Sheep and Goat EXPO: Supplemental Feeds and Feeding

Travis Whitney

8-18-17
San Angelo, TX

Supplementation in West Texas

What exactly do you need?

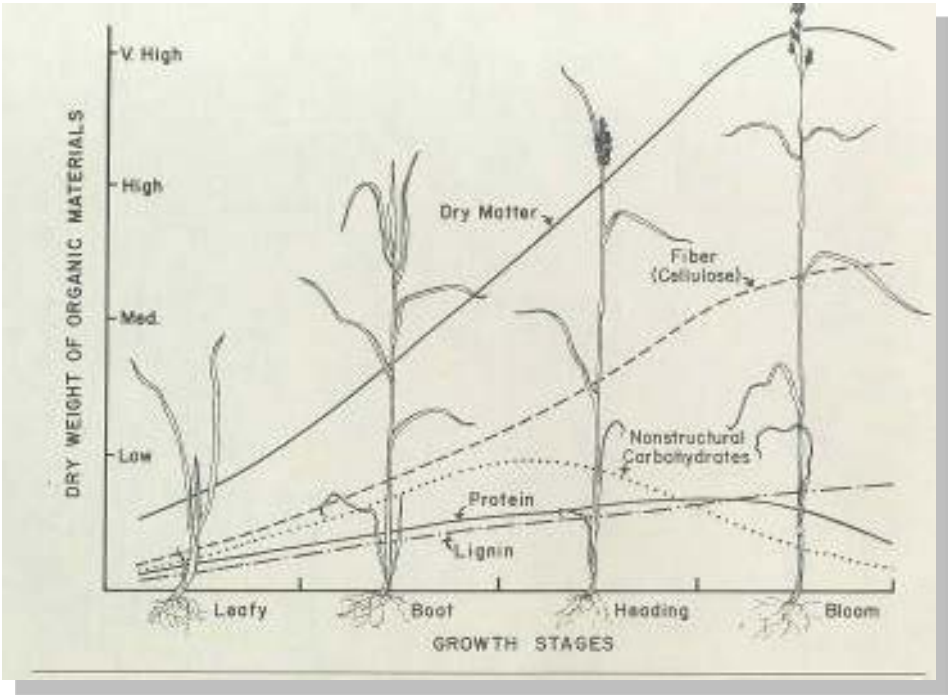
Perennial, Warm-Season Plants

	CP	P	Digestion
GRASS: spring	8	0.13	44
summer	6	0.11	43
fall	5	0.08	34
winter	5	0.06	31
FORB: spring	19	0.21	59
summer	11	0.17	53
fall	14	0.20	53
BROWSE: spring	16	0.22	70
summer	11	0.10	64
fall	9	0.09	58

Supplementation in West Texas

Feed

- *Know* average daily intake and what plants are being consumed
- Know your plants!
- Analyze nutrients & digestibility



Ewe Nutrition: What are you asking from her?

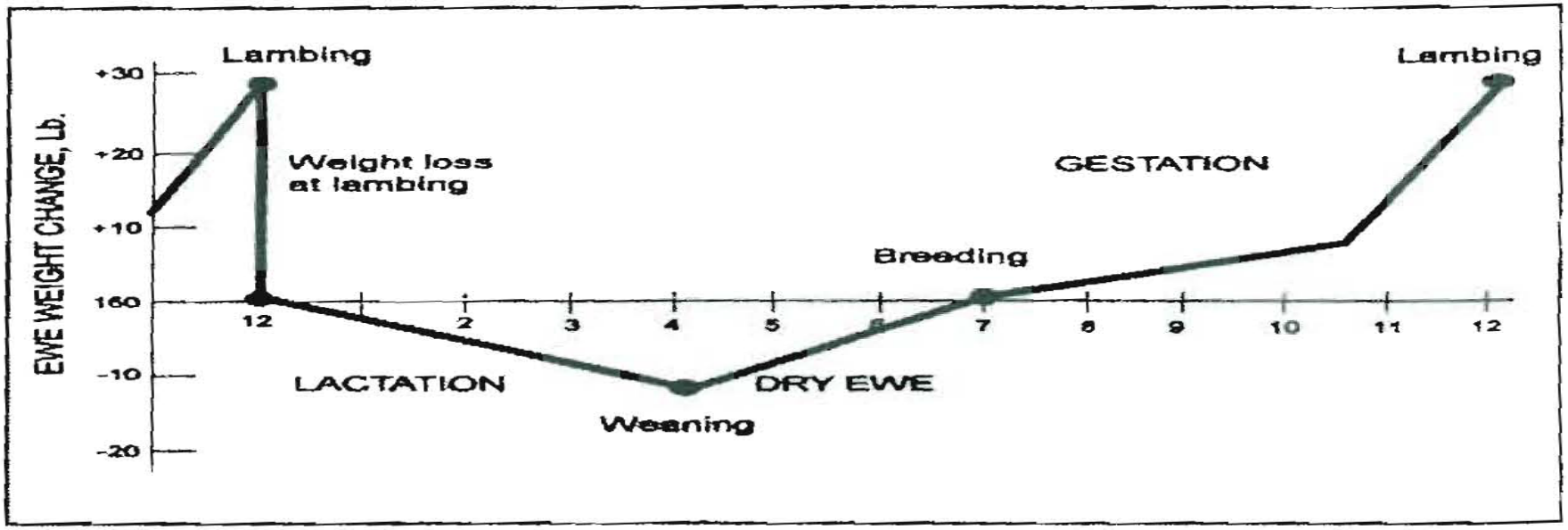


FIGURE 11-1 Annual weight change for single-bearing ewe. Reprinted, with permission, from the American Sheep Industry Association (2006). Sheep Production Handbook, Copyright 2003, All rights reserved.

Ewe Nutrition: What are you asking from her?

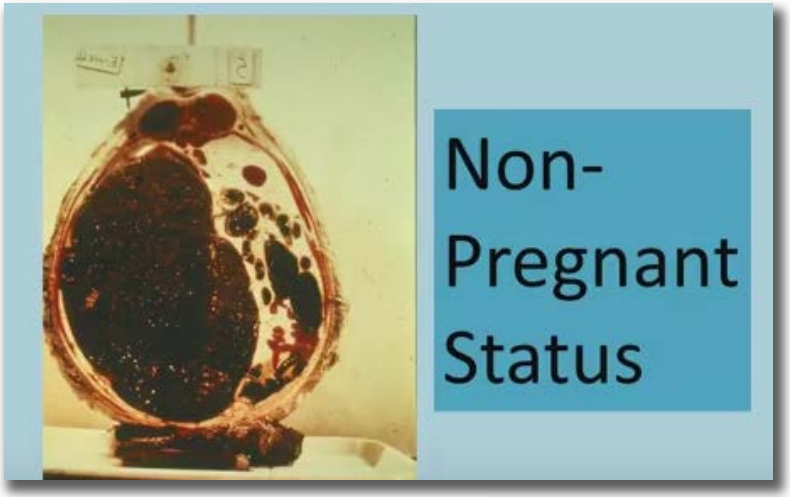
- 1st 50 days pregnant
  - minimal fetus/placenta growth
- Days 50 to 100
  - rapid placental growth
- Days 100 to 150 (3rd trimester)
  - rapid fetal growth (90% of total fetal growth)

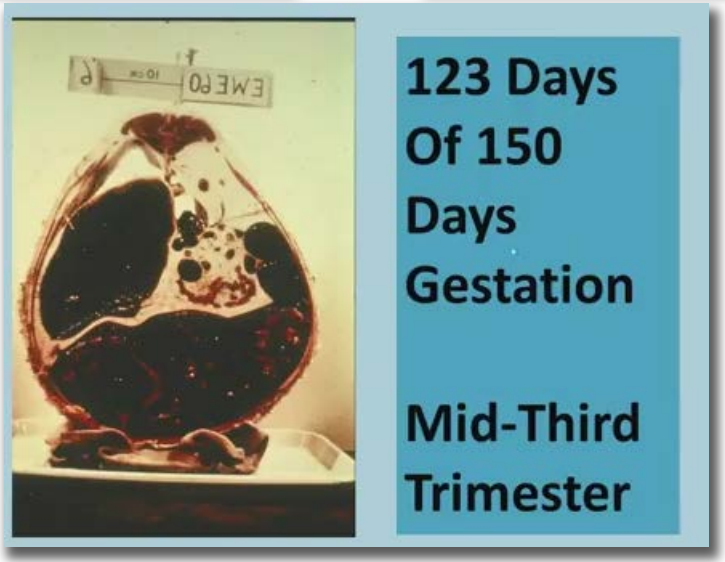
Ewe Nutrition: What are you asking from her?

- Early lactation
- At least meet maintenance
  - high plain of nutrition after early lactation; not doing as much
- After 100 days, fetus takes up more space and rumen volume decreases. This is when you are asking her to maintain BW & BC;
  - even more so after 125 days

Ewe Nutrition: What are you asking from her?

Nancy Irlbeck (CO State Univ.)



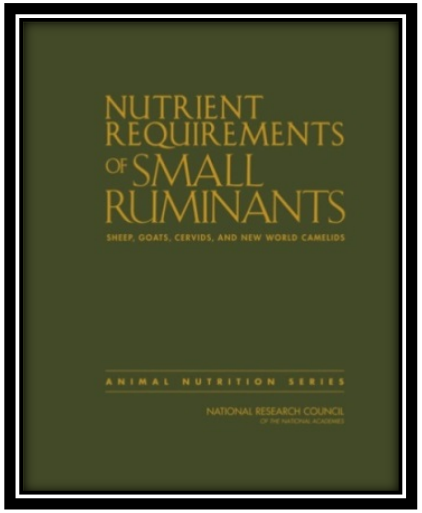


Ewe Nutrition

Know what you are asking her to do

Mature Ewe, 100 kg	Energy of Diet, Mcal/kg	DMI, kg	TND, kg/d	ME, Mcal/d	CP
Maintenance	1.91	1.54	0.82	2.94	106-116
Breeding	1.91	1.69	0.90	3.25	125-130

- **TDN (energy)** = CP + CFiber + NFreeExtract + (Cfat x 2.25)
  - NFE = carbs
- **DE** = GE – fecal
- **ME** = DE – urine, gas
- **NE** = ME – E used for consumption, dig., metab.
  Available for productive functions



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Breeding	1.91	1.69	0.90	3.25	125-130
Early gest., single	1.91	1.89	1.0	3.61	141-154
Early gest., twin	1.91	2.15	1.14	4.10	167-182
Late gest., single	1.91	2.31	1.22	4.40	180-198
Late gest., twin	1.91	2.87	1.52	5.48	236-258

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Late gest., single	1.91	2.31	1.22	4.40	180-198
Late gest., twin	1.91	2.87	1.52	5.48	236-258
Early lact., single	1.91	2.47	1.31	4.73	260-284
Early lact. twin	**2.39**	2.48	1.64	5.92	343-376

Ewe Nutrition

Can your management efforts and resources achieve your expectations?

Mature Ewe, 100 kg	Energy of Diet, Mcal/kg	DMI, kg	TND, kg/d	ME, Mcal/d	CP
Maintenance	1.91	1.54	0.82	2.94	106-116
Breeding	1.91	1.69	0.90	3.25	125-130

Texas: Average rangelands: 1,500 lb of DM/acre.
TDN (50%); ME (2 Mcal/kg); CP (8%)

Ewe consumes (1.54 kg x ...)

TDN intake = 0.77 kg/d

ME intake = 3.1 Mcal/d

CP intake = 123 g/d

Ewe Nutrition

Can your management efforts and resources achieve your expectations?

Mature Ewe, 100 kg	Energy of Diet, Mcal/kg	DMI, kg	TND, kg/d	ME, Mcal/d	CP
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Texas: Average rangelands: 1,500 lb of DM/acre.
TDN (50%); ME (2 Mcal/kg); CP (8%)

Ewe consumes (1.54 kg x ...)			deficient during late gest
TDN intake	=	0.77 kg/d	0.75
ME intake	=	3.1 Mcal/d	2.38
CP intake	=	123 g/d	135

Ewe Nutrition

Can your management efforts and resources achieve your expectations?

Mature Ewe, 100 kg	Energy of Diet, Mcal/kg	DMI, kg	TND, kg/d	ME, Mcal/d	CP
Early lact., single	1.91	2.47	1.31	4.73	260-284
Early lact. twin	**2.39**	2.48	1.64	5.92	343-376

Texas: Average rangelands: 1,500 lb of DM/acre.
TDN (50%); ME (2 Mcal/kg); CP (8%)

Ewe consumes (1.54 kg x ...)			deficient during late gest
TDN intake	=	0.77 kg/d	0.87
ME intake	=	3.1 Mcal/d	2.82
CP intake	=	123 g/d	253

How to Get There?

Texas: Average rangelands: 1,500 lb of DM/acre.
TDN (50%); ME (2 Mcal/kg); CP (8%)

Ewe consumes (1.54 kg x ...)			deficient during late gest
TDN intake	=	0.77 kg/d	0.87
ME intake	=	3.1 Mcal/d	2.82
CP intake	=	123 g/d	253

Supplementation			**Supplement needed**
TDN	=	69%	**1.26 kg**
ME	=	2.5 Mcal/kg	1.13 kg
CP	=	20%	**1.27 kg**
OR:			
CP	=	36%	0.70 kg

Nutritional Value vs. Feeding Value

- Plant-based vs. Animal based
- Laboratory vs. "Field knowledge"
  - ex: urea; low-quality roughages
- Affected by numerous things
  - grazing, planting, and harvesting strategies
  - storage, field drying, baler, etc...

  - Feeding value ALSO affected by:
  - animal species, supplementation/feeding strategies, additives, ingredient synergies, etc...

DDGS vs. "Traditional" Ingredients

	CP	UIP	FAT	ADF	NDF	P	S
DDGS	30 (6.4%)	18	10.9 (7.8%)	16 (28%)	42 (14%)	0.9 (11.7%)	0.47 (22%)
Corn	9	5	4	3	9	0.3	0.12
Milo	11	6	3	6	15	0.3	0.14
CSM	48	20	1.8	17	25	1.3	0.44
SBM	49	17	1.6	10	15	0.7	0.45




Underutilized Feed Ingredients

- **Low-quality roughages**
  - CSH, gin trash, cotton bales, etc.
  - Stover
  - Ground hay
  - Ground woody products
- **Urea**
- **Molasses**

Cottonseed Hulls

21 - 31% digested

3 - 6.6% CP

80% NDF (cell/hemicell/cutin/lignin)

70% ADF (cell/lignin)

Knowledge is built over time, which reduces skepticism

"Such material as this (CSH) belongs with the very lowest grade of coarse fodder, as both composition and experience demonstrate.

– **W. H. Jordan**, 1903
The Feeding of Animals

CSH = junk

Knowledge is built over time, which reduces skepticism

"Such material as this (CSH) belongs with the very lowest grade of coarse fodder, as both composition and experience demonstrate."

47 years later,

– W. H. Jordan, 1903
The Feeding of Animals

"When properly fed, CSH are generally about equal in value to fair-quality grass hay and are worth more/ton than corn stover, straw, or poor hay. Hulls are well liked by cattle, even when fed as the only roughage"

– **F. B. Morrison,** 1950
Feeds and Feeding

CSH = feed ingredient

How Did "Wood to Feed" Come About?

Ranch Resources?

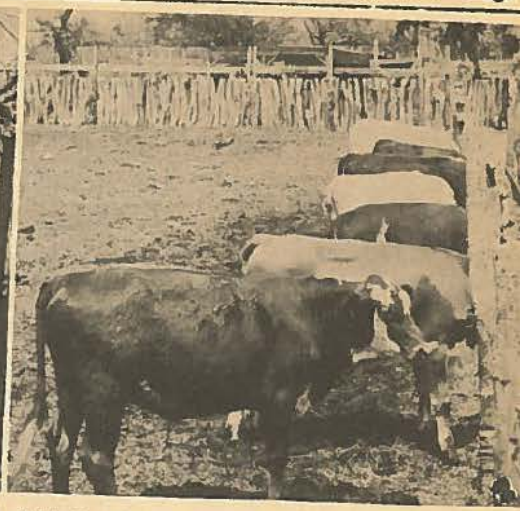
Wood to Feed Program

Texas A&M AgriLife Research

	CP	Crude Fat	NDF	ADF	Ca	48 hr dig.
Juniper leaves	6-9	8.7	38	31	1.5	68
CSH	3-6	1.9	80	70	0.18	21-31

Nutritional Value of Range Plants in the Edwards Plateau Region of Texas

J.E. Huston, B.S. Rector, L.B. Merrill, and B.S. Engdahl*



South Texan Says Ground Mesquite Gave Good Results As Cattle Feed

GROUND MESQUITE LIMBS formed a roughage feed which Les Coleman, stockman of Big Wells, Texas says helped cheapen rations for feedlot cattle and stocker cows. At left, Jack Savage, a neighboring rancher, is shown by a pile of limbs stacked in the pasture where they were cut; center, Coleman is feeding limbs into a chopper, cutting them into chips which later are put through finer grinders; at right are "tail end" cattle, the remainder of 300 head which Coleman fed for slaughter on a ration of mesquite meal, ground corn, cottonseed meal and molasses. The cattle seem to relish the feed. If Coleman's experiment, born of drouth necessity, leads to further proof of mesquite's value as feed, many a Texas rancher may someday instruct his laborers to "go out and chop up a load of firewood, also a load of feed."

By Loyd Hackler

BIG WELLS, Texas—The ornery mesquite, cussed ceaselessly by countless stockmen as a moisture-sapping parasite, may be of some value after all.

If the claims of Les Coleman, Big Wells rancher, are substantiated by further tests, ground mesquite could prove a cheap roughage feed, available in much of Texas' ranch country in almost infinite abundance. Cole-

in his farm lots on a mixture of 50 pounds of ground mesquite, 15 pounds of cottonseed meal, 20 pounds of molasses and 15 pounds of ground corn. He figures this ration cost him around $35 per ton. The calves, from a starting weight of around 300 pounds, were practically all fed to slaughter grade inside of 120 days. Since he started with his own weaning calves that weren't carefully weighed, Coleman didn't have

make total cost run around $5 per ton, he says.

Coleman says he hit on the idea of feeding the ground mesquite branches last fall when a chipping machine was sent to the farms to grind mesquite for an experiment to test its value as fertilizer. The farms are owned by the Frito Company of Dallas

and has some food value too. Mesquite grows on the best land so it must get something out of the soil," Coleman contends.

Interested neighbors who have followed Coleman's feeding say his feedlot calves got fat. Jack Savage, Crystal City rancher, said he saw a lot of the calves just before they

that since mesquite was a type of legume, it surely has some nutritive value. Just how much could be assimilated by livestock was debatable, but if enough of the bulk was not the hard core of branches, it could be of some value, he said. Some thought that a ration of 50 percent

Mixed diet:

Mesquite	**= 50%**
CSM	= 15%
molasses	= 20%
corn	= 20%

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Progress Report 1972 *Cattle Series 141*

TEXAS AGRICULTURAL EXPERIMENT STATION

R. D. LEWIS, DIRECTOR, COLLEGE STATION, TEXAS, JUNE 28, 1957

Ground Mesquite Wood

As a Roughage in Rations for Yearling Steers

P. T. Marion, C. E. Fisher and E. D. Robison*

THE TEXAS AGRICULTURAL Experiment Station has conducted experiments at the Spur station and on cooperating ranches since 1938 in an effort to develop effective and economical methods of controlling mesquite, which infests about 70 million acres of grassland in the United States.

Exploratory feeding trials conducted at Spur during the past 3 years in an effort to find a new use for this pest have shown that ground mesquite wood (mesquite meal) is a possible source of bulk in rations for cattle when other roughages

* * * * * * * * * * *

SUMMARY

Yearling steers fed a ration containing 7.2 pounds of ground mesquite wood gained 2.20 pounds per head daily in a 140-day feeding trial in 1955-56 at the Spur station. Similar steers fed cottonseed hulls instead of mesquite meal gained 2.29 pounds per head daily. The steers fed the mesquite meal made a higher net return on the basis of $10 per ton for ground wood and $18 per ton for cottonseed hulls than those fed the cottonseed hull ration.

ves were fed the same ration with cottonseed hulls substituted for the mesquite meal. The calves fed the mesquite meal ration gained an average of 1.35 pounds daily, while those fed the hull ration gained 1.54 pounds. Nightblindness, the first symptom of vitamin A deficiency, was observed in the calves fed the cottonseed hull ration, but those on the mesquite meal ration had normal night vision at the end of the trial.

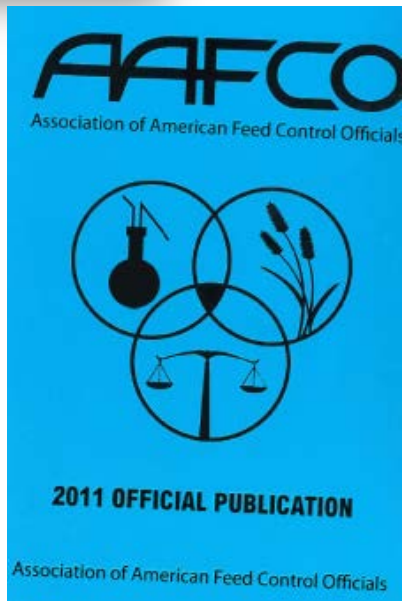
Meanwhile, it was learned that C. E. Doolin had been feeding a ration containing mesquite

Ground Aspen has a Definition

60.44 Ground Whole Aspen and/or Parts is generally recognized as a feed ingredient in cattle diets when used in accordance with good nutritional practices. Ground whole aspen (Populus tremuloides Michiz and Populus gradidentata) is composed of the entire tree including leaves, branches, trunk, and bark. Ground aspen parts may also include leaves, branches, trunk, and bark. Roots and stumps are excluded to avoid contamination of dirt and rocks in the product. The particle size of the product shall not exceed 3/8 inches. (Proposed 1979, Adopted 1980)

IFN 1-30-183 Aspen quaking/Aspen large toothed aerial part ground

IFN 1-12-241 Aspen aerial part ground



PART III

Rumen Function/Physiology FIBER

What affects the "feeding value" of roughages?

1. Nutritional quality
2. Plant secondary compounds
3. Palatability
4. Feeding value
5. Density, buoyancy, rate of hydration
   - immediate, short-term, and long-term
   - **Jung and Allen, (1995):** "Particles with lower functional specific gravity (FSG) have a lower probability of passage from the rumen either because they become entrapped in the raft (Faichney, 1986; Sutherland, 1988) or are propelled dorsally, away from the reticulo-omasa1 orifice ... (Lechner-Doll et al., 1991). Retention time of particles in the reticulorumen decreases linearly with increasing density from 0.9 to 1.4 g/mL (Lechner-Doll et al., 1991)"

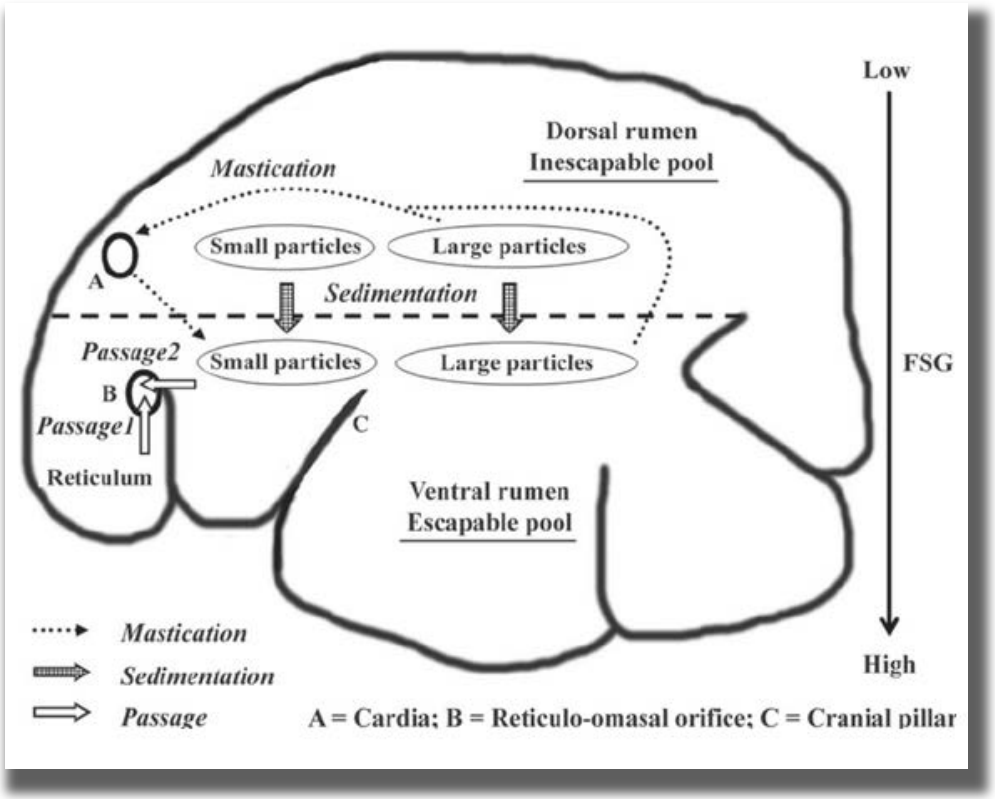
What affects the "feeding value" of roughages?

6. Fragility
7. Digestibility: extent and rate
   - ultimate goal: pass through the reticulo-omasa1 orifice
8. Ability to retain microbial gas
9. Physical effective fiber
   1. ruminal pH and function
   2. saliva production

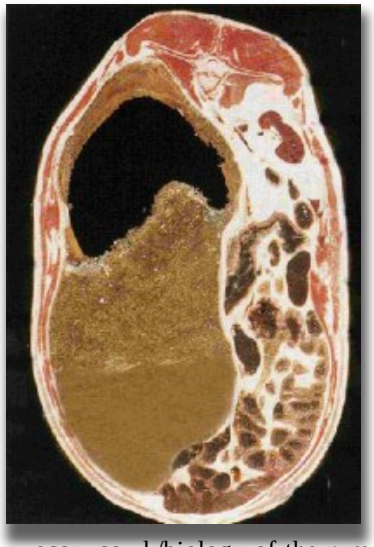
FIBER

physically effective NDF

"NDF portion of cell wall that stimulates chewing & increases rumination and motility."



Seo, et al., J. Dairy Sci. 92:3981-4000



www.ecow.co.uk/biology-of-the-rumen

FIBER

Based on particle size and degree of NDF lignification.

- crude method; never designed to be an exact science
- % of NDF left on 1.18-mm screen
  - increases saliva and rumen pH
  - > 22% peNDF to keep pH above 6.0 (*Mertens, 1997*)
- balancing act: sorting vs. peNDF

FIBER

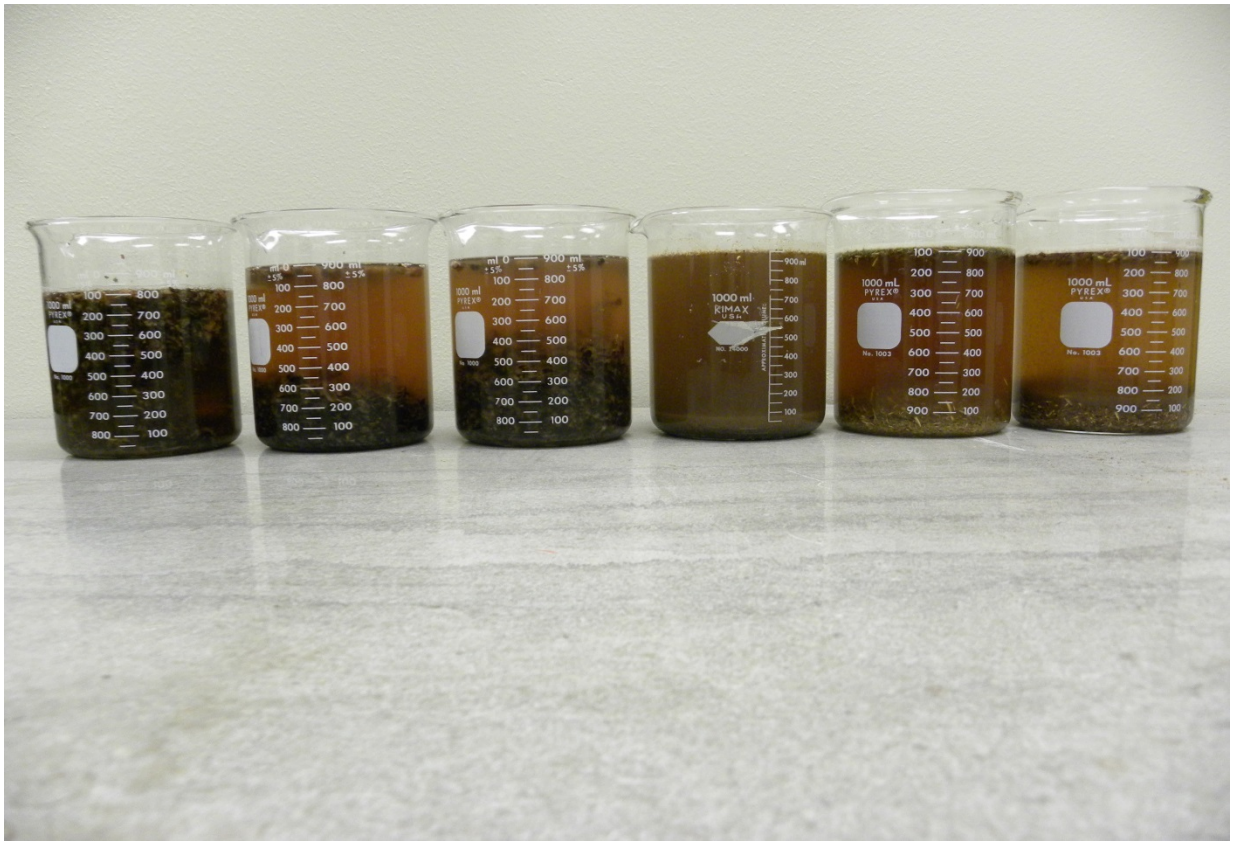
- peNDF = NDF x > 1.18-mm sieve
  - grass hay NDF = 65% and fraction > 1.18 mm = 0.98
    peNDF = 63.7
  - ground corn NDF = 9% and fraction > 1.18 mm = 0.48
    peNDF = 4.3

FIBER

- Exploit differences in feed ingredient fiber characteristics to make a "better" rumen environment.
- Forage particle buoyancy, rate of hydration, passage rate

ground juniper

ground oat hay



What About Hay?

- Supplement or substitute?
- $/ton of hay vs. $/ton of growing forage
- Hay is expensive

Hay: $50/1,000-lb. bale (FOB). Real cost/bale: ADD:

1. transport 40 bales, 100 miles x $3/mile = $7.50/bale
2. 5% loss: [$50/1000] x 50 lb. = $2.5

True Cost/ton of hay: **$112/ton**

Growing forage: $15/acre lease. 2,000 lb./acre.
Rules: take ½ & leave ½ and only graze ½:
Avail. forage = 500 to 1,000 lb.
[$15/500 lb.] x 2,000 =
True $/ton of forage: **$30 to $60/ton**

What About Hay?

- You are paying for "convenience"
- What's in it and how much does weigh!
- Some hays can never become a "supplement"
- Use for "special" situations:
  - newly weaned lambs/kids
  - backgrounding
  - at receiving or just prior to shipping
  - enhance grazing distribution
  - cold weather, especially near parturition
- Think about grinding it

https://today.agrilife.org/2016/10/08/providing-proper-nutrition-wintering-cows-can-pay-dividends-long-term/

What About Cubes?

Know $/lb. of protein.

Is a $220/ton cube (18%) really less expensive than a $400/ton cube (36% CP)?

$220/360 lb. CP = $0.61/lb or $1,222/ton of CP

$400/720 lb. CP = $0.56/lb or $1,111/ton of CP

More Factors Affecting "True Cost"

- Is ingredient priced high because of other markets?
  - more suited for human consumption or industrial markets (oilfield)
  - take advantage of "rumen" ingredients
- Waste: Storage & at the bunk
- Transportation/handling
- Nutrient availability:
  - ADIN concentration?
  - oxides vs. organic minerals
- Feed ingredient and nutrient/chemical interactions