

Protein Sources: What are the Options to Reduce Costs?

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Feed Markets

- Feed prices are at the mercy of all the outside influences we have been blaming everything on for the last couple of years.
 - COVID-19 – slowed economy and decreased oil use/prices
 - Supply chain issues, labor shortages, trucking...
 - Increased economic activity – increased oil use oil and fuel prices and commodity prices
 - War in Eastern Europe
 - Reduced oilseed production (sunflower, soybean etc.)
 - High oil/natural gas and less fertilizer leads to high fertilizer prices
 - High value for soybeans for oil

My original theory

- Corn is a high input crop
 - Very high fertilizer use
 - Shift acres to soybeans
 - Lots of soybean meal influencing costs of all protein feeds
- High fuel cost increases the value of Ethanol
 - Lots of ethanol = lots of Distiller's Grains
- If we can produce abundant low quality hay, straw, and stalks
 - We should be able to get cattle through on roughage and cake

ZCU22 - Corn - Daily Line Chart



ZSQ22 - Soybean - Daily Line Chart



Global Market

- “On the soybean side, there is great potential for revisions higher to the export estimate, as 2.11 billion or the 2.115 billion bushel estimate export forecast has already been sold or shipped...soybeans will see tighter stocks-to-use [ratios] ahead if sales continue”
CattleFax Update, April 15, 2022.
- U.S. oilseed production is projected down 3.4 m bu
 - Projected soybean crush reduced, based on reduced meal exports
- Corn production is forecast 45 million bushels higher based on greater planted and harvested acres.
 - Ethanol production is up 10%
 - Distiller’s Grains Exports are also up

Value of Protein Feeds

Feedstuff	\$/ton	\$/lb	\$/lb DM	\$/lb CP
SBM	559	0.2795	0.31	0.64
Corn Gluten Feed	230	0.115	0.1278	0.51
Dried Distillers Grains	290	0.145	0.1611	0.47
Hominy Feed	265	0.1325	0.147	1.47
Soybean Hulls	270	0.135	0.15	1.07
Molasse Tub HI	960	0.48	0.6857	2.44
Molasses Tub LI	1,184	0.592	0.6231	2.96
Alfalfa Hay	275	0.1375	0.1562	0.625



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COMPARATIVE FEED VALUE CALCULATOR

BASIS INGREDIENTS	\$	
Corn	\$5.86	\$/bushel
Soybean meal 48%	\$559.00	\$/ton

Ingredient	AS - FED				Protein and Energy				Energy Only			
	DM%	CP%	TDN%	\$/ton	\$/cwt	\$/ton	\$/ton DM	Ratio	\$/cwt	\$/ton	\$/ton DM	Ratio
1 Brewers Grains, Dehydrated	92	24	64.4		\$15.89	\$317.87	\$345.51	#DIV/0!	\$8.32	\$166.40	\$180.86	#DIV/0!
2 Brewers Grains, Wet	21	5.5	14.7		\$3.64	\$72.75	\$346.44	#DIV/0!	\$1.90	\$37.98	\$180.86	#DIV/0!
3 Corn	90	8.8	87	328.21	\$10.95	\$218.98	\$243.31	67%	\$11.24	\$224.79	\$249.76	68%
4 Corn Gluten Feed	90	21.4	72	230	\$15.35	\$306.99	\$341.10	133%	\$9.30	\$186.03	\$206.70	81%
5 Cottonseed Hulls	91	3.7	41		\$4.96	\$99.21	\$109.03	#DIV/0!	\$5.30	\$105.93	\$116.41	#DIV/0!
6 Cottonseed Meal	92	42.4	75		\$24.95	\$498.92	\$542.30	#DIV/0!	---	---	---	---
7 Defatted Rice Bran	90	14.3	52.8		\$10.64	\$212.71	\$236.35	#DIV/0!	\$6.82	\$136.42	\$151.58	#DIV/0!
8 Defatted Rice Mill Feed	90	6.9	31.5		\$5.62	\$112.37	\$124.86	#DIV/0!	\$4.07	\$81.39	\$90.43	#DIV/0!
9 Dried Distillers Grains	91	26.8	80.1	290	\$18.41	\$368.19	\$404.60	127%	\$10.35	\$206.96	\$227.43	71%
10 Full Fat Rice Bran	90	13	63		\$10.88	\$217.62	\$241.79	#DIV/0!	\$8.14	\$162.78	\$180.86	#DIV/0!
11 Grass Hay	88	9.7	53	150	\$8.60	\$172.06	\$195.52	115%	\$6.85	\$136.94	\$155.61	91%
12 Hominy	90	10.4	82	265	\$11.26	\$225.16	\$250.17	85%	\$10.59	\$211.87	\$235.41	80%
13 Soybean Hulls	91	11	72.8	270	\$10.78	\$215.63	\$236.96	80%	\$9.40	\$188.10	\$206.70	70%
14 Wheat Middlings	89	16.4	73.9		\$13.28	\$265.52	\$298.33	#DIV/0!	\$9.55	\$190.94	\$214.54	#DIV/0!
15 Whole Cottonseed	92	21.1	87.4		\$16.46	\$329.20	\$357.83	#DIV/0!	\$11.29	\$225.82	\$245.46	#DIV/0!
16 Silage, Corn	38	3.5	24.3		\$3.52	\$70.45	\$185.39	#DIV/0!	\$3.14	\$62.79	\$165.23	#DIV/0!
17 Molasses Tub high intake	80	28	70	960	\$18.13	\$362.56	\$453.19	38%	\$9.04	\$180.86	\$226.08	19%
18 Molasses Tub low intake	80	20	95	1184	\$16.58	\$331.68	\$414.61	28%	\$12.27	\$245.46	\$306.82	21%
19 Alfalfa Hay	88	25	63	275	\$16.23	\$324.52	\$368.77	118%	\$8.14	\$162.78	\$184.97	59%
20 Feedstuff	0	0	0		\$0.00	\$0.00	\$0.00	0%	\$0.00	\$0.00	\$0.00	0%

Factors Affecting Protein Requirements

- Genetics –
 - Maintenance requirements – Milk potential
 - Growth potential
- Composition of gain – frame size, compensatory gain, gender
- Gain– 600 lb steer calf
 - 1 lb/day 9.3%CP & 59%TDN
 - 1.5lb/day 10.5%CP & 64%TDN
 - 2 lb/day 11.9%CP & 69%TDN
- Stage of Production
- Dry matter intake – effects and is affected by diet protein

Class	n	CP	ADF	NDF	TDN	DMI, % BW
Mean	670	11.3	42.6	69.4	54.8	1.7
I	32%	3.0 -16.1 9.2	47.5	74.8	31 - 52 49.2	1.6
II	15%	5.2 – 17.4 10.4	44.3	71.3	52 – 54 52.9	1.7
III	36%	6.5 – 20.9 12.0	40.8	67.9	54 – 59 56.8	1.8
IV	17%	7.4 – 26 14.6	37	59	59 - 72 60.6	2.0

Percentage of Hays Deficient in

Nutrient	Dry Cow	Lactating Cow/ Growing Calf
Crude Protein	19%	45%
Total Digestible Nutrients	31%	83%

Based on 670 hay test results in SW Arkansas

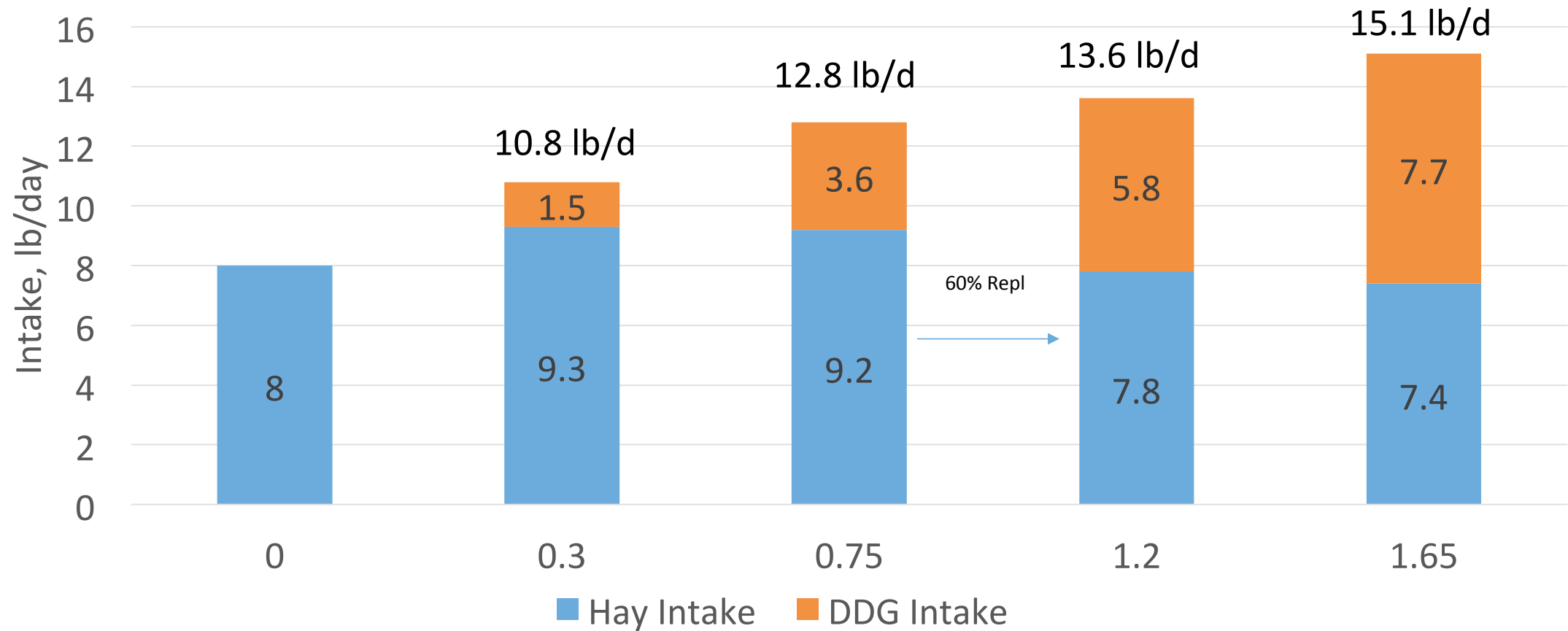
Forage Resources

Forage	% CP	% TDN	TDN:CP
Winter Range	5	44	8.8
Prairie Hay	7	48	6.9
Bermudagrass Hay	10	56	5.6
Wheat Straw	4.5	45	10.0
Corn Stalks	6.4	45	7.0
Milo Stover	7.8	53	6.8
Cotton Gin Trash	12.3	43	3.5

Correct Ruminal Nutrient Imbalances

- Quantity of microbial protein synthesis is limited by amount of protein available to microbes and the efficiency of energy use.
- TDN:CP ratio between 4:1 and 8:1 are considered balanced. **(Moore, 1992)**
 - > 8:1 Deficiency of Ruminant Nitrogen limiting MCP
 - 4:1 to 8:1 Ruminant energy and Nitrogen in balance
 - <4:1 Associated with losses of Ruminant Nitrogen
- When Ruminant Nitrogen is limiting
 - Microbial digestion of fiber is slowed and total fiber digestion reduced
 - Passage of fiber from the rumen slows
 - Reduce total hay intake
 - Feeding protein supplement results in increased hay intake and digestibility

DDG (31% CP) and Hay Intake (5%CP 53% TDN)



Cow-Calf Examples

Select Class of Cattle

Late Gestation, Dry Cow

Feeding Period, Days

60

Inputs for Cows, Bred Heifers and Mature Bulls

Number of Cattle	Initial Weight, lb	Mature Weight, lb	Expected Calf Birth Weight, lb	Genetic Potential for Milk	Peak Milk, lb/day	Initial Body Condition Score	Desired Body Condition Score
10	1250	1250	75	Average	24	5	5

Body Condition Guidelines

Finish Weight Guidelines

Breed	Percentage
Angus	100%
Braford	
Brahman	
Brangus	
Braunvieh	
Charolais	
Chianina	

Ionophore

None



Pistol Pete, Bullet Ranch		Post-weaning spring-born calves		
Class of cattle:		Late Gestation, Dry Cow		
Formulate on as fed (AF) or dry matter (DM) basis?		AF		
Feed Category	Feed or Forage	lb or % AF	% AF	% DM
Grazed forages	Native Range, Nov-Dec	24.50	100.00	100.00
Harvested Forages	Prairie Hay, mature			
Harvested Forages	Bermuda Hay, early bloom			
Harvested Forages	Wheat Straw			
Harvested Forages	Corn Stalks			
Harvested Forages	Milo Stover			
Harvested Forages	Cotton Gin Trash			
Concentrates	Soybean meal, 48%			
Concentrates	Corn Gluten Feed			
Concentrates	Distillers Grains with Solubles, corn			
		24.5	100.0	100.0
Cost Per Day	\$0.55	Feed Intake, lb	AF	24.5

Projected ADG, lb	-0.59	Feed Intake Ratio	1.01
Desired ADG, lb	1.10	Feed Intake, lb DM	18.4
Days to	lose	Predicted Intake, lb DM	18.2
one condition score:	-50	DM Intake, % of Body Weight	1.49

Protein Ratio	0.49
Ca:P Ratio	2.8

Maternal Tissue ADG, lb	-1.70	Fetal Tissue ADG, lb	1.10	Milk Yield, lb
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Nutrient	Diet Concentration			Daily Amount		Status
	As Fed	DM	Required	DM	Required	
Diet DM	75%	-	-	-	-	-
TDN	33%	44%	-	8.1 lb	TDN:CP	8.80
ME, Mcal/lb	0.54	0.72	-	13.3 Mca	-	-
NE _m , Mcal/lb	0.26	0.34	-	6.3 Mca	-	-
NE _g , Mcal/lb	0.07	0.10	-	1.8 Mca	-	-
NDF	58%	77%	-	2.9 lb	-	-
peNDF	58%	77%	7 - 20 Min	14.1 lb	7.0 pH	ADEQUATE
Crude Protein	3.8%	5.0%	-	0.92 lb	1.86 lb	DEFICIENT
Fat	1.7%	2.2%	-	0.40 lb	-	ADEQUATE
Calcium	0.17%	0.22%	0.33%	18.4 g	27.1 g	DEFICIENT
Phosphorus	0.06%	0.08%	0.16%	6.7 g	12.9 g	DEFICIENT
Sodium	0.01%	0.01%	0.07%	0.83 g	5.84 g	DEFICIENT
Potassium	0.60%	0.80%	0.60%	66.7 g	50.1 g	ADEQUATE
Magnesium	0.15%	0.20%	0.15%	16.7 g	10.0 g	ADEQUATE
Sulfur	0.08%	0.10%	0.15%	8.3 g	12.5 g	DEFICIENT
Cobalt ppm	0.11	0.15	.15 ppm	1.3 mg	1.3 mg	ADEQUATE
Copper ppm	5.25	7.0	10 ppm	58 mg	83 mg	DEFICIENT
Iron ppm, mg	127.50	170.0	50 ppm	1418 mg	417 mg	EXCESSIVE
Manganese ppm	31.50	42.0	40 ppm	350 mg	334 mg	ADEQUATE
Selenium ppm	0.12	0.16	.1 ppm	1.3 mg	0.8 mg	ADEQUATE
Zinc ppm	16.50	22.0	30 ppm	184 mg	250 mg	DEFICIENT

	Desired Time on Feed	Desired Final Weight
Initial Weight, lb	1250	1250
Final Weight, lb	1214	1316
Average Weight, lb	1232	1283
Days on Feed	60	-



Pistol Pete, Bullet Ranch		Post-weaning spring-born calves		
Class of cattle:		Late Gestation, Dry Cow		
Formulate on as fed (AF) or dry matter (DM) basis?		AF		
Feed Category	Feed or Forage	lb or % AF	% AF	% DM
Grazed forages	Native Range, Nov-Dec	26.50	92.98	91.78
Harvested Forages	Prairie Hay, mature			
Harvested Forages	Bermuda Hay, early bloom			
Harvested Forages	Wheat Straw			
Harvested Forages	Corn Stalks			
Harvested Forages	Milo Stover			
Harvested Forages	Cotton Gin Trash			
Concentrates	Soybean meal, 48%	2.00	7.02	8.22
Concentrates	Corn Gluten Feed			
Concentrates	Distillers Grains with Solubles, corn			
		28.5	100.0	100.0
Cost Per Day	\$1.16	Feed Intake, lb	AF	28.5

Projected ADG, lb	0.03	Feed Intake Ratio	1.10
Desired ADG, lb	1.10	Feed Intake, lb DM	21.7
Days to	lose	Predicted Intake, lb DM	19.6
one condition score:	-80	DM Intake, % of Body Weight	1.73

Protein Ratio	1.04
Ca:P Ratio	1.8

Maternal Tissue ADG, lb	-1.07	Fetal Tissue ADG, lb	1.10	Milk Yield, lb
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Nutrient	Diet Concentration			Daily Amount		Status
	As Fed	DM	Required	DM	Required	
Diet DM	76%	-	-	-	-	-
TDN	36%	47%	-	10.2 lb	TDN:CP	5.25
ME, Mcal/lb	0.59	0.77	-	16.7 Mca	-	-
NEm, Mcal/lb	0.29	0.39	-	8.3 Mca	-	-
NEg, Mcal/lb	0.11	0.14	-	3.0 Mca	-	-
NDF	54%	72%	-	3.2 lb	-	-
peNDF	54%	71%	7 - 20 Min	15.3 lb	7.0 pH	ADEQUATE
Crude Protein	6.8%	8.9%	-	1.93 lb	1.86 lb	ADEQUATE
Fat	1.7%	2.2%	-	0.47 lb	-	ADEQUATE
Calcium	0.18%	0.24%	0.28%	23.2 g	27.1 g	DEFICIENT
Phosphorus	0.10%	0.14%	0.13%	13.3 g	12.9 g	ADEQUATE
Sodium	0.01%	0.01%	0.07%	1.23 g	6.88 g	DEFICIENT
Potassium	0.71%	0.93%	0.60%	91.3 g	59.0 g	ADEQUATE
Magnesium	0.16%	0.21%	0.15%	20.6 g	11.8 g	ADEQUATE
Sulfur	0.10%	0.13%	0.15%	12.3 g	14.7 g	DEFICIENT
Cobalt ppm	0.15	0.20	.15 ppm	2.0 mg	1.5 mg	ADEQUATE
Copper ppm	5.87	7.7	10 ppm	76 mg	98 mg	DEFICIENT
Iron ppm, mg	131.17	172.6	50 ppm	1697 mg	492 mg	EXCESSIVE
Manganese ppm	31.91	42.0	40 ppm	413 mg	393 mg	ADEQUATE
Selenium ppm	0.14	0.19	.1 ppm	1.9 mg	1.0 mg	ADEQUATE
Zinc ppm	18.57	24.4	30 ppm	240 mg	295 mg	DEFICIENT

	Desired Time on Feed	Desired Final Weight
	Initial Weight, lb	Final Weight, lb
Initial Weight, lb	1250	1250
Final Weight, lb	1252	1316
Average Weight, lb	1251	1283
Days on Feed	60	2050

Pistol Pete, Bullet Ranch		Post-weaning spring-born calves		
Class of cattle:		Late Gestation, Dry Cow		
Formulate on as fed (AF) or dry matter (DM) basis?		AF		
Feed Category	Feed or Forage	lb or % AF	% AF	% DM
Grazed forages	Native Range, Nov-Dec	26.50	89.83	87.81
Harvested Forages	Prairie Hay, mature			
Harvested Forages	Bermuda Hay, early bloom			
Harvested Forages	Wheat Straw			
Harvested Forages	Corn Stalks			
Harvested Forages	Milo Stover			
Harvested Forages	Cotton Gin Trash			
Concentrates	Soybean meal, 48%			
Concentrates	Corn Gluten Feed			
Concentrates	Distillers Grains with Solubles, corn	3.00	10.17	12.19
		29.5	100.0	100.0
Cost Per Day	\$1.03	Feed Intake, lb	AF	29.5

Projected ADG, lb	0.30	Feed Intake Ratio	1.12
Desired ADG, lb	1.10	Feed Intake, lb DM	22.6
Days to lose one condition score:	-106	Predicted Intake, lb DM	20.3
		DM Intake, % of Body Weight	1.80

Protein Ratio	1.00
Ca:P Ratio	1.1

Maternal Tissue ADG, lb	-0.81	Fetal Tissue ADG, lb	1.10	Milk Yield, lb
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Nutrient	Diet Concentration			Daily Amount		Status
	As Fed	DM	Required	DM	Required	
Diet DM	77%	-	-	-	-	-
TDN	37%	48%	-	11.0 lb	TDN:CP	5.92
ME, Mcal/lb	0.61	0.79	-	18.0 Mca	-	-
NEm, Mcal/lb	0.31	0.41	-	9.2 Mca	-	-
NEg, Mcal/lb	0.12	0.16	-	3.6 Mca	-	-
NDF	55%	72%	-	3.3 lb	-	-
peNDF	53%	68%	7 - 20 Min	15.5 lb	7.0 pH	ADEQUATE
Crude Protein	6.3%	8.2%	-	1.85 lb	1.86 lb	ADEQUATE
Fat	2.5%	3.3%	-	0.74 lb	-	ADEQUATE
Calcium	0.16%	0.20%	0.26%	20.9 g	27.1 g	DEFICIENT
Phosphorus	0.15%	0.19%	0.13%	19.6 g	12.9 g	ADEQUATE
Sodium	0.01%	0.01%	0.07%	1.40 g	7.19 g	DEFICIENT
Potassium	0.65%	0.85%	0.60%	87.7 g	61.7 g	ADEQUATE
Magnesium	0.17%	0.22%	0.15%	22.4 g	12.3 g	ADEQUATE
Sulfur	0.13%	0.17%	0.15%	17.3 g	15.4 g	ADEQUATE
Cobalt ppm	0.14	0.18	.15 ppm	1.8 mg	1.5 mg	ADEQUATE
Copper ppm	5.41	7.0	10 ppm	72 mg	103 mg	DEFICIENT
Iron ppm, mg	114.53	149.3	50 ppm	1534 mg	514 mg	EXCESSIVE
Manganese ppm	30.92	40.3	40 ppm	414 mg	411 mg	ADEQUATE
Selenium ppm	0.17	0.22	.1 ppm	2.3 mg	1.0 mg	EXCESSIVE
Zinc ppm	21.09	27.5	30 ppm	282 mg	308 mg	DEFICIENT

Desired Time on Feed		Desired Final Weight	
Initial Weight, lb	1250	1250	
Final Weight, lb	1268	1316	
Average Weight, lb	1259	1283	
Days on Feed	60	223	

Protein/Forage Source Comparisons - Gestation

Item	Prairie H	Berm H	Straw	Stalks	Stover	Trash
DMI, lbs	22.5	26.0	20.6	21	26.5	20
Assoc Ef	+	0	+	+	0	0
SBM, lbs	1	-	2	1.5	0.3	0.15
cost/d	1.60	1.95	1.00	0.88	0.61	0.44
BCS +/-	(0.5)	0.10	(0.67)	(0.70)	(0.2)	(1.2)
CGF, lbs	2		5	3	0.7	0.3
cost/d	1.55		0.98	0.79	0.61	0.43
BCS +/-	(0.34)		(0.3)	(0.5)	(0.1)	(1.1)
DDGS, lbs	1.5		3.5	2	0.5	0.2
cost/d	1.53		0.95	0.75	0.59	0.43
BCS +/-	(0.42)		(0.40)	(0.6)	(0.1)	(1.1)

Protein Source Comparisons - Gestation

Item	Prairie H	Straw	Stover	Trash
DMI, lbs	22.5	20.6	26.5	20
Assoc Ef	+	+	0	0
Mol. Tub HI, lbs	2	2 (66%)	2	2
cost/d	2.33	1.41	1.49	1.36
BCS +/-	(0.4)	(0.77)	-	(1.0)
Mol Tub LI, lbs	0.75 (90%)	0.75 (55%)	0.75	0.75
cost/d	1.82	0.90	0.98	0.89
BCS +/-	(0.5)	(1.0)	(0.1)	(1.0)
DDGS, lbs	1.5	3.5	0.5	0.2
cost/d	1.53	0.95	0.59	0.43
BCS +/-	(0.42)	(0.40)	(0.1)	(1.1)

Conclusions

- Protein feeds will be high this winter
- Most roughage sources will be low in protein
 - Will also require energy supplementation
 - Even on lowest requirement animals
- Byproduct feeds may be of economic value compared to other feeds
 - Even though they are higher than normal
 - Cheaper per unit protein basis
 - Supply protein and energy
- Self-fed supplements work with moderate quality roughages
 - Low requirement cows

