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Feed and Water Efficiency, and Water Conservation Impacts on Drought Management

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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.

Drought

- Herd reduction due to drought is one of the largest threats for ranch sustainability in the Southwest
- Efficient use of resources is important to reduce the effects or need for significant herd reductions

<https://www.drought.gov/drought/states/new-mexico>

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Tying it all together

- ✓ Feed Efficiency
- ✓ Water Use Efficiency
- ✓ Water Quality
- ✓ Water Conservation

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Feed Efficiency is 35% Heritable.....

- Can you tell if he is efficient?

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Feed Efficiency is 35% Heritable.....

Actual Data for Efficiency

- ✓ Average Daily Gain
- ✓ Dry Matter Intake
- ✓ Feed Conversion
- ✓ Residual Feed Intake
- ✓ *Direct correlation between feed intake and water consumption.*

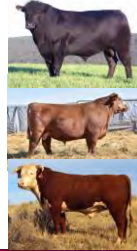
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Table 1. 2020 Tucumcari Bull Test Data of Two Angus Bulls from Same Ranch

Item	Bull A	Bull B
In Body Weight (lbs)	710	718
Average Daily Intake (lbs)	20	23.5
End Weight (lbs)	848	814
Feed Conversion (lbs feed:1lb gain)	5.12	7.52
Potential Feed Savings(lbs)/yr	1278	

EPDs For Efficiency



- **DMI = Dry matter intake** potential of offspring. A negative number of DMI means this animal requires less intake than the breed average for body weight maintenance.
- **rADG = Residual average daily gain** is a value only found in the Angus breed. The more positive this number indicates the animal will have greater growth and performance on the same amount of intake as the breed average.

Cow Efficiency



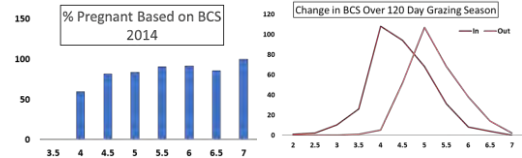
Item	Cow A	Cow B
Age	5	5
Breed	South Devon	South Devon
Ave BW (lbs)	1270	1260
Ave AsFed Intake (lbs)	44.4	32.9
205d Weaning Wt (lbs)	377	460
Cow Cost	\$810.00	\$600.00
Profitability	(\$112.55)	\$159.00

Cow Body Condition

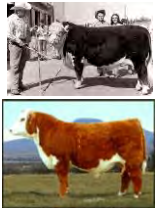
- Quickest assessment of nutritional status
- BCS at Calving is critical
- Want to be at least a 5 (on a scale of 1-9) at calving
- Thin cows have higher requirements



The New Mexico Cow...



Implications




Through selection and data analysis, producers that have tested their bulls at the Tucumcari Bull Test station have increased pounds of product per animals by 30% on 40% less feed since the first bull test in 1961.

Index: 130.5 ADG 4.10 WDA 3.62 FE 4.07 RFI -3.90

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Herd Efficiency = Reduced Impacts from Drought



- ✓ Select bulls with proven efficiency in feed conversion and lower intake needs
- ✓ Culling Criteria
 - ✓ Open Cows
 - ✓ Late Bred Cows(?)
 - ✓ Can't maintain body condition in good years
- ✓ Poor/young calves
- ✓ Heifer Replacements
 - ✓ Oldest
 - ✓ Moderate framed
- ✓ **Records is the best tool**

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Water Consumption



- Quantification of ranging livestock and wildlife has not been fully evaluated.
- Averages and prediction models (based on dry lot data) are the only data available.
- Preliminary research suggests that water intake is approximately 35% heritable in beef cattle.
 - (Ashberg et al., 2019)

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Water Intake Project




WESTERN SARE
Sustainable Agriculture Research & Education

- Phase 1 = Collect water data from purebred yearling bulls
- Phase 2 = Collect water data in a range setting
 - Sire, dams, and full sibs of bulls tested at Tucumcari
 - Begin wildlife data collection

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Water Quality



- Impacts consumption
- Impacts performance
- Impacts health
- Impacts grazing distribution

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Water Quality

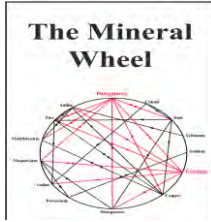


New Mexico Water Quality Challenges

- Total Dissolved Solids
- CaCO₃
- Sulfur
- Iron
- Sodium
- Occasional blue-green algae blooms

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Water Quality Impacts on Nutrition



- Total Dissolved Solids
- CaCO3
- Sulfur
- Iron
- Sodium

Water Quality Impacts on Pasture Use

The first screenshot shows a table with columns for Client Name, Date Received, Sample No., Name of Sample, Name of Submitter, and Date. The second screenshot shows a table with columns for Sample No., Date Received, Client Name, Date/Time Sampled, Client Name/Address, and Laboratory. Both tables contain detailed data for various water samples.

Water Source Management



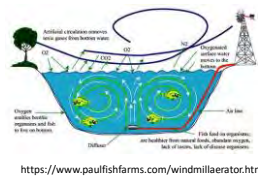
1. Reduce evaporation
2. Improve quality
3. Improve water capture outlets

Water Source Management



1. Reduce evaporation
 1. 16-17 gallons are lost to evaporation per 16 sq ft of water surface per day (at 85°F)
2. Shade balls
 1. Reduce evaporation
 2. Help keep water open in winter
 3. Cost = approx. \$100.00 per 16ft tank
 4. NRCS?
3. Reducing evaporation can help with water quality issues

Water Source Management



1. Improve quality
 1. Improve pasture use
2. Reduce sediment/dredge and pack capture ponds.
3. Aeration of water sources
 1. Reduces CO2
 2. Oxidized Fe, Sulfides, and volatile organic chemicals.
 3. Can reduce algae blooms
 4. Improves palatability

Tying it all together



- ✓ Feed Efficiency
- ✓ Water Use Efficiency
- ✓ Improve Water Capture Systems
- ✓ Reduce Evaporation



THANK YOU!
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