



Put Your Money Where Her Mouth Is

Nutrition to Optimize Production

Dr. Matt Hersom

Extension Beef Cattle Specialist

UF-IFAS Dept. of Animal Sciences

What influences profit for the beef enterprise?

1. Weaning weight of calves
2. Percent of cows weaning a calf
3. Annual cost of maintaining the cow
4. The price received for the calves

REPRODCUTION and NUTRITION



Give Her What She Needs

ESSENTIAL NUTRITION

Nutrient Priorities in Cattle

1. Maintenance

2. Growth

3. Lactation

4. *Reproduction*

What are the nutrient requirements?

- Weight
 - Maintenance reqs \uparrow as BW \uparrow
- Stage of production
 - Pregnant ? (\uparrow reqs)
 - Lactating ? (\uparrow reqs)
 - Growing ? (\uparrow reqs)

Stuff to Be Concerned About

1. Intake

- cows need enough to eat (start at 2% of BW)

2. Energy

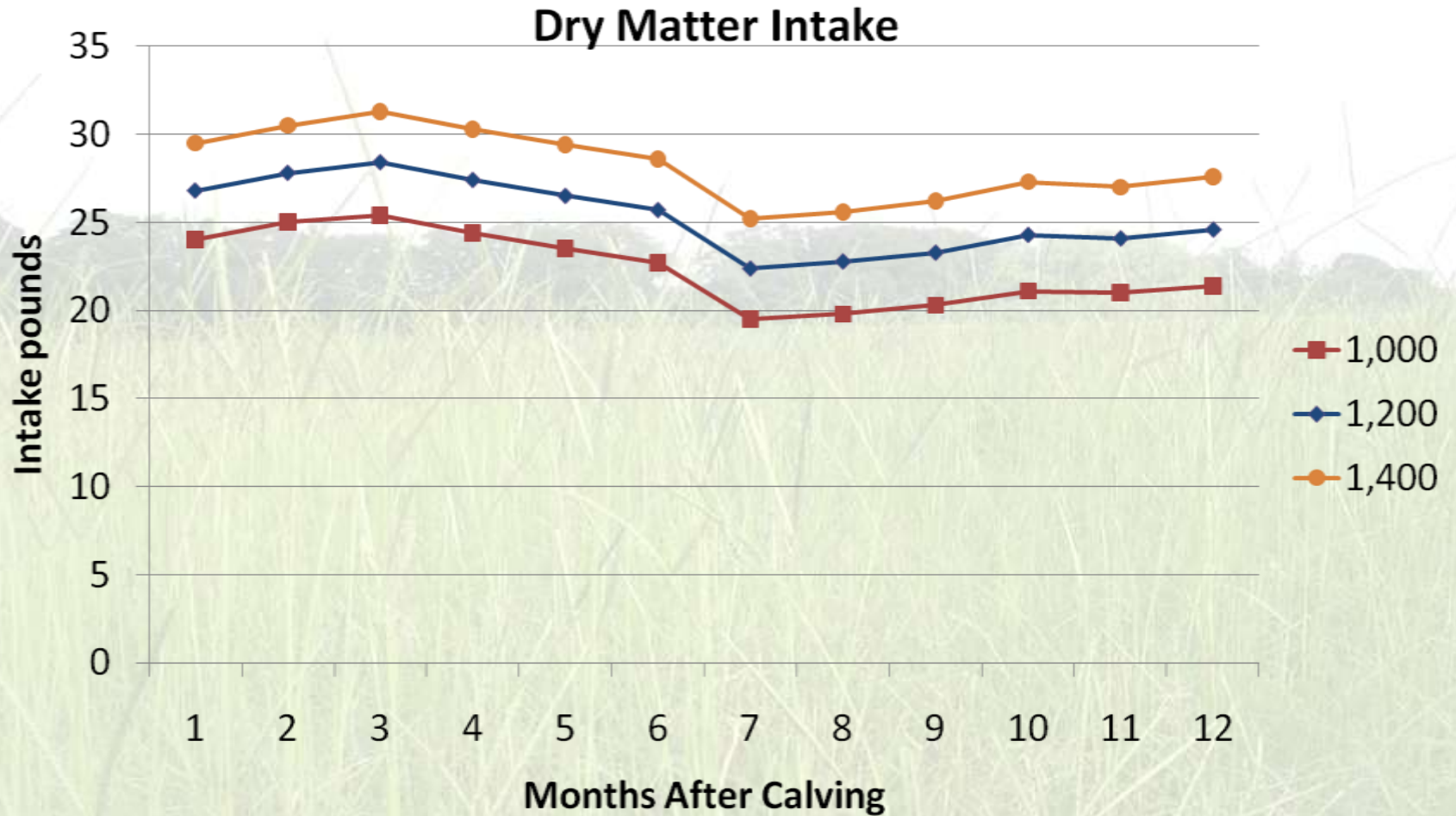
- Most commercial supplements don't tell you this, but it's important
- TDN is easily measured in forages, determine the cow's requirement met by forage and supplement needs (50-60% of total diet)

3. Protein

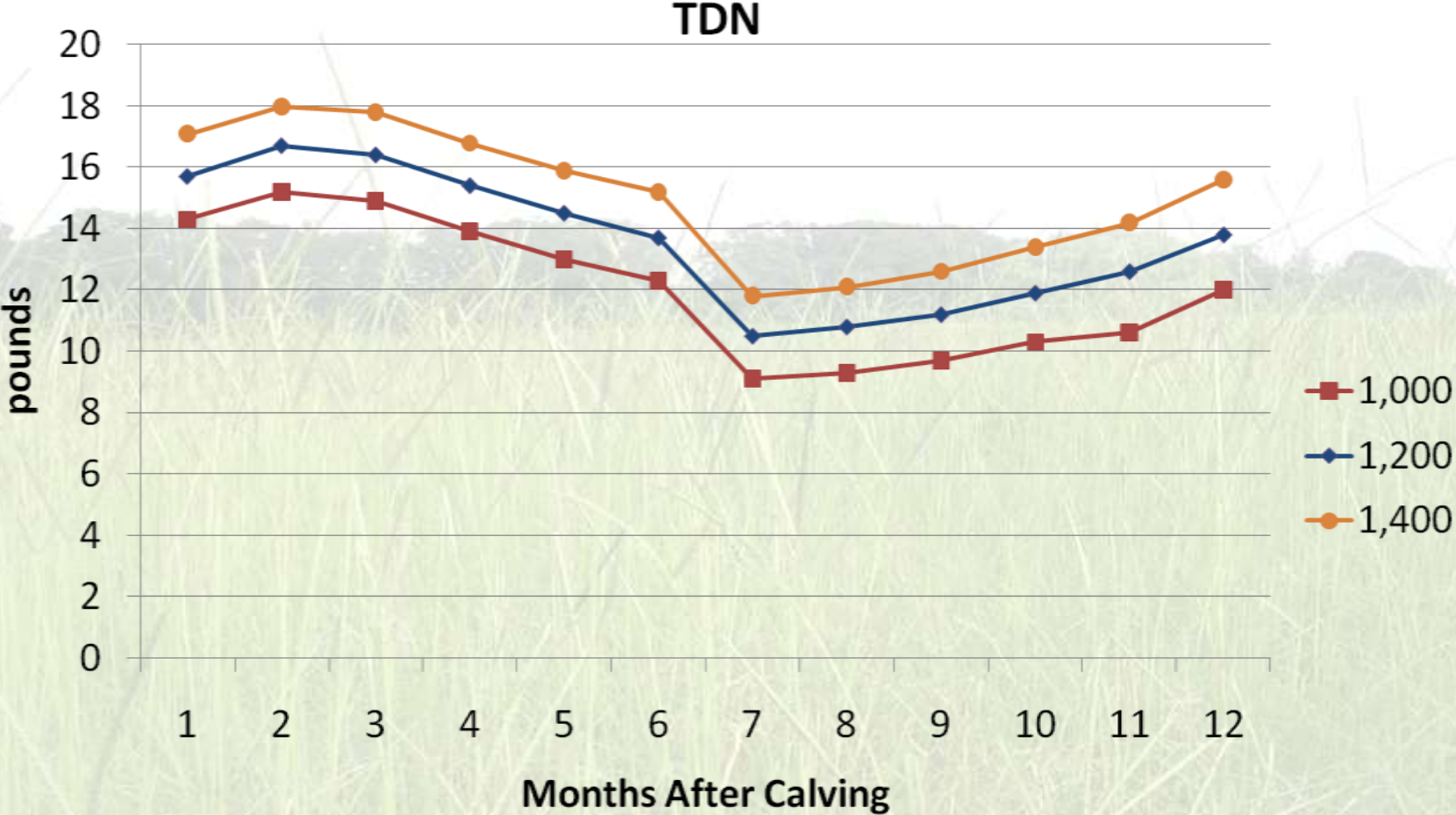
- Most commercial supplements sold advertising CP
- CP is easily measured in forages, determine the cow's requirement met by forage and supplement needs (8-12% of total diet)

4. Mineral supply (esp. crucial times)

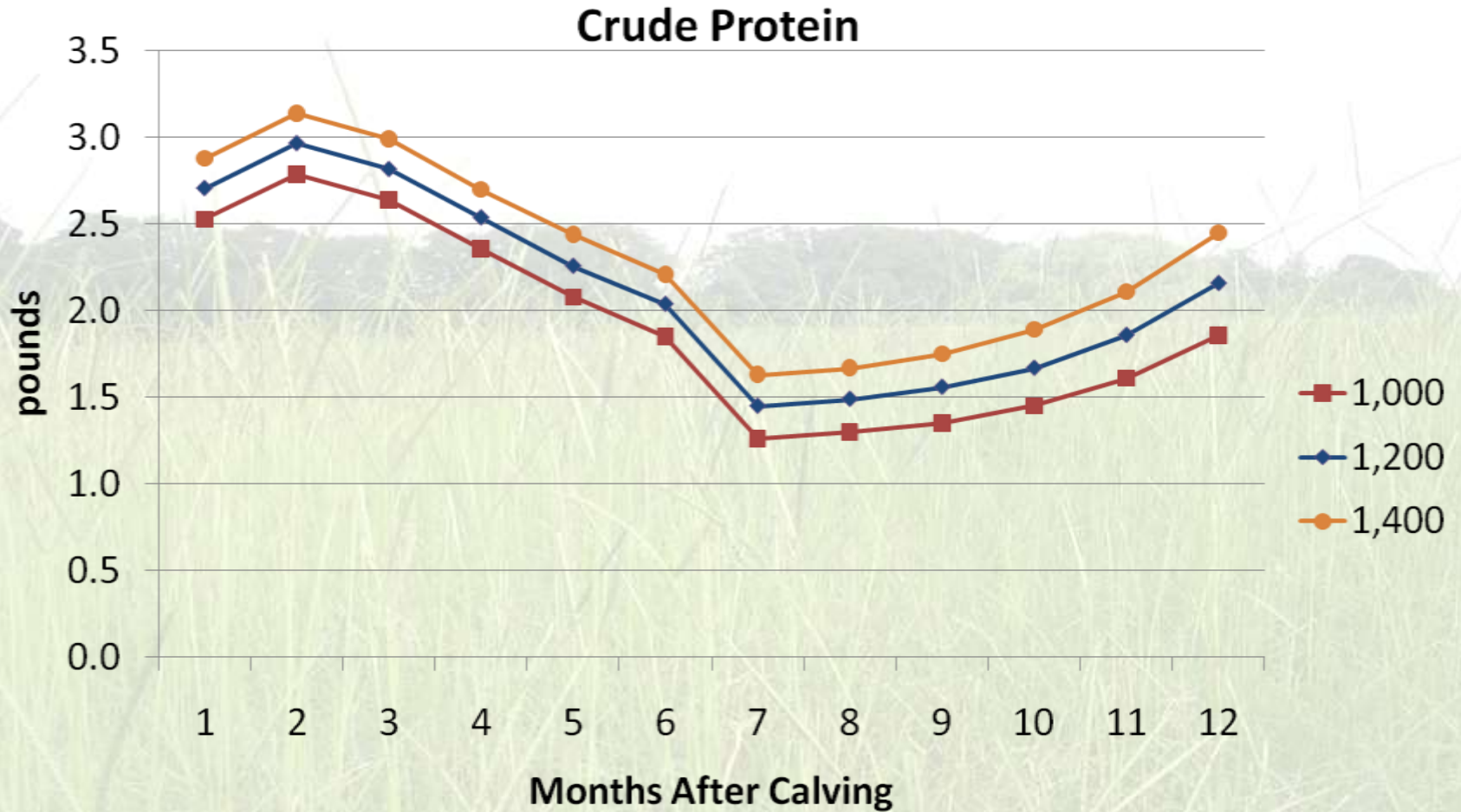
Effect of Cow BW on Feed Intake



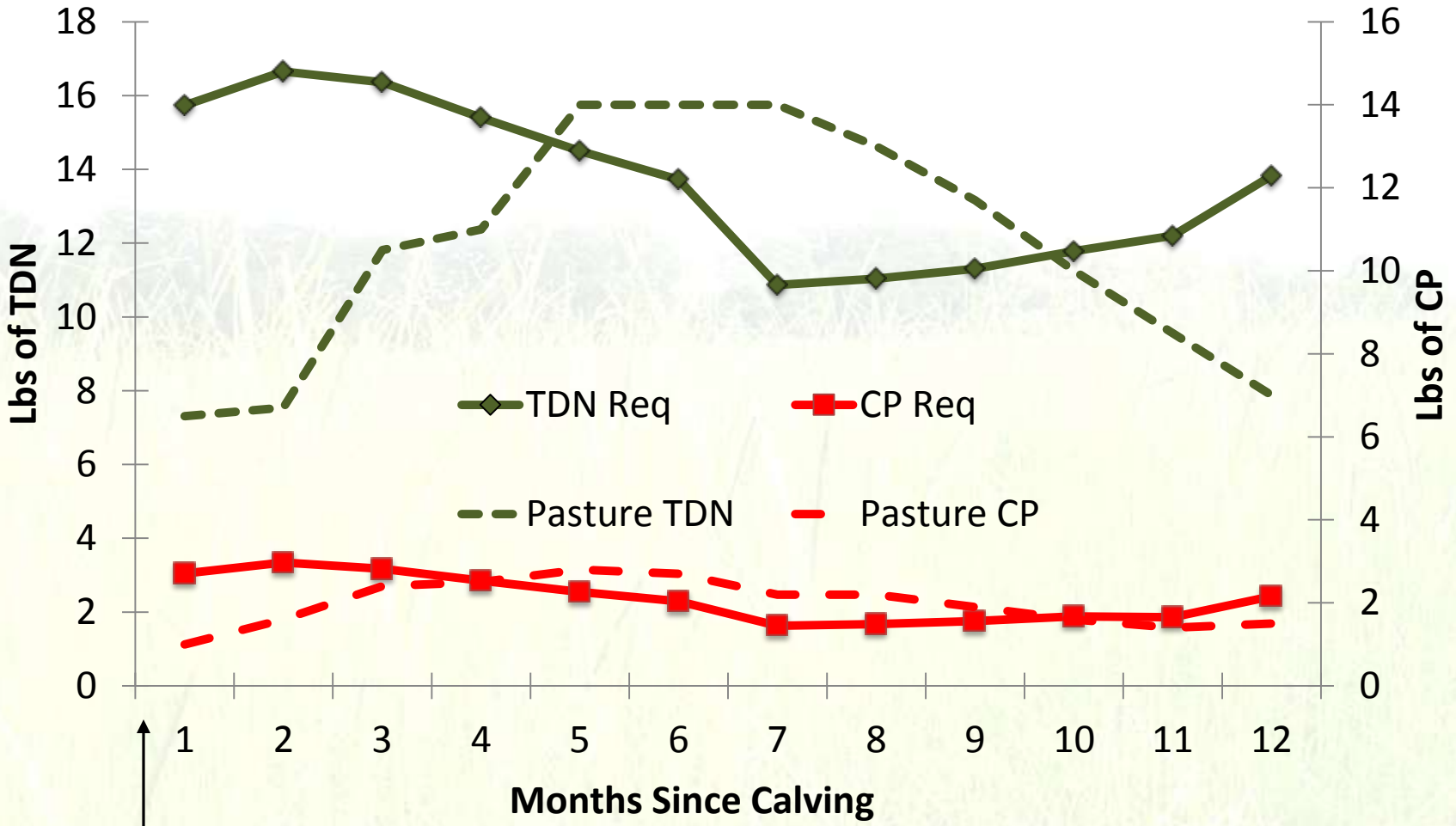
Effect of Cow BW on Energy Intake



Effect of Cow BW on Protein Intake

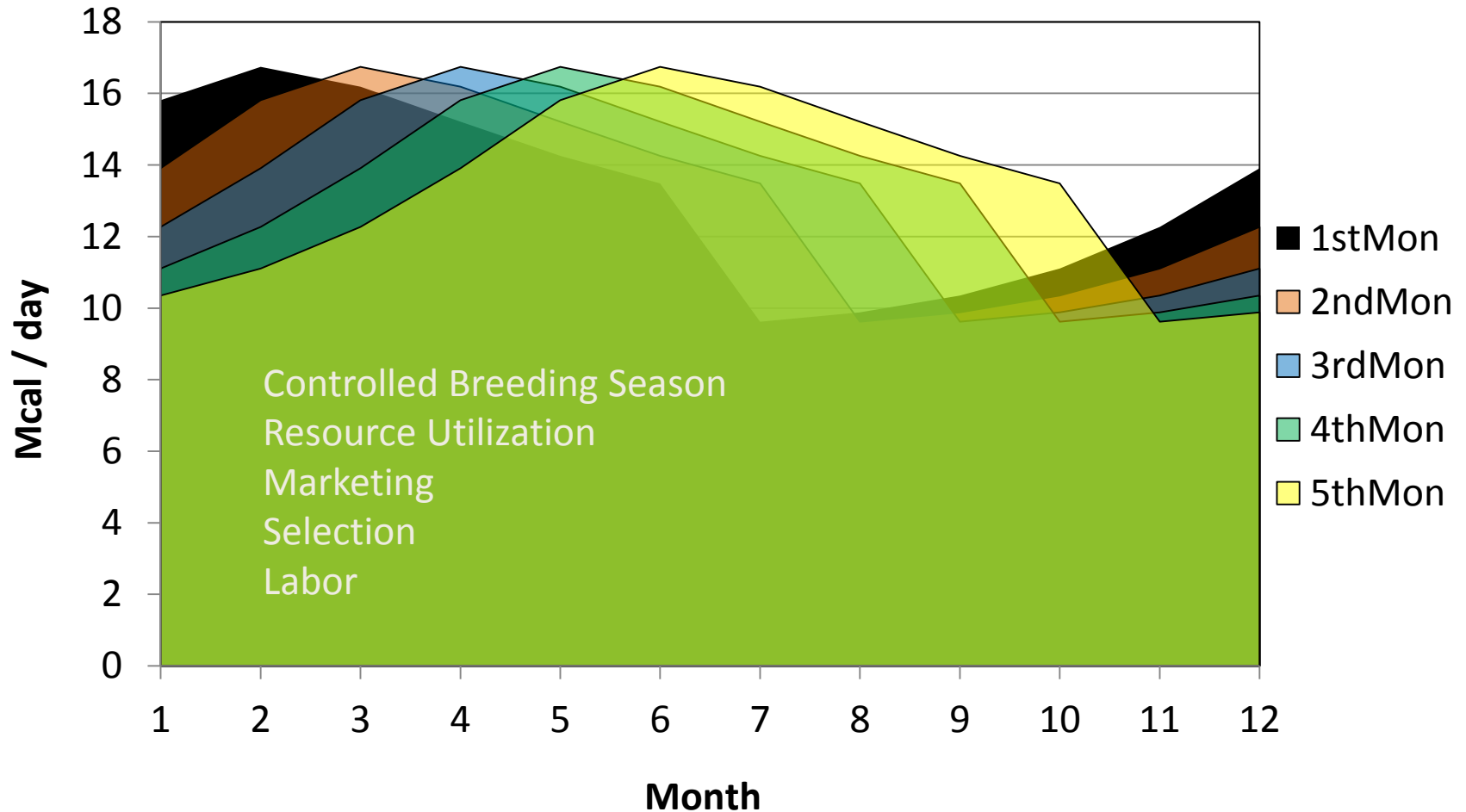


Requirement Cycles in Beef Cows



January

Predicted energy requirement of cows with different calving dates



7-Month Cow Nutrient Requirements

1,200 (20 lbs peak milk)	<u>Months After Calving</u>						
	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
DMI, lb/d	26.8	27.8	28.4	27.4	26.5	25.7	24.2
TDN, %	58.7	59.9	57.6	56.2	54.7	53.4	44.9
NEm, mcal/lb	0.59	0.61	0.57	0.55	0.53	0.51	0.37
CP, %	10.10	10.69	9.92	9.25	8.54	7.92	5.99
Ca, %	0.29	0.31	0.29	0.26	0.24	0.22	0.15
P, %	0.19	0.21	0.19	0.18	0.17	0.15	0.12
TDN, lb/d	15.73	16.65	16.36	15.40	14.50	13.72	10.87
NEm, mcal/d	15.81	16.96	16.19	15.07	14.05	13.11	8.95
CP, lb/d	2.71	2.97	2.82	2.53	2.26	2.04	1.45
Ca, lb/d	0.08	0.09	0.08	0.07	0.06	0.06	0.04
P, lb/d	0.05	0.06	0.05	0.05	0.05	0.04	0.03

Bovine Fetal Growth Time Line

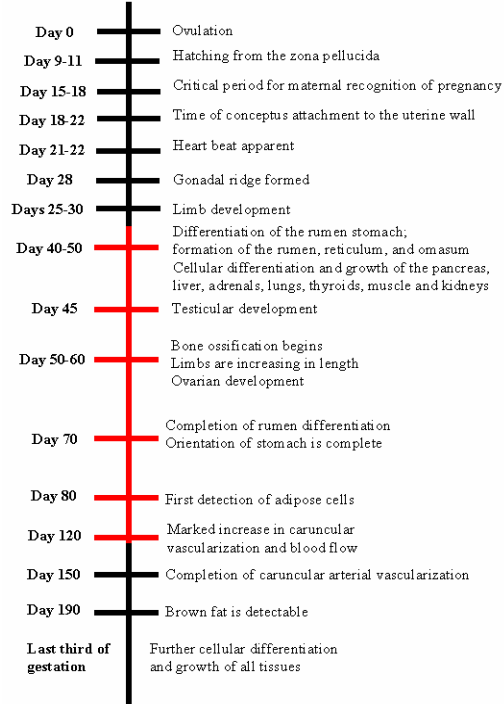


Figure 1. Timeline of bovine fetal development. The portion in red is the time point of feed restriction in the current study.

Think about how your production calendar fits this time line.

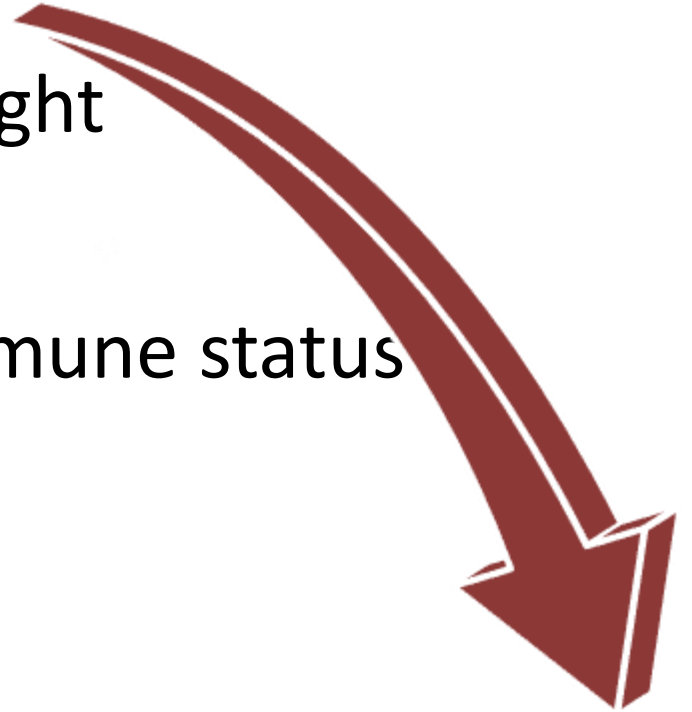
What nutritional insults do your cows experience?

What developmental functions are you compromising?

What does it cost you?

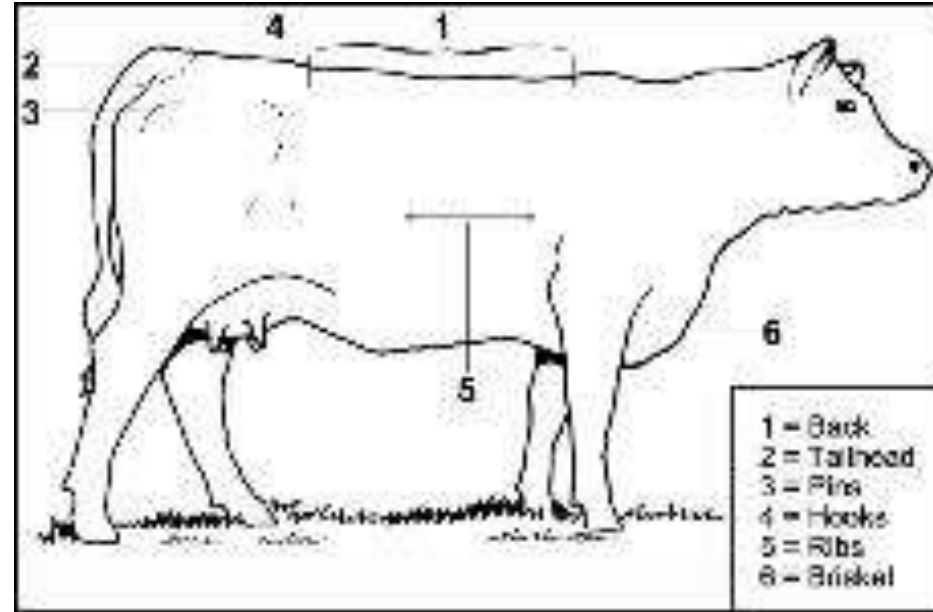
What Happens When Nutrition Compromised?

- Decreased calf birth weight
- Calving difficulty
- Suppressed calf/cow immune status
- Poorer colostrum
- Decreased growth rate
- Reduced pregnancy rate
- Lower weaning weights



How to tell if cattle are getting adequate nutrition

- Body Condition Score
- Estimation of body fat
- Gauge effectiveness of feeding program
- Decision tool to determine future feeding needs
- Scale of 1 to 9



<http://edis.ifas.ufl.edu/AN001>

<http://edis.ifas.ufl.edu/AN004>

MIDWEST
FEED & FARM

★ COW HAY ★

\$3

Are You Producing Feed or Fill

HAY QUALITY

Isn't All Hay the Same?



You Don't Know if You Don't Assess



Do You Know What These Are?



Effect of grass maturity on forage quality

Week	TDN, % DM			Intake, % BW		
	4	6	8	4	6	8
Bahia	56	55	54	2.3	2.1	1.7
Bermuda	57	52	44	2.3	2.2	1.8
Star	60	53	49	2.4	2.5	2.1
Digit	60	58	57	2.5	2.7	2.2
Limpo	63	63	56	2.5	2.3	2.2

Adapted from Brown and Kalmbacher, 1998

Quality of Bermudagrass Harvested at Different Maturity and Season

Item	Wks of regrowth	Harvest date				
		06/14	07/12	08/09	09/06	10/04
TDN, %	4	55	57	52	53	46
	6	52	51	47	49	48
	8	52	51	46	47	44
ADG, lb	4	0.57	0.78	0.72	0.63	0.28
	6	0.34	0.48	-0.04	0.42	0.22
	8	0.16	0.07	-0.39	0.07	-0.39

Nutrients supplied by hay at different qualities in relation to cow requirements and how much would she have to eat to meet requirements and is it feasible?

3 month after calving		Cow Req	TDN	CP	DMI	2.4% BW	
Feed		Lbs Feed to Meet Req		Feasible?			
TDN	CP	TDN	CP	TDN	CP	TDN	CP
60%	15%	27.3	18.8	Yes	Yes		
58%	14%	28.3	20.1	Yes	Yes		
56%	13%	29.3	21.7	Yes	Yes		
54%	12%	30.4	23.5	Yes	Yes		
52%	11%	31.5	25.6	No	Yes		
50%	10%	32.8	28.2	No	Yes		
48%	9%	34.2	31.3	No	No		
46%	8%	35.7	35.3	No	No		
44%	7%	37.3	40.3	No	No		
42%	6%	39.0	47.0	No	No		
40%	5%	41.0	56.4	No	No		
38%	4%	43.2	70.5	No	No		
36%	3%	45.6	94.0	No	No		

Feeding different hay qualities

Hay	DM, %	TDN, %	CP, %
1	93	50	5
2	92	54	7
3	92	57	10



Hay quality and cow nutrition

		1 Month Before Calving			1 Month After Calving			3 Month After Calving
1200 lb	DMI, lbs	25			27			28
Cow	TDN, lbs	13.8			15.7			16.4
Require	CP, lbs	2.2			2.7			2.8
Amount supplied by hay, lbs		Balance		Balance		Balance		Balance
Hay1	TDN	12.5	-1.3	13.5	-2.2	14.0	-2.4	
	CP	2.0	-0.2	2.2	-0.5	2.1	-0.6	
Hay2	TDN	13.5	-0.3	14.6	-1.1	15.1	-1.3	
	CP	1.75	-0.45	1.9	-0.6	2.0	-0.8	
Hay3	TDN	14.3	+0.5	15.4	-0.3	16.0	-0.4	
	CP	2.5	+0.3	2.7	0.0	2.8	0.0	

Hay1=50/5; Hay2=54/7; Hay3=57/10

In a 5.5 ft diameter round bale

33.1% of the bale is in the outer 6"

26.4% of the bale is in the next 6"

19.9% of the bale is in the next 6"

13.2% of the bale is in the next 6"

7.4% of the bale is in the inner 6"

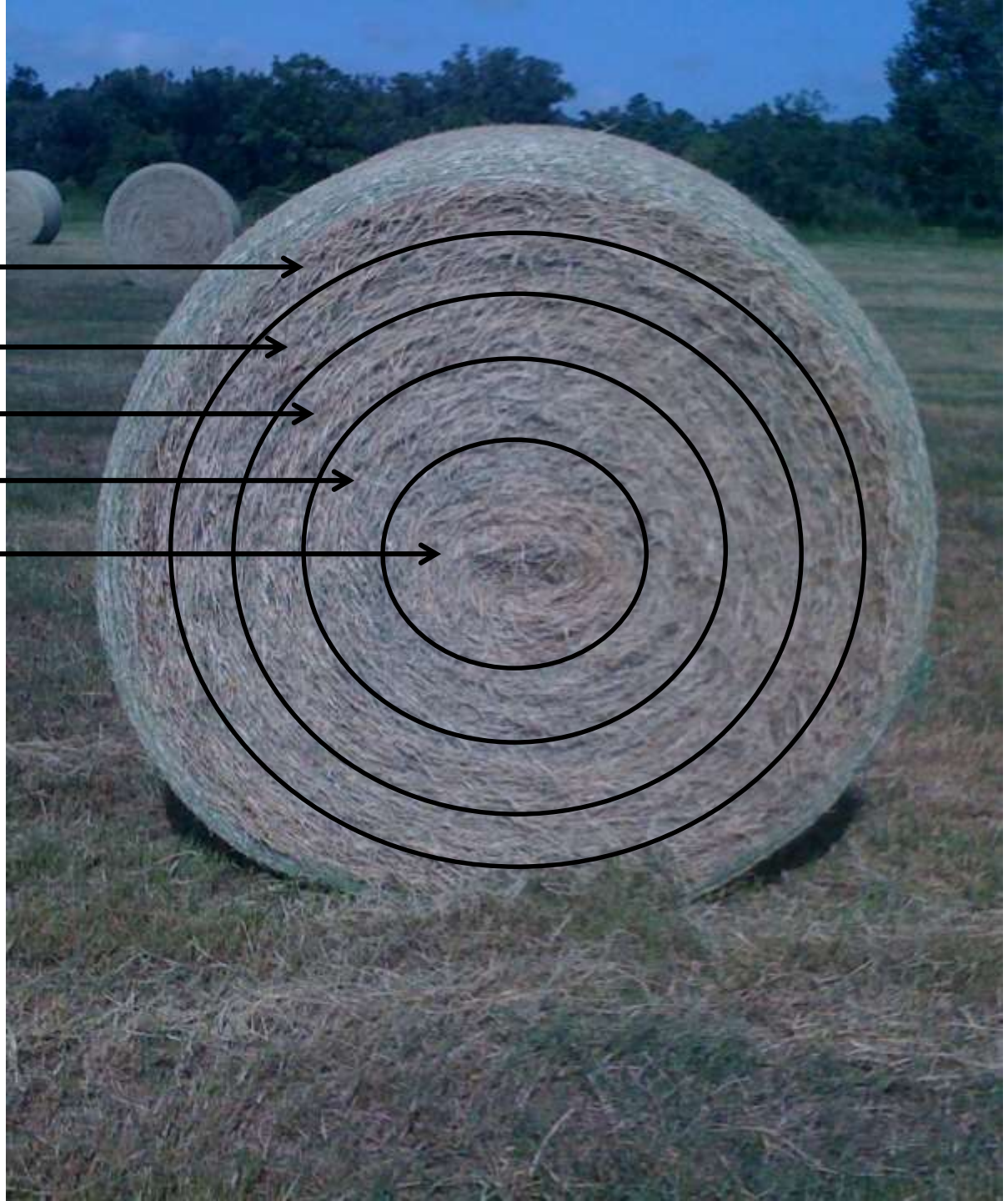


Table 1. Effect of bale size on bale weight and value of large round bales¹

Bale width, ft	Bale dia, ft	Bale volume, ft ³	Est. bale weight, lb ²	Bale size, % of a 5x5 bale	Bale value in relation to 5x5 bale ³	\$/Ton if bale cost \$50 ⁴
4	4	50	512	51	\$25.60	\$195.22
4	5	79	800	80	\$40.00	\$124.94
4	6	113	1153	115	\$57.60	\$86.76
5	5	98	1000	100	\$50.00	\$100.00
5	6	141	1441	144	\$72.00	\$69.41

¹ Reproduced from J. Banta, TAMU Extension document E-319.

² Assumes all bales are the same density as a 5'x5' bale that weighs 1,000 lb (10.17 lb/ft³).

³ Assumes all factors are equal except bale size and weight.

⁴ Price per ton assuming all bales, regardless of size and weight, cost \$50.

A photograph of a herd of cattle of various colors (black, brown, white) standing in a green field. In the background, there is a dense line of tall, thin trees, likely a forest. The image is slightly faded, serving as a background for text.

Supplementation Decisions

FILLING THE GAP

Supplement Choice

What Drives It

- Price
- Crude protein value
- Convenience
- Habit

What Should Drive It

- Needed nutrients
- Practicality
- Price per unit
- Convenience

What is the worst thing that could happen?

Combine poor forage with poor supplement!!



Table 1. Alternative Forage Sources

	Percent of Dry Matter						
	DM	CP.	TDN	CF	Ca	P	Ash
Corn Stalks	85.0	6.6	50.0	34.0	0.50	0.10	7.2
Cotton Gin Trash	92.0	6.0	44.0	38.0	0.60	0.20	10.0
Cottonseed Hulls	91.0	4.1	45.0	48.0	0.10	0.07	2.8
Milo Stalks	85.0	5.6	54.0	33.0	0.40	0.10	10.0
Peanut Hay	91.0	10.8	48.0	33.0	1.20	0.15	8.6
Peanut Hulls	91.0	8.5	22.0	63.0	0.20	0.07	4.0
Soybean Stubble	88.0	5.0	40.0	44.3	1.00	0.06	6.4
Wheat Straw	92.0	4.1	40.0	42.0	0.17	0.04	10.0

Supplement Decision Making

- Energy is limiting nutrient if:
 - Cows are thin
 - Forage availability is limited
- Solving Energy limitation:
 - Forage availability is problem then substitution with harvested forage
 - Forage availability is adequate (selection) then supplement with high energy/low protein
- Supplement selection based on \$/lb of TDN or NE_g
- Supply sufficient supplement to meet crude protein deficiencies
- Protein is limiting nutrient if:
 - Energy is satisfactory
 - Cows in adequate BCS for energy mobilization
 - Forage availability is not limited
- Solving Protein limitation:
 - Forage availability is adequate then supplement with high crude protein
 - Plant protein supply RDP, improve forage utilization
 - NPN in molasses 50% utilization
 - RUP source improve animal performance after RDP is met
- Supplement selection based on \$/lb of CP
- Supply sufficient supplement to meet CP deficiencies and monitor energy status

Commodity feedstuff options

Feed	TDN,%
Whole Cottonseed	95
Hominy	91
Corn	88
Dried Distillers Grains	90
Soybean Meal	87
Wheat Middlings	83
Citrus Pulp	82
Corn Gluten Feed	80
Cottonseed Meal	75
Soybean Hulls	72
Molasses	70
Wet Brewers Grains	70
Peanut Skins	65
Hay	40-50
Peanut Hulls	22
Urea	0

Feed	Crude Protein, %
Urea	281
Cottonseed Meal	49
Soybean Meal	49
Dried Distillers Grains	30
Wet Brewers Grains	24
Corn Gluten Feed	24
Whole Cottonseed	23
Wheat Middlings	18
Peanut Skins	17
Soybean Hulls	12
Hominy	12
Corn	9
Citrus Pulp	9
Hay	10-4
Peanut Hulls	8
Molasses	5

Calculations

- $\$/\text{CWT feed} = \$ \text{ per ton} / 20$
 $\$10.00 = \$200 / 20$
- $\$/\text{CWT feed DM} = \$/\text{cwt} / (\% \text{DM} / 100)$
 $\$9.20 = \$10.00 / (92\% / 100)$
- $\$/\text{CWT Nutrient (TDN or CP)} = \$/\text{cwt} / (\% \text{Nutrient} / 100)$
 $\$13.14 = \$9.20 / (70\% / 100)$

Feedstuff options

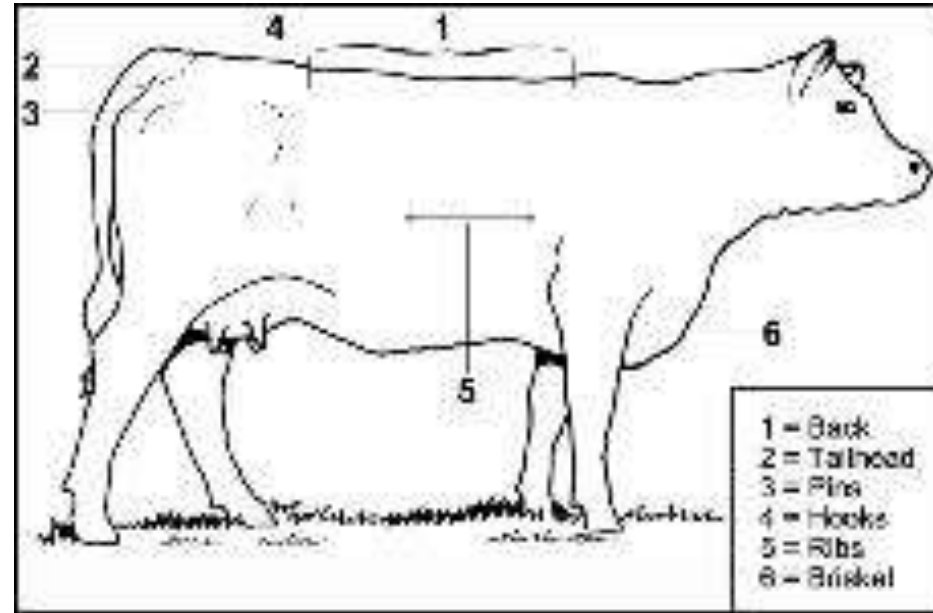
Feed	\$ / Ton	% DM	% TDN	% CP	\$ / CWT (as fed)	\$ /CWT (dm)	\$/CWT TDN (as fed)	\$/CWT CP (as fed)	\$/CWT TDN (dm)	\$/CWT CP (dm)
Blackstrap Molasses	170	74	72	5	8.50	11.49	11.81	170.00	15.95	229.73
Corn	322	88	88	9	16.10	18.30	18.30	178.89	20.79	203.28
Citrus Pulp	335	91	82	9	16.75	18.41	20.43	186.11	22.45	204.52
Hay [†]	100	92	54	10	5.00	5.43	9.26	50.00	10.06	54.35
Soybean Hull, pellet	225	91	70	12	11.25	12.36	16.07	93.75	17.66	103.02
Soybean Hulls, loose	215	91	72	12	10.75	11.81	14.93	89.58	16.41	98.44
SBH/CGF 50/50	263	91	75	15	13.15	14.45	17.53	87.67	19.27	96.34
Corn Gluten Feed	298	91	80	24	14.90	16.37	18.63	62.08	20.47	68.22
Whole Cottonseed	260	92	95	24	13.00	14.13	13.68	54.17	14.87	58.88
Dried Distillers Grains	342	91	88	30	17.10	18.79	19.43	57.00	21.35	62.64
Cottonseed Meal	275	92	75	49	13.75	14.95	18.33	28.06	19.93	30.50
Peanut Hull Pellet	135	91	22	7	6.75	7.42	30.68	96.43	33.72	105.97

[†] \$40/800 lb roll

<http://animal.ifas.ufl.edu/faculty/hersom/documents/pricing.xlsx>

How to tell if cattle are getting adequate nutrition

- Body Condition Score
- Estimation of body fat
- Gauge effectiveness of feeding program
- Decision tool to determine future feeding needs
- Scale of 1 to 9



<http://edis.ifas.ufl.edu/AN001>

<http://edis.ifas.ufl.edu/AN004>

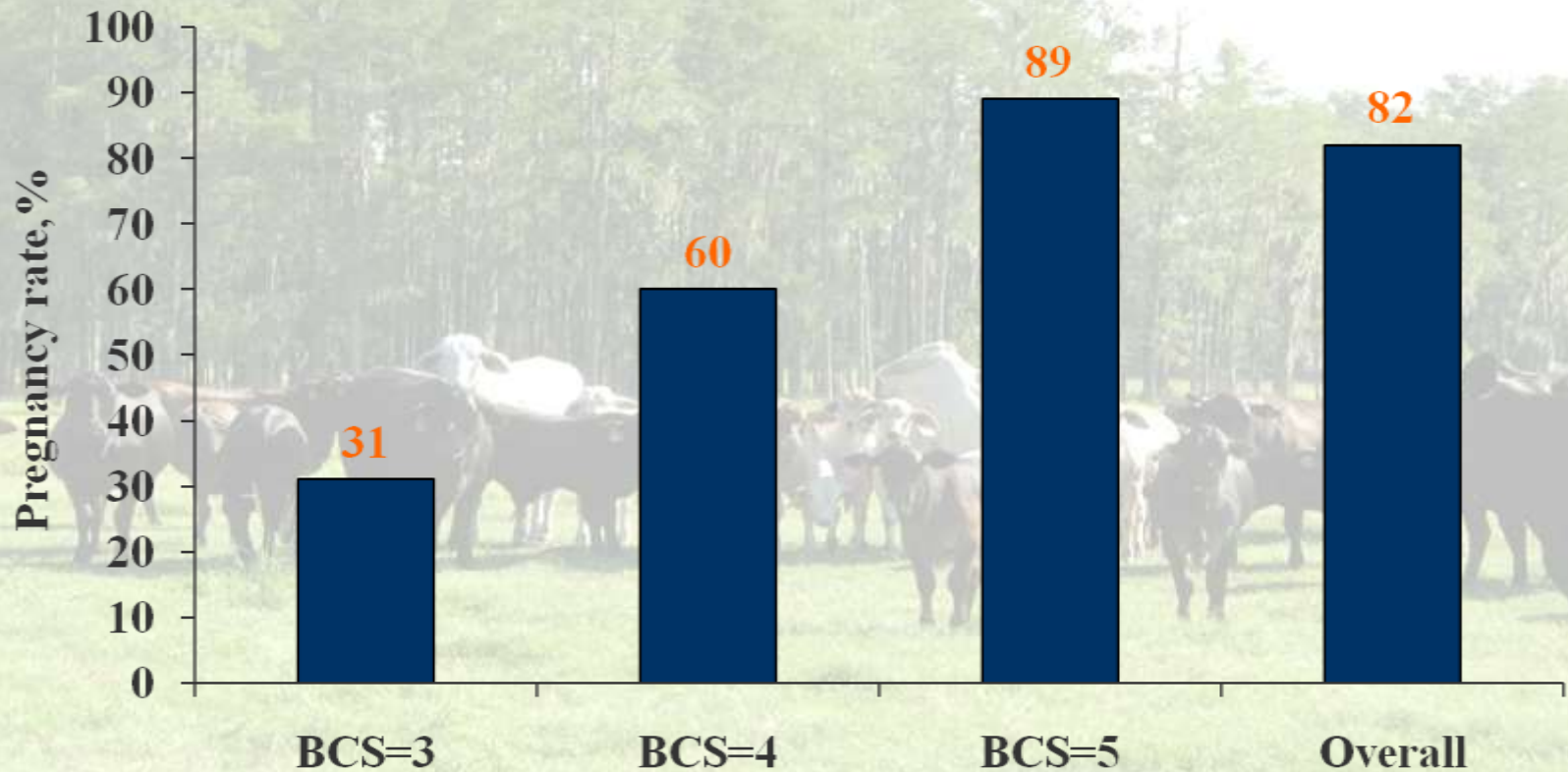
Importance of BCS in Cows of Different Age

Relationship of Parity and BCS to Pregnancy Rate (%)

Parity	Body condition score			<i>All</i>
	≤ 3	4	≥ 5	
1	20	53	90	84
2	28	50	84	71
3	23	60	90	85
4-7	48	72	92	87
>8	37	67	89	74
<i>All</i>	31	60	89	82


Adapted from Knukle et al., 1994

Relationship of Body Condition Score to Pregnancy Rate



Rae et al., 1993; Body condition scored at pregnancy testing.

The Final Equation:

$$\begin{array}{l} \text{Forage} \\ + \\ \text{Supplement} \end{array} = \text{Body Condition Score}$$


Reproduction Success

Dollar Differences in BCS

	BCS 3	BCS 4	BCS 5
% Pregnant	\$59,516	\$63,768	\$68,019
Weaning %	\$22,854	\$46,806	\$52,375
205-d Weaning Wt	\$665.61	\$710.96	\$719.06
Weaning Wt, \$/cow	\$256	\$522	\$554

Assumptions: 100 hd herd,
all calves marketed,
weaning wt= 525 lb,
market price of \$162/cwt.

USDA-ERS 2014 Est. Cow-calf
total operating costs = \$518.91

Dollar Differences in BCS

	BCS 3	BCS 4	BCS 5
% Pregnant	\$41, 913	\$44, 907	\$47, 907
Weaning %	\$16,095	\$32,962	\$36,884
205-d Weaning Wt	\$468.13	\$487.73	\$491.06
Weaning Wt lb/cow, \$/cow	\$175	\$380	\$398

Assumptions: 100 hd herd,
all calves marketed,
weaning wt= 525 lb,
market price of \$114.05/cwt.

USDA-ERS 2015 Est. Cow-calf
total operating costs = \$397.95

Returns to Nutrition

Supplementation

Return to estrus

Weaning weight

Calving interval

Pregnancy rate

More calves and weight to sale

Increased cow productivity

Take Home Points

- Nutrients and Timing are Critical
 - Limiting performance
- Hay Quality Matters
 - Feed vs Fill
- Supplement Type, Quality, and Intake
 - Return on investment is there

Final Remarks

- Underfeeding the cow herd before or after calving really affects 2 calf crops, this year's and next year's.
- **THE MOST IMPORTANT NUTRIENT IS THE ONE THAT IS MISSING!**

If your truck looks like this.....



.... and your cows and pastures looks like this, your spending priorities are mis-placed.



Key points for condition scoring cows

Reference Point	Condition score								
	1	2	3	4	5	6	7	8	9
Physically weak	yes	no	no	no	no	no	no	no	no
Muscle atrophy ^a	yes	yes	slight	no	no	no	no	no	no
Outline of spine visible	prominent	prominent	prominent	yes	slight	no	no	no	no
Outline of ribs visible	all	all	all	3 – 5	1 – 2	0	0	0	0
Fat in brisket and flanks	no	no	no	no	no	some	full	full	extreme
Outline of hip and pin bones visible	yes	yes	yes	yes	yes	yes	slight	no	no
Fat udder and fat around tail head	no	no	no	no	no	no	slight	yes	yes

^aMuscles of loin, rump and rear quarter are concave, indicating loss of muscle tissue.