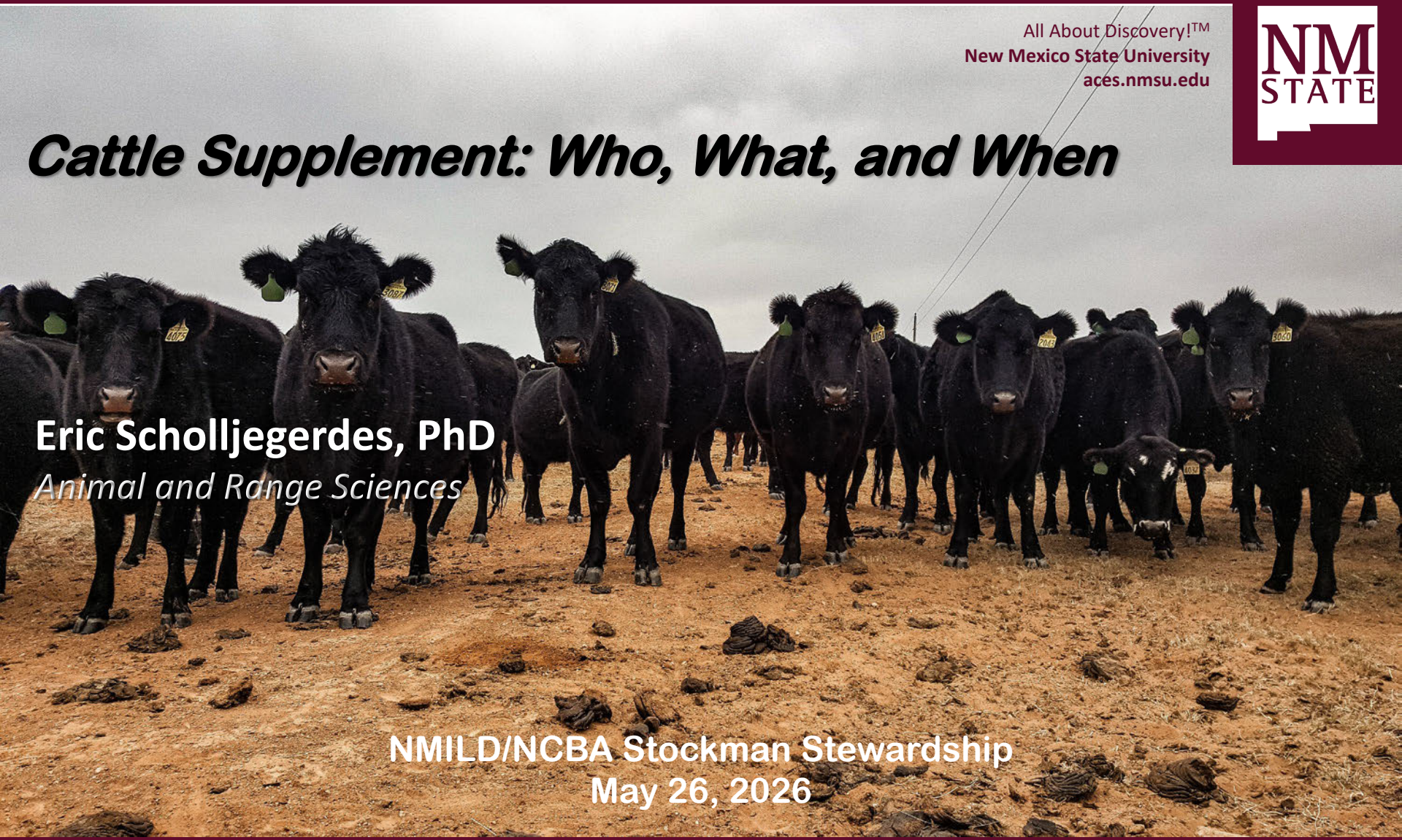
College of Agricultural, Consumer and Environmental Sciences

All About Discovery!™
New Mexico State University
aces.nmsu.edu

Cattle Supplement: Who, What, and When



Eric Scholljegerdes, PhD
Animal and Range Sciences

NMILD/NCBA Stockman Stewardship
May 26, 2026

The College of Agricultural, Consumer and Environmental Sciences is an engine for economic and community development in New Mexico, improving the lives of New Mexicans through academic, research, and Extension programs.



Requirements

- **Forage supply – Sample (can use range monitoring sample)**
  - **Time of year**
  - **Drought**
  - **Rainy season (yeah right)**

- **Animal requirements**
  - **Age**
    - **Running age, young, old**
  - **Physiological state**

Table 4. Mature Cow Requirements at Mature Unshrunk Weight

Mature Weight: Peak Milk Period	Month Since Calving	Daily Nutrients Required					Daily Nutrients as Percentage of Intake					
		TDN (lbs)	NEm (Mcal)	CP (lbs)	Ca (lbs)	P (lbs)	Intake lbs DM/d	TDN %DM	NEm Mcal/lb	CP %DM	Ca %DM	P %DM
1,200 lbs												
18 lb Peak												
Early Lactation	1	15.21	15	2.67	0.072	0.048	25.7	59.3	0.58	10.4	0.28	0.19
	2	16.06	16	2.94	0.08	0.052	26.5	60.5	0.6	11.1	0.3	0.2
	3	15.56	15.4	2.79	0.076	0.05	26	59.8	0.59	10.7	0.29	0.19
Mid Lactation	4	14.71	14.4	2.52	0.068	0.045	25.1	58.5	0.57	10	0.27	0.18
	5	13.87	13.4	2.24	0.06	0.041	24.2	57.2	0.55	9.2	0.25	0.17
	6	13.19	12.6	2.01	0.053	0.037	23.5	56.2	0.54	8.6	0.23	0.16
Mid Gestation	7	12.68	12	1.84	0.048	0.034	22.9	55.3	0.52	8	0.21	0.15
	8	10.32	8.9	1.43	0.035	0.027	21.1	48.8	0.42	6.8	0.17	0.13
	9	10.59	9.3	1.48	0.035	0.027	21.2	49.9	0.44	7	0.17	0.13
Late Gestation	10	11.06	10	1.58	0.059	0.037	21.4	51.8	0.47	7.4	0.27	0.17
	11	11.85	11.1	1.73	0.059	0.037	21.7	54.5	0.51	8	0.27	0.17
	12	12.95	12.6	1.97	0.059	0.037	22.4	57.9	0.56	8.8	0.26	0.16
1,300 lbs												
25 lb Peak												
Early Lactation	1	16.89	16.8	3.08	0.084	0.055	28	60.3	0.6	11	0.3	0.2
	2	17.99	18.1	3.42	0.094	0.061	29.1	61.7	0.62	11.7	0.32	0.21
	3	17.4	17.4	3.23	0.089	0.058	28.5	61	0.61	11.3	0.31	0.2
Mid Lactation	4	16.3	16.1	2.89	0.079	0.052	27.4	59.5	0.59	10.5	0.29	0.19
	5	15.21	14.8	2.54	0.069	0.047	26.2	57.9	0.56	9.7	0.26	0.18
	6	14.36	13.8	2.25	0.061	0.042	25.3	56.7	0.55	8.9	0.24	0.17
Mid Gestation	7	13.76	13.1	2.04	0.054	0.038	24.6	55.9	0.53	8.3	0.22	0.16
	8	10.99	9.5	1.52	0.038	0.029	22.4	49	0.42	6.8	0.17	0.13
	9	11.26	9.9	1.58	0.038	0.029	22.5	50	0.44	7	0.17	0.13
Late Gestation	10	11.8	10.7	1.68	0.064	0.04	22.7	52	0.47	7.4	0.28	0.17
	11	12.59	11.8	1.84	0.064	0.04	23.1	54.5	0.51	8	0.27	0.17
	12	13.84	13.5	2.11	0.064	0.04	23.8	58.1	0.57	8.8	0.27	0.17

Table 5. First Calf Heifers, Peak Milk:13 lbs (74% of Mature Production), NEm × 1.25 During Lactation

85% Mature Weight: and Period	Month Since Calving	Daily Nutrients Required						Daily Nutrients as Percentage of Intake						
		TDN (lbs)	NEm (Mcal)	NEg Mcal/lb	CP (lbs)	Ca (lbs)	P (lbs)	Intake lbs DM/d	TDN %DM	NEm Mcal/lb	NEg Mcal/lb	CP %DM	Ca %DM	P %DM
1,020 lbs														
Early Lactation	1	14.94	14.8	0.3	2.25	0.061	0.04	23.3	64	0.66	0.39	9.7	0.26	0.17
	2	15.62	15.6	0.3	2.46	0.067	0.043	24.1	64.9	0.67	0.39	10.2	0.28	0.18
	3	15.39	15.3	0.3	2.35	0.064	0.041	23.8	64.6	0.66	0.39	9.9	0.27	0.17
Mid Lactation	4	14.72	14.5	0.3	2.16	0.058	0.038	23.2	63.5	0.65	0.39	9.3	0.25	0.16
	5	14.14	13.8	0.3	1.96	0.052	0.035	22.6	62.6	0.63	0.39	8.7	0.23	0.15
	6	13.71	13.3	0.3	1.79	0.047	0.032	22.1	62	0.63	0.39	8.1	0.21	0.14
Mid Gestation	7	13.38	12.9	0.3	1.67	0.043	0.03	21.8	61.4	0.62	0.39	7.7	0.2	0.14
	8	9.85	8.1	0.3	1.38	0.034	0.025	19.4	50.8	0.45	0.39	7.1	0.17	0.13
	9	10.11	8.5	0.3	1.43	0.034	0.025	19.5	51.7	0.47	0.39	7.3	0.17	0.13
Late Gestation	10	10.58	9.2	0.3	1.52	0.055	0.033	19.8	53.4	0.49	0.39	7.7	0.28	0.17
	11	11.28	10.2	0.3	1.66	0.055	0.033	20.2	55.8	0.53	0.39	8.2	0.27	0.16
	12	12.27	11.6	0.3	1.88	0.055	0.033	20.9	58.8	0.58	0.39	9	0.26	0.16
1,105 lbs														
Early Lactation	1	15.7	15.5	0.3	2.34	0.064	0.042	24.6	63.8	0.65	0.39	9.5	0.26	0.17
	2	16.38	16.3	0.3	2.54	0.069	0.045	25.3	64.7	0.67	0.39	10	0.27	0.18
	3	16.13	16	0.3	2.44	0.066	0.044	25.1	64.3	0.66	0.39	9.7	0.26	0.17
Mid Lactation	4	15.55	15.3	0.3	2.24	0.061	0.04	24.5	63.5	0.65	0.39	9.1	0.25	0.16
	5	14.88	14.5	0.3	2.04	0.055	0.037	23.8	62.4	0.63	0.39	8.6	0.23	0.15
	6	14.46	14	0.3	1.88	0.05	0.034	23.4	61.8	0.62	0.39	8	0.21	0.15
Mid Gestation	7	14.12	13.6	0.3	1.76	0.046	0.032	23	61.3	0.62	0.39	7.6	0.2	0.14
	8	10.46	8.6	0.3	1.47	0.037	0.027	20.6	50.8	0.45	0.39	7.1	0.18	0.13
	9	10.8	9.1	0.3	1.52	0.037	0.027	20.8	52	0.47	0.39	7.3	0.18	0.13
Late Gestation	10	11.27	9.8	0.3	1.62	0.059	0.036	21.1	53.5	0.5	0.39	7.7	0.28	0.17
	11	11.96	10.8	0.3	1.77	0.059	0.036	21.5	55.7	0.53	0.39	8.3	0.28	0.17
	12	13.1	12.4	0.3	2.01	0.059	0.036	22.2	59	0.58	0.39	9.1	0.27	0.16

Table 7. Bred Heifer 60% Mature Weight at Breeding and 85% Mature Weight at Calving as 2 Year Old

Mature Weight and Range*	Month Since Conception	Daily Nutrients Required						Daily Nutrients as Percentage of Intake						
		TDN (lbs)	NEm (Mcal)	NEg (Mcal/lb)	CP (lbs)	Ca (lbs)	P (lbs)	Intake lbs DM/d	TDN %DM	NEm Mcal/lb	NEg Mcal/lb	CP %DM	Ca %DM	P %DM
1,100 lbs														
690 lbs	1	8.83	5.9	1.5	1.35	0.041	0.024	14.9	59.1	0.58	0.32	9	0.28	0.16
	2	9.12	6.1	1.6	1.37	0.042	0.025	15.4	59.2	0.58	0.32	8.9	0.27	0.16
	3	9.39	6.3	1.6	1.39	0.042	0.025	15.9	59.2	0.58	0.32	8.8	0.27	0.16
	4	9.73	6.6	1.7	1.43	0.043	0.026	16.4	59.4	0.59	0.33	8.7	0.26	0.16
	5	10.06	6.9	1.7	1.47	0.043	0.026	16.9	59.7	0.59	0.33	8.7	0.26	0.15
	6	10.51	7.4	1.7	1.54	0.044	0.027	17.4	60.3	0.6	0.34	8.8	0.25	0.15
	7	11.06	8.1	1.7	1.64	0.063	0.035	18	61.3	0.61	0.35	9.1	0.35	0.19
	8	11.85	9.2	1.7	1.8	0.064	0.036	18.8	63	0.64	0.38	9.5	0.34	0.19
1,020 lbs	9	12.69	10.5	1.5	2.04	0.067	0.037	19.6	64.7	0.67	0.4	10.4	0.34	0.19
1,200 lbs														
753 lbs	1	9.49	6.3	1.7	1.44	0.045	0.026	16	59.4	0.59	0.33	9	0.28	0.16
	2	9.78	6.5	1.8	1.47	0.046	0.027	16.5	59.4	0.59	0.33	8.9	0.28	0.16
	3	10.08	6.7	1.8	1.5	0.046	0.027	17	59.4	0.59	0.33	8.8	0.27	0.16
	4	10.42	7	1.8	1.53	0.047	0.028	17.5	59.6	0.59	0.33	8.8	0.27	0.16
	5	10.83	7.4	1.9	1.58	0.047	0.028	18	60	0.59	0.33	8.8	0.26	0.16
	6	11.28	7.9	1.9	1.65	0.048	0.029	18.6	60.5	0.6	0.34	8.9	0.26	0.16
	7	11.91	8.7	1.9	1.76	0.069	0.038	19.3	61.6	0.62	0.36	9.1	0.36	0.2
	8	12.69	9.8	1.8	1.93	0.07	0.039	20.1	63.1	0.64	0.38	9.6	0.35	0.19
1,113 lbs	9	13.67	11.3	1.7	2.19	0.072	0.04	21	65	0.67	0.4	10.4	0.34	0.19
1,300 lbs														
816 lbs	1	10.07	6.6	1.9	1.54	0.049	0.028	17	59.4	0.59	0.33	9.1	0.29	0.17
	2	10.45	6.9	1.9	1.57	0.049	0.029	17.5	59.6	0.59	0.33	8.9	0.28	0.16
	3	10.75	7.1	2	1.6	0.05	0.029	18	59.6	0.59	0.33	8.8	0.28	0.16
	4	11.18	7.5	2	1.63	0.05	0.03	18.6	60	0.59	0.33	8.8	0.27	0.16
	5	11.6	7.9	2.1	1.69	0.051	0.031	19.2	60.3	0.6	0.34	8.8	0.26	0.16
	6	12.13	8.5	2.1	1.76	0.052	0.031	19.9	61	0.61	0.35	8.9	0.26	0.16
	7	12.76	9.3	2.1	1.88	0.074	0.041	20.6	62	0.63	0.36	9.1	0.36	0.2
	8	13.61	10.5	2	2.06	0.076	0.042	21.4	63.5	0.65	0.38	9.6	0.35	0.2
1,205 lbs	9	14.66	12.1	1.8	2.35	0.078	0.043	22.4	65.4	0.68	0.41	10.5	0.35	0.19

Table 8. Growing Replacement Heifers (No Implant or Ionophore Adjustment)

Mature Weight and Range	Daily BW Gain (lbs)	Daily Nutrients Required						Daily Nutrients as Percentage of Intake						
		TDN (lbs)	NEm (Mcal)	NEg (Mcal)	CP (lbs)	Ca (lbs)	P (lbs)	Intake lbs DM/d	TDN %DM	NEm Mcal/lb	NEg Mcal/lb	CP %DM	Ca %DM	P %DM
1,100 lbs	0.5													
400 lbs		5.12	3.9	0.5	0.82	0.025	0.015	9.2	55.8	0.53	0.28	9	0.28	0.16
500 lbs		6.05	4.6	0.6	0.92	0.028	0.016	10.8	55.7	0.53	0.27	8.5	0.25	0.15
600 lbs		6.95	5.3	0.7	1.01	0.03	0.018	12.5	55.8	0.53	0.28	8.1	0.24	0.15
700 lbs		7.77	5.9	0.8	1.1	0.032	0.02	14	55.7	0.53	0.27	7.9	0.23	0.15
800 lbs		8.57	6.5	0.8	1.18	0.034	0.022	15.4	55.6	0.53	0.27	7.7	0.22	0.14
	1													
400 lbs		5.81	3.9	1.1	1.04	0.039	0.02	9.6	60.6	0.6	0.34	10.8	0.4	0.21
500 lbs		6.86	4.6	1.2	1.12	0.04	0.021	11.3	60.5	0.6	0.34	9.9	0.35	0.19
600 lbs		7.89	5.3	1.4	1.2	0.041	0.023	13	60.6	0.6	0.34	9.2	0.31	0.18
700 lbs		8.82	5.9	1.6	1.27	0.042	0.025	14.6	60.4	0.6	0.34	8.7	0.29	0.17
800 lbs		9.74	6.5	1.8	1.34	0.044	0.026	16.1	60.4	0.6	0.34	8.3	0.27	0.16
	1.5													
400 lbs		6.43	3.9	1.7	1.25	0.051	0.025	9.8	65.8	0.68	0.41	12.8	0.52	0.26
500 lbs		7.59	4.6	2	1.31	0.051	0.026	11.6	65.7	0.68	0.41	11.4	0.44	0.23
600 lbs		8.72	5.3	2.2	1.37	0.052	0.027	13.2	65.9	0.68	0.41	10.4	0.39	0.21
700 lbs		9.77	5.9	2.6	1.43	0.052	0.028	14.9	65.7	0.68	0.41	9.6	0.35	0.19
800 lbs		10.79	6.5	2.8	1.49	0.053	0.03	16.4	65.6	0.68	0.41	9	0.32	0.18
	2													
400 lbs		7	3.9	2.3	1.46	0.064	0.03	9.7	72	0.77	0.49	15	0.66	0.31
500 lbs		8.27	4.6	2.7	1.5	0.063	0.031	11.5	71.9	0.77	0.49	13.1	0.55	0.27
600 lbs		9.5	5.3	3.1	1.55	0.062	0.032	13.2	72.1	0.77	0.49	11.7	0.47	0.24
700 lbs		10.64	5.9	3.5	1.59	0.062	0.032	14.8	71.9	0.77	0.49	10.7	0.42	0.22
800 lbs		11.75	6.5	3.9	1.63	0.061	0.033	16.4	71.8	0.77	0.49	10	0.37	0.2
1,200 lbs	0.5													
400 lbs		5.08	3.9	0.5	0.82	0.026	0.015	9.2	55.5	0.53	0.27	9	0.28	0.16
500 lbs		5.99	4.6	0.6	0.92	0.028	0.017	10.8	55.4	0.53	0.27	8.5	0.26	0.15
600 lbs		6.88	5.3	0.6	1.01	0.03	0.019	12.4	55.5	0.53	0.27	8.2	0.24	0.15
700 lbs		7.7	5.9	0.7	1.1	0.032	0.021	13.9	55.4	0.52	0.27	7.9	0.23	0.15
800 lbs		8.5	6.5	0.8	1.19	0.035	0.023	15.4	55.3	0.52	0.27	7.7	0.23	0.15
	1													
400 lbs		5.74	3.9	1	1.04	0.039	0.02	9.6	60	0.59	0.33	10.9	0.41	0.21
500 lbs		6.77	4.6	1.2	1.12	0.04	0.022	11.3	59.9	0.59	0.33	9.9	0.36	0.19
600 lbs		7.79	5.3	1.4	1.2	0.042	0.023	13	60	0.6	0.34	9.2	0.32	0.18
700 lbs		8.71	5.9	1.5	1.27	0.043	0.025	14.5	59.9	0.59	0.33	8.8	0.3	0.17
800 lbs		9.62	6.5	1.7	1.35	0.045	0.027	16.1	59.8	0.59	0.33	8.4	0.28	0.17

Supplement decisions

- Nutrient deficiencies
- Least cost
  - Calculate based on:
    - $/hd/day
    - $/lb of nutrient (CP or TDN)
- Ease of delivery
  - Bulky feeds
  - Self-fed
  - Loose meals
  - Cubes
- Equipment needed to deliver
  - Feed bunks
  - Trip Hoppers
  - Distance travelled
- Days per week to supplement

Scenario 1: Breeding Season

- 2- and 3-year-old cows
  - Lactating
  - 45 days post-partum
- Diet
  - NM Spring Rangeland
    - A little green and a lot of brown
    - CP: 6%
    - TDN: 45%

Scenario 1: Breeding Season

Table I. Nutrient Requirements of Heifers and Cows (Pounds or Percentage of Ration Dry Matter)[1]

	Calving to Breeding[2]				Mid[3] Pregnancy		Late[4] Pregnancy	
	Avg. Milk		High Milk					
	lbs	%	lbs	%	lbs	%	lbs	%
Heifer-Calving as 2's[5]								
Protein	1.8- 2.0	11.3	2.4	14.7			1.4- 1.6	9.0
TDN6	10.3-12.0	65.1	13.3	79.3			9.5-11.3	60.0
Calcium	.057-.062	.36	.083	.53			.053-.057	.33
Phosphorus	.037-.044	.24	.054	.31			.033-.040	.21
Cows-Calving as 3's or older[7]								
Protein	1.9- 2.1	9.9	2.4- 2.7	12.9	1.2- 1.4	7.0	1.5- 1.7	8.0
TDN[6]	10.8-12.8	57.3	13.1-15.2	69.8	8.2-10.1	48.8	9.8-11.8	54.0
Calcium	.053-.062	.28	.077-.086	.41	.031-.040	.19	.049-.057	.26
Phosphorus	.042-.051	.22	.053-.062	.28	.031-.040	.19	.037-.046	.21

1 Requirements from 1984 Nutrient Requirements of Beef Cattle.
2 Heifers fed the higher levels of protein and TDN should gain .5 lb daily; cows should gain some weight.
3 Heifers should make some gain; cows will usually lose weight on lower levels of TDN.
4 Heifers fed higher levels should gain 1.4 lb daily in addition to fetal weight gain; cows should gain fetal weight.
5 Range of requirements for heifers weighing 700 to 900 lb gaining 1.4 daily before and .5 daily after calving.
6 Total digestible nutrients (TDN) - an estimate of energy.
7 Range of requirements for cows weighing 900 to 1200 lb, respectively.

Scenario 1: Breeding Season

- 2-year-old cows (1000 lb)
  - Lactating
  - 45 days post-partum
- Diet
  - NM Spring Rangeland
  - A little green and a lot of brown
  - CP: 6%
  - TDN: 45%
- Requirements
  - CP: 1.9 lbs CP
  - TDN: 11 lbs TDN
- Differences
  - Intake: 1.8% of Body weight
  - CP: 1000 lb BW x 1.8% of BW Intake = 18 lbs of forage intake/day
    - 18 lbs of forage x 6% CP in forage = 1.1 lbs of CP consumed/day
    - 18 lbs of forage x 45% TDN in forage = 8.1 lbs of TDN consumed/day
  - Requirement – actual
    - CP: 1.9 – 1.1 = - 0.8 lbs deficient in protein
    - TDN: 11 – 8.1 = - 2.9 lbs deficient in TDN

Scenario 1: Breeding Season

- 2-year-old cows (900 to 1100 = avg of 1000 lb)
- Options
  - Hay
    - Alfalfa - 19% CP 55% TDN @ $240/ton ($0.63/lb CP and $0.22/lb TDN)
    - Wheat hay – 11% CP 58% TDN @ $100/ton ($0.45/lb CP and $0.09/lb TDN)
  - Cube
    - 20%: 20% CP 77% TDN @ $343/ton ($0.86/lb CP and $0.22/lb TDN)
    - 32%: 32% CP 69% TDN @ $450/ton ($0.70/lb CP and $0.33/lb TDN)
  - Tub
    - 20%: 20% CP 60% TDN @ $80/ 200 lb tub ($2.00/lb CP and $0.67/lb TDN)
    - 30%: 30% CP 70% TDN @ $130/ 200 lb tub ($2.17/lb CP and $0.93/lb TDN)

$/lb CP calculation: 2000 lbs (ton) x 19% CP = 380 lbs of protein in a ton of alfalfa
$240 per ton / 380 lb of protein = $0.63 per lb of protein

Scenario 1: Breeding Season

- **2-year-old cows (900 to 1100 = avg of 1000 lb)**
- **Options**
  - **Hay**
    - **Alfalfa: 4.2 lbs @ $0.51/day**
    - **Wheat hay: 7.3 lbs @ $0.36/day**
      - **(7.3 x 100 hd = 730 lbs or 5,110 lb per week OR if we feed 3 days per week – 5,110 lb ÷ 3 days = 1,703 lbs per feed day)**
  - **Cube**
    - **20%: 4.0 lbs @ $0.69/day**
    - **32%: 2.5 lbs @ $0.56/day**
  - **Tub**
    - **20%: 4.0 lbs @ $1.60/day**
    - **30%: 2.7 lbs @ $1.73/day**

Calculation for how much to feed

Deficiency ÷ % nutrient in feed = lbs to feed to meet deficiency

Example: 0.8 lb deficiency in CP ÷ 19% (0.19) CP in Alfalfa = 4.2 lbs of Alfalfa needs to be fed to meet protein deficiency

Effects of forage CP% on forage DM intake

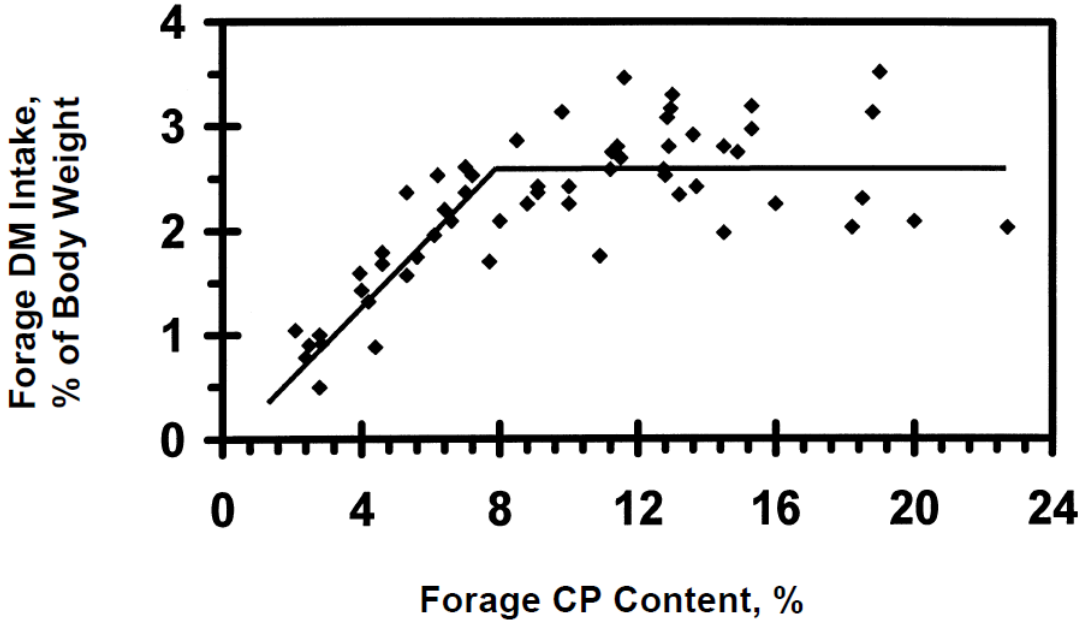


Figure 1. Forage dry matter (DM) intake relative to the forage crude protein (CP) content.

Mathis, 2003

Improvement in low-quality forage intake in response to %CP in supplement

Supplement Protein Content, %	Improvement in Forage Intake Above Unsupplemented, %
Less than 15	3
15to 20	10
20 to 30	21
Greater than 30	44

Heldt, 1998

Scenario 2: Breeding Season

- Mature cows, 1200 lbs
  - Lactating
  - 45 days post-partum
- Diet
  - NM Spring Rangeland
    - A little green and a lot of brown
    - CP: 6%
    - TDN: 45%
  - Requirements:
    - CP: 3 lbs
    - TDN: 16 lbs
  - Deficiency:
    - CP: 1.3
    - TDN: 4.0
- Supplement
  - 20%: 6 lbs/hd/d
  - 32%: 5 lbs/hd/d
- Recommendations
  - If forage quantity is short, then energy is likely further limited. Choose the 20% Cube
  - If forage quantity is adequate, then select the 32% cube

Scenario 3: Pre-Breeding Season

- Yearling heifers, Target 660 lbs (55% of mature body weight at breeding)
  - Current weight in January 550 lbs with breeding starting in May (120 days)
  - Target to gain 110 lbs or ADG of 0.9 lb/d
- Diet
  - NM Winter Rangeland
    - CP: 5%
    - TDN: 40%

Table 8. Growing Replacement Heifers (No Implant or Ionophore Adjustment)

Mature Weight and Range	Daily BW Gain (lbs)	Daily Nutrients Required						Daily Nutrients as Percentage of Intake						
		TDN (lbs)	NEm (Mcal)	NEg (Mcal)	CP (lbs)	Ca (lbs)	P (lbs)	Intake lbs DM/d	TDN %DM	NEm Mcal/lb	NEg Mcal/lb	CP %DM	Ca %DM	P %DM
1,100 lbs	0.5													
400 lbs		5.12	3.9	0.5	0.82	0.025	0.015	9.2	55.8	0.53	0.28	9	0.28	0.16
500 lbs		6.05	4.6	0.6	0.92	0.028	0.016	10.8	55.7	0.53	0.27	8.5	0.25	0.15
600 lbs		6.95	5.3	0.7	1.01	0.03	0.018	12.5	55.8	0.53	0.28	8.1	0.24	0.15
700 lbs		7.77	5.9	0.8	1.1	0.032	0.02	14	55.7	0.53	0.27	7.9	0.23	0.15
800 lbs		8.57	6.5	0.8	1.18	0.034	0.022	15.4	55.6	0.53	0.27	7.7	0.22	0.14
	1													
400 lbs		5.81	3.9	1.1	1.04	0.039	0.02	9.6	60.6	0.6	0.34	10.8	0.4	0.21
500 lbs		6.86	4.6	1.2	1.12	0.04	0.021	11.3	60.5	0.6	0.34	9.9	0.35	0.19
600 lbs		7.89	5.3	1.4	1.2	0.041	0.023	13	60.6	0.6	0.34	9.2	0.31	0.18
700 lbs		8.82	5.9	1.6	1.27	0.042	0.025	14.6	60.4	0.6	0.34	8.7	0.29	0.17
800 lbs		9.74	6.5	1.8	1.34	0.044	0.026	16.1	60.4	0.6	0.34	8.3	0.27	0.16
	1.5													
400 lbs		6.43	3.9	1.7	1.25	0.051	0.025	9.8	65.8	0.68	0.41	12.8	0.52	0.26
500 lbs		7.59	4.6	2	1.31	0.051	0.026	11.6	65.7	0.68	0.41	11.4	0.44	0.23
600 lbs		8.72	5.3	2.2	1.37	0.052	0.027	13.2	65.9	0.68	0.41	10.4	0.39	0.21
700 lbs		9.77	5.9	2.6	1.43	0.052	0.028	14.9	65.7	0.68	0.41	9.6	0.35	0.19
800 lbs		10.79	6.5	2.8	1.49	0.053	0.03	16.4	65.6	0.68	0.41	9	0.32	0.18
	2													
400 lbs		7	3.9	2.3	1.46	0.064	0.03	9.7	72	0.77	0.49	15	0.66	0.31
500 lbs		8.27	4.6	2.7	1.5	0.063	0.031	11.5	71.9	0.77	0.49	13.1	0.55	0.27
600 lbs		9.5	5.3	3.1	1.55	0.062	0.032	13.2	72.1	0.77	0.49	11.7	0.47	0.24
700 lbs		10.64	5.9	3.5	1.59	0.062	0.032	14.8	71.9	0.77	0.49	10.7	0.42	0.22
800 lbs		11.75	6.5	3.9	1.63	0.061	0.033	16.4	71.8	0.77	0.49	10	0.37	0.2
1,200 lbs	0.5													
[illegible]		5.08	3.9	0.5	0.82	0.026	0.015	9.2	55.5	0.53	0.27	9	0.28	0.16
500 lbs		5.99	4.6	0.6	0.92	0.028	0.017	10.8	55.4	0.53	0.27	8.5	0.26	0.15
600 lbs		6.88	5.3	0.6	1.01	0.03	0.019	12.4	55.5	0.53	0.27	8.2	0.24	0.15
700 lbs		7.7	5.9	0.7	1.1	0.032	0.021	13.9	55.4	0.52	0.27	7.9	0.23	0.15
800 lbs		8.5	6.5	0.8	1.19	0.035	0.023	15.4	55.3	0.52	0.27	7.7	0.23	0.15
	1													
400 lbs		5.74	3.9	1	1.04	0.039	0.02	9.6	60	0.59	0.33	10.9	0.41	0.21
500 lbs		6.77	4.6	1.2	1.12	0.04	0.022	11.3	59.9	0.59	0.33	9.9	0.36	0.19
600 lbs		7.79	5.3	1.4	1.2	0.042	0.023	13	60	0.6	0.34	9.2	0.32	0.18
[illegible]		8.71	5.9	1.5	1.27	0.043	0.025	14.5	59.9	0.59	0.33	8.8	0.3	0.17
800 lbs		9.62	6.5	1.7	1.35	0.045	0.027	16.1	59.8	0.59	0.33	8.4	0.28	0.17

Scenario 3: Pre-Breeding Season

- Yearling heifers, Target 660 lbs (55% of mature body weight at breeding)
  - Current weight in January 550 lbs with breeding starting in May (120 days)
  - Target to gain 110 lbs or ADG of 0.9 lb/d
- Diet
  - NM Winter Rangeland
    - CP: 5%
    - TDN: 40%
  - Requirements:
    - CP: 1.2 lbs
    - TDN: 7.9 lbs
  - Deficiency:
    - CP: 0.5 lbs
    - TDN: 2.7 lbs
- Supplement
  - 20%: 3 lbs/hd/d
  - 32%: 4 lbs/hd/d
- Recommendations
  - Because they are young and growing, additional energy is best, so 20% would be the choice

Scenario 4: 3rd Trimester

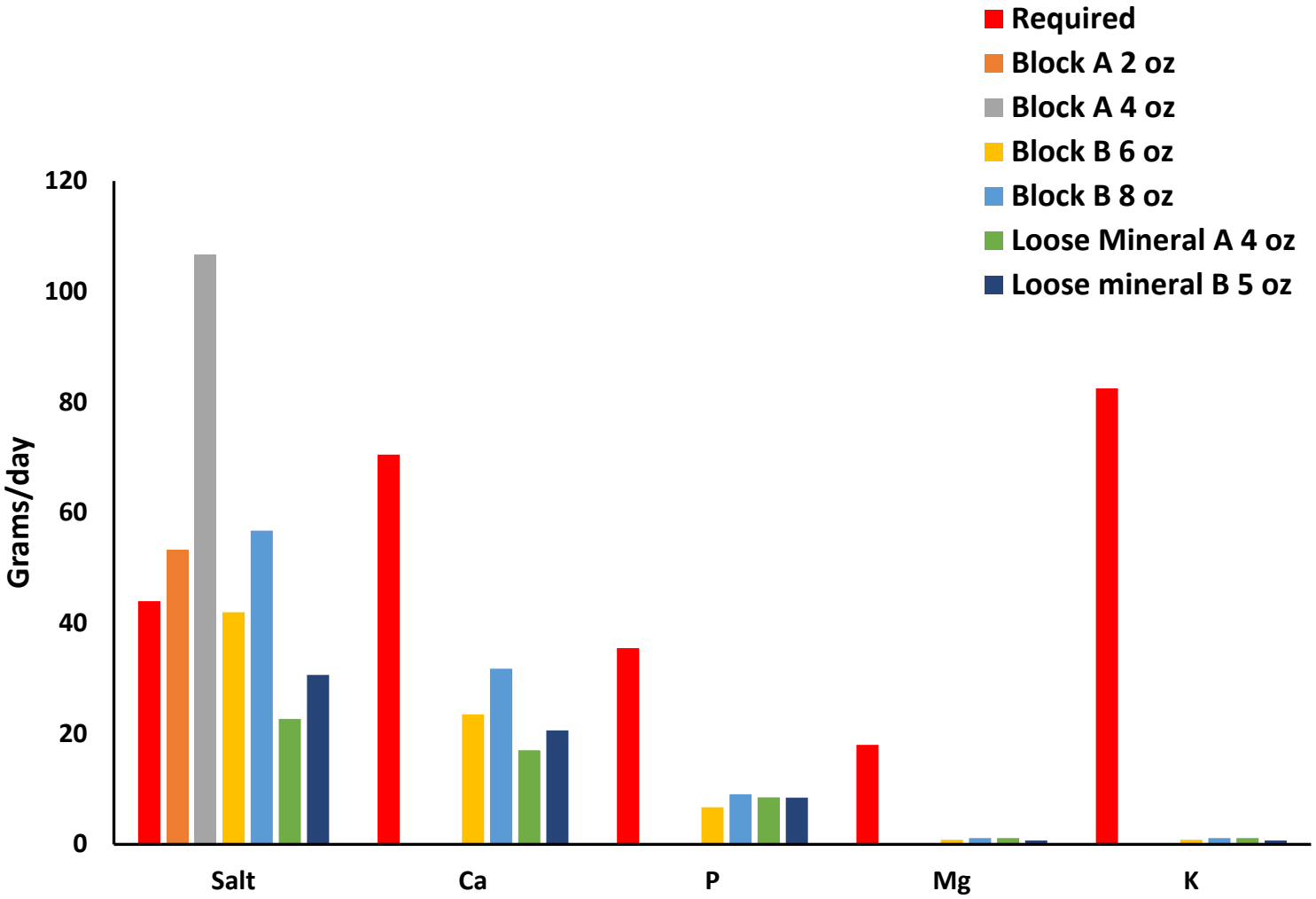
- **Mature Cow, Target to gain 1 Body Condition Score before calving**
  - **Cow body condition score at calving has a greater impact on subsequent pregnancy than BCS at breeding**
  - **Body condition is equivalent to 80 to 100 lbs of body weight**
  - **ADG needed of 0.88 lb/hd/d**
- **Diet**
  - **NM Winter Rangeland**
    - **CP: 5%**
    - **TDN: 40%**
  - **Requirements:**
    - **CP: 2 lbs**
    - **TDN: 17 lbs**
  - **Deficiency:**
    - **CP: 0.7 lbs**
    - **TDN: 7.3 lbs**
- **Supplement**
  - **20%: 9 lbs/hd/d**
  - **32%: 11 lbs/hd/d**
- **Recommendations**
  - **Start in 2nd Trimester – lower requirements and longer period – ADG of 0.4 lb/hd/d**
  - **20%: 5 lbs/hd/d**
  - **32%: 6 lbs/hd/d**


Mineral

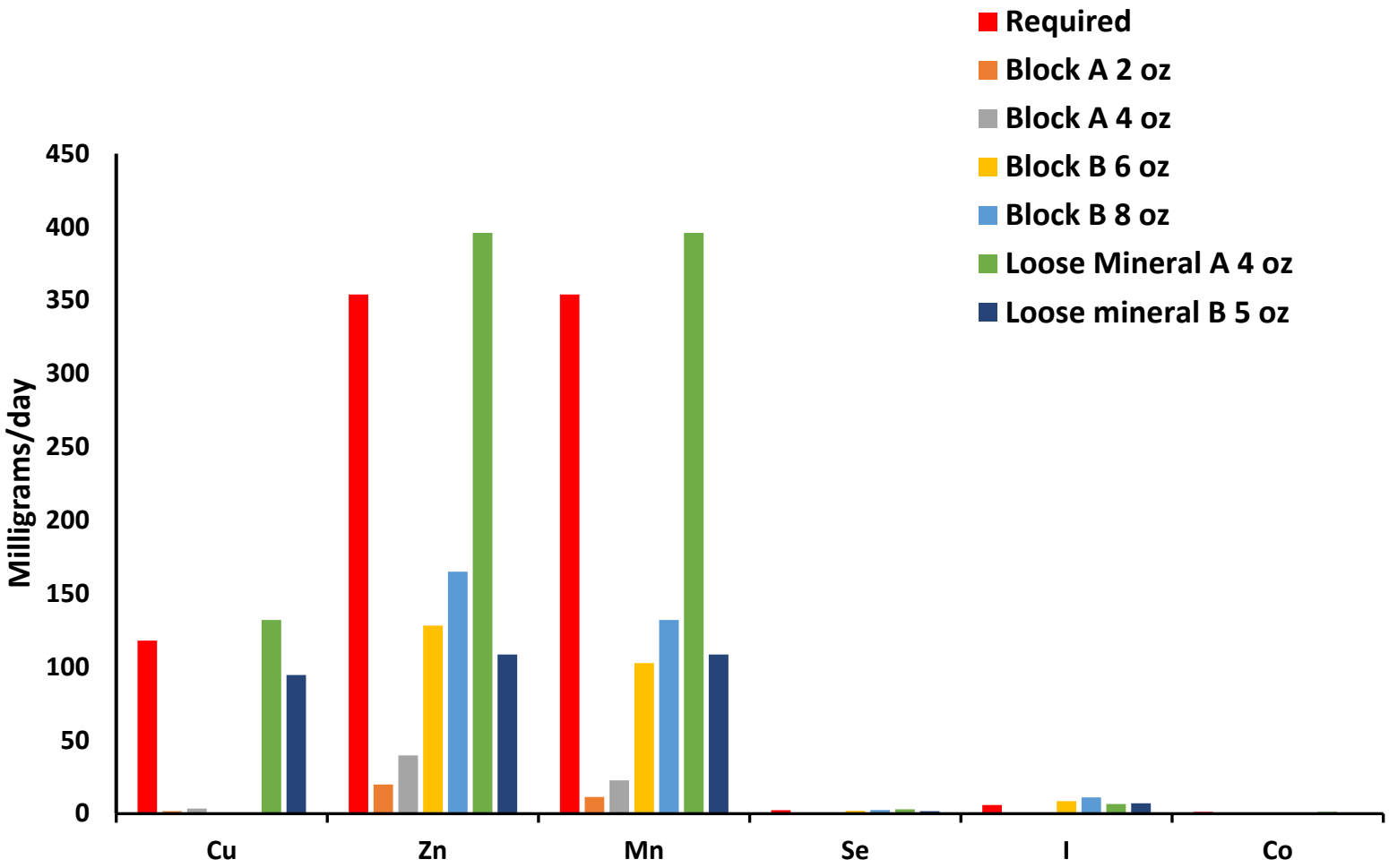
Mineral

- Typical recommended intakes of 2 to 4 oz/hd/d
  - 2 oz mineral = 0.125 lb/hd/d
    - 100 cows will eat 87 lbs per week
  - 4 oz mineral = 0.25 lb/hd/d
    - 100 cows will eat 175 lb per week
- Watch ingredient list
  - Mineral attached to oxide less available than sulfates
  - Mineral with “Organics” have minerals attached to a variety of things like amino acids
    - Protect from bacteria
    - Increase absorption
  - Some do not add white salt, so it will suggest to provide along with
- Form of mineral can influence intake
  - 50 lb Block
  - Loose
  - Protein/mineral Tub

Comparison of Macro-mineral supplements



Comparison of Micro-mineral supplements



Mineral

- Mineral intake issues
  - Too much
    - Mix lose white salt
      - Start with 10 lbs of salt per 50 lb bag of mineral
        - 100 cows who need to eat 4 oz (0.25 lb) should consume 30 lbs of mixture (25 lbs TM salt an 5 lb White salt)
  - Too little
    - Mix lose white salt
      - Mix in small incremental amounts to determine if they increase intake
    - Some ingredients, like Magnesium, Potassium, or Phosphorus can be unpalatable to cattle
    - It is best not to put out a white salt block along with trace minerals as they will preferentially consume

Mineral Tubs

Nutrient	Typical Tub Composition	Intake from Tub at 1 lb/day	Approx. Cow Requirement/day	Comment
Crude Protein	20%	0.20 lb CP/day	Depends on stage; ~1.5–2.5 lb CP/day	Tub supplements forage, does not meet total protein alone
Salt	10–20%	45–91 g/day	~25–50 g/day salt equivalent	Often used to regulate intake
Calcium	2–8%	9–36 g/day	~20–35 g/day	Can supply most or all Ca need
Phosphorus	0.5–4%	2.3–18 g/day	~18–26 g/day	Low-P tubs may not meet requirement
Magnesium	0.5–3%	2.3–13.6 g/day	~12–24 g/day	Higher Mg needed for grass tetany risk
Copper	50–300 ppm	23–136 mg/day	~100–125 mg/day	Need depends on antagonists: Mo, S, Fe
Zinc	150–1,000 ppm	68–454 mg/day	~350–400 mg/day	Higher-Zn tubs may meet full need
Manganese	150–800 ppm	68–363 mg/day	~450–500 mg/day	Often only partial supply

Alternative supplements



By-products – things to consider

- What is a by-product
  - Waste from another industry
    - Soybean meal
    - Chile trash
    - Dried Distillers Grains
- What are the advantages
  - Typically, cheaper than manufactured feeds
- What are the disadvantages or things to consider
  - Price per unit of protein or energy
  - Special handling or storage
  - Any toxic effects
    - Feeding rate
  - Reliable/consistent source
    - Availability – minor issue
    - Nutrient variability – could be major issue

By-products – things to consider

- Example evaluation of a by-product feed for ranch
  - Dried Distillers Grains
    - 31% CP, 10% fat, 89% TDN
    - Sulfur content 0.6% to 1.1%
    - If water is high in sulfur, this can be a concern
      - 0.41% or greater daily Sulfur intake can cause polio
      - Ties up copper in the rumen
    - So, cows drinking water with 1600 mg/L sulfate and being fed distillers grains that varies from 0.6% to 1.1% S have a safe (max of 0.37% S) intake range of:
      - 3 to 0.75 lb/hd/d

By-products – things to consider

- Moisture
  - Below 10%, safe for long-term storage
  - Above 15 to 18% - increased risk of spoilage
    - Feed more quickly
  - Example – whole potatoes
    - Crush with tractor to let dry or ensile with wheat straw
- Highly digestible
  - Increase bloat or acidosis
  - Limit inclusion to 15 to 20% if unsure
- Crop residues
  - Excellent option
  - Typically, low in protein and/or energy and minerals

By-products – things to consider

- Anti-nutrition factors
  - Gossypol in cottonseed
    - Whole cottonseed – 0.5 to 1.5% DM
    - Cottonseed meal – 0.05 to 0.20% DM
    - Bulls are very sensitive, avoid whole cottonseed during breeding season and 60 days prior to breeding season
    - Do not exceed 1 to 2 lbs of cottonseed meal for mature bulls
  - High fat
    - Whole oilseeds are high in fat ~ 30%
      - Don’t exceed 3% added fat in diet (3 lbs of seed/hd/d)
    - High fat supplements (10 to 12%)
      - Don’t exceed 8 lbs of supplement

By-products – things to consider

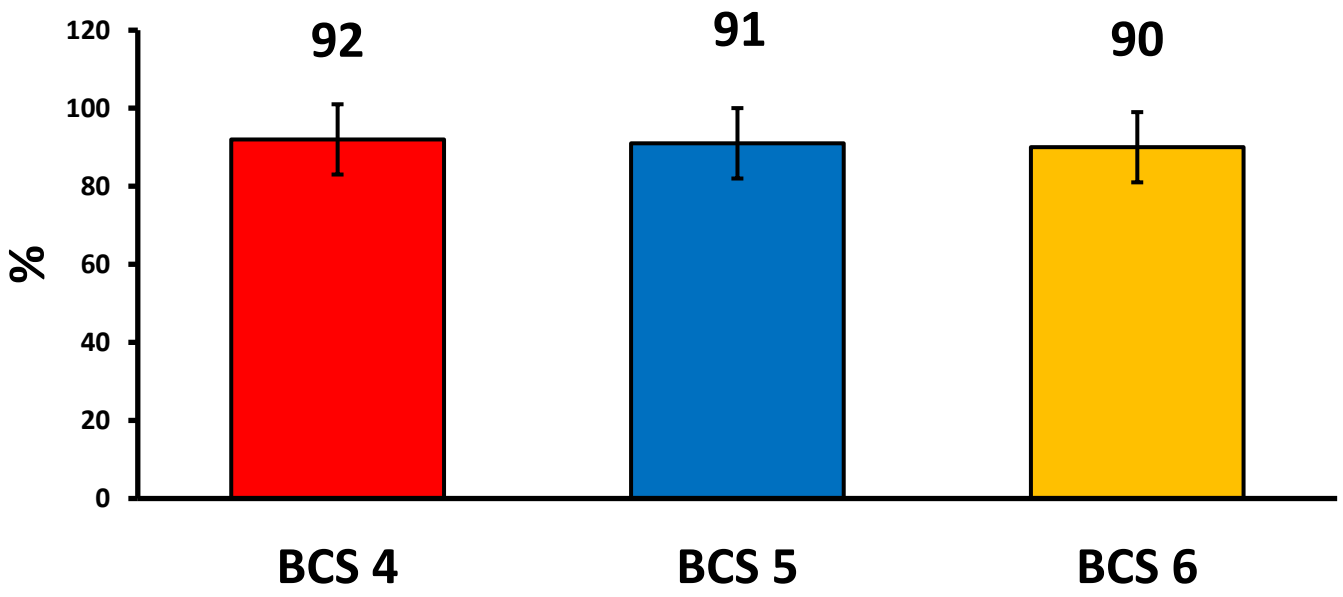
- Anti-nutrition factors
  - Molds
    - Ruminants can tolerate
      - <5% visible mold is tolerated well
      - 5 to 10% dilute with good feed
      - 10 to 20% can cause digestive upset
  - Nitrates (> 2500 ppm NO3)
    - Watch for nitrates in (not an all-inclusive list):
      - Forage Sorghum
      - Sudangrass
      - Johnson grass
      - Millet
      - Various weeds

By-products – things to consider

- Unique nutritional factors
  - By-pass protein
    - Protein that escapes the rumen and goes directly to the animal
      - Benefits – increases amino acid supply, glucose, reproduction
    - Examples: Corn gluten meal, Dried distillers grains, Fish meal
  - Fats
    - Boost energy density
    - Essential fatty acids
  - Essential oils, probiotics, prebiotics
    - Shows benefits in some cases
      - Yes, low quality forages
      - No, very low-quality forages
      - No, in good to high quality forages


7060

Effects of BCS at calving on pregnancy



Mulliniks et al, 2012

Questions



Eric Scholljegerdes 575-646-1750
ejs@nmsu.edu