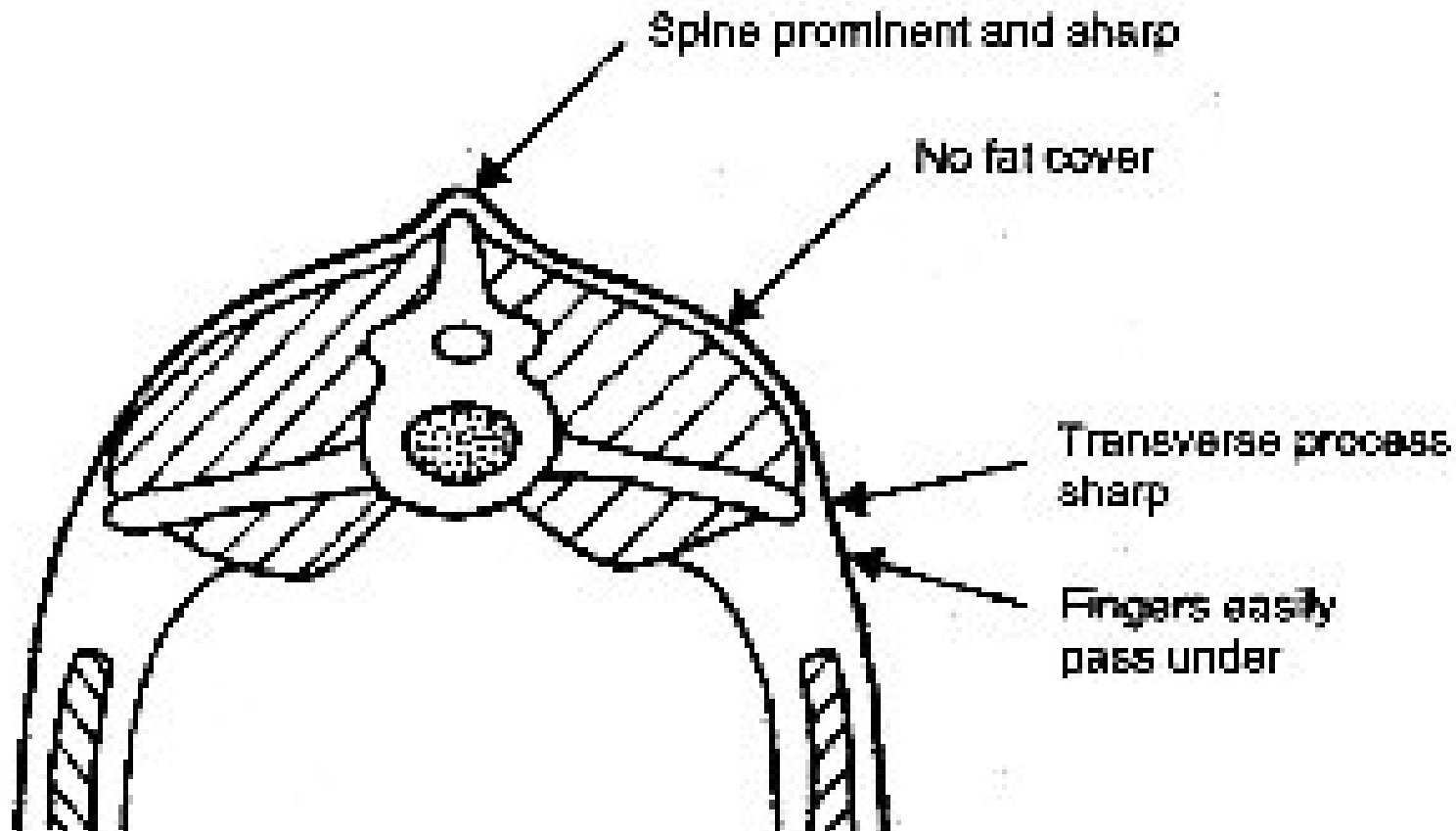
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Condition 1 (Emaciated): Spinous processes are sharp and prominent. Loin eye muscle is shallow with no fat cover.

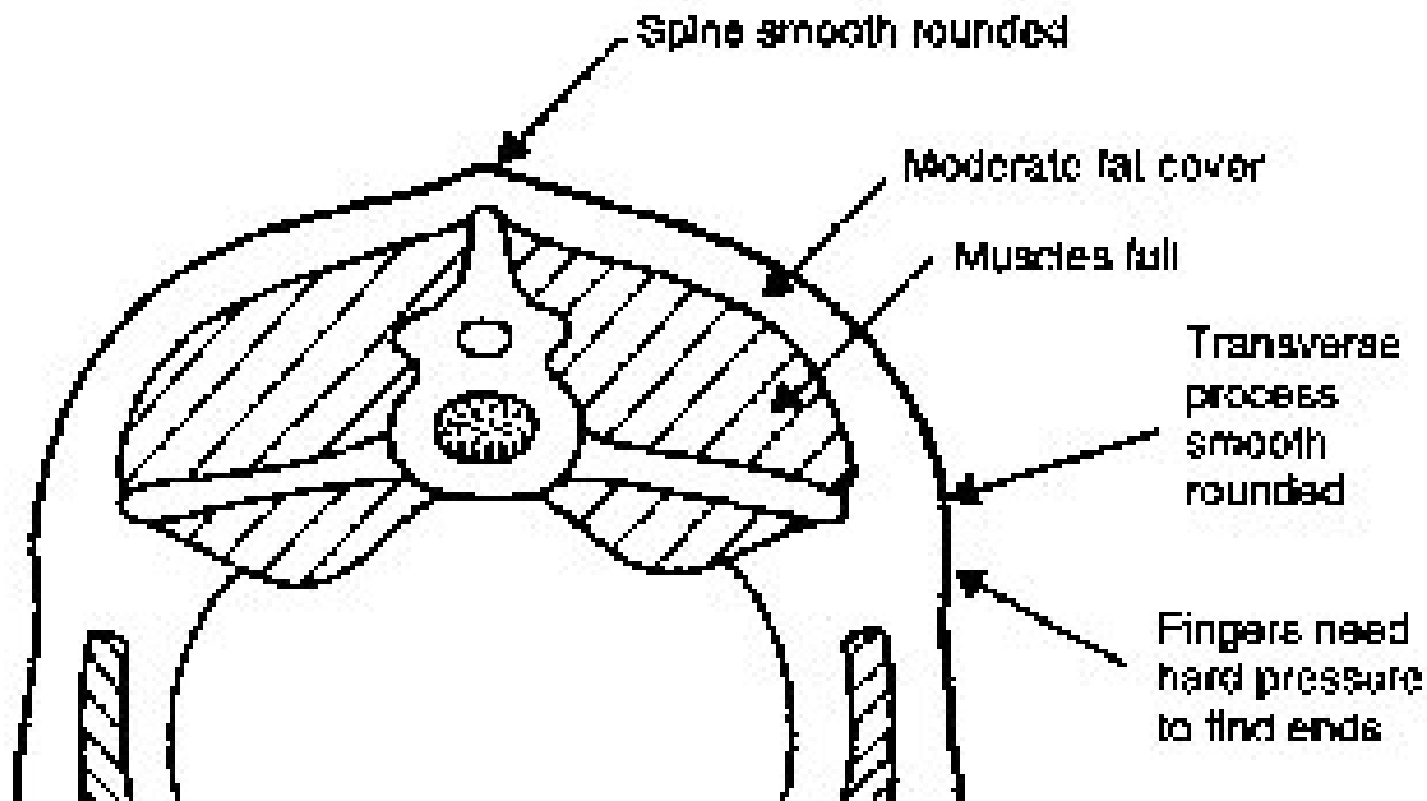
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Transverse processes are sharp; one can pass fingers under ends. It is possible to feel between each process.



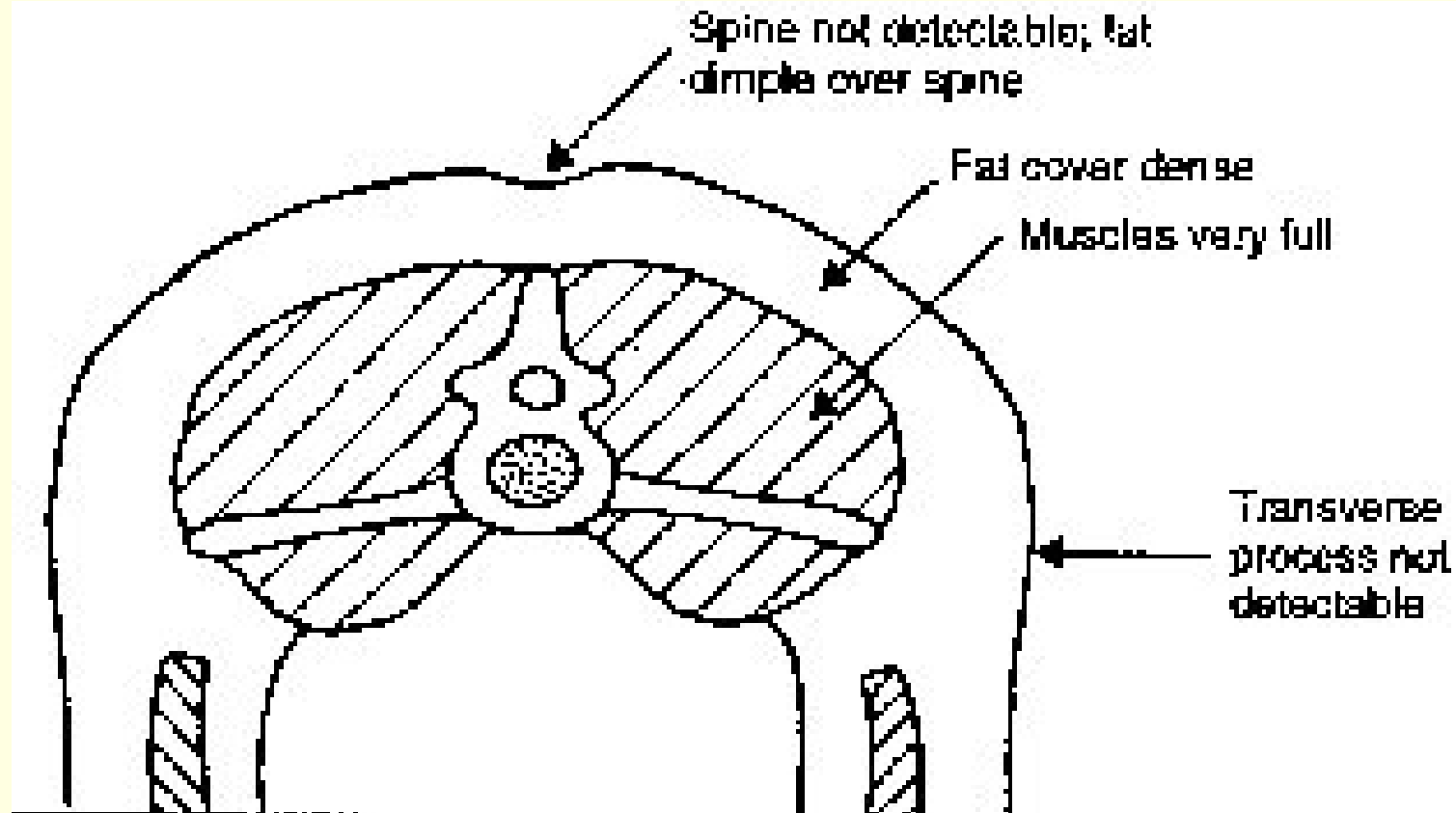
Condition 3 (Average) Spinous processes are smooth and rounded and one can feel individual processes only with

pressure. Transverse processes are smooth and well covered, and firm pressure is needed to feel over the ends. Loin eye muscle is full with some fat cover.



Condition 5 (Obese): Spinous processes cannot be detected. There is a depression between fat where spine would

normally be felt. Transverse processes cannot be detected. Loin eye muscle is very full with a very thick fat cover.





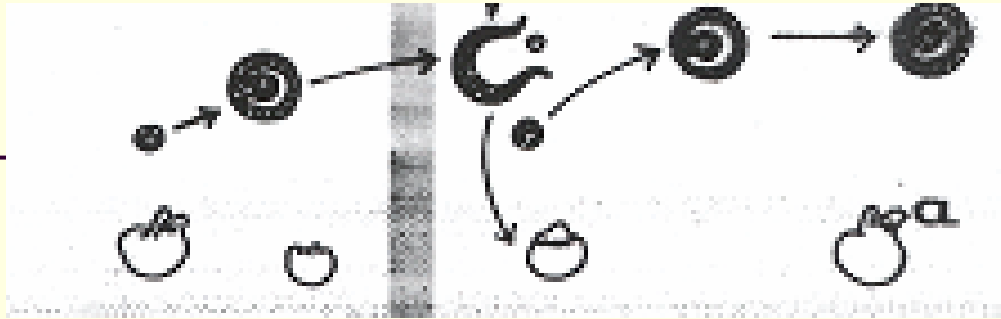
Fat goat



Skinny goat



# Ovulation



- The better the body condition score
  - the higher the ovulation rate
  - the higher the potential kidding percentage
  
- BCS > 4 at breeding
  - tend to have a higher incidence of barrenness
  
- BCS < 3 at breeding
  - more responsive to flushing than those with 3.0-3.5 at mating

# Body Condition

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- Doe body condition score at kidding has an effect on total pounds of kid weaned per doe
- Does with a body condition score of 3 to 4 at kidding lose fewer offspring and wean more pounds of kid than those with a condition score of 2.5 or less

# Suggested Condition Scores for Goats



<b>Production Cycle</b>	<b>Optimum Score</b>
Breeding	3 - 4
Early - Mid Gestation	2.5 - 4
Kidding	
singles	3.0 - 3.5
twins	3.5 - 4
Weaning	2 or higher

# Summary

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- Identify nutritional needs of animal
- Remember that nutritional needs change throughout the production cycle
- Match animal requirements to nutrient value of feeds
- Use body condition score to fine tune nutrition program
- Always have minerals and fresh water available