Commodity Feed and Mineral Supplementation

Mark A. McCann
Extension Animal Scientist
Virginia Tech

Factors Affecting Usefulness of Commodity Feeds

- Moisture Content
- Nutrient Density
- Local Availability
- Seasonal Availability
- Limited Inclusion Rate
- Handling/Processing/Storage

- Cost / value is generally considered to be relative to the value of corn and soybean meal

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COMPARATIVE FEED VALUE CALCULATOR

BASIS INGREDIENTS	$	
Corn	$7.00	$/bushel
Soybean meal 48%	$400.00	$/ton

	AS - FED				Protein and Energy				Energy Only			
Ingredient	DM%	CP%	TDN%	$/ton	$/cwt	$/ton	$/ton DM	Ratio	$/cwt	$/ton	$/ton DM	Ratio
Brewers Grains, Dehydrated	92	26.3	59.4	120	$13.11	$262.10	$284.90	218%	$9.17	$183.33	$199.28	153%
Brewers Grains, Wet	21	5.5	14.7	50	$3.04	$60.86	$289.82	122%	$2.27	$45.37	$216.05	91%
Corn	88	8.8	81	100	$12.50	$250.00	$284.09	250%	######	$250.00	$284.09	250%
Corn Gluten Feed	90	21.4	70	180	$13.54	$270.80	$300.89	150%	######	$216.05	$240.05	120%
Cottonseed Hulls	91	3.8	37.8	80	$5.77	$115.45	$126.87	144%	$5.83	$116.67	$128.21	146%
Cottonseed Meal	92	41.5	67.5	360	$17.20	$343.94	$373.85	96%	---	---	---	---
Defatted Rice Bran	90	14.3	52.8	60	$9.85	$196.95	$218.84	328%	$8.15	$162.96	$181.07	272%
Defatted Rice Mill Feed	90	6.9	31.5	20	$5.55	$111.03	$123.36	555%	$4.86	$97.22	$108.02	486%
Dried Distillers Grains	91	21.6	80.8	180	$15.01	$300.27	$329.97	167%	######	$249.38	$274.05	139%
Full Fat Rice Bran	90	13.1	63.7	65	$11.06	$221.13	$245.70	340%	$9.83	$196.60	$218.45	302%
Grass Hay	88	9.5	48.4	90	$8.31	$166.22	$188.88	185%	$7.47	$149.38	$169.75	166%
Hominy	90	10.4	82	92	$12.95	$259.01	$287.78	282%	######	$253.09	$281.21	275%
Soybean Hulls	91	11	75	160	$12.14	$242.80	$266.81	152%	######	$231.48	$254.38	145%
Wheat Middlings	89	16.4	73.9	150	$13.07	$261.31	$293.61	174%	######	$228.09	$256.28	152%
Whole Cottonseed	92	21.7	84.6	155	$15.54	$310.76	$337.78	200%	######	$261.11	$283.82	168%
Silage, Corn	33	3	21.8	50	$3.49	$69.79	$211.49	140%	$3.36	$67.28	$203.89	135%
excellent hay	88	11.5	54	100	$9.45	$189.03	$214.80	189%	$8.33	$166.67	$189.39	167%
good hay	88	9.7	50	90	$8.56	$171.26	$194.61	190%	$7.72	$154.32	$175.36	171%
average hay	88	7.75	46	80	$7.64	$152.90	$173.75	191%	$7.10	$141.98	$161.34	177%

Nutrient content of Alternative Feeds

Nutrient content (dry basis) of soybean hulls, wheat midds, corn gluten feed and other selected dry byproduct commodity feeds

Commodity	% CP	UIP, % of CP	% fat	% TDN	% Ca	% P	% S
Corn grain	9.8	55	4.1	90	0.03	0.32	0.11
Soybean meal	54.0	35	1.1	87	0.29	0.71	0.48
Soybean hulls	12.2	25	2.1	77	0.53	0.18	0.11
Wheat midds (flour byproduct)	18.7	21	4.7	69	0.17	1.01	0.19
Corn gluten feed	23.8	22	3.9	80	0.07	0.95	0.47
Distiller's grains	30.4	52	10.7	90	0.26	0.83	0.44
Hominy feed	11.5	--	7.7	87	0.05	0.57	0.03
Bakery byproduct	10.7	--	12.7	89	0.14	0.26	0.02

Corn Gluten Feed

- By-product of starch removal
- May be wet or dried
- Corn gluten “feed” is around 22-25% CP
- Low starch
- Can replace a portion of corn in finishing rations

Corn Gluten Feed

- Results from wet milling of corn to produce corn starch, oil and syrup.
- About 24% CP and 80% TDN
- Low Calcium; High Phosphorus
- High level of Sulfur (around 0.6%) --variable
- Limit to 50% of DMI due to its high sulfur content (Cu deficiency and polio). Usually more of an issue with stockers vs cows

Wheat Middlings

- Flour by-products
  - Do not store well – readily absorbs moisture from the air 20 – 30% starch
- Limit to 50% of DMI due to the rapidly fermentable starch content
- Low Calcium, High Phosphorus
- Excellent pellet binding properties

Hominy Feed

- Contains the bran, germ, and some of the starch from the corn kernel
- Equal to ground corn
- Very palatable
- Can be used up to 70% of ration buts works best at 10 to 15%
- Good energy source
- Higher in protein than corn
- Fat content will vary with milling process

Soy Hulls

- Excellent palatability
- Less starch content than grains; therefore, less negative effect on forage utilization
- Safer, less incidence of founder
- Can be pelleted or loose
- Absorbs water
- Fluffy, dusty

Soy Hulls

- Soybean seed coat, which is removed during the "crushing" process, yield 8% hulls
- The fiber in soy hulls is low in lignin and has high potential digestibility. Nearly devoid of starch soyhulls are primarily digestible fiber.
- They can be added to forage-based diets without causing low ruminal pH (acidosis) and a depression of fiber digestion like high starch concentrates
- Recent VT lamb project fed 0, 1, 2, or 3% BW/d. SH DM digestibility was 76.0, 70.4 and 66.8 %.

Associative effects on forage digestion

- High-fiber energy supplements may not depress forage digestibility like highly fermentable concentrates (corn, wheat)
- Effective energy value of some high fiber by-product feeds may be higher than corn.
- Some high fiber by-product feeds can be nearly devoid of starch and yield less lactic acid

Effect of Corn on Hay Intake & Digestibility

	Corn, lbs/day			
	None	2.2	4.4	6.6
Hay DMI lbs	19.3	18.0	14.1	11.2
Total DMI, lbs	20.9	21.1	18.6	17.2
DOMI, lbs	7.5	8.4	7.1	7.3
Hay OM Digest %	36.5	35.1	23.6	18.9

JAS 65:557

Effect of Increasing Soybean Hulls on Hay Intake

	SH, lbs/day			
	None	2.2	4.4	6.6
Hay, OMI, lbs	21.4	22.3	21.6	19.9
DOMI, lbs	10.6	11.8	12.3	12.7

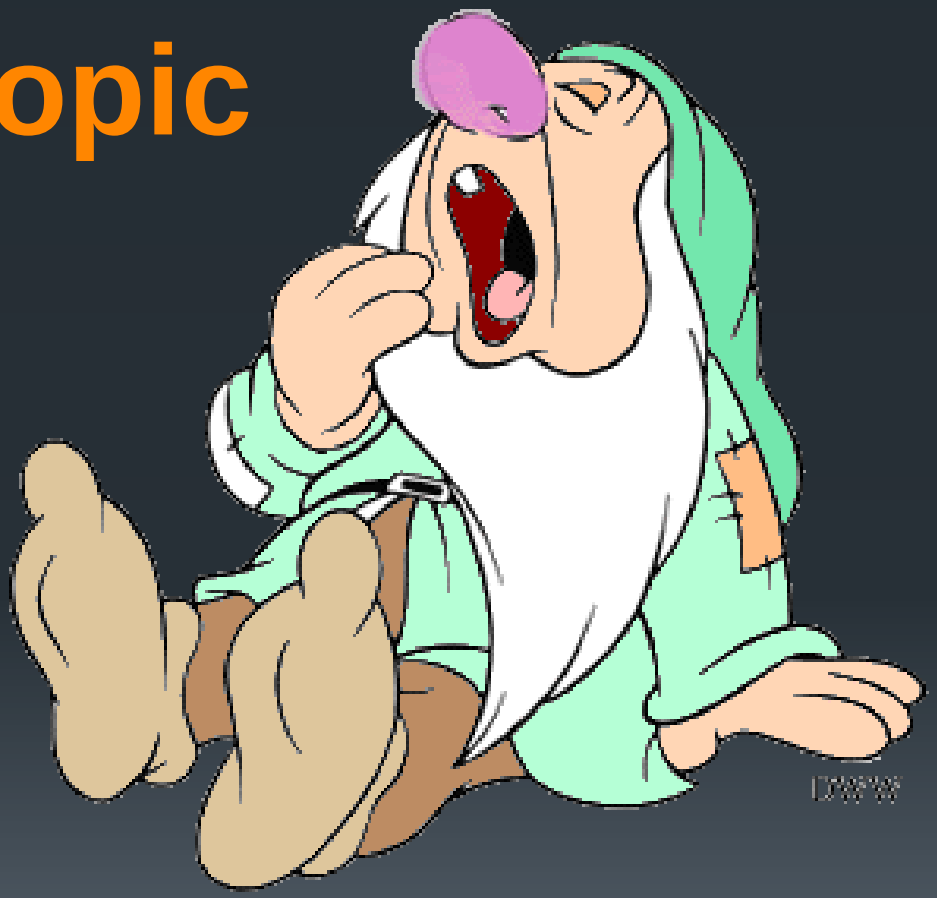
Influence of Concentrate Source (6 lb/d) on Performance of Stocker Calves[1]

Item	Corn/SBM	Comm 14%	Soyhulls	Midds
ADG, lbs	2.33	2.17	2.19	2.31
Hay, lb/d	18.8	18.0	17.2	16.9

[1] Calves were fed for 84 days on hay and 6 lb of concentrate at the Upper Mountain Res Station, Laurel Springs, NC

Minerals-

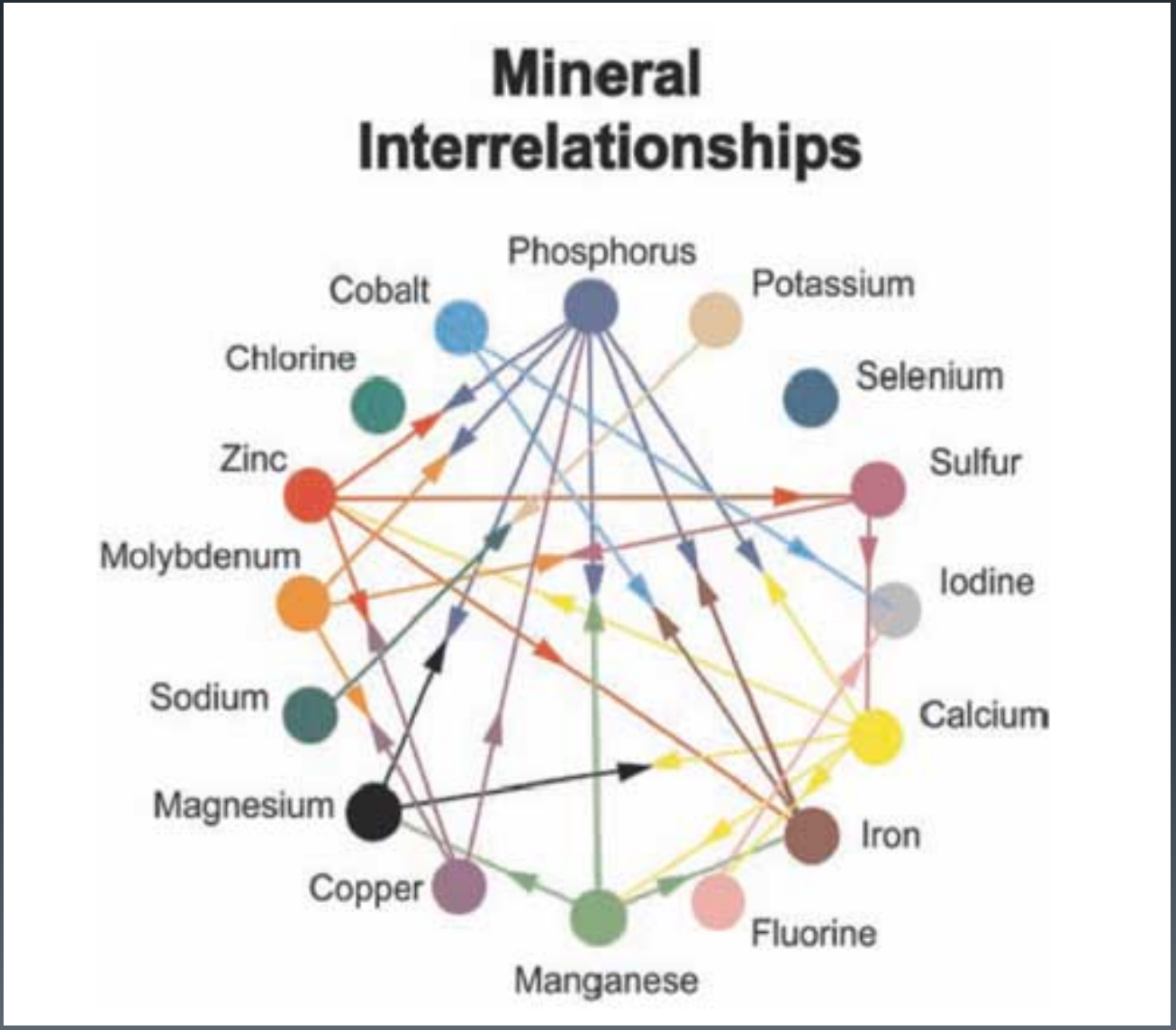
Popular Topic



WHY ?????

- Typically we are concerned about too much or too little
- Hard to gauge or measure the in between
- Pasture and hay provide alot of what is needed (forage test)

Mineral Interactions



Macrominerals (percent or grams per day)

- Calcium
- Phosphorous
- Potassium
- Magnesium
- Sulfur
- Sodium

Microminerals
(parts per million or milligrams)

Most are included in trace mineral salt

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

Table 1. Minerals and Forage and Requirements by Cattle

		Class of Cattle and Their Requirements (in diet Dry Matter)		
		Mature Cow		Growing Cattle
Nutrient	Good Forage	Dry, Midpreg	Lactating	Moderate Gain
Calcium, %	.45	.15	.36	.50
Phosphorous, %	.40	.12	.23	.25
Potassium, %	2.0	.6	.7	.6
Magnesium, %	.25	.12	.2	.10
Sulfur, %	.25	.10	.15	.15
Sodium, %	.0005	.08	.10	.08
Iron, PPM	100	50	50	50
Copper, PPM	8	10	10	10
Manganese, PPM	70	40	40	20
Zinc, PPM	30	30	30	30
Selenium, PPM	.15	.3	.3	.3
Vit A, IU/lb DM	50,000	1300	1800	1000
Vit D, IU/lb DM	500	125	125	125
Vit E, IU/lb DM	10	7	7	7

Stages of Growth of Orchardgrass

	Constituents				
Dry Matter %	Leafy	Boot	Headed	Full Bloom	Seeding
Crude Protein, %	33.9	17.6	10.1	7.8	6.1
Phosphorus, %	0.41	0.30	0.23	0.20	0.17
Potassium, %	3.90	2.86	2.47	1.87	1.63
Magnesium, %	0.21	0.19	0.13	0.14	0.18
Calcium, %	0.47	0.36	0.26	0.35	0.42

Stages of Growth of Red Clover

Dry Matter %	Leafy	Early Bud	Late Bloom	Bloom	Seeding
			Constituents		
Crude Protein, %	29.3	20.5	19.5	14.0	13.2
Phosphorus, %	0.32	0.25	0.21	0.15	0.15
Potassium, %	3.48	3.17	2.14	1.39	0.85
Magnesium, %	0.38	0.41	0.37	0.43	0.29
Calcium, %	1.38	1.31	1.42	1.61	1.58

Forage Mineral Content Depends Upon

- Fertilization - (Primarily NPK and Ca)
- Innate soil characteristics
- Stage of growth - young, rapidly growing is a lot higher
- Species Composition - Legumes higher than grasses
- Environment / Season of the Year

Commonly deficient in forages

- Magnesium

- Copper
- Zinc
- Selenium

Copper Toxicity

- Excess accumulates in liver, animal is normal during this phase
- Once liver cells die, Cu is released, blood Cu increases 10 to 20 X
- Clinical signs begin 24 to 48 hr later (anorexia, excessive thirst, depression)
- Death 1-2 days following signs

Copper Status Affected By

- High Molybdenum (normal is 1 to 3 ppm) decreases gut absorption
- Cu:Mo ratio of 10:1 or less are desired
- Sulfur can enhance the Mo effect on Cu absorption
- High Zinc (>100 ppm) reduces liver Cu
- Minerals in water must be considered

Copper is a Special Consideration

- Often a deficient item
- Charolais/Simmental have higher requirements
- Immune Status is impaired
- Commercial minerals often don’t have enough
- Should have 0.1 to 0.15% (up to 0.2% for Sim/Char

Selenium Deficiency

- Immune response, embryonic mortality, infertility, high mortality of newborns, reduced growth, white muscle disease
- Associated with Vitamin E
- Our soils are marginal to deficient
- Selenium supplements are controlled by FDA

Practical Considerations About Selenium for Cattle

- **Can be added to feed or injected**
- **Blood levels are good indicators of Se status**
- **Injectible “wears off” within 2 or 3 months**
- **Se analysis of feeds is not routine and quite expensive**
- **Forages in TN, VA and NC are probably deficient**
- **At least 50 PPM Se needs to be in all cattle minerals**

Selenium Supplementation

- Not included unless the label says it is

  Selenium, in the form of sodium selenate or sodium selenite, can be added to cattle feeds up to

- Max of 0.3 PPM in total diet
- Max of 120 PPM in free-choice mineral
- Max of 3.0 mg Se per head per day

Mineral Intake is Not Constant

- Individual animal variation
- Seasonal variation
  - lower in mid summer
- Mineral product formulation
  - unpalatable ingredients (Dical, MgO)
  - grain products, molasses, etc
- Loose vs Block
- Proximity to water
- Intake should range from 2 to 6 oz/day

Chelated Minerals

- Mineral elements bound to proteins or amino acids to enhance absorption
- Zinc, Copper and Manganese most common
- Higher cost ingredients
- Uptake (“digestibility”) is improved
- If animal is OK before, production is not increased with chelates

Chelated Minerals

- Variables results with stressed calves and reproduction in cows
- Growth and interest in this area.
- New products in this area.
- New market price conditions changing the expected level of results to be economical.

Questions