Applied Beef Nutrition
Ration Formulation Short Course

BRaNDS

BRaNDS

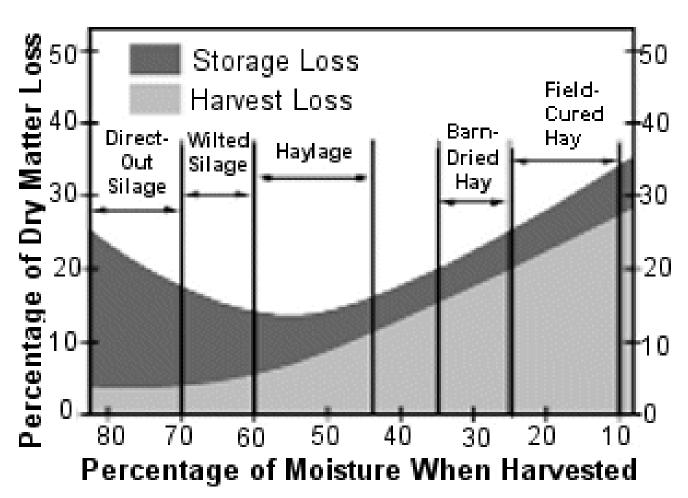Beef Ration and Nutrition
Decision Software

Settings

BRaNDS - Standard Stocker Module - Version 2

Be sure to select Save from your Excel menu above after changing settings.

Weather Data

	Temperature		Wind speed		Precipitation	
January	20.7	20.7	10.5	10.5	0.69	0.69
February	25.5	25.5	10.4	10.4	0.83	0.83
March	37.8	37.8	10.8	10.8	2.11	2.11
April	50.8	50.8	11.3	11.3	3.72	3.72
May	61.6	61.6	10.5	10.5	4.81	4.81
June	70.7	70.7	8.4	8.4	4.96	4.96
July	74	74	6.5	6.5	4.83	4.83
August	72	72	5.9	5.9	4.82	4.82
September	64.8	64.8	7.1	7.1	3.25	3.25
October	52.5	52.5	8.9	8.9	2.61	2.61
November	37.8	37.8	10.2	10.2	2.04	2.04
December	23.7	23.7	9.9	9.9	1.16	1.16

Find Weather Data @

http://w2.weather.gov/climate/index.php?wfo=dmx

select NOWData

select Daily/Monthly normals

http://mesonet.agron.iastate.edu/sites/locate.php

select station

select windrose

Provide your local values

Feed Library Issues For the Grazier

Feeds Selected:

Feed Library

Supplemental Feeds

RationRef. Number	* Feedstuff update with your values	lbs/unit	$/Unit Cost	Storage Shrink%	% * DM	% * TDN	Mcal/lb * NE m	Mcal/lb * NE g	% * CP	% of CP * RDP	% Solubility	% * NDF	% * ADF	% of NDF *pe NDF	% *NFC	% Salt	% * Ca
67	*PASTURE*																
68	*Legume*																
69	leg-veg	2000	$5.00	0	10.0	72.4	0.78	0.44	23.0	85	25.0	33.3	23.8	100	23.1	0.0	1
70	leg-bud	2000	$5.00	0	13.0	68.3	0.72	0.40	21.0	85	25.0	38.0	28.5	100	21.5	0.0	1
71	leg-1st flwr	2000	$5.00	0	15.0	64.1	0.69	0.37	18.5	85	25.0	40.8	31.4	100	22.6	0.0	1
72	leg-mid	2000	$5.00	0	17.0	60.9	0.65	0.34	16.0	85	25.0	43.7	34.2	100	23.4	0.0	0
73	leg-full	2000	$5.00	0	17.0	55.7	0.62	0.30	13.5	82	15.0	47.5	37.0	100	23.1	0.0	0
74	leg mature	2000	$5.00	0	20.0	47.3	0.57	0.23	11.0	80	10.0	57.0	42.8	100	16.8	0.0	0
75	leg stockpile1	2000	$5.00	0	40.0	56.6	0.53	0.28	14.0	85	35.0	44.0	31.0	100	31.6	0.0	1
76	leg stockpile2	2000	$5.00	0	40.0	51.8	0.46	0.21	12.0	85	35.0	48.0	35.0	100	29.6	0.0	1
77	leg stockpile3	2000	$5.00	0	40.0	47.1	0.38	0.14	11.5	85	35.0	51.0	38.0	100	27.1	0.0	1
78																	
79	*Cool Season Grass*																
80	c-s-gr-veg	2000	$5.00	0	10.0	73.5	0.73	0.40	17.0	85	25.0	38.0	28.5	100	22.6	0.0	0
81	c-s-gr-boot	2000	$5.00	0	13.0	66.2	0.68	0.35	14.0	85	25.0	42.8	33.3	100	23.1	0.0	0
82	c-s-gr-head	2000	$5.00	0	15.0	60.9	0.62	0.30	10.5	85	25.0	47.5	38.0	100	23.9	0.0	0
83	c-s-gr-dough	2000	$5.00	0	17.0	56.7	0.57	0.24	8.0	85	25.0	52.3	42.8	100	22.6	0.0	0
84	c-s-gr-mature	2000	$5.00	0	17.0	50.4	0.52	0.19	6.0	80	15.0	61.8	47.5	100	15.8	0.0	0
85	c-s-gr-dead	2000	$5.00	0	20.0	31.5	0.41	0.09	4.0	75	10.0	74.1	57.0	100	5.8	0.0	0
86	c-s-gr-stockpil	2000	$5.00	0	49.0	61.1	0.60	0.34	11.0	85	30.0	55.0	42.0	100	23.6	0.0	0
87	c-s-gr-stockpil	2000	$5.00	0	49.0	52.0	0.46	0.21	10.0	85	30.0	58.0	45.0	100	21.6	0.0	0
88	c-s-gr-stockpil	2000	$5.00	0	49.0	47.2	0.38	0.14	9.5	85	30.0	62.0	48.0	100	18.1	0.0	0
89																	
90	*Legume - Grass*																
91	leg-gr veg	2000	$5.00	0	10.0	72.4	0.75	0.42	19.0	85	25.0	35.6	26.1	100	22.8	0.0	1
92	leg-gr early	2000	$5.00	0	13.0	66.2	0.70	0.37	16.5	85	25.0	40.4	30.9	100	22.3	0.0	0
93	leg-gr mid	2000	$5.00	0	15.0	61.4	0.66	0.33	14.0	85	25.0	44.2	34.7	100	23.3	0.0	0
94	leg-gr dough	2000	$5.00	0	17.0	57.2	0.61	0.29	12.0	85	25.0	48.0	38.5	100	23.0	0.0	0
95	leg-gr mat	2000	$5.00	0	17.0	52.0	0.57	0.25	9.8	81	15.0	54.6	42.3	100	19.4	0.0	0
96	leg-gr dead	2000	$5.00	0	20.0	39.4	0.49	0.16	7.5	78	10.0	65.6	49.9	100	11.3	0.0	0

Pasture Analysis

Hoglund, 1964

Feed Library Issues - Energy

- A 5% loss in carbon through respiration and degradation is likely between cutting and lab analysis. This would primarily be from the NFC fraction (1 Mcal/lb DM).

- A quick Guide for entering energy in the program would be:
  - Multiply Lab NE values x 1.05

Feed Library Issues - Fiber

* Feedstuff update with your values	% * NDF	% * ADF	% of NDF *pe NDF
PASTURE			
Legume			
leg-veg	33.3	23.8	100
leg-bud	38.0	28.5	100
leg-1st flwr	40.8	31.4	100
leg-mid	43.7	34.2	100
leg-full	47.5	37.0	100
leg mature	57.0	42.8	100
leg stockpile1	44.0	31.0	100
leg stockpile2	48.0	35.0	100
leg stockpile3	51.0	38.0	100
Cool Season Grass			
c-s-gr-veg	38.0	28.5	100
c-s-gr-boot	42.8	33.3	100
c-s-gr-head	47.5	38.0	100
c-s-gr-dough	52.3	42.8	100
c-s-gr-mature	61.8	47.5	100
c-s-gr-dead	74.1	57.0	100
c-s-gr-stockpil	55.0	42.0	100
c-s-gr-stockpil	58.0	45.0	100
c-s-gr-stockpil	62.0	48.0	100
Legume - Grass			
leg-gr veg	35.6	26.1	100
leg-gr early	40.4	30.9	100
leg-gr mid	44.2	34.7	100
leg-gr dough	48.0	38.5	100
leg-gr mat	54.6	42.3	100
leg-gr dead	65.6	49.9	100

NDF = neutral detergent fiber

ADF = acid detergent fiber

peNDF = physically effective neutral detergent fiber
        – grazed forage is 100 % physically effective

Feed Library Issues - Protein

RationRef. Number	* Feedstuff *update with your values*	% * CP	% of CP * RDP	% Solubility	% * N
	IOWA STATE UNIVERSITY Extension and Outreach Iowa Beef Center	*Selected:*			
			Supplemental Feeds		
67	**PASTURE**				
68	*Legume*				
69	leg-veg	23.0	85	25.0	
70	leg-bud	21.0	85	25.0	
71	leg-1st flwr	18.5	85	25.0	
72	leg-mid	16.0	85	25.0	
73	leg-full	13.5	82	15.0	
74	leg mature	11.0	80	10.0	
75	leg stockpile1	14.0	85	35.0	
76	leg stockpile2	12.0	85	35.0	
77	leg stockpile3	11.5	85	35.0	
78					
79	*Cool Season Grass*				
80	c-s-gr-veg	17.0	85	25.0	
81	c-s-gr-boot	14.0	85	25.0	
82	c-s-gr-head	10.5	85	25.0	
83	c-s-gr-dough	8.0	85	25.0	
84	c-s-gr-mature	6.0	80	15.0	
85	c-s-gr-dead	4.0	75	10.0	
86	c-s-gr-stockpil	11.0	85	30.0	
87	c-s-gr-stockpil	10.0	85	30.0	
88	c-s-gr-stockpil	9.5	85	30.0	
89					
90	*Legume - Grass*				
91	leg-gr veg	19.0	85	25.0	
92	leg-gr early	16.5	85	25.0	
93	leg-gr mid	14.0	85	25.0	
94	leg-gr dough	12.0	85	25.0	
95	leg-gr mat	9.8	81	15.0	
96	leg-gr dead	7.5	78	10.0	

Inputs: Available Crude Protein (CP), Rumen Degradable Protein (RDP) and Soluble Protein

RDP is fairly high in fresh forage
(75 to 90 % of CP would be RDP)

Soluble Protein is actually quite low on grazed forage (about 20% of CP)

but increases greatly with ensiled or slowly dried forage (lab sample)

Metabolizable Protein (MP) is calculated from these in the context of TDN level and NDF / eNDF level.

Feed Library Issues - Minerals

Values given at 100% Dry Matter Mineral		Mineral %	Relative Availability	Relative %	Cost $/lb	Relative Cost
Calcium - _(Ca)_						
Limestone	Ca(CO3)	36.00	85.00	30.6	$4.55	$14.87
Limestone / Magnesium	Ca(CO3)- Mg	33.00	60.00	19.8	$2.00	$10.10
Calcium Chloride (dihydrate)	CaCl2(H2O)	31.00	125.00	38.8	$5.00	$12.90
Dicalcium Phosphate (21%)	Ca2(PO4)	21.00	110.00	23.1	$3.00	$12.99
Dicalcium Phosphate (18%)	Ca2(PO4)	18.00	110.00	19.8	$3.00	$15.15
Monocalcium Phosphate	Ca(PO4)	17.00	130.00	22.1	$5.00	$22.62
Calcium Sulfate	Ca(SO4)	21.20	90.00	19.1	$5.00	$26.21
Oyster Shells (ground)		33.30	85.00	28.3	$4.00	$14.13
alfalfa		1.00	100.00	1.0		
milk		1.30	120.00	1.6		
				0.0		

Provide minerals into program on a relative percent available basis if known.

Vitamins should be plentiful on grazed, green forage

Input Analysis

```
PRODUCT:  21-5 wheat/rye past.  (1  - N9                )

Moisture                   %           73.36%
Dry Matter                 %           26.64%
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		Dry Basis	Average	Normal Range
Crude Protein	%DM	23.05%	19.00	11.58 - 26.42
ADF	%DM	26.69%	34.05	23.49 - 44.61
aNDF	%DM	40.20%	44.76	28.16 - 61.36
aNDFom	%DM	38.64%	43.37	27.70 - 59.41
Lignin (Sulfuric Acid)	%DM	3.97%	7.27	4.83 - 9.71
Lignin	%NDF	10.27%		
NDFD 48	%NDF	65.19%	46.53	29.87 - 63.19
NDFD 240	%NDF	78.57%	48.40	31.30 - 66.40
uNDFom48	%DM	13.45%	23.00	12.90 - 33.10
uNDFom240	%DM	8.28%	22.80	12.70 - 31.20
AD-ICP	%DM	1.17%	1.46	0.88 - 2.04
ND-ICP w/ SS	%DM	4.05%	3.36	0.14 - 5.70
Protein Sol.	%CP	38.18%	32.90	19.72 - 46.08
Fat (EE)	%DM	4.06%	2.69	1.63 - 3.75
Total Fatty Acid (TFA)	%DM	2.07%	2.04	0.98 - 3.10
Ash	%DM	12.51%	11.29	8.09 - 14.49
Calcium	%DM	1.12%	1.30	0.70 - 1.90
Phosphorus	%DM	0.41%	0.33	0.21 - 0.45
Magnesium	%DM	0.35%	0.29	0.19 - 0.39
Potassium	%DM	3.01%	2.34	1.40 - 3.28
Sulfur	%DM	0.31%	0.25	0.13 - 0.37
Sugar (ESC)	%DM	5.16%	6.50	2.52 - 10.48
Sugar (WSC)	%DM	6.85%	8.16	3.90 - 12.42

```
Adjusted Crude Protein  %           23.05%
NFC                     %           26.78%
RFV                                157.87
RFQ                                191.33
```

		ADF	OARDC	MLK13
		-----	-----	-----
TDN 1x	%DM	68.11	62.99	67.02
Nel 3x	Mcal/cwt	70.47	64.69	66.65
Neg	Mcal/cwt	36.18	42.55	47.36
Nem	Mcal/cwt	62.47	69.56	74.97
Milk per ton	lb/ton DM			3206

Input Analysis

```
PRODUCT:  Kale                    (10 - DLZM7              )

Moisture               %              81.33%
Dry Matter             %              18.67%


                                Dry Basis      Average     Normal Range
Crude Protein          %DM           15.14%      13.70      7.70 -  19.71
aNDF                   %DM           29.01%      10.89      0.31 -  26.73
aNDFom                 %DM           28.30%
NDFD 48                %NDF          78.76%
uNDFom48               %DM            6.01%
Fat (EE)               %DM            5.27%       8.88      0.38 -  17.64
Ash                    %DM            8.89%       4.39      1.03 -   7.75
Calcium                %DM            2.01%       0.25      0.03 -   0.70
Phosphorus             %DM            0.25%       0.43      0.10 -   0.76
Magnesium              %DM            0.35%       0.17      0.03 -   0.36
Potassium              %DM            1.84%       0.53      0.14 -   0.99
Sulfur                 %DM            0.34%       0.23      0.09 -   0.67
Manganese              ppm          23 ppm
Zinc                   ppm          37 ppm
Copper                 ppm           4 ppm
Iron                   ppm         171 ppm
Sodium                 %DM            0.06%
Chloride               %DM            0.91%
Molybdenum             ppm         4.30 ppm


NFC                    %              42.40%
DCAD               mEq/100g +     2.47
```

Dry Matter Digestibility

- 100 – uNDFom – ash   (an estimate if not given to you directly)

Steps Involved In Cow Ration Formulation

- Dry Matter Intake

  – Determine Maximum and feed at or below this value.

  – Use the Consumption Ratio to monitor this.

    - A ratio between 75 and 95% would be a "limit" feeding situation.

    - A full feed intake ratio is generally at 95 to 105%

Dry Matter Intake

Head Balanced for	1		
DMI	25.99	DMI Ratio	92.47%
Est. DMI	28.11	DMI:BWt	2.07%

NE Reqmt.	100.2%	NE/MP adj	0.42
MP Reqmt.	101.7%	RDP Ratio	220.9%
peNDF %	40.5%	Rumen pH	6.17

Daily Gain	0.27	30 Day BCS	0.00
Target ADG	0.26	Tetany Ratio	0.74

percent of requirement met (using total intake)

Ca	219.0%	Se	90.9%
P	178.2%	Zn	75.9%
Mg	155.0%	Cu	64.4%
K	262.3%	Mn	58.9%
S	84.8%	Co	178.1%
Na	115.9%	I	18.0%
Cl	388.4%	Fe	377.3%
Vit. A	0.0%	Vit. E	0.0%

more data >>> scroll right >>>

Ca:P	2.06	Fe:Cu	29.28
N:S	15.32	DCAD	28.42

Actual Dry Matter Intake

Estimated Dry Matter Intake (textbook)

Intake Ratio

(actual / estimated)

Feed Intake Guidelines

- Balance ration based on current feed dry matter intake if known

  – this includes accurate estimates of feed dry matter & feed waste

- If intake is not known – use the textbook estimate of DMI as guide

  – pay attention to consumption ratio since this ratio can be used as a guide for balancing next year's rations

Steps Involved In Cow Ration Formulation

- Energy

  - Match target energy requirement determined by the program.
    (meet 100% +/- 1% of requirement)

Energy

Head Balanced for		1	
DMI	25.99	DMI Ratio	92.47%
Est. DMI	28.11	DMI:BWt	2.07%
NE Reqmt.	100.2%	NE/MP adj	0.42
MP Reqmt.	101.7%	RDP Ratio	220.9%
peNDF %	40.5%	Rumen pH	6.17
Daily Gain	0.27	30 Day BCS	0.00
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S	84.8%	Co	178.1%
Na	115.9%	I	18.0%
Cl	388.4%	Fe	377.3%
Vit. A	0.0%	Vit. E	0.0%

more data >>> scroll right >>>

Ca:P	2.06	Fe:Cu	29.28
N:S	15.32	DCAD	28.42

Energy Requirement

– Goal is to meet 100% of energy requirement

-If less than 100% - poor performance

-If greater than 100% - excessive weight gain

-Pregnancy, body condition requirements, growth, ration excesses, weather, health are factored into this value already
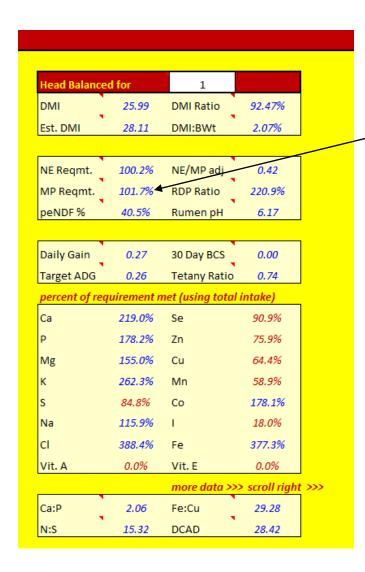
Steps Involved In Ration Formulation

- Metabolizable Protein

  – Meet minimum metabolizable protein requirement.

    (100% + of requirement)

Protein (metabolizable protein)

Head Balanced for	1		
DMI	25.99	DMI Ratio	92.47%
Est. DMI	28.11	DMI:BWt	2.07%
NE Reqmt.	100.2%	NE/MP adj	0.42
MP Reqmt.	101.7%	RDP Ratio	220.9%
peNDF %	40.5%	Rumen pH	6.17
Daily Gain	0.27	30 Day BCS	0.00
Target ADG	0.26	Tetany Ratio	0.74

percent of requirement met (using total intake)

Ca	219.0%	Se	90.9%
P	178.2%	Zn	75.9%
Mg	155.0%	Cu	64.4%
K	262.3%	Mn	58.9%
S	84.8%	Co	178.1%
Na	115.9%	I	18.0%
Cl	388.4%	Fe	377.3%
Vit. A	0.0%	Vit. E	0.0%

more data >>> scroll right >>>

Ca:P	2.06	Fe:Cu	29.28
N:S	15.32	DCAD	28.42

Metabolizable Protein Requirement

-Goal is to reach a minimum value of 100% (100 to 170 is tolerable range) , if less than 100% - poor performance, if greater - probably not a big deal in many situations

-Incorporates rumen degradable and rumen bypass protein requirements

-Nitrogen recycling is also included in this value to account for low rumen degradable protein (RDP)

*RDP ratio can be used to choose best source of protein to meet MP requirements

Steps Involved In Ration Formulation

- Dietary Fiber

  - Meet minimum eNDF concentration in ration. (100% + of requirement)

Fiber

Head Balanced for	1		
DMI	25.99	DMI Ratio	92.47%
Est. DMI	28.11	DMI:BWt	2.07%
NE Reqmt.	100.2%	NE/MP adj	0.42
MP Reqmt.	101.7%	RDP Ratio	220.9%
peNDF %	40.5%	Rumen pH	6.17
Daily Gain	0.27	30 Day BCS	0.00
Target ADG	0.26	Tetany Ratio	0.74

percent of requirement met (using total intake)

Ca	219.0%	Se	90.9%
P	178.2%	Zn	75.9%
Mg	155.0%	Cu	64.4%
K	262.3%	Mn	58.9%
S	84.8%	Co	178.1%
Na	115.9%	I	18.0%
Cl	388.4%	Fe	377.3%
Vit. A	0.0%	Vit. E	0.0%

more data >>> scroll right >>>

Ca:P	2.06	Fe:Cu	29.28
N:S	15.32	DCAD	28.42

Fiber – peNDF – Effective Neutral Detergent Fiber

-Goal is to provide a minimum level of eNDF

-peNDF = percent of NDF that stimulates "chewing"

-Cows & Mature Bulls 25/30 minimum

-Weaned calves – 20

-Bull test rations – 12 to 18

-Feedyard rations- down to 9

-Holstein (grain fed calves then put in feedlot) – 12 to 18

Steps Involved In Ration Formulation

- Minerals & Vitamins

  - Determine necessary minerals and vitamins to supplement. (many may be present in sufficient quantities from base ration)
  - Consider the tolerable 'window'. (minimum and maximum levels)

Minerals & Vitamins

Head Balanced for		1	
DMI	26.14	DMI Ratio	93.15%
Est. DMI	28.06	DMI:BWt	2.08%
NE Reqmt.	100.3%	NE/MP adj	0.42
MP Reqmt.	101.3%	RDP Ratio	222.9%
peNDF %	40.3%	Rumen pH	6.17
Daily Gain	0.27	30 Day BCS	0.00
Target ADG	0.26	Tetany Ratio	0.70

percent of requirement met (using total intake)

Ca	235.1%	Se	202.9%
P	191.7%	Zn	161.7%
Mg	159.8%	Cu	79.8%
K	261.2%	Mn	113.4%
S	86.3%	Co	210.8%
Na	139.3%	I	152.8%
Cl	417.1%	Fe	377.5%
Vit. A	47.7%	Vit. E	2.1%

more data >>> scroll right >>>

Ca:P	2.06	Fe:Cu	23.65
N:S	15.07	DCAD	28.16

	% *NDF	% *ADF	% of NDF *pe NDF	% *NFC	Salt	% *Ca	% *P	% *Mg	% *K	% *S	% *Na	% *Cl	% open
	41.6	29.0	67.0	36.5	0.00	0.27	0.20	0.20	2.00	0.10	0.00	0.00	0.0
	50.5	40.5	90.0	21.9	0.00	0.81	0.28	0.25	1.92	0.16	0.10	0.50	0.0
	9.0	5.0	5.0	74.7	0.00	0.02	0.35	0.10	0.35	0.14	0.06	0.10	0.0
	18.0	9.0	10.0	24.3	0.00	0.44	1.14	0.78	1.14	0.24	0.24	0.20	0.0
	0.0	0.0	0.0	0.0	11.00	10.00	5.00	2.00	0.50	0.50	4.29	6.60	0.0
	60.0	45.0	67.0	16.5	0.00	0.16	0.08	0.10	0.40	0.13	0.00	0.00	0.0
	0.0	0.0	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
	0.0	0.0	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
	0.0	0.0	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
	0.0	0.0	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
	0.0	0.0	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
	0.0	0.0	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
	0.0	0.0	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
	0.0	0.0	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
		0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Concentration	40.3	22.0	0.06	0.82	0.40	0.32	1.83	0.17	0.14	0.50	0.0		
Quantity	10.5	5.8	7.33	97.23	47.31	37.89	216.81	20.27	16.52	59.34	0.0		
Total Units From Supplement				6.67	3.33	1.33	0.33	0.33	2.86	4.40	0.0		
radable	76.5%	Target		41.35	24.68	23.71	83.00	23.49	11.86	14.23			
ble	26.7%	Max		237.13	83.00	47.43	237.13	47.43	118.57	118.57			
		Status	ok	ok	ok	ok	low	ok	ok				
		Max Conc.	2.00%	0.70%	0.40%	2.00%	0.40%	1.00%	1.00%				

Percent of requirement satisfied by the ration

Example Ration Problems