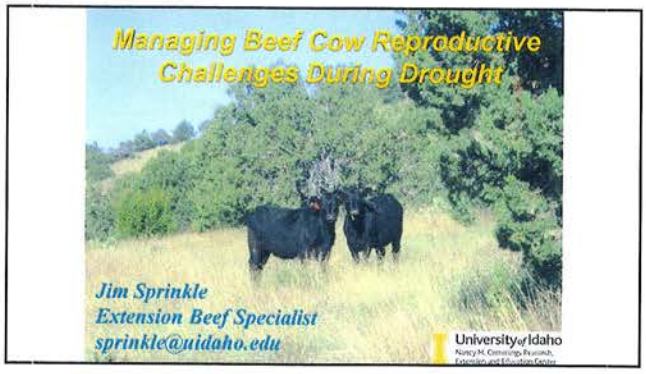
13th Annual AZ/UT Cowman's Reproduction Virtual Workshop

September 8, 2020

Jim Sprinkle, Extension Beef Specialist
University of Idaho



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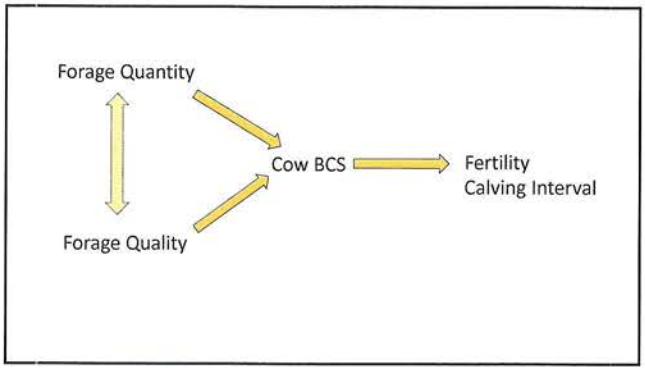

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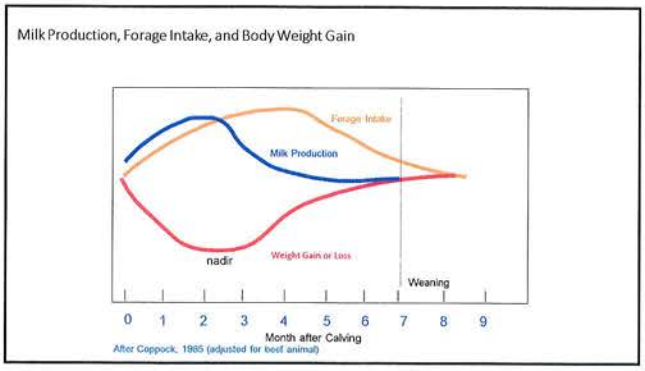
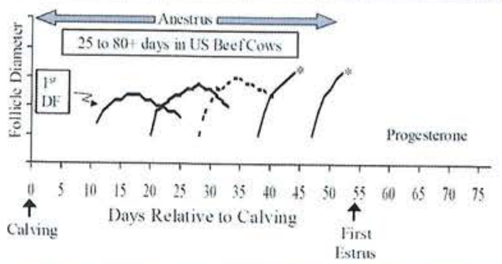


4

Figure 6. Postpartum Anestrus in Beef Cows



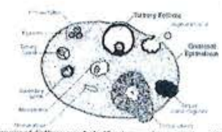
From: Handbook of Estrus Synchronization, 2nd Ed. by G. A. Bridges, M. L. Day, and T. W. Geary

5

Short Term Dietary Restriction[1]

12 to 13 days (effects started showing up at 7 days)

- Operated at ovary level with reduced growth rate of dominant follicle and reduced maximum size of dominant follicle.



http://www.ansci.wisc.edu/jjp1/ansci_repro/lec/lec1/female_images/images_label/ovary%20diagram.jpg

[1]Nutrient intake reduced to 40% of maintenance. Mackey et al., 2000, Journal of Animal Science 78:429-442. They stated the threshold is from 40 to 60% of maintenance for short tem effects.

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Long Term Dietary Restriction[1]

93 days + additional 21 days before re-feeding

- At first, operated at ovary level. A 10% weight loss caused a 9% decrease in both the maximum size of dominant follicle and ovulatory follicle. The CL size was reduced by 11%.
- The life of the dominant follicle was reduced by 0.4 days for each wt. loss of 22 lbs.
- LH release was not reduced until cows quit cycling (anestrus) at 93 days (BCS = 3.3).
- 54 days re-feeding at full feed were required to bring heifers back in estrus (BCS = 3.9). First estrus cycles following re-feeding were 10 days shorter than later normal cycles.
- The shorter the time period required to achieve anestrus, the longer the anestrus period, suggesting that animal variation is important and that the trajectory of the weight loss is important.

[1]Nutrient intake reduced to 0.5% of body wt. for 18 mo. Brahman heifers, starting BCS = 5.7, losing 1.76 lb/d. Rhodes et al., 1995, Journal of Reproduction & Fertility 104:41-49.

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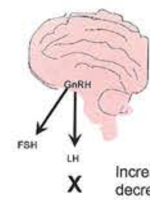

Increased weight loss and stress causes the release of cortisol.

Increased cortisol causes a decrease in LH release.

LH is necessary for ovulation.

8


Picture from Dr. Dean Fish
BCS 2

9


BCS 3
Picture from Dr. Dean Fish

10


Picture from Dr. Dean Fish
BCS 4

11


Picture from Dr. Dean Fish
BCS 5

12

Pregnancy % by Body Condition Score

Body Condition at Calving	Day 40 of Breeding Season	Day 60 of Breeding Season
4	43 ± 5	56 ± 5
5	65 ± 4	80 ± 4
6	90 ± 9	96 ± 8

Spitzer et al., 1995. Journal of Animal Science

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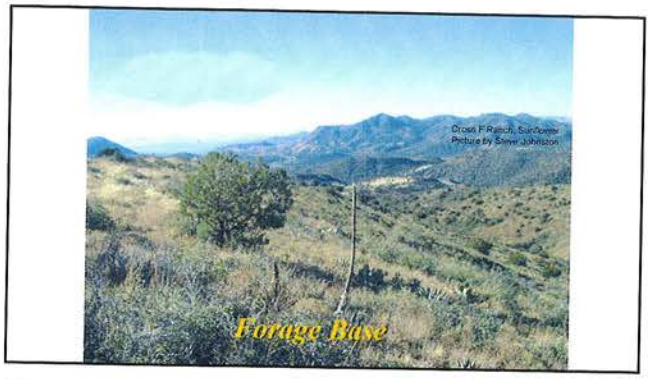

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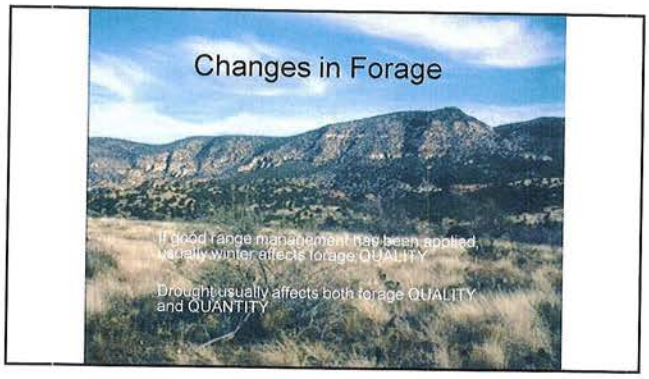

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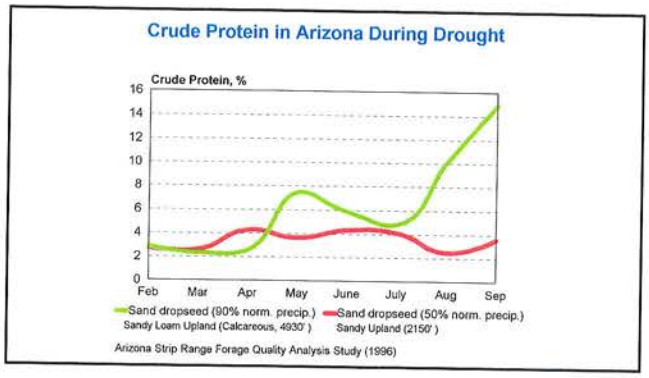

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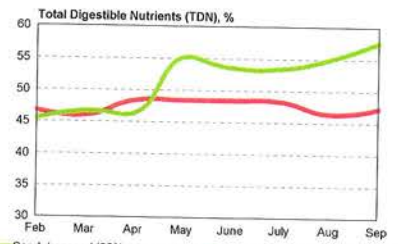
Energy Content in Arizona During Drought



Arizona Strip Range Forage Quality Analysis Study (1996)

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Non-supplemented Steers

S. Central NM Blue Grama Rangeland (6233 to 7564')

Characteristic	Growing Season	Dormant Season
Plant		
Crude Protein	15.4 %	9.6 %
Available Protein	12.8 %	6.5 %
Forage Digestibility	61.8 %	47.9 %
Animal		
Forage Intake, % of BW	2.17 %	1.49 %
% Grasses in Diet	74.6 %	46.8 %
% Forbs in Diet	25.4 %	53.2 %
Rumen Retention Time	45.8 h	58.2 h

Galyean et al., 1987 NMSU Bulletin 727

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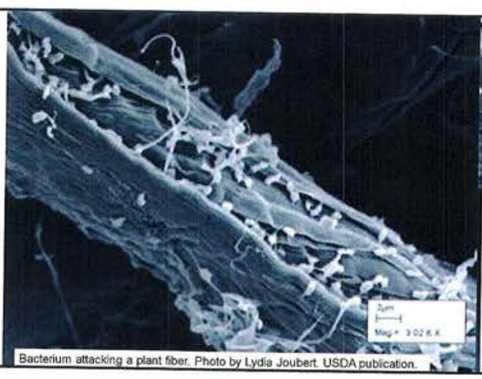

Bacterium attacking a plant fiber. Photo by Lydia Joubert. USDA publication.

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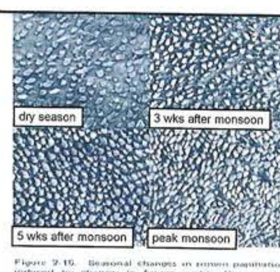

Figure 2-15. Seasonal changes in rumen papillation induced by changes in forage quality (free-ranging impala antelopes) as seen in homologous regions of the rumen dorsal wall; cnf. 2.8-2.9. A = peak of dry season, minimal SEF (early March); B = 3 weeks after onset of rainy season (mid April); C = 5 weeks after onset of rains (end of April); D = climax of rainy season (May), predominant selection of leaves, maximal SEF. From Hofmann (9) and Hofmann and Schnorr (7).

Anatomy of the Gastro-Intestinal Tract. In: The Ruminant Animal. Digestive Physiology & Nutrition. Edited by D.C. Church 1988 Prentice Hall, Englewood Cliffs, NJ

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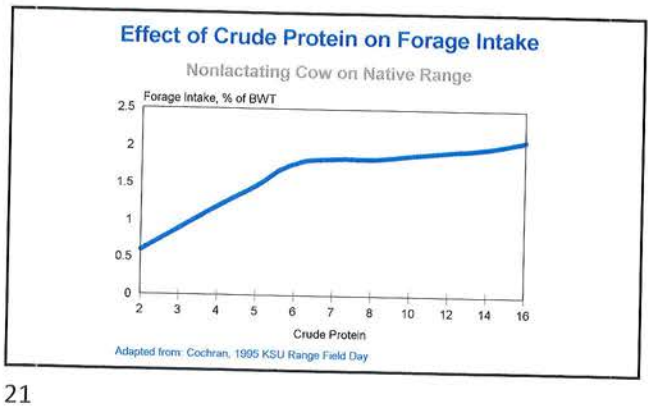
Effect of Crude Protein on Forage Intake
Nonlactating Cow on Native Range
Forage Intake, % of BWT
2.5
2
1.5
1
0.5
0
2 3 4 5 6 7 8 10 12 14 16
Crude Protein
Adapted from: Cochran, 1995 KSU Range Field Day

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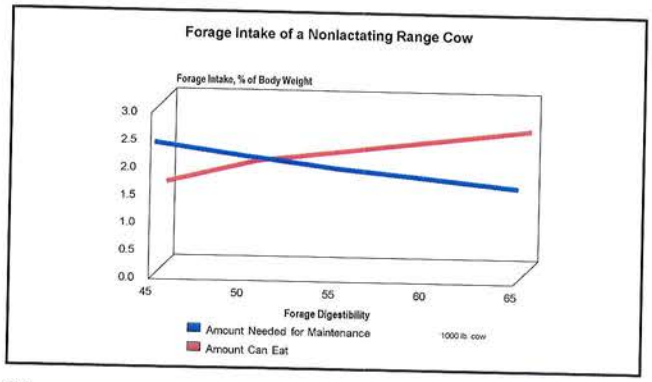
Forage Intake of a Nonlactating Range Cow
Forage Intake, % of Body Weight
3.0
2.5
2.0
1.5
1.0
0.5
0.0
45 50 55 60 65
Forage Digestibility
Amount Needed for Maintenance
Amount Can Eat
1000 lb. cow

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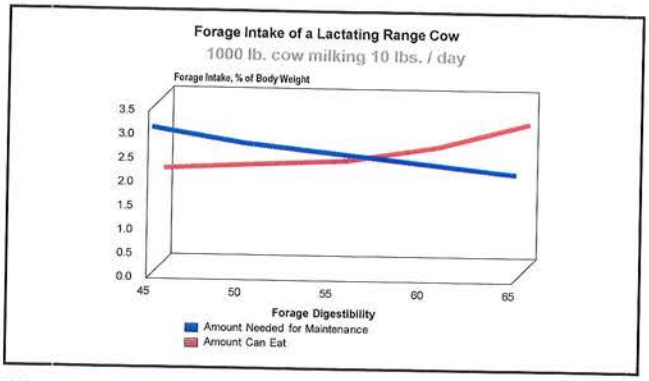
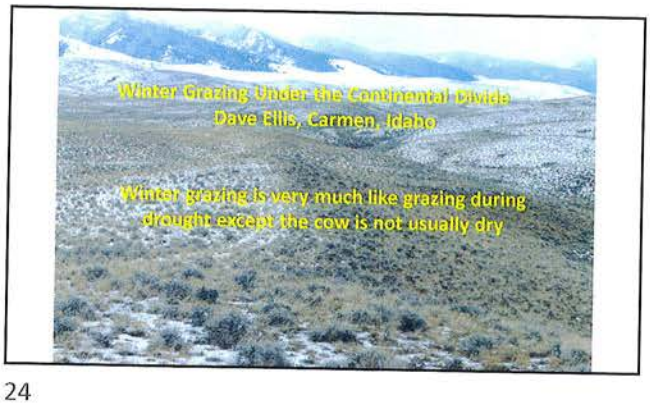

Forage Intake of a Lactating Range Cow
1000 lb. cow milking 10 lbs. / day
Forage Intake, % of Body Weight
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
45 50 55 60 65
Forage Digestibility
Amount Needed for Maintenance
Amount Can Eat

23


Winter Grazing Under the Continental Divide
Dave Ellis, Carmen, Idaho
Winter grazing is very much like grazing during drought except the cow is not usually dry

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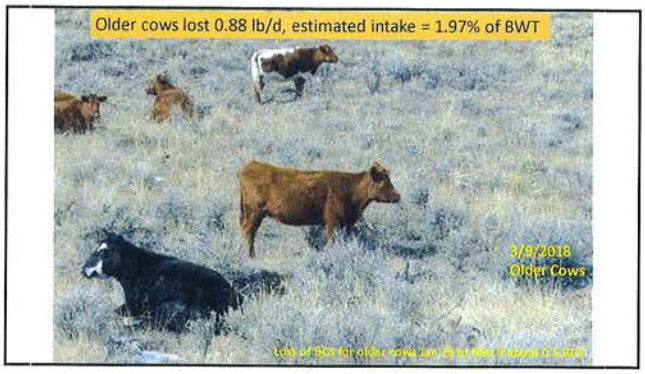
Older cows lost 0.88 lb/d, estimated intake = 1.97% of BWT
3/9/2018
Older Cows

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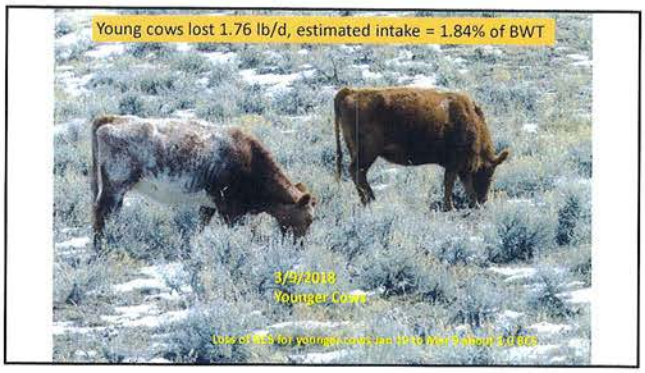
Young cows lost 1.76 lb/d, estimated intake = 1.84% of BWT
3/9/2018
Younger Cows

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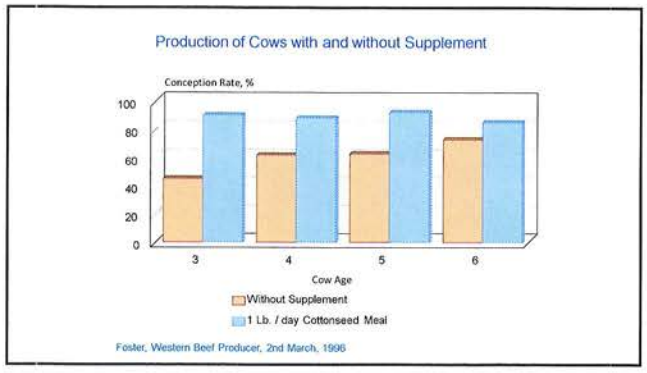
Production of Cows with and without Supplement
Conception Rate, %
100
80
60
40
20
0
3
4
5
6
Cow Age
Without Supplement
1 Lb. / day Cottonseed Meal
Foster, Western Beef Producer, 2nd March, 1996

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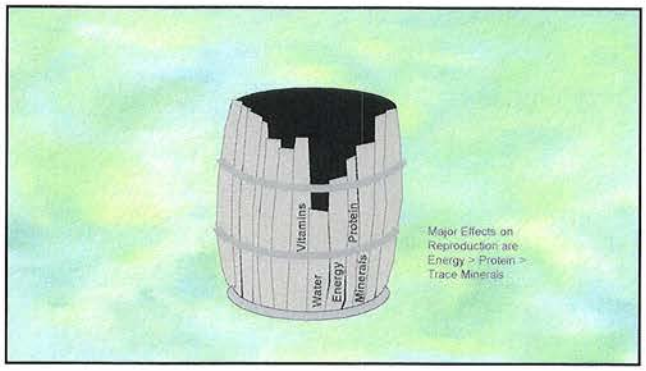
Vitamins
Protein
Water
Energy
Minerals
Major Effects on Reproduction are Energy > Protein > Trace Minerals

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How much forage?

Forage: Green or Dry

Adequate Forage

Inadequate Forage

What's Missing?

Nutritional Stress: TM, or E, or CP

Protein Supplementation Forage < 7% CP

For TM: Available at all times. For energy, usually helped by CP.

Stage of Production: Lactating, Nonlactating, Growing

What's Cow Behavior?

Move Cows or Haul Water to "Forage Banks"

Protein/Energy or Energy Supplement

Wean Calves

Cull Cows according to drought plan.

What's BCS?

Growing

Nonlactating Mature Cows

Lactating Mature Cows

Traditional Knowledge: Supplement 60-90 d before calving to preserve BCS. Calve at BCS = 5. Cattle at BCS = 4 or > at breeding. 1 to 2 lb/d fed 1x/ wk or 2x/wk or daily.

NMLCS: **OPEN WINTER** - Each cow gets self fed minute mineral with protein added for 30 d before calving (.15 lb./d of 50% TM & 50% protein sources (65 - 70% rumen undegradeable)

OR

NMLCS: **BEFORE WINTER** – Mini: 0.55 lb./ d of 36% CP fed 1/wk (3.85 lbs./feeding) From 35 to 40 % bypass protein. To try to build BCS before winter when needed.

OR

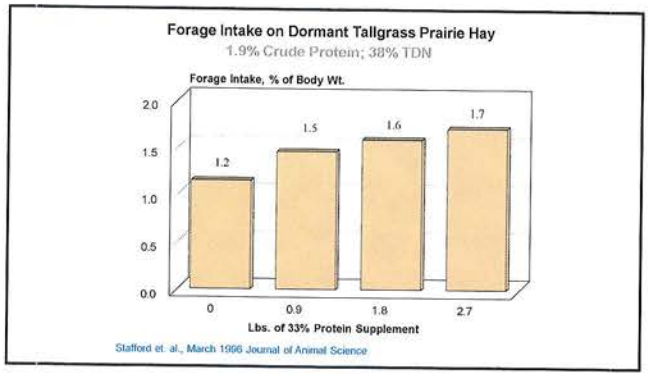
NMLCS: **MORE SEVERE WINTER** – 1 lb./ d of 36% CP fed 2x/wk (3.5 lbs./feeding) to daily. Uses oil seed feeds and is < 40% bypass protein. Will add 0.25 to 0.50 BCS.

OR

NMLCS:**SEVERE WINTER & SEVERE WT LOSS** – 2 lb./ d of 36% CP fed 2x/wk (7 lbs./feeding) to daily. Has 50% bypass protein. Reduces wt loss, milk fat, & days to estrus.

NMLCS:**SEVERE WT LOSS AFTER CALVING** – 2 lb./d of 36% CP + 0.088 lb./d propionate salt. Fed 2x/wk (7.63 lb./feeding) to daily. Has 50% bypass protein. Reduces wt loss and days to estrus. Increases insulin sensitivity.

For replacement heifers, may require drylot feeding for two most severe months to achieve weight needed for puberty.


Forage Intake on Dormant Tallgrass Prairie Hay
1.9% Crude Protein; 38% TDN
Forage Intake, % of Body Wt.
2.0
1.5
1.0
0.5
0.0
1.2
1.5
1.6
1.7
0
0.9
1.8
2.7
Lbs. of 33% Protein Supplement
Stafford et. al., March 1996 Journal of Animal Science

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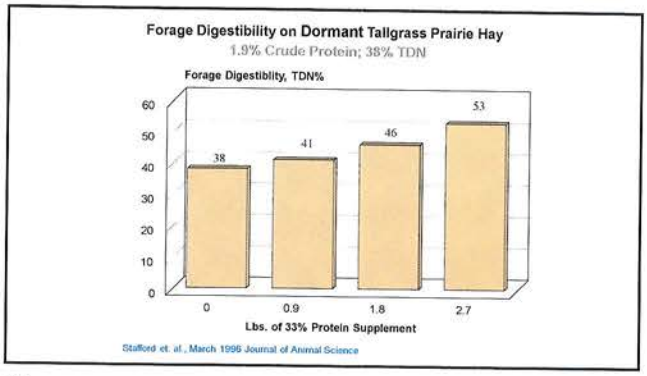
Forage Digestibility on Dormant Tallgrass Prairie Hay
1.9% Crude Protein; 38% TDN
Forage Digestiblity, TDN%
60
50
40
30
20
10
0
38
41
46
53
0
0.9
1.8
2.7
Lbs. of 33% Protein Supplement
Stafford et. al., March 1996 Journal of Animal Science

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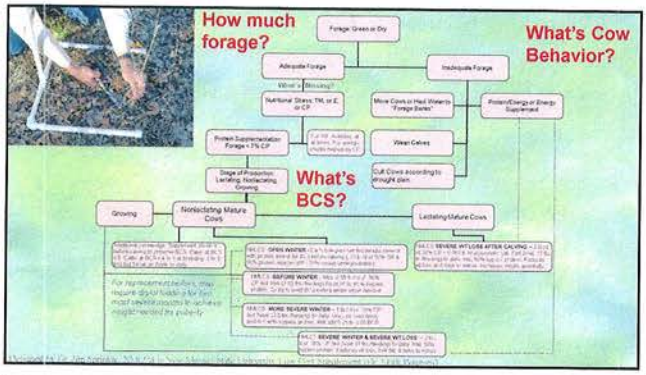
How much forage?
What's Cow Behavior?
What's BCS?
Forage: Green or Dry
Adequate Forage
Inadequate Forage
What's Missing?
Nutritional Stress: TM, or E, or CP
More Cows or Hay Waste to "Forage Barter"
Protein/Energy or Energy Supplement
Protein Supplementation Forage < 7% CP
Wean Calves
Cull Cows according to drought plan
Stage of Production: Lactating, Nonlactating, Growing
Growing
Nonlactating Mature Cows
Lactating Mature Cows

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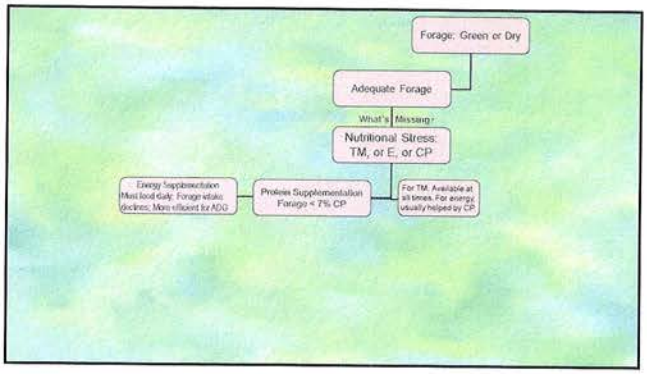
Forage: Green or Dry
Adequate Forage
What's Missing?
Nutritional Stress: TM, or E, or CP
Energy Supplementation Most food daily; Forage intake declines; More efficient for ADG
Protein Supplementation Forage < 7% CP
For TM. Available at all times. For energy usually helped by CP

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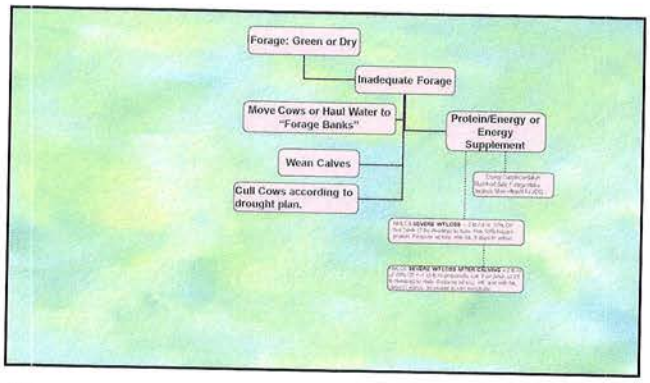
Forage: Green or Dry
Inadequate Forage
Move Cows or Haul Water to "Forage Banks"
Protein/Energy or Energy Supplement
Wean Calves
Cull Cows according to drought plan.

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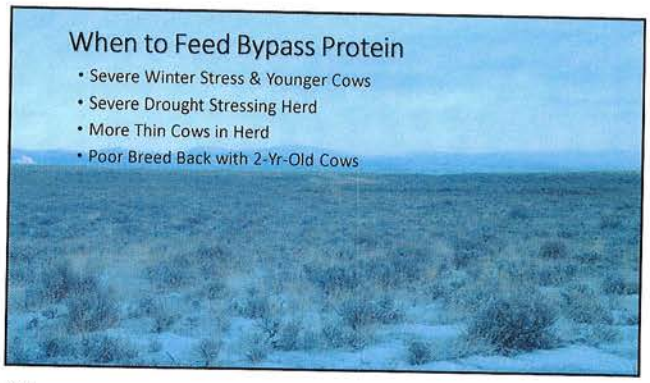
When to Feed Bypass Protein
• Severe Winter Stress & Younger Cows
• Severe Drought Stressing Herd
• More Thin Cows in Herd
• Poor Breed Back with 2-Yr-Old Cows

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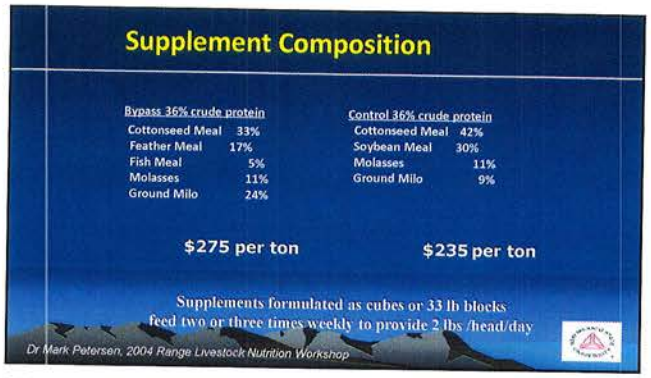
Supplement Composition
Bypass 36% crude protein
Cottonseed Meal 33%
Feather Meal 17%
Fish Meal 5%
Molasses 11%
Ground Milo 24%
Control 36% crude protein
Cottonseed Meal 42%
Soybean Meal 30%
Molasses 11%
Ground Milo 9%
$275 per ton
$235 per ton
Supplements formulated as cubes or 33 lb blocks
feed two or three times weekly to provide 2 lbs /head/day
Dr Mark Petersen, 2004 Range Livestock Nutrition Workshop

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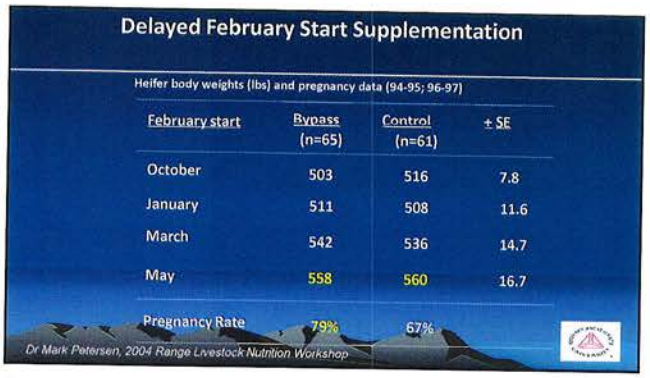
Delayed February Start Supplementation
Heifer body weights (lbs) and pregnancy data (94-95; 96-97)
February start
Bypass (n=65)
Control (n=61)
± SE
October 503 516 7.8
January 511 508 11.6
March 542 536 14.7
May 558 560 16.7
Pregnancy Rate 79% 67%
Dr Mark Petersen, 2004 Range Livestock Nutrition Workshop

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Bypass Protein with Brahman Cows and 1st Calf Heifers in TX[1]

	Low Bypass Protein (37%)	Medium Bypass Protein (56%)	High Bypass Protein (76%)
1st Service Conception	29%	58%	55%
90 Day Pregnancy Rate	43%	62%	56%

[1]Fed 6.5 to 7.7 lbs/d for 112 days after calving, 23 to 25% CP; 60 d AI + 30 d cleanup bull breeding. Triplett et al., 1995; Journal of Animal Science 73:3223-3229.

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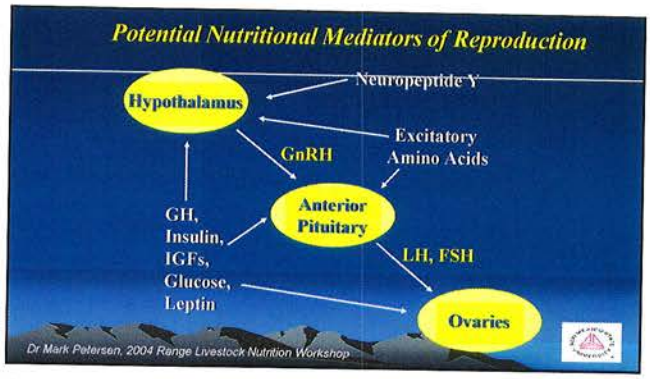

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Supplementation

- If forage supply is adequate (less than 50% utilization) and low in protein:
  - ✓Feed Protein
- If forage supply is limiting (greater than 50% utilization):
  - ✓Feed Energy (and satisfy protein req.)

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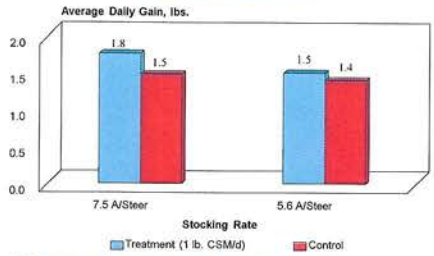
Effect of Stocking Rate Upon Cottonseed Meal Supplementation



McCollum et al., 1992 Marvin Klemme Range Res. Sta. Report, OK

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Concepts & Rules for Energy Supplementation

- Energy supplements must be fed every day as opposed to protein supplements which can be fed once a week (at 7 times the daily rate of 1 lb/d; 7 lbs. total).
- Energy supplements usually decrease forage intake when fed with poor quality forage. Cattle usually substitute the supplement for forage. This can be an advantage in drought.
- The above substitution effect is less severe when energy supplements are fed at rates of less than .30% of body weight (3 lbs. for a 1000 lb. cow).
- If you do not desire to overly impact grazing time, it is best to feed energy supplements in the early afternoon when cows are resting.
- Energy supplements are more efficient for putting on weight.

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Urea toxicity

- Must feed urea every day
- Cattle must adapt to urea and can lose ability to use urea very quickly (days)
- To feed urea you must meet energy need first, without sufficient energy urea is not useful
- NPN < 1/3 total diet nitrogen
- Urea toxicity is often seen in AZ during drought

From: Dr. Peder Cuneo, UA 2010 Range Livestock Nutrition School

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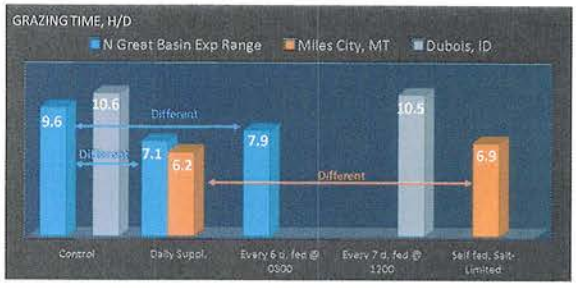
Effects of Frequency of Supplementation



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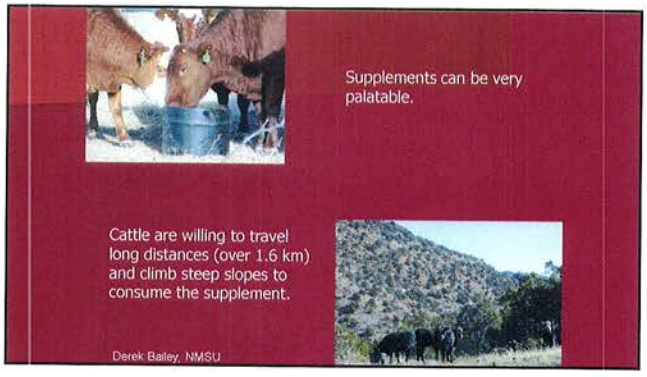
Supplements can be very palatable.
Cattle are willing to travel long distances (over 1.6 km) and climb steep slopes to consume the supplement.
Derek Bailey, NMSU

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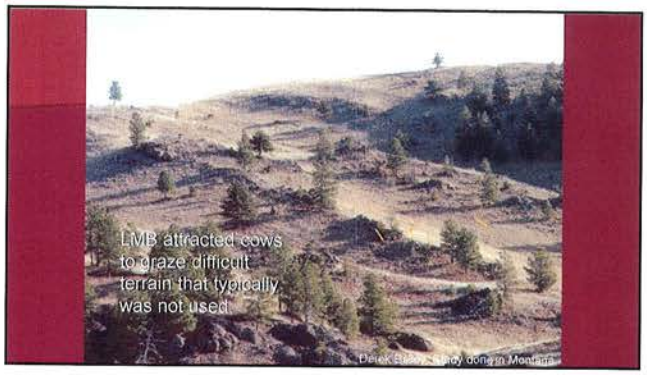
LMB attracted cows to graze difficult terrain that typically was not used

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University of Idaho
Nancy M. Cummings Research, Extension and Education Center

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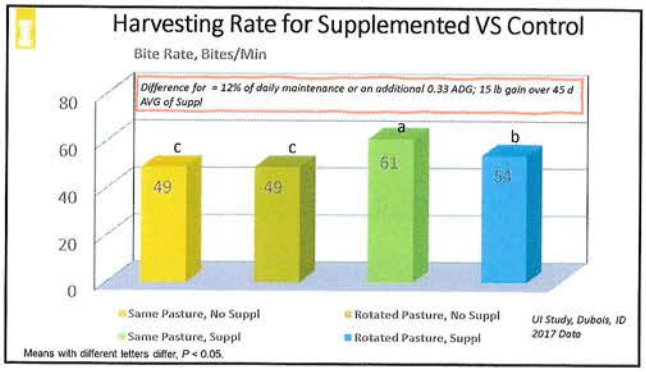
Harvesting Rate for Supplemented VS Control
Bite Rate, Bites/Min
Difference for = 12% of daily maintenance or an additional 0.33 ADG; 15 lb gain over 45 d AVG of Suppl
80
60
40
20
0
c
c
a
b
49
49
61
54
Same Pasture, No Suppl
Rotated Pasture, No Suppl
Same Pasture, Suppl
Rotated Pasture, Suppl
UI Study, Dubois, ID 2017 Data
Means with different letters differ, P < 0.05.

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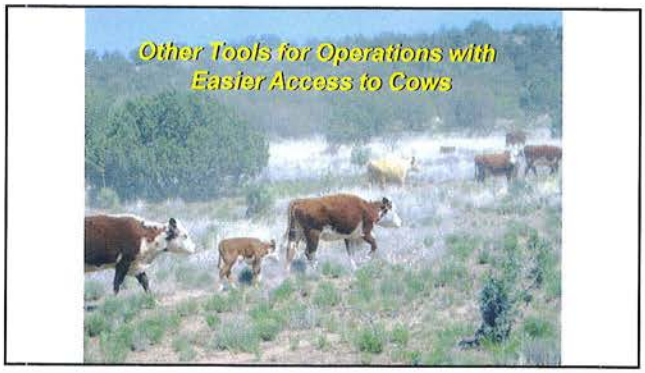

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Suppression of Estrus by Suckling

- 1st dominant follicle after calving ovulates in 11% beef cows
- For dairy cows, 74%
- Interval to 1st estrus: Short et al. 1972
  - 65 days suckled cows
  - 25 days non-suckled cows
  - 12 days non-suckled, udder removed
  - Sucking by calf reduces LH release by cow
  - 1st Estrus in beef cows is usually short
- Some suggest for 48 hour calf removal to work, cows need to be at least 36 days after calving and BCS of 4.5
- If cow is thin, can combine 48 hour calf removal with hormone manipulation (CIDR & Prostaglandin) to improve conception **SOMETIMES**

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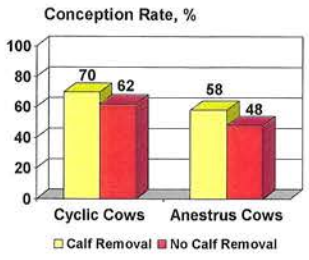
Effect of Ovsynch/Cosynch Estrus Synchronization and 48 Calf Removal[1]
Angus & Hereford Cows, 1 Timed AI + Bulls in WY & CO



[1]Geary et al., 2001, Journal of Animal Science 79:1-4.

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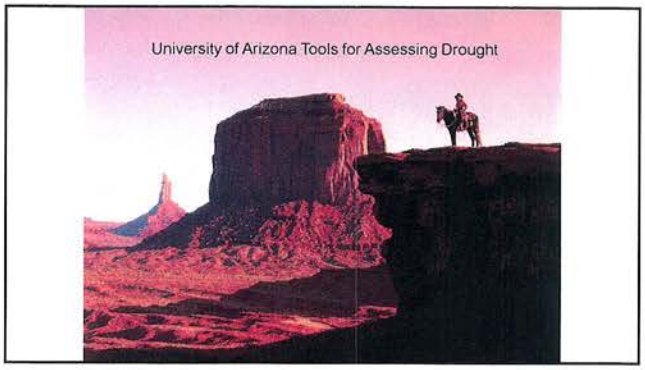

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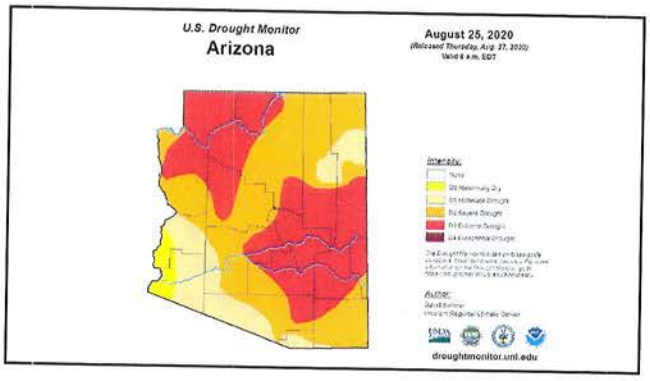
U.S. Drought Monitor
Arizona
August 25, 2020
droughtmonitor.unl.edu

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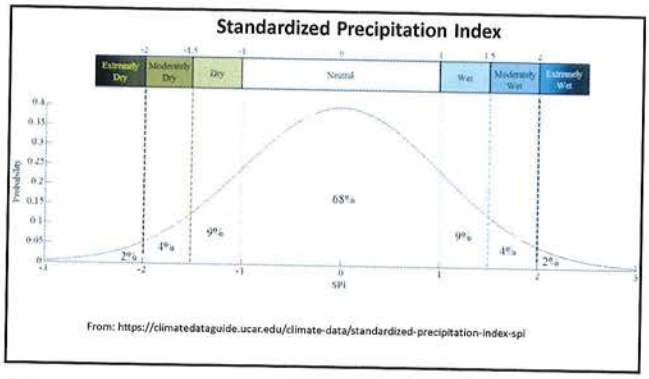
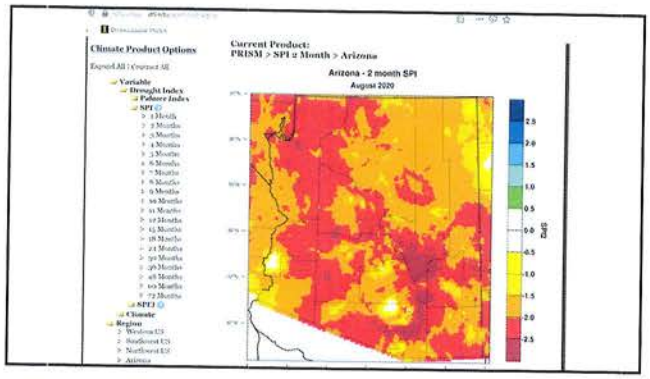

Standardized Precipitation Index
Extremely Dry
Moderately Dry
Dry
Neutral
Wet
Moderately Wet
Extremely Wet
Probability
SPI
68%
9%
9%
4%
4%
2%
2%
From: https://climatedataguide.ucar.edu/climate-data/standardized-precipitation-index-spi

54


Climate Product Options
Current Product:
PRISM > SPI 2 Month > Arizona
Arizona - 2 month SPI
August 2020

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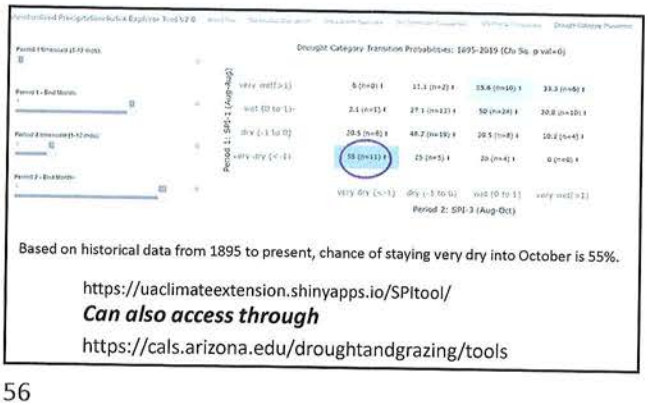
Drought Category Transition Probabilities: 1895-2019 (Chi Sq. p val=0)
Period 2: SPI-3 (Aug-Oct)
Based on historical data from 1895 to present, chance of staying very dry into October is 55%.
https://uaclimateextension.shinyapps.io/SPItool/
Can also access through
https://cals.arizona.edu/droughtandgrazing/tools

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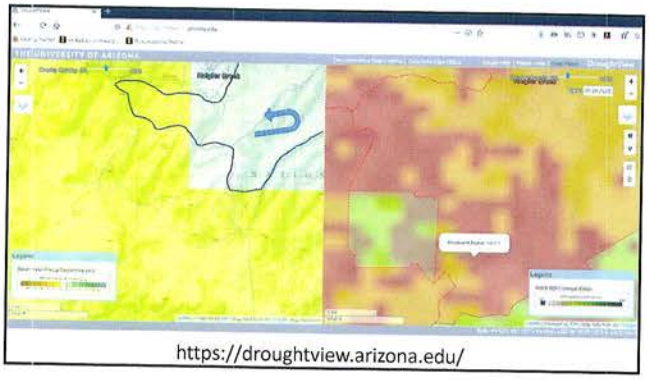
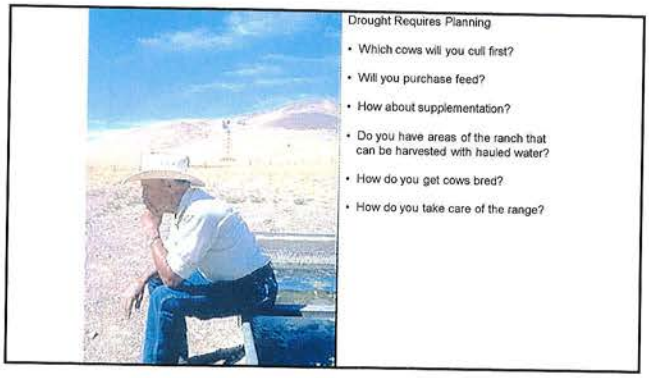

https://droughtview.arizona.edu/

57


Drought Requires Planning
• Which cows will you cull first?
• Will you purchase feed?
• How about supplementation?
• Do you have areas of the ranch that can be harvested with hauled water?
• How do you get cows bred?
• How do you take care of the range?

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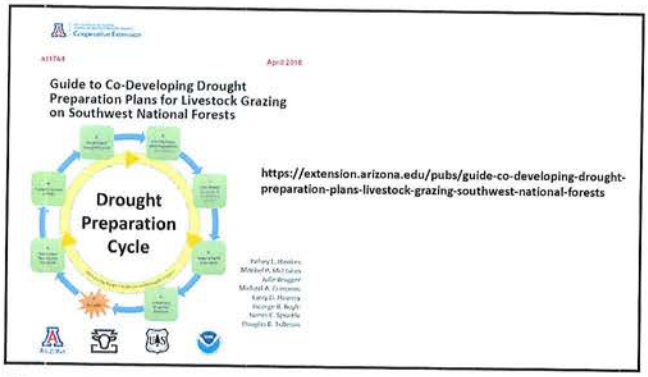
Guide to Co-Developing Drought Preparation Plans for Livestock Grazing on Southwest National Forests
Drought Preparation Cycle
https://extension.arizona.edu/pubs/guide-co-developing-drought-preparation-plans-livestock-grazing-southwest-national-forests

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University of Arizona Drought Resources
https://cals.arizona.edu/droughtandgrazing/dashboard
https://cals.arizona.edu/droughtandgrazing/tools
https://droughtview.arizona.edu/
https://extension.arizona.edu/pubs/rangeland-management-during-after-drought
https://extension.arizona.edu/pubs/easy-use-system-developing-drought-management-contingency-plan
Rangeland Management Before, During, and After Drought
An Easy to Use System for Developing a Drought Management Contingency Plan

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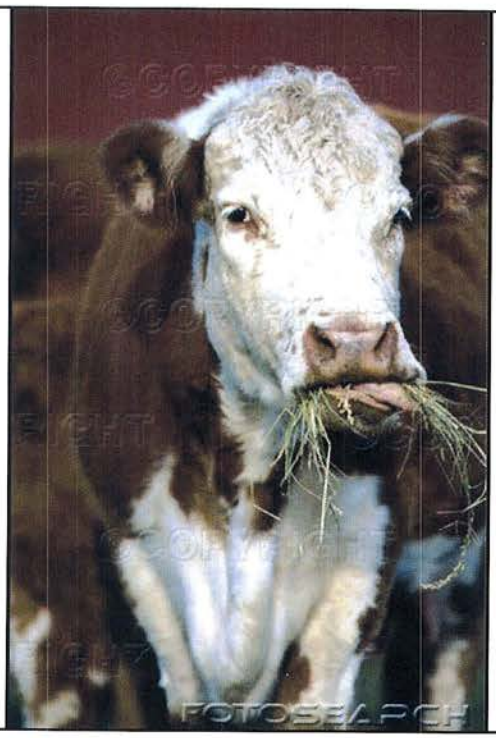

Rules for Range Nutrition

1. Feed both the cow & the rumen. Supplemental protein required when forage is < 6 to 7% CP. Protein that feeds the rumen is ***degradable*** intake protein; protein for the cow is ***undegradable*** intake protein or ***bypass*** protein and some microbial protein.
2. **Quantity:** A range cow needs to have the opportunity to eat all she can every day. If she doesn't lay down mid-morning, potential problem with forage supply.
3. **Quality:** Supplementing CP will often increase both forage intake and digestibility on warm season grasses due to increased rumen microbes and faster passage rate.
4. BCS = 5 is a good target for calving.
5. Minimize wt. loss after calving with lower milk production, moderate cow size, calving to match forage supply, and using best pastures.
6. For thinner cows after calving, some tools to improve pregnancy are bypass protein, 48 hr calf removal, hormonal manipulation, and small amounts of added glucose in protein supplements.

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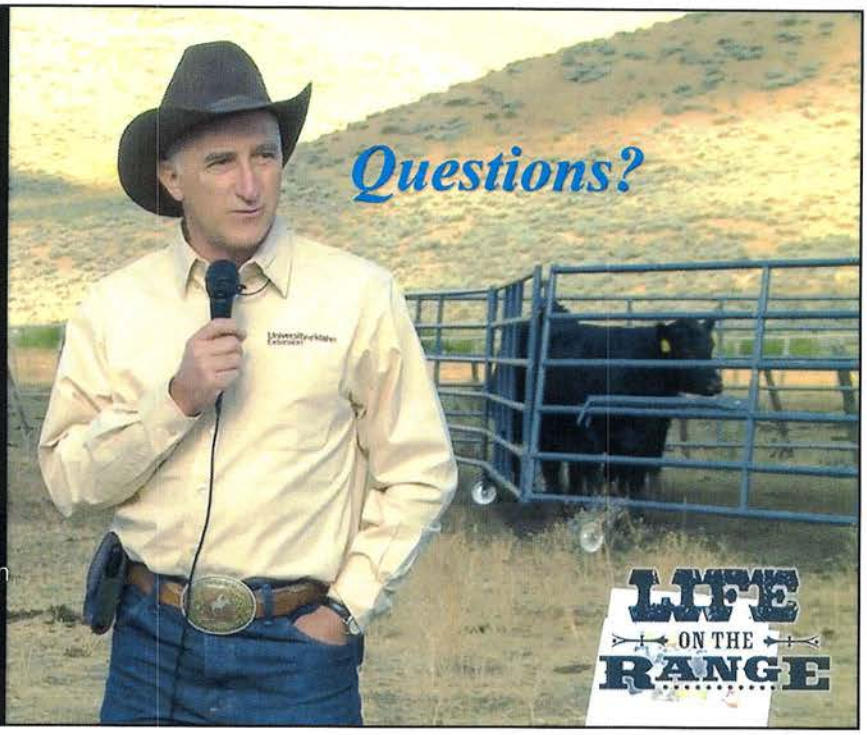

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