Alternative protein supplementation

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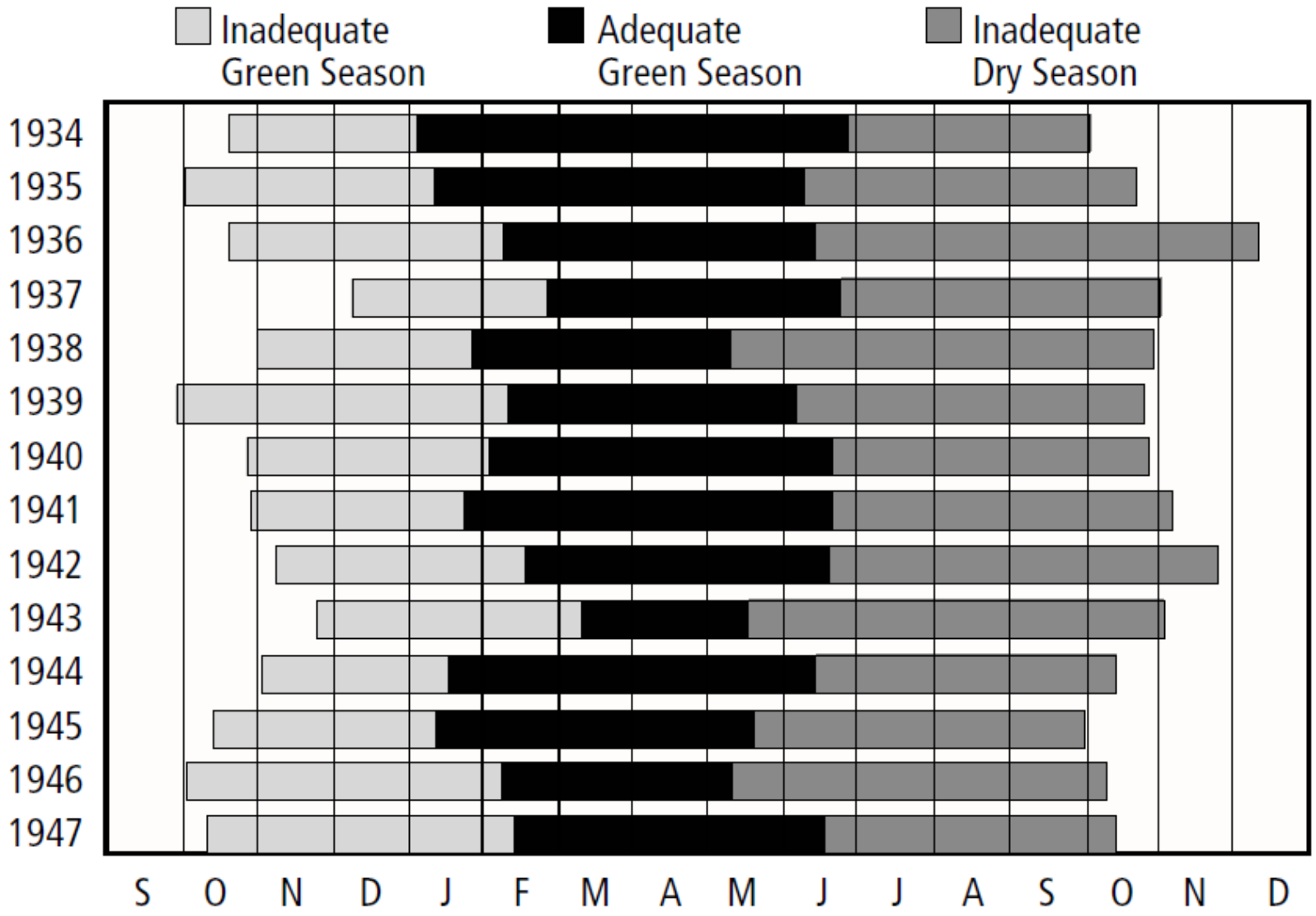
Outline

- Normal forage pattern & cow-calf requirements
- Current situation
- Drought management options
- Feeding options
- Ruminant nitrogen nutrition
- Alternative protein supplementation
- Conclusions

What is “normal”?



From: George, M, G Nader, N McDougald, M Connor and B Frost. 2001. Annual rangeland forage quality. DANR Pub. 8022.

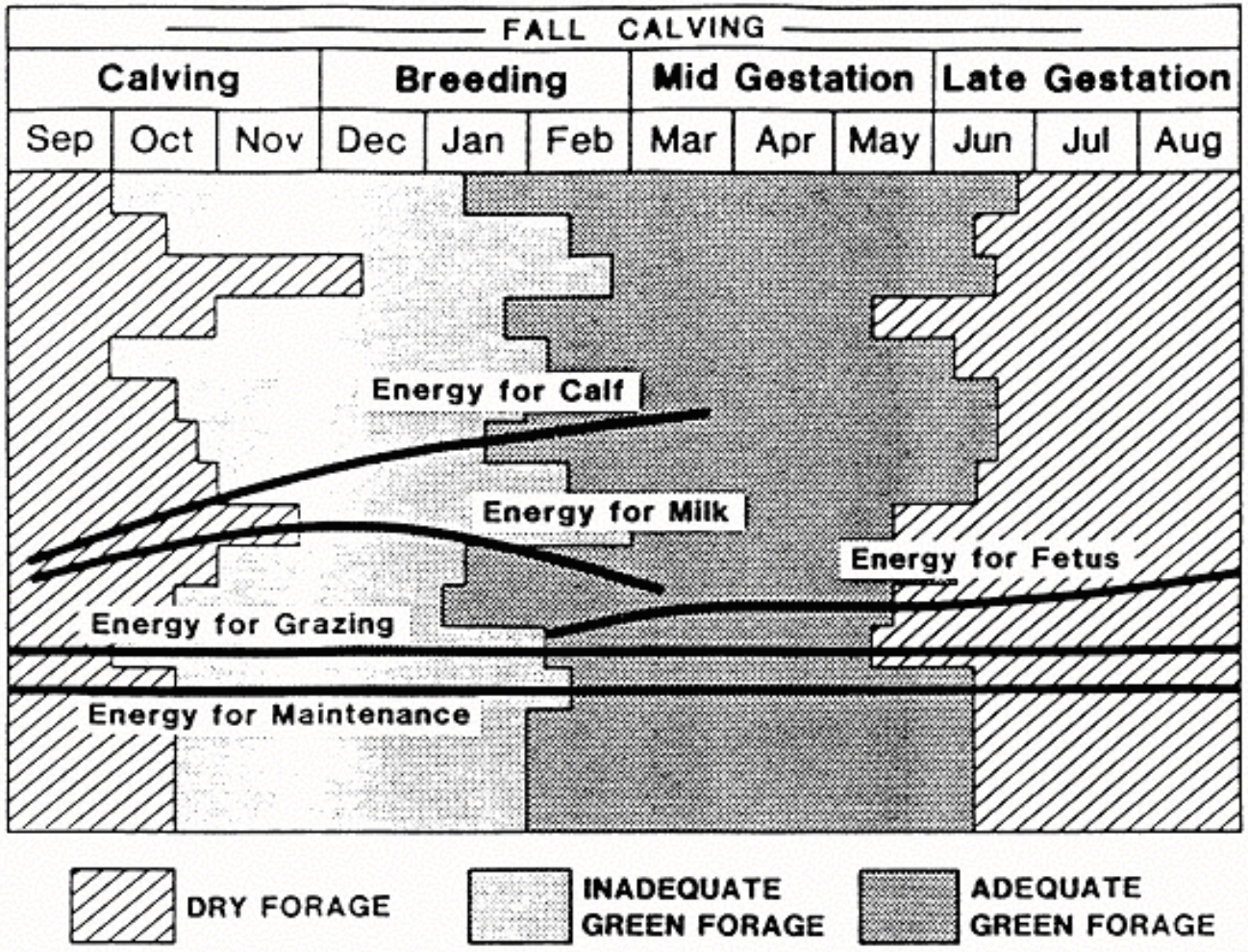
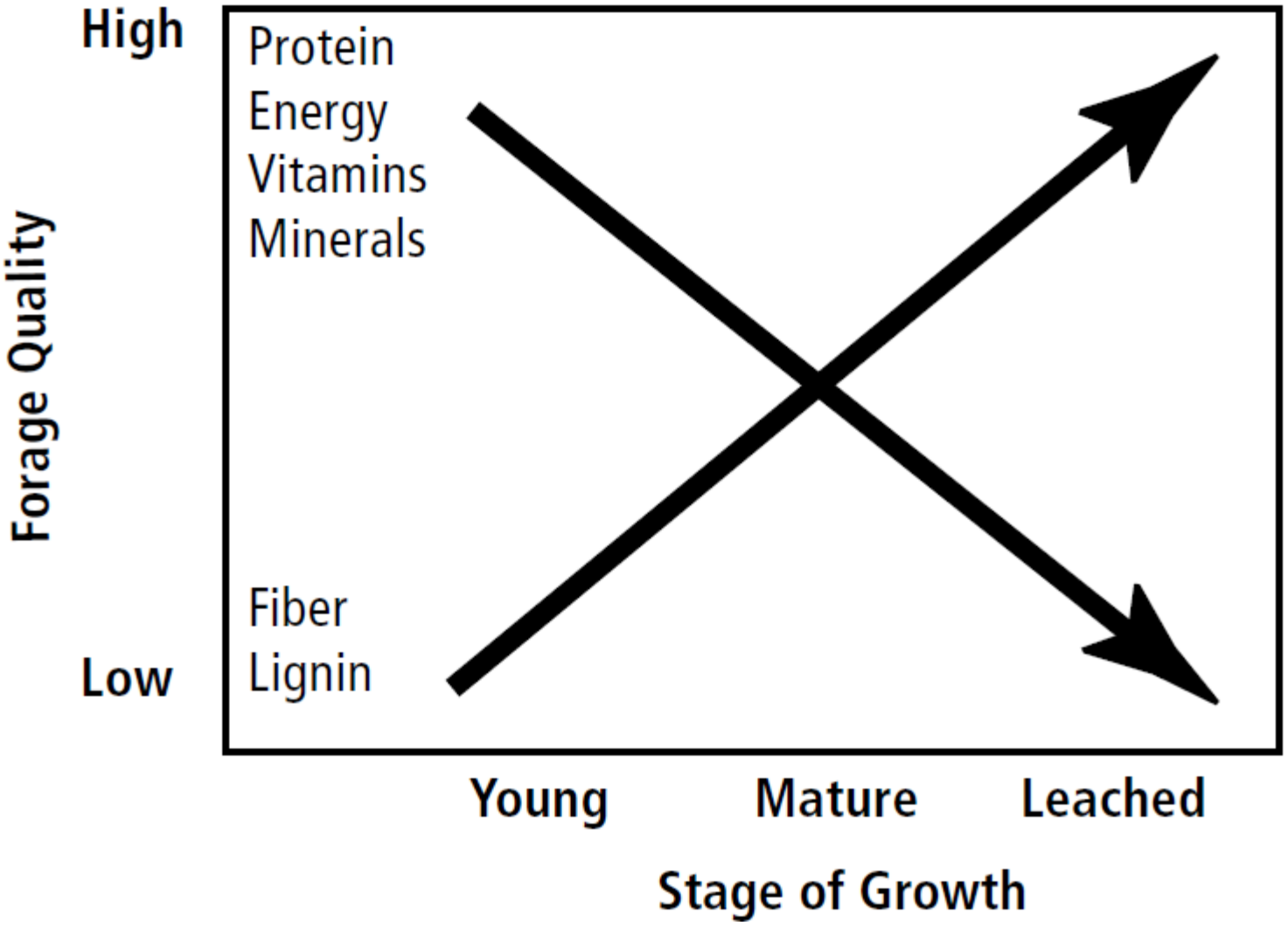


Figure 15. Fall calving calendar of livestock operations, energy requirements and seasonal variation in forage.



From: George, M, G Nader, N McDougald, M Connor and B Frost. 2001. Annual rangeland forage quality..DANR Pub. 8022.


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Table 1. Minimum residual dry matter (RDM) guidelines for dry annual grassland.

Percent	Percent slope			
woody cover	**0–10%**	**10–20%**	**20–40%**	**>40%**
	(lb RDM per acre)			
0–25	300	400	500	600
25–50	300	400	500	600
50–75	NA	NA	NA	NA
75–100	NA	NA	NA	NA

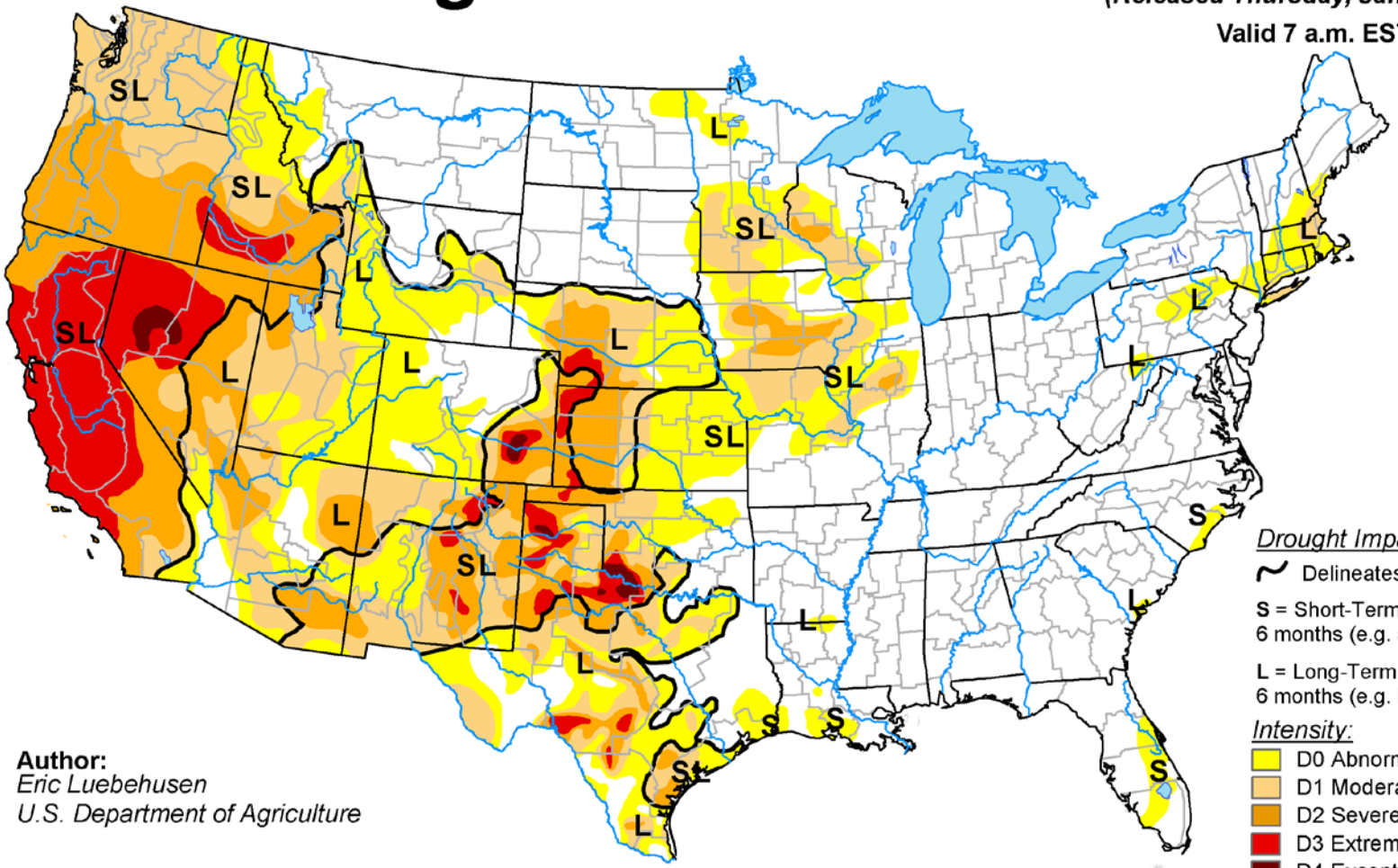
From: Bartolome, JW, WE Frost, NK McDougald, and M Connor. 2002. California guidelines for residual dry matter (RDM) management on coastal and foothill Annual Rangelands. DANR Pub. 8092.

U.S. Drought Monitor

January 14, 2014

(Released Thursday, Jan. 16, 2014)

Valid 7 a.m. EST



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Drought Impact Types:

~ Delineates dominant impacts

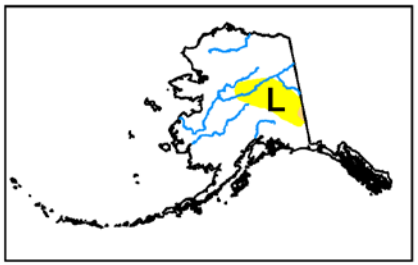
S = Short-Term, typically less than 6 months (e.g. agriculture, grasslands)

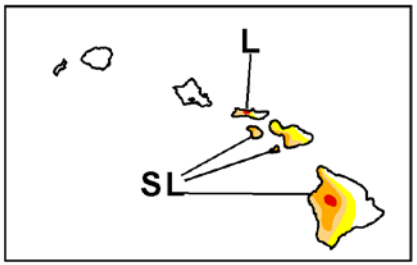
L = Long-Term, typically greater than 6 months (e.g. hydrology, ecology)

Intensity:

- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

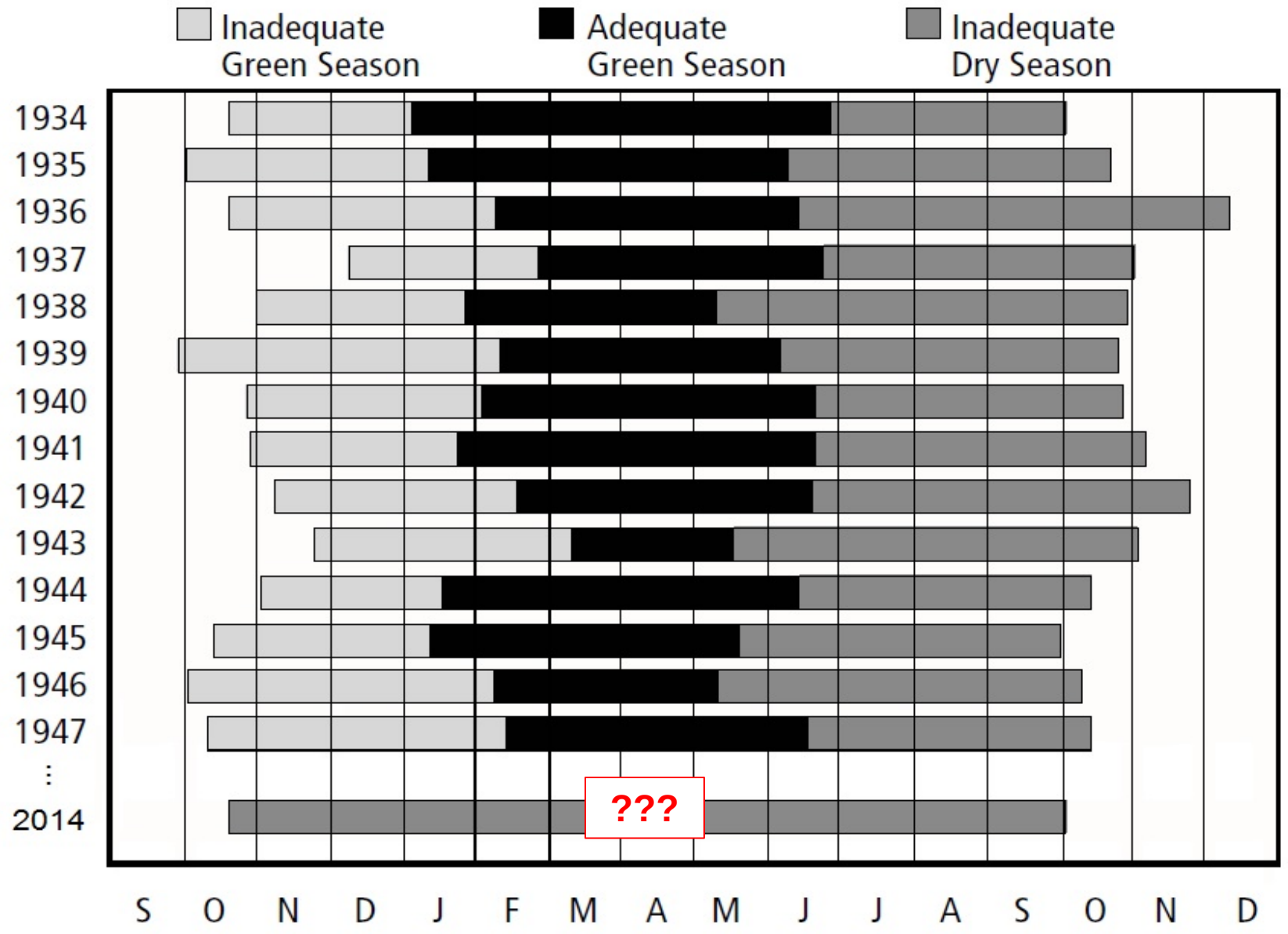


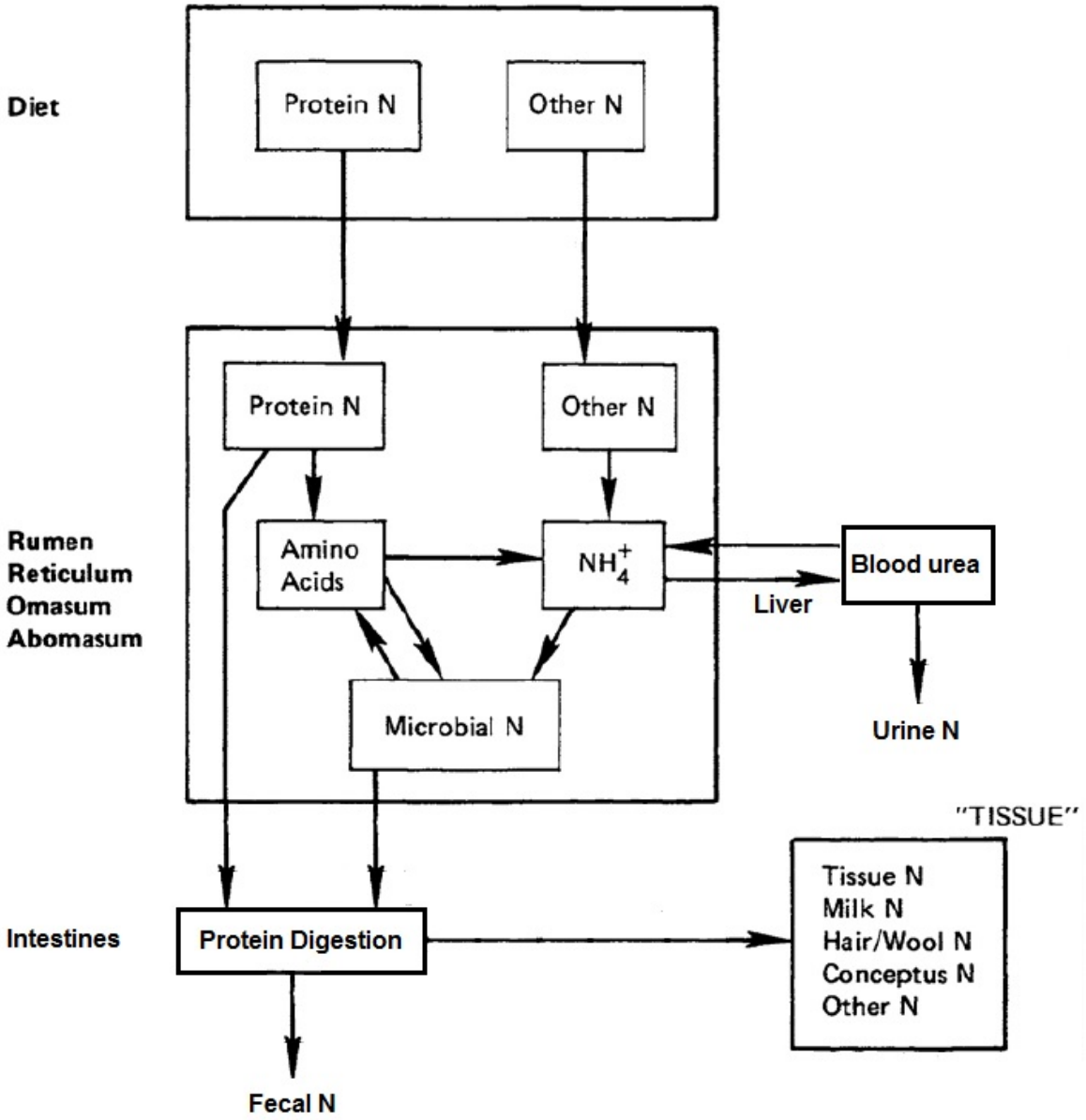


USDA National Drought Mitigation Center

http://droughtmonitor.unl.edu/

What about now?





Adapted from: NRC (1985) Ruminant Nitrogen Usage. National Academy Press, Washington, DC.

Composition of feeds and cow requirements

	Dry range	Rice straw	Wheat straw
Crude protein, % DM	5.5	4.3	4.2
TDN, % DM	51.1	44.0	45.0
NDF, % DM	63.7	69.1	77.6
Ash, % DM	10.0	18.1	6.7
Calcium, % DM	0.58	0.21	0.23
Phosphorus, % DM	0.14	0.08	0.14
Magnesium, % DM	0.18	0.19	0.12
Potassium, % DM	1.49	1.80	0.11
Sodium, % DM	0.05	0.27	0.01
Copper, ppm	6	6	3
Iron, ppm	916	335	190
Manganese	112	454	32
Zinc, ppm	39	34	17

Composition of feeds and cow requirements

	Dry range	Rice straw	Wheat straw	Requirement*
Crude protein, % DM	5.5	4.3	4.2	9.25
TDN, % DM	51.1	44.0	45.0	56.2
NDF, % DM	63.7	69.1	77.6	
Ash, % DM	10.0	18.1	6.7	
Calcium, % DM	0.58	0.21	0.23	0.26
Phosphorus, % DM	0.14	0.08	0.14	0.18
Magnesium, % DM	0.18	0.19	0.12	
Potassium, % DM	1.49	1.80	0.11	
Sodium, % DM	0.05	0.27	0.01	
Copper, ppm	6	6	3	
Iron, ppm	916	335	190	
Manganese	112	454	32	
Zinc, ppm	39	34	17	

*Assuming an average 1200 lb cow 4 months post-calving

Compositions of commercial and UC-Davis supplements

Composition	Commercial tub	UCD-DR	UCD-Tub	Units
Total digestible nutrients	-	59	40	% of DM
Crude protein	30	54	64	% of DM
Calcium	2.00	2.03	1.54	% of DM
Phosphorus	2.00	3.31	2.62	% of DM
Magnesium	0.50	1.15	0.82	% of DM
Potassium	2.50	1.11	0.34	% of DM
Sulfur	-	1.17	0.80	% of DM
Sodium	-	4.74	3.90	% of DM
Chlorine	-	6.41	5.26	% of DM
Cobalt	3.3	9.6	10.9	ppm
Copper	330	569	459	ppm
Iodine	17	17	20	ppm
Manganese	1330	544	448	ppm
Selenium	4.4	4.1	3.5	ppm
Zinc	1000	2011	1633	ppm
Vitamin A	80	194	163	KIU/kg
Vitamin D	8	27	26	KIU/kg
Vitamin E	0.10	0.49	0.40	KIU/kg

[1]UCD-DR, UC-Davis dry range supplement; UCD-Tub, UC-Davis molasses-based tub supplement.

UCD Dry Range Supplementation - 2005

UCD Dry Range Supplementation – 2006-2007


UCD Dry Range
Supplementation –
2006-2007

UCD Tub Supplementation – 2007

Composition of UCD tub supplement

Ingredients	% in mix
Gilberts premix	43%
Molasses	25%
Soybean meal sol 46.7%CP	17%
Canola meal 34.5%	8%
Portland cement	8%
Total	100%


UCD Tub
Supplementation – 2007


UCD Tub
Supplementation – 2007

UCD Tub Supplementation – 2007

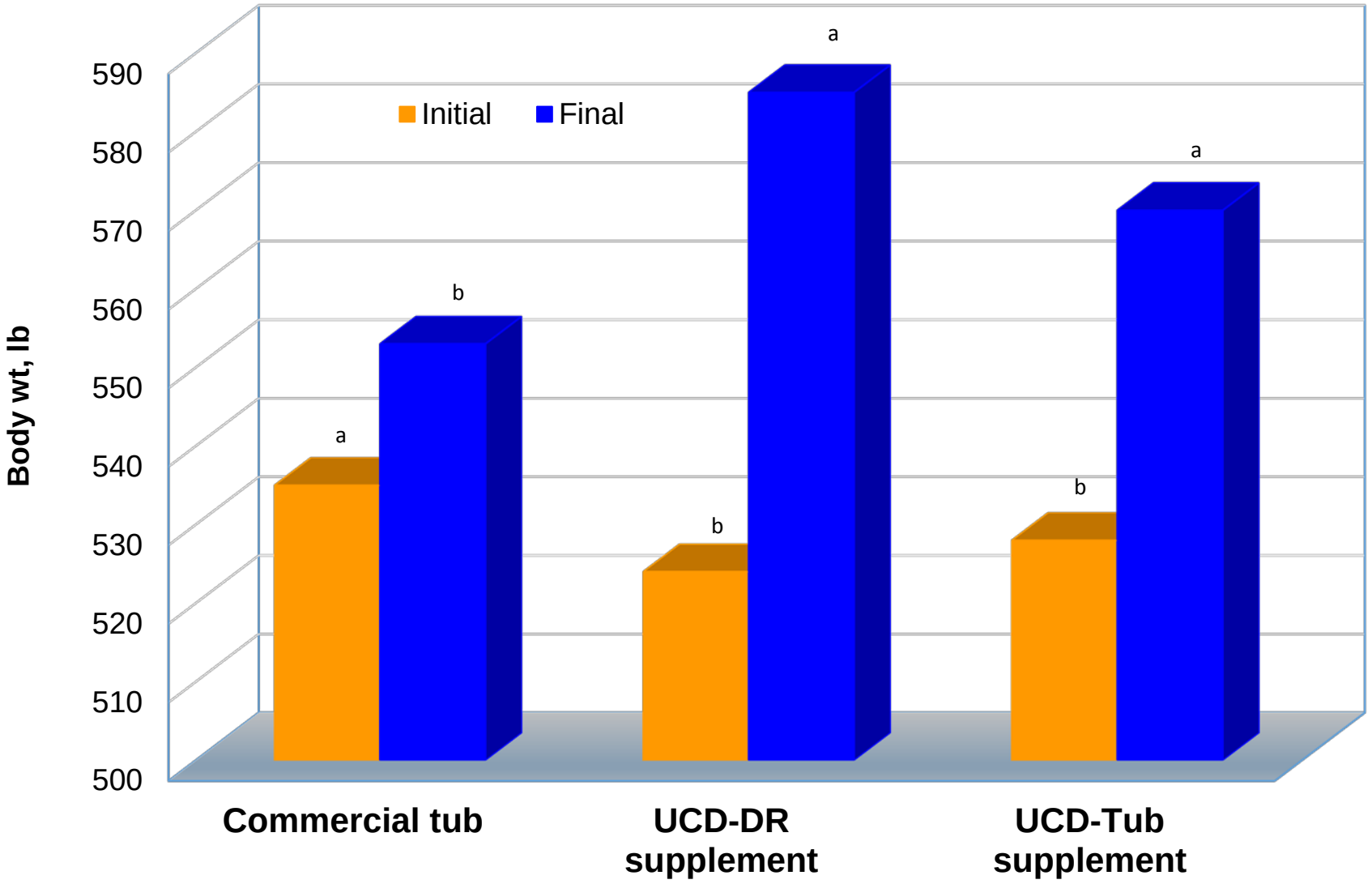
Weights, weight gains, and supplement intakes and costs of heifers on dry range and different types of supplement – 2005-07

	Commercial tub[1]	UCD-DR supplement[2]	UCD-Tub supplement[3]	SD	P
Initial wt, lb	535[a]	524[b]	528[b]	5.92	0.017
Final wt, lb	553[b]	585[a]	570[a]	16.3	0.012
Average daily gain, lb/d	0.172[b]	0.681[a]	0.626[a]	0.097	0.00
Supplement intake, lb/d	1.21	0.91	0.94	0.141	0.21
Supplement cost, $/d	0.331[a]	0.199[b]	0.173[b]	0.084	0.02

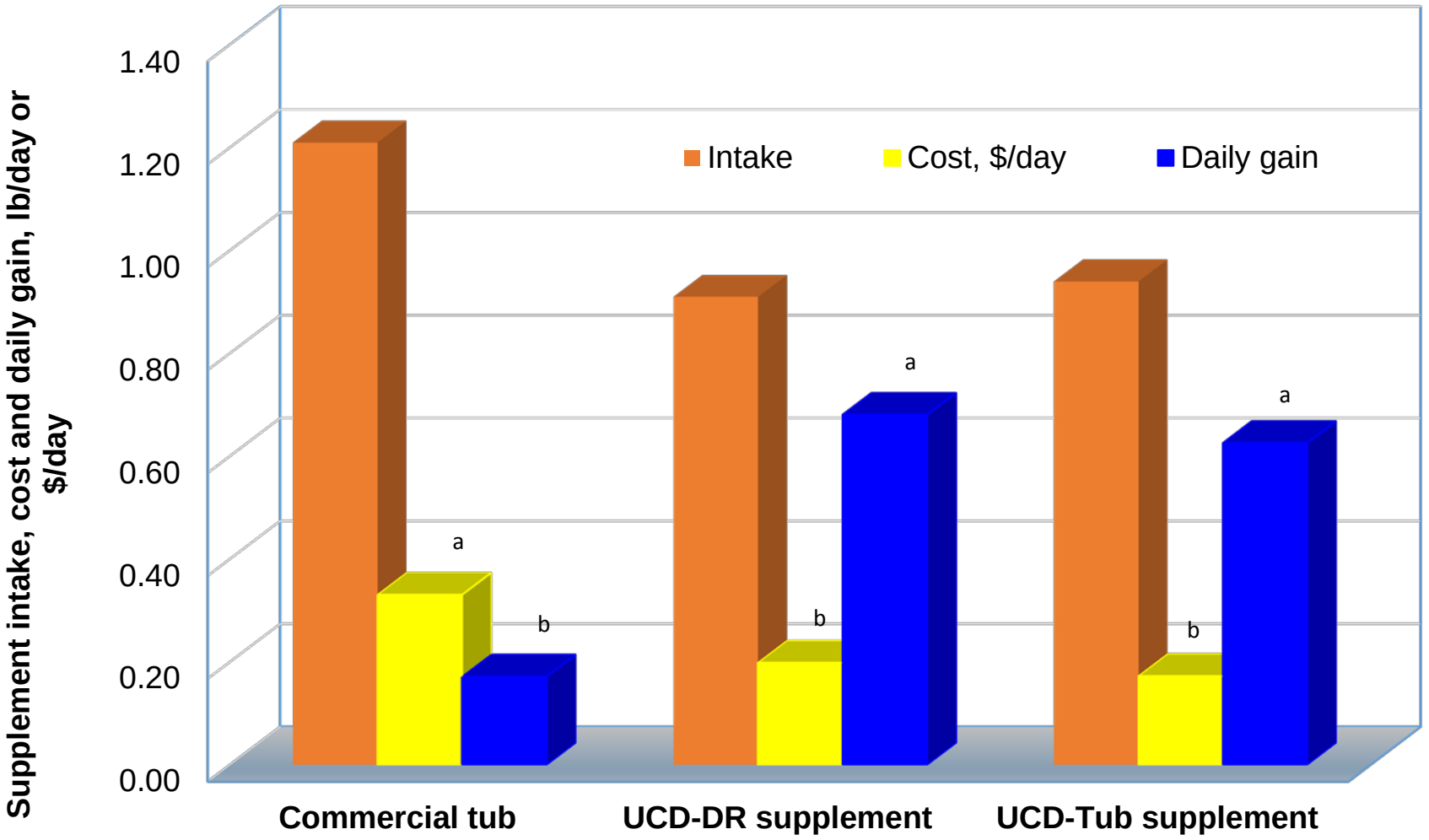
[a,b]Means in the same row not sharing a superscript are different ($P < 0.05$).

[1,2,3]Commercial tubs were used in 2005 and 2006; UCD-DR was used in all three years; UCD tubs were used only in 2007. Note that initial weights were different between treatments due to the absence of the commercial tubs in 2007 and of the UCD tubs in 2005 and 2006.

Body weights of heifers on dry range and fed different types of supplement - 2005-07



Supplement intakes, costs, and weight gains of heifers on dry range and fed different types of supplement – 2005-07



Conclusions

- Calves grazing dry summer range can benefit from a high protein + mineral supplement
- The UCD-DR supplement was **superior** (+300%!) to a commercial tub supplement, at **lower cost** (-40%)
- Specialized feeders eliminated the labor required for daily feeding
- A home-made tub gave similar results as UCD-DR

Acknowledgments

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From pasture...

...to meat...

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...it's a beautiful thing!