33nd Annual

Range Livestock Workshops

Arizona / Utah

Washington County Fairgrounds, Hurricane UT- April 5, 2011
Frontier Movie Town, Kanab UT – April 6, 2011
Field Trip – Carroll Ranch, AZ Strip – April 7, 2011

Please do NOT park at Country Critter Corner or Kanab Wonderstone.
They have indicated they will tow away! Park at Frontier Movie Town
And 4 Seasons Motor Inn, across the street.

7:30 am Registration Utah Time (6:30 am AZ Time)
AZ/UT RANGE LIVESTOCK SPONSORS

SPONSORS
Beck Enterprises
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Pfizer Animal Health
Powder River
Ridley Nutrition Solutions
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Utah Beef Council
Utah Cattlemen Association
Utah Farm Bureau Federation
Utah Seed
Wheatland Seed

HOSTED BY
The University of Arizona
Utah State University
Bureau of Land Management-AZ Strip District
USDA Forest Service
USDA, Natural Resources Conservation Service
PROGRAM FUNDING ASSISTANCE BY
Arizona Strip Grazing Board
Fredonia NRCD
Kane County NRCD
Littlefield-Hurricane Valley NRCD
USDA, Farm Service Agency (FSA)
Western Region Sustainable Agriculture Research and Education Program

PROGRAM PROMOTIONAL ITEMS DONATED BY
Crop Protection Services AGU
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Dixie Conservation District
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Kane County Farm Bureau Young Farmers
Kane County Conservation District
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Washington County Farm Bureau Young Farmers & Ranchers
Utah Beef Council
Utah Cattlemen Association

BE
Beck Enterprises

THE UNIVERSITY OF ARIZONA®
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We would like to express our sincere appreciation to those who have helped make this program possible.

Proceedings by Karma Wood, Staff Assistant III, USU
Proceedings edited by Dale ZoBell, USU Beef Extension Specialist

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2010 AZ/UT RANGE LIVESTOCK WORKSHOP

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<td>HURRICANE, UTAH</td>
<td>KANAB, UTAH</td>
<td>Carrol Ranch, AZ Strip</td>
</tr>
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<td>Frontier Movie Town</td>
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7:30-8:00 AM  Registration
8:00-8:15 AM  Welcome and Introductions
8:15-8:45 AM  **Evolution of an Agency, Taylor Grazing Act to FLPM,**
Sheridan Hansen, BLM Area Manager, Retired
8:45-9:15 AM  **Comparison of Net Returns and Alternative Background Scenarios:**
What ADG, Ration and Number of Days are More Profitable,
Dr. Dillon Feuz, Utah State University Extension Ag Economist
9:15-9:45 AM  **Broom Snakeweed Research Update,**
Dr. Mike Ralphs, ARS Retired, Logan Utah
9:45-10:00 AM  Sponsor Introductions
10:00-10:30 AM  Break
10:30-11:15 AM  **Matching Your Cattle to Your Environment,**
Dr. Ken Olson, Extension Beef Specialist, South Dakota State University
11:15-11:45 AM  **Selecting Your Sire’s to Match Your Environment and Cow Herd,**
Dr. Dave Schafer, Resident Director, V-V Ranch, University of Arizona
11:45-12:15 AM  **Supplement Strategies for Grazing Livestock and Management of Supplement Therein, Lunch Sponsor,**
Representing IFA, Jon Albro, Ridley Block Operations, Bayard Nebraska
12:15-1:15 PM  Lunch –Provided
1:15-1:45 PM  **Arizona Range Mineral Program – Lunch Sponsor,**
Bryan McMurry, Ph.D., Cargill Animal Nutrition
1:45-2:30 PM  **History and Cattle Operations of the Carrol Ranch,**
Merlin Esplin, Rancher, AZ Strip
2:3 0-3:00 PM  Ranching on Cheatgrass Range in Skull Valley,
Jeff Young, Manager, Ensign Ranch, Grantsville UT

3:00-3:20 pm  Break

3:20-4:00 pm  Reducing Cheat Grass Fuel Loads by the Use of Fall Cattle Grazing,
Dr. Barry Perryman, Department of Animal Biotechnology,
University of Nevada, Reno

4:00-4:40 pm  Funding Natural Resource and Ranch Programs,
Nile Sorenson, Farm Bill Biologist, NRCS, Utah and
Kyle Spencer, NRCS, Fredonia, Arizona

4:40-5:00 pm  Wrap up and evaluation

CEUs have been applied for through Society for Range Management
# 2010 AZ/UT RANGE LIVESTOCK WORKSHOP

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Sheridan Hansen, Bureau of Land Management Retired

Prior to the Taylor Grazing Act of 1934 there were numerous management authorities governing the use of public lands and their resources. These have applied not only to grazing and land disposal, but to mineral leasing, mining, timber harvesting, and homesteading. These laws were fragmented and not coordinated. Ranchers could not protect land they used for grazing because these lands were public and open to all citizens until they were homesteaded. In addition, many ranchers grazed on public lands without a home base or regulated grazing systems and migrant herds added to the problem. The lands were being abused; there were range wars, and no stability for ranchers.

With the support of land holding ranchers, Don Colton of Utah introduced a bill to create grazing districts in 1933 however it failed in the Senate. The bill was re-introduced as the Taylor Grazing Act in 1934 and was passed. The Grazing Districts, grazing privileges, and grazing permits in existence today are all based on the requirements established by the Act. The Grazing Service was established to administer the law. Grazing Advisory Boards were established, and during this era these advisory boards had significant influence. Since that time many new laws and regulations have been enacted affecting the use of the original grazing privileges.

The Taylor Grazing Act basically established a single use government agency, and gave range users some priority over the other resource users.

The following are some of the laws which have changed the mission of the original Grazing Service and later the Bureau of Land Management. In 1945 the Bureau of Land Management (BLM) was established when the General Land Office and the Grazing Service were combined.

The government policy was to dispose of public lands to private ownership. The Land Office carried out this policy under numerous land disposal laws. The Grazing Service offices were small with very few employees, when they added the Land Offices many more responsibilities were added. Realty Specialists were added in the State Office and District Offices. This combination allowed the Bureau to better coordinate lands actions with livestock grazing concerns.

Under the BLM range management was better funded, and cooperating with range users, the ranges continued to improve. Allotment Management Plans were implemented and range improvements were completed on many allotments. These range improvements included; boundary and pasture fences, water development, chemical treatments, and seedings.

In 1960 I was hired as a Range Conservationist by the Bureau of Land Management at the Richfield, Utah District Office. The office was on top of an old bank building. There was a staff of less than 10 people. I did range surveys, dependent properties surveys, and adjudication. We worked directly with the ranchers in establishing allotment boundaries, season of use, and stocking rates. In order to improve ranges, for watershed, wildlife, and livestock. This was all done with user input and very little outside interference.

In 1967 I was transferred to Monticello, Utah as the San Juan Resource Area Manager. In order to work closer with users on the ground, Districts were divided into Resource Areas. Area Managers could make many decisions directly with the users. By the time I transferred to Burley, Idaho in 1972 Allotment Management Plans had been completed on all allotments in my
resource area. And the plans were being cooperatively implemented. During this period range
trends improved. In my opinion this era was truly the golden age of applied range management!

In 1969 the National Environmental Policy Act (NEPA) was passed. Implementation of
this act has had a great effect on the BLM and Livestock grazing. It has allowed numerous
outside interests to attack grazing as a cause for environmental damage. A lawsuit was filed
against the BLM for failing to properly determine the effects of grazing and a judgment was
made against them. This judgment required the agency to complete 212 Environmental Impact
Statements. This required a massive effort of inventories, and data collection of all kinds. In
order to gather the information and prepare the impact statement, staffs at the District Offices
were increased to include all disciplines. The statements were completed and grazing was
effected. An environmental analysis is now required before issuance of 10 year grazing permits.
Because of the large division of financial resources, actual range management on the ground has
decreased. I feel that the NEPA lawsuit greatly harmed range management in general and the
ability of the BLM to work closely with range users. I believe that this has caused some loss of
trust from the local users towards the BLM.

The Wild Horse and Burro Act of 1971 require the BLM to protect and manage wild free
roaming horses. This act requires that horse herds be identified, and horse or burro numbers
established. Excess horses can be removed. If horse herds must be retained, forage must be
provided which can have a direct effect on livestock grazing. The law, while good intentioned
has caused the BLM major problems. It gives special interest groups the ability to sue over:
horse numbers, removal practices, horse herd establishment, and horse adoption practices.

I transferred to Battle Mountain, Nevada as Chief of Resources in 1974. While I was in
Nevada we gathered the first horses ever under the provisions of this act, and had them in
corrals. Then the state of Nevada claimed them as belonging to the State, because they were
considered the same as wildlife. So these wild horses were turned back out on the range. After
this issue was resolved, these horses were gathered again and adopted. Originally virtually all of
these horses were quickly adopted. However the BLM now has thousands of horses removed
from rangelands in holding corrals, feeding these horses and burros is costing millions of dollars
each year, because of how the law protects them from disposal. Under the current administration
wild horse gathering will be greatly curtailed for the next two years or more.

The 1976 Federal Land Policy Management Act declares as policy that remaining public
domain land be retained in federal ownership. The act established the BLM as a multiple use
agency. This act once again mandated more inventory, planning, and personnel.

I transferred to Cedar City, Utah in 1979 as Inventory Team Leader. The soil and
vegetation data that we gathered was used to prepare Management Framework Plans (MFP) with
all resources given equal consideration. A large team of specialists at the District was hired to
complete these plans. By the time that I retired from the BLM as the Beaver River Resource
Area Manager in 1990 the MFP plan was completed. This process is currently being repeated.

I have referenced some of the key laws and regulations that have shaped the complexion
and mission of the BLM, but there have been many other significant acts such as: The
Act, and others. All of this ongoing legislation continues to affect the scope and mission of the
BLM. I might also add that this same type of change and evolution has occurred within the
Forest Service for the same reasons.

In the early days of the Grazing Service and the BLM, employees primarily were from
agricultural backgrounds, and had close ties to the land and local customs, possessing the ability
to communicate in the familiar rancher terms. Agency employees today come from many various locales and backgrounds, making it more difficult for many of them to establish personal relationships with traditional public land users. If grazing on public lands is going to survive, ranchers must be willing to adapt to the continuing evolution of public land policy.

Immediately following the passage of The Taylor Grazing Act of 1934, the typical local Grazing Agency office was staffed by a District Grazier and a part-time clerk and was only responsible for livestock grazing. In 2011 a District such as the Arizona Strip District now employs more than 60 people representing dozens of disciplines. And they are responsible for the implementation and enforcement of all of the federal land policy laws and regulations that have been passed during the past seven decades. All of this has happened during my lifetime.
With the price of corn now over $6 per bushel and futures market projections showing it may stay there for some time, and with feedlot total cost per pound of gain near $1.00 per pound of gain there are new incentives to try and add weight to calves outside of feedlots. The question then arises of how to add weight to a calf in the most economical manner. There are many different feeding programs to consider. However, with few exceptions, the cheapest way to add weight outside of a feedlot usually involves the calf grazing for an extended period of time. Winter pasture, wheat pasture and corn stalk grazing followed by summer pasture grazing are examples of these programs.

However, most of the area west of the Great Plains lacks the resources and climate for most of these winter grazing programs. For those states, cattle producers can background calves through the winter and then allow them to graze pastures in the summer. Backgrounding calves is essentially taking calves at weaning and feeding them to heavier weights without placing them directly in a feedlot on a finishing ration.

The overall objective of this research is to evaluate the level and variability of returns to several background alternatives to try and determine the best rations, rates of gain, and number of days to feed calves of various weights. Data on feeder cattle prices, feed costs, and other feeding costs from 1999-2010 were used to determine past returns.

**Data and Methods**

Enterprise budgets were constructed in order to compare different calf weights, feed rations, and ADG’s across different backgrounding scenarios. There were over 300 different background alternatives considered, but not all of them will be discussed in this paper. Only those that tended to generate positive returns will be discussed. That large number of alternative is the result of evaluating returns for various initial calf weights, feed rations, rates of daily gain, and differing number of days the cattle are on feed.

Initial calf weights ranged from 450 to 600 lbs. in 50 lb. increments. Feed rations evaluated were: 1) grass hay, 2) alfalfa hay, 3) grass hay & corn silage, 4) alfalfa hay & corn silage, 5) alfalfa hay & corn grain, and 6) alfalfa hay, corn silage & corn grain. These feeds can be fed at different levels to achieve different rates of gain in calves. The average daily gains evaluated ranged from .5 to 2.5 lbs. in .5 lb increments. However, not all rates of gain are achievable with all rations (rations were balanced for energy and protein using a least cost gain computer program). Returns for each of the above combinations were evaluated for a 120 day and 180 day feeding program and for the 180 day feeding program followed by a 120 day summer grazing program.

There are many different factors that were included in these enterprise budgets, some of which vary annually, and others that were fixed in each scenario. The factors that vary annually were the purchase price and sale price of the calves and yearlings, alfalfa hay price, grass hay price, silage price, corn price, interest, transportation, and yardage. The other factors such as vet and vaccine costs and death loss remain fixed over time and for each specific budget.

Feed prices from 1999 to 2009 are listed in Table 1. Actual historical information has been used on alfalfa hay price and corn grain price. Grass hay and corn silage prices were not
compiled, and therefore a formula has been used to correlate these feeds with alfalfa hay and corn grain. The other cost factors that are variable throughout this study

Table 1  Historic Utah Commodity Prices

<table>
<thead>
<tr>
<th>Year</th>
<th>November Corn Price</th>
<th>November Silage Price</th>
<th>November Alfalfa Hay Price</th>
<th>November Grass Hay Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>1999</td>
<td>2.25</td>
<td>20.28</td>
<td>77.00</td>
<td>61.60</td>
</tr>
<tr>
<td>2000</td>
<td>2.47</td>
<td>22.19</td>
<td>82.00</td>
<td>65.60</td>
</tr>
<tr>
<td>2001</td>
<td>2.61</td>
<td>23.51</td>
<td>97.00</td>
<td>77.60</td>
</tr>
<tr>
<td>2002</td>
<td>3.11</td>
<td>27.97</td>
<td>97.00</td>
<td>77.60</td>
</tr>
<tr>
<td>2003</td>
<td>2.72</td>
<td>24.46</td>
<td>70.00</td>
<td>56.00</td>
</tr>
<tr>
<td>2004</td>
<td>2.49</td>
<td>22.37</td>
<td>92.00</td>
<td>73.60</td>
</tr>
<tr>
<td>2005</td>
<td>2.56</td>
<td>23.00</td>
<td>100.00</td>
<td>80.00</td>
</tr>
<tr>
<td>2006</td>
<td>4.04</td>
<td>36.36</td>
<td>99.00</td>
<td>79.20</td>
</tr>
<tr>
<td>2007</td>
<td>4.59</td>
<td>41.31</td>
<td>135.00</td>
<td>108.00</td>
</tr>
<tr>
<td>2008</td>
<td>4.46</td>
<td>40.14</td>
<td>170.00</td>
<td>136.00</td>
</tr>
<tr>
<td>2009</td>
<td>4.52</td>
<td>40.68</td>
<td>85.00</td>
<td>68.00</td>
</tr>
</tbody>
</table>

Mean | 3.26 | 29.30 | 100.36 | 80.29 |
SD   | 0.94 | 8.48  | 28.61  | 22.89 |
Cof V| 28.96% | 28.96% | 28.50% | 28.50% |

are diesel fuel, interest rate, yardage cost, and yearly grazing cost. These factors and the values for each year are shown in Table 2.

November calf prices are shown in Table 3 and sale prices for all of the scenarios are taken from historical monthly feeder cattle prices and are shown in Tables 4 and 5. This information has been gathered from USDA market reports from Salina Utah Producers’ Livestock Auction.

Results
The number of years in the past 11 years that each ration and rate of gain combination was profitable is displayed in Table 6. All initial calf weights have been averaged for this table. Across all of the different backgrounding scenarios, alfalfa hay has the least probability of incurring a profit, and alfalfa, silage and corn incurs the highest
### Table 2  Other Variable Costs

<table>
<thead>
<tr>
<th>Year</th>
<th>Diesel Fuel March cents/gallon</th>
<th>Interest Rate</th>
<th>Yardage Cost cents/day</th>
<th>Yearly Grazing Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>1999</td>
<td>11.00%</td>
<td></td>
<td>0.27</td>
<td></td>
</tr>
<tr>
<td>2000</td>
<td>146.5</td>
<td>12.00%</td>
<td>0.29</td>
<td>11.30</td>
</tr>
<tr>
<td>2001</td>
<td>149.1</td>
<td>8.00%</td>
<td>0.29</td>
<td>11.50</td>
</tr>
<tr>
<td>2002</td>
<td>115.7</td>
<td>7.25%</td>
<td>0.28</td>
<td>12.10</td>
</tr>
<tr>
<td>2003</td>
<td>173.6</td>
<td>6.50%</td>
<td>0.28</td>
<td>12.50</td>
</tr>
<tr>
<td>2004</td>
<td>159.9</td>
<td>7.25%</td>
<td>0.32</td>
<td>13.10</td>
</tr>
<tr>
<td>2005</td>
<td>222.9</td>
<td>9.50%</td>
<td>0.32</td>
<td>13.00</td>
</tr>
<tr>
<td>2006</td>
<td>254.5</td>
<td>10.75%</td>
<td>0.33</td>
<td>13.50</td>
</tr>
<tr>
<td>2007</td>
<td>265.8</td>
<td>10.00%</td>
<td>0.34</td>
<td>14.20</td>
</tr>
<tr>
<td>2008</td>
<td>357.3</td>
<td>6.50%</td>
<td>0.37</td>
<td>15.50</td>
</tr>
<tr>
<td>2009</td>
<td>209.1</td>
<td>5.75%</td>
<td>0.34</td>
<td>16.20</td>
</tr>
<tr>
<td>2010</td>
<td>285.1</td>
<td></td>
<td></td>
<td>16.50</td>
</tr>
<tr>
<td>Mean</td>
<td>212.68</td>
<td>0.09</td>
<td>0.31</td>
<td>13.58</td>
</tr>
<tr>
<td>SD</td>
<td>72.79</td>
<td>0.02</td>
<td>0.03</td>
<td>1.81</td>
</tr>
<tr>
<td>C of V</td>
<td>34.23%</td>
<td>24.87%</td>
<td>10.35%</td>
<td>13.36%</td>
</tr>
</tbody>
</table>

### Table 3  Yearly Historicals November Calf Price

<table>
<thead>
<tr>
<th>Year</th>
<th>450 lb</th>
<th>500 lb</th>
<th>550 lb</th>
<th>600 lb</th>
<th>650 lb</th>
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<tr>
<td>1999</td>
<td>89.14</td>
<td>83.61</td>
<td>75.86</td>
<td>74.08</td>
<td>71.61</td>
</tr>
<tr>
<td>2000</td>
<td>95.89</td>
<td>86.99</td>
<td>82.19</td>
<td>77.72</td>
<td>74.63</td>
</tr>
<tr>
<td>2001</td>
<td>92.77</td>
<td>85.31</td>
<td>81.95</td>
<td>80.08</td>
<td>77.55</td>
</tr>
<tr>
<td>2002</td>
<td>86.46</td>
<td>80.10</td>
<td>77.31</td>
<td>78.85</td>
<td>70.97</td>
</tr>
<tr>
<td>2003</td>
<td>110.67</td>
<td>100.74</td>
<td>97.24</td>
<td>93.69</td>
<td>93.85</td>
</tr>
<tr>
<td>2004</td>
<td>121.71</td>
<td>109.88</td>
<td>102.85</td>
<td>97.06</td>
<td>89.61</td>
</tr>
<tr>
<td>2005</td>
<td>132.20</td>
<td>121.81</td>
<td>112.33</td>
<td>106.52</td>
<td>102.71</td>
</tr>
<tr>
<td>2006</td>
<td>112.03</td>
<td>103.00</td>
<td>95.58</td>
<td>91.83</td>
<td>89.25</td>
</tr>
<tr>
<td>2007</td>
<td>115.21</td>
<td>107.24</td>
<td>99.39</td>
<td>95.13</td>
<td>93.35</td>
</tr>
<tr>
<td>2008</td>
<td>104.84</td>
<td>95.30</td>
<td>89.74</td>
<td>88.59</td>
<td>85.81</td>
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<tr>
<td>2009</td>
<td>104.19</td>
<td>97.42</td>
<td>85.59</td>
<td>82.58</td>
<td>81.46</td>
</tr>
<tr>
<td>Mean</td>
<td>105.92</td>
<td>97.40</td>
<td>90.91</td>
<td>87.83</td>
<td>84.62</td>
</tr>
<tr>
<td>SD</td>
<td>14.23</td>
<td>12.80</td>
<td>11.54</td>
<td>9.99</td>
<td>10.26</td>
</tr>
<tr>
<td>C of V</td>
<td>13.43%</td>
<td>13.15%</td>
<td>12.70%</td>
<td>11.37%</td>
<td>12.12%</td>
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Table 4. Historic Feeder Cattle Prices for March and May

<table>
<thead>
<tr>
<th></th>
<th>MARCH</th>
<th>MAY</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>450 103.75</td>
<td>450 104.20</td>
</tr>
<tr>
<td>2001</td>
<td>550 114.28</td>
<td>550 105.94</td>
</tr>
<tr>
<td>2002</td>
<td>650 105.60</td>
<td>650 88.81</td>
</tr>
<tr>
<td>2003</td>
<td>750 97.41</td>
<td>750 98.11</td>
</tr>
<tr>
<td>2004</td>
<td>850 117.72</td>
<td>850 120.92</td>
</tr>
<tr>
<td>2005</td>
<td>97.94 114.28</td>
<td>97.94 117.72</td>
</tr>
<tr>
<td>2006</td>
<td>105.60 108.44</td>
<td>105.60 105.60</td>
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<tr>
<td>2007</td>
<td>115.47 102.55</td>
<td>115.47 102.55</td>
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<tr>
<td>2008</td>
<td>114.28 92.59</td>
<td>114.28 92.59</td>
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<tr>
<td>2009</td>
<td>118.11 90.25</td>
<td>118.11 90.25</td>
</tr>
<tr>
<td>2010</td>
<td>122.60 85.98</td>
<td>122.60 85.98</td>
</tr>
</tbody>
</table>

Mean 116.22 108.23 96.33 87.64 83.61 115.60 108.92 99.28 91.55 86.17
CofV 9.92% 10.11% 10.81% 10.88% 10.87% 14.69% 12.83% 11.89% 11.99% 11.74%

Table 5. Historic Feeder Cattle Prices for September.

<table>
<thead>
<tr>
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<th>SEPTEMBER</th>
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<tbody>
<tr>
<td>2000</td>
<td>450 96.47</td>
</tr>
<tr>
<td>2001</td>
<td>550 105.83</td>
</tr>
<tr>
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<td>2003</td>
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<td>2005</td>
<td>950 127.08</td>
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<tr>
<td>2007</td>
<td>1150 112.69</td>
</tr>
<tr>
<td>2008</td>
<td>2009 110.74</td>
</tr>
<tr>
<td>2010</td>
<td>123.75 113.63</td>
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</tbody>
</table>

Mean 112.04 103.76 96.95 93.65 90.38 88.21 87.21 86.71
Cof V 12.93% 12.53% 12.83% 12.69% 11.65% 11.88% 12.01% 11.51%

probabilities of incurring a positive return. The probability of a positive return also increases when ADG increases. The highest probabilities occur when ADG reaches 2 and 2.5 lbs. There was also a greater probability of profit if calves were fed for 180 days and then placed on grass for 120 days. If cattle are not going to be placed on grass, then a shorter 120 day feeding period was more profitable than the 180 day feeding period.
### Table 6. The Probability of a Positive Return from each of the Backgrounding Alternatives

<table>
<thead>
<tr>
<th>DIET</th>
<th>120 Day Profitable Years</th>
<th>120 Day Return Probability</th>
<th>180 Day Profitable Years</th>
<th>180 Day Return Probability</th>
<th>Grass Profitable Years</th>
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<tr>
<td>Grass Hay</td>
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<td>1</td>
<td>11%</td>
<td>1</td>
<td>7%</td>
<td>4</td>
</tr>
<tr>
<td></td>
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<td>1</td>
<td>22%</td>
<td>1</td>
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<td>Alfalfa Hay</td>
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<td>7%</td>
<td>1</td>
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<td></td>
<td>1</td>
<td>11%</td>
<td>1</td>
<td>9%</td>
<td>5</td>
</tr>
<tr>
<td>Alfalfa Hay &amp; Corn Silage</td>
<td>0.5</td>
<td>1</td>
<td>9%</td>
<td>1</td>
<td>5%</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1.5</td>
<td>27%</td>
<td>2</td>
<td>18%</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2</td>
<td>51%</td>
<td>5</td>
<td>41%</td>
<td>9</td>
</tr>
<tr>
<td>Grass Hay &amp; Corn Silage</td>
<td>0.5</td>
<td>1</td>
<td>13%</td>
<td>1</td>
<td>5%</td>
<td>4</td>
</tr>
<tr>
<td></td>
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<td>4</td>
<td>32%</td>
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<td>Alfalfa Hay &amp; Corn Grain</td>
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<td>1</td>
<td>9%</td>
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<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1.5</td>
<td>16%</td>
<td>1</td>
<td>7%</td>
<td>5</td>
</tr>
<tr>
<td></td>
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<td>2</td>
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<td></td>
<td></td>
<td>2.5</td>
<td>64%</td>
<td>5</td>
<td>48%</td>
<td></td>
</tr>
<tr>
<td>Alfalfa Hay &amp; Corn Silage</td>
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<td>40%</td>
<td>4</td>
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<td></td>
<td></td>
<td>2</td>
<td>51%</td>
<td>4</td>
<td>39%</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2.5</td>
<td>76%</td>
<td>6</td>
<td>52%</td>
<td></td>
</tr>
</tbody>
</table>

The returns for each initial calf weight for each ration, rate of gain and number of days on feed were compared in a graphical presentation. Each graph shows the average expected return from the simulated analysis on the vertical axis and the variability of those returns (standard deviation) on the horizontal axis. In one out of three years, you could expect returns to be one standard deviation higher or lower than the average.

The frontier line in each graph shows the highest returns with the least amount of risk. It is assumed that producers would choose one of the backgrounding alternatives along this frontier, because to choose one of the alternatives not on the frontier would mean you would be getting a lower average expected return and you would have more risk to get this return. The numbered points shown in the Figures 1-4 correspond to different backgrounding alternatives that will be briefly explained for each calf weight.

There are five points that fall on the frontier for 450 lb calves. Point 1 has a mean value of 7.33 and a standard deviation of 35.68. This point on the frontier represents a 120-day backgrounding scenario feeding the alfalfa and silage ration with an ADG of 2 lbs. The second point along the frontier represents the 120-day backgrounding scenario feeding alfalfa, silage and corn with an ADG of 2 lbs. The mean value is 9.98 with a standard deviation of 35.53. Point
three is representative of the 120-day backgrounding feeding the alfalfa and silage ration at a 2.5 lb ADG. The mean value for this point is 27.77 with a standard deviation of 38.09. Point four represents the 120-day backgrounding scenario while feeding alfalfa, silage and corn with an ADG of 2.5 lbs. The largest return and the largest variance are shown at point five. This point represents the summer grass scenario while feeding alfalfa, silage and corn with an ADG of 2 lbs the previous winter.

Figure 2 displays the frontier for the 500 lb calf class. There are only three points that fall on the frontier in this weight class. Point one represents the 120-day backgrounding scenario with a ration of alfalfa, silage and corn with an ADG of 2. This point has a mean of 14.33 and a standard deviation of 35.68. The second point is representative of the 120-day backgrounding scenario feeding alfalfa, silage and corn with an ADG of 2.5 lbs. The third point correlates to the summer grass scenario where alfalfa, silage and corn was fed as the winter ration at a rate of 2 lbs. This point has a mean of 111.67 and a standard deviation of 90.31.

Figure 3 shows the frontier for the 550 lb weight class. There are four points in which a producer would choose if looking to retain ownership through backgrounding. Point number one has a mean value of 5.25 and a standard deviation of 45.72. This point represents the 120-day backgrounding scenario while feeding alfalfa, silage and corn at an ADG of 1.5 lbs. The second and third points represent the 120-day scenario while feeding alfalfa, silage and corn with an ADG of 2 and 2.5 lbs. The fourth point represents the summer grass scenario feeding alfalfa, silage and corn as the winter ration at an ADG of 2.5 lbs and had a mean value of 133 with a standard deviation of 94.

Figure 4 shows the frontier of the 600 lb weight class. There are three points in which a producer would select given the returns and the risk involved. Points one and two represent the 120-day backgrounding scenario while feeding alfalfa, silage and corn at an ADG of 2 and 2.5 lbs. The third point represents the summer grass scenario with a backgrounding diet of alfalfa, silage and corn and an ADG of 2 lbs.

Comparing all of the scenarios together it appears that the order of highest positive returns go from summer grass to 120-day backgrounding to 180-day backgrounding. Throughout every enterprise the alfalfa, silage and corn ration on average yielded the highest returns to the operation and the highest returns for any given level of risk were generally associated with winter average daily gains of 2 or 2.5 pounds per day.

Many producers background calves at a lower rate of gain (1 lb on a hay only ration) through the winter and then place them on grass in the summer. This alternative was not one of our more profitable alternatives. However, it is important to note that we valued grass hay at 80% of the value of alfalfa. This implies that all producers have the opportunity to sell grass hay for this value. Some producers may raise and harvest grass
Figure 1  500 lb calf

Figure 2  450 lb calf

Figure 3  550 lb calf

Figure 4  600 lb calf
with the intent of only feeding it on location and it may not be in a very saleable (moveable) form. If this were the case, then the value of that hay is probably less than 80% of the value of alfalfa hay. We ran the model a second time, where we valued grass hay at the cost of production. Figure 5 contains the results of this scenario for 550 lb calves. All returns shown are for feeding the calves for 180 days through the winter and then running them on grass for 120 days. Point 1 is the grass hay ration at .5 lb adg, point 2 is grass hay and silage at 1.0 lb adg, point 3 is feeding grass hay at 1.0 lb adg, point 4 is feeding grass hay and silage for a 1.5 lb gain and point 5 is feeding alfalfa, silage and corn for a 2.0 lb gain. Results for the other weights are similar to the 550 lb weight. Rations with grass hay only show up on the frontier, but the highest returning program remains the program where alfalfa, silage and corn are fed through the winter at 2.0 lb average daily gain and then the cattle are placed on grass.

In conclusion, this analysis was conducted during a time when corn prices varied from $2.25 to $4.50 per bushel. With corn now over $6.00 per bushel the rations with corn and corn silage will have reduced returns and it is likely that the hay only rations will be relatively more profitable. It is important for producers to value their resources and evaluate returns from various background programs.
Broom Snakeweed: Toxicology, Ecology, Control and Management

Michael H. Ralphs
Rangeland Scientist, USDA/ARS Poisonous Plant Lab, Logan UT 84341

Abstract
Broom snakeweed is a native weed widely distributed on rangelands of western North America. It often increases to near monocultures following disturbance from overgrazing, fire or drought. This paper presents an up-to-date review of broom snakeweed toxicology, seed ecology, population cycles, succession and management. The greatest ecological concern is that broom snakeweed displaces desirable forage for livestock or wildlife and greatly reduces biodiversity. It is also toxic and can cause abortions in all species of livestock. Propagation is usually pulse driven in wet years, allowing large expanses of even-aged stands to establish and dominate plant communities. Snakeweed can be controlled by prescribed burning or spraying with herbicides. A weed-resistant plant community dominated by competitive grasses can prevent or minimize its reinvasion.

Introduction
Broom snakeweed (Gutierrezia sarothrae (Pursh) Britt. & Rusby) is widely distributed across western North America, from Canada south through the plains to west Texas and northern Mexico, and west through the Intermountain region and into California (Figure 1). It ranges in elevation between 50 and 2900 m (160 and 9500 ft) and commonly inhabits dry, well-drained, sandy, gravely or clayey loam soils (Lane 1985).

Broom snakeweed is a suffrutescent sub-shrub, having many unbranched woody stems growing upwards from a basal crown, giving it a broom-shaped appearance. These stems die back each winter and new growth is initiated from the crown in early spring. It is often confused with two similar plants. Douglas rabbitbrush (Chrysothamnus viscidiflorus (Hook) Nutt.) is similar in appearance, but is distinguished by its multi-branched woody stems and linear twisted leaves. The closely related threadleaf snakeweed (G. microcephala (DC) L. Benson) is similar in growth form and appearance, but differs in that it has only 1 to 2 florets per flowering head, compared to 3 to 5 in broom snakeweed. Most of this review pertains to broom snakeweed.

Broom snakeweed is a native plant that can increase in density when other more desirable plants are reduced or removed by disturbance, such as overgrazing, fire or drought. It can dominate many of the plant communities on western rangelands including: salt-desert-shrub, sagebrush, and pinyon/juniper plant communities of the Intermountain region; short- and mixed-grass prairies of the plains; and mesquite, creosotebush and desert grassland communities of the southwestern deserts (US Forest Service 1937). In addition to its invasive nature, it contains toxins that can cause abortions in livestock (Dollahite and Anthony 1957). Platt (1959) ranked it one of the most undesirable plants on western rangelands.

Toxicology
If animals eat snakeweed, they can be poisoned or pregnant animals can abort. Clinical signs of poisoning include anorexia, nasal discharge, loss of appetite and listlessness, diarrhea followed by constipation and rumen stasis, which may lead to death (Mathews 1936). Clinical signs of the abortion include weak uterine contractions, occasional incomplete cervical dilation and excessive mucus discharge (Dollahite and Anthony 1957). The abortion often results in
stillbirth or the birth of small weak calves, depending on the period of gestation. Cows that have aborted may retain the placenta, which can lead to uterine infection and death.

Low nutrition exacerbates fertility problems caused by broom snakeweed. Smith et al. (1991, 1994) reported that increasing amounts of snakeweed in rat diets reduced intake of food, which led to malnutrition and contributed to diminished fertility and increased fetal mortality. Edrington et al. (1993) confirmed that increasing amounts of snakeweed in rat diets reduced intake, but it directly impaired hormonal balance and disrupted blood flow to the uterus and developing embryos, leading to fetal death. Ewes fed low quality blue grama hay (*Bouteloua graminis* (Willd. ex Kunth) Lag ex Griffiths) (11% crude protein) refused to consume rations containing more than 10% snakeweed, and 43% of these ewes did not show estrus and did not breed (Oetting et al. 1990). In contrast, ewes on high quality alfalfa (18% crude protein) readily consumed the ration mixed with up to 25% snakeweed, and showed no adverse effects on estrus. Heifers fed snakeweed as 15% of a balanced diet before breeding and during early gestation had no effect on progesterone levels or conception rates (Williams et al. 1992). Snakeweed added up to 30% of this same diet during the last trimester of gestation, did not cause abortion or lower calf birth weight (Martinez et al. 1992).

Supplemental protein and energy may enhance degradation and elimination of terpenes. Strickland et al. (1998) reported that a protein supplement improved tolerance to snakeweed toxicosis in cows in low body condition. In contrast, Ralphs et al. (2007) reported no effect of a special supplement formulated to provide bypass protein high in sulfur-containing and glucogenic amino acids and additional energy for detoxification of terpenes. It remains unclear whether protein or energy supplements will prevent snakeweed poisoning or abortions.

**ECOLOGY**

Once established, snakeweed typically survives 4 to 7 years (Dittberner 1971). It is a prolific seed producer with 2036 to 3928 seeds/plant (Wood et al. 1997). Seeds held in dried flower heads are gradually dispersed over winter. They have no specialized structures such as wings to aid in long range dispersal, thus they usually drop close to the parent plant. Seeds remain viable into spring, but rapidly disintegrate after May if they remain exposed on the soil surface (Wood et al. 1997).

Germination is light-stimulated (Mayeaux 1983), therefore seeds must remain partially exposed on the soil surface (Mayeux and Leotta 1981). Furthermore, the soil surface must remain near saturation for at least 4 days for the seeds to imbibe and successfully germinate (Wood et al. 1997). Buried seeds remain viable for several years and germinate when moved to the soil surface by disturbance (Mayeux 1989).

**Pulse Establishment**

The fluctuating resource availability theory of invasibility (Davis et al. 2000) suggests that plant communities are more susceptible to weed invasion whenever there are unused resources. This occurs when there is either an increase in resource supply or a decrease in resource use. Snakeweed populations often establish in years with above average precipitation following disturbance that reduces competition from other vegetation (McDaniel et al. 2000). Ralphs and Banks (2009) reported a new crop of snakeweed plants (30/m²) established in a wet spring (precipitation 65% above average) in a crested wheatgrass seeding (*Agropyron cristatum* (L.) Gaertner). Intense grazing reduced the grass standing crop (which reduced use of soil
moisture by crested wheatgrass) and trampling disturbed the soil surface, thus providing ideal soil and environmental conditions for snakeweed establishment.

In a companion defoliation study (Ralphs 2009), density of snakeweed seedlings was higher in clipped plots in both the crested wheatgrass seeding and in a native bluebunch wheatgrass \( (Pseudoroegneria spicata \) Pursh) stand. Clipping reduced competition for soil moisture from grass and mature snakeweed plants, allowing new snakeweed seedlings to establish. This study showed that in wet years, snakeweed can establish even in healthy stands of native bluebunch wheatgrass or seeded crested wheatgrass, when defoliation of the grasses reduces competition for soil moisture.

**Population Cycles**

Pulse establishment allows massive even-aged stands of snakeweed to establish. There is little intraspecific competition among snakeweed seedlings (Thacker et al. 2009a), thus large expanses of even-aged stands establish in wet years. As these stands mature, they become susceptible to die-off, mainly from insect damage or drought stress. Although snakeweed is highly competitive for soil moisture, it is not particularly drought tolerant (Pieper and McDaniel 1989; Wan et al. 1993b). Ralphs and Sanders (2002) reported that snakeweed populations in a salt desert shrub community on the Colorado Plateau died out in 1990, reestablished in 1994, declined in 1996, completely died out in 2000, and have not established during the current region-wide drought (Figure 2).

**Competition**

Once established, snakeweed is very competitive with other vegetation. McDaniel et al. (1993) reported a negative exponential relationship between snakeweed overstory and grass understory that implies snakeweed’s presence, even in minor amounts, suppresses grass growth. Partial removal of snakeweed allowed remaining plants to increase in size and continue to dominate the plant community (Ueckert 1979). Total removal allowed grass production to increase >400% on blue grama grasslands (McDaniel et al. 1982, McDaniel and Duncan 1987). Control strategies should strive for total snakeweed control.

Snakeweed’s root structure and depth provide a competitive advantage over associated grasses for soil moisture (Torell et al. 2011). In the southwest, its deeper roots enable it to extract soil water at greater depths (30-60 cm), compared to the shallow rooted sand dropseed \( (Sporobolus cryptandrus \) (Torr.) A. Gray) (Wan et al. 1993c). In its northern range, snakeweed is acclimated to a saturated soil profile from snowmelt and spring rains to sustain rapid growth (Wan et al. 1995). When soil water stress increases seasonally or during drought, leaf stomata do not close completely (Wan et al. 1993a, DePuit and Caldwell 1975), allowing snakeweed to continue transpiring. This depletes soil moisture to the detriment of associated grasses. If drought persists, leaf growth declines and leaves are eventually shed to cope with water stress, but stems continue photosynthesis to enable it to complete flowering and seed production (DePuit and Caldwell 1975). However, as drought stress increases, tissues dehydrate and mortality occurs rapidly (< 10 days) when soil water potential drops below -7.5 MPa and leaf water content declines to 50% (Wan et al. 1993b).
State-and-Transition Model

Healthy sagebrush/bunchgrass communities can suppress snakeweed. Thacker et al. (2008) described a fence line contrast between a Wyoming big sagebrush/bluebunch wheatgrass community and a degraded sagebrush/Sandberg bluegrass (*Poa secunda* J. Presl) community in northern Utah. A 2001 wildfire removed the sagebrush in both communities. Snakeweed established on the degraded side of the fence and increased to 30% cover and dominated the site by 2005. Bunchgrasses on the other side of the fence prevented establishment of snakeweed.

Thatcker et al. (2008) proposed a new broom snakeweed phase to the Upland Gravelly Loam (Wyoming big sagebrush) ecological site state-and-transition model (Figure 3) (NRCS 2007). Two “triggers” were identified that lead to snakeweed invasion. Heavy spring grazing over decades eliminated most of the bunchgrass in the plant community, putting the community “at risk” and eventually transitioning from the Current Potential State (2.2) over a threshold (T2b) to a dense Wyoming Sagebrush State (4). The lack of competition from bunchgrasses allowed snakeweed to establish in the understory. Fire then removed the sagebrush and snakeweed was the first plant to germinate, establish, and rapidly increase and dominate the Snakeweed/Sandberg bluegrass phase (4.2). Subsequent fires will remove snakeweed and the site will likely transition over another threshold (T4b) to a cheatgrass (*Bromus tectorum* L.) community in the Invasive Plant State (5). Thacker et al. (2008) suggests that if robust perennial bunchgrasses can be maintained in the community, they will provide “resilience” to resist snakeweed invasion or expansion, recover from fire or drought, and produce more forage for wildlife and livestock.

CONTROL

Snakeweed can be controlled by herbicides and prescribed burning. McDaniel and Ross (2002) recommended prescribed burning during the early stages of a snakeweed infestation if there is sufficient grass to carry a fire. Herbicide control is recommended on dense snakeweed stands, particularly where fine fuels are not sufficient to carry a fire. Picloram at 0.28 kg ae/ha (0.25 lb/ac) or metsulfuron at 0.03 kg ai/ha (0.43 oz/ac) applied in the fall provided consistent control in New Mexico (McDaniel and Duncan 1987, McDaniel 1989). Sosebee et al. (1982) suggested fall applications were more effective than spring in the southwest because carbohydrate translocation was going down to the crown and roots, thus carrying the herbicide down to the perennating structures. Whitson and Freeburn (1989) recommended picloram at 0.56 kg ae/ha (0.5 lb/ac) and metsulfuron at 0.04 kg ai/ha (0.6 oz/ac) applied in the spring on shortgrass rangelands in Wyoming. In big sagebrush sites in Utah, the new herbicide aminopyralid at 0.12 kg ae/ac (0.11 lb/ac) was effective when applied during the flower stage in fall, as was metsulfuron 0.042 kg ai/ha (1.67 oz/ac) and picloram + 2,4-D at 1.42 kg ae/ha (1.25 lb/ac) (Keyes et al. 2011). Picloram by itself at 0.56 kg ae/ha (0.5 lb/ac) was most effective and eliminated snakeweed when applied in either spring or fall. Residual control was obtained with tebuthiuron (80% wettable powder) at 1.1 to 1.7 kg ai/ha (1 to 1.5 lb/ac) on mixed grass prairies in west Texas (Sosebee et al. 1979).

After snakeweed control, a weed-resistant plant community should be established to prevent reinvasion of snakeweed, cheatgrass and other invasive weeds. Thacker et al. (2009a) reported competition from cool season grasses prevented establishment of snakeweed seedlings in both potted-plant and field studies. Snakeweed seedlings appear to be sensitive to competition from all established vegetation, including cheatgrass. Hycrest crested wheatgrass (*Agropyron cristatum* (L.) Gaertner x *A. desertorum* (Fisch. Ex Link) Schultes) was the most reliable grass to
establish on semi-arid rangelands, thus was most effective in suppressing snakeweed establishment and growth (Thacker et al. 2009b). There appears to be a window of opportunity for grasses to suppress snakeweed in its seedling stage, if the grasses can be rapidly established. However, once established, snakeweed is very competitive and will likely remain and dominate the plant community.

**SUMMARY**

Broom snakeweed is an invasive native sub-shrub that is widely distributed across rangelands of western North America. In addition to its invasive nature, it contains toxins that can cause death and abortions in livestock. It establishes in years of above average precipitation following disturbance by fire, drought or overgrazing. This allows widespread even-aged stands to develop that can dominate plant communities. Although its populations cycle with climatic patterns, it can be a major factor impeding succession of plant communities. Snakeweed can be controlled with prescribed burning and herbicides, however a weed-resistant plant community should be established and/or maintained to prevent its reinvasion.
Matching your Cattle to Your Environment

Ken Olson
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Introduction

Do relationships exist between cow size, nutrient requirements, and production capability? Does a cow’s size and nutrient requirements affect her ability to harvest enough nutrients from a grazing environment to meet her production capability? We can assume that a bigger cow will require more nutrients. What are the characteristics of that relationship? Is it a direct response wherein a cow that is 10% bigger than another will require 10% more nutrients, or is there economy of scale, so to speak? Can we assume that a bigger cow will be more productive? Is it automatic that bigger size means faster growth so we can expect the calves of bigger cows to grow faster? We will explore these relationships.

Cow Size

It is commonly understood that cows are getting bigger. When one considers that the cow population in the US has shrunk since 1974 (as depicted in the cow inventory figure below) while total pounds of beef produced annually has been maintained at nearly 50 billion lb over the same time period (as depicted in the lb produced of various meat sources figure), it is obvious that cattle have had to steadily increase growth potential and size.
Perhaps the more important question is how big is the modern cow? More particularly, each of you might wonder how big your cows are. If everyone had a scale on the ranch, this would be known. Perhaps the best alternative on a ranch-specific basis is to look at sale weights of cull cows and then try to adjust for any differences between the culls and the cows that remain in the herd.

In place of thinking specifically of each ranch, let’s look at indicators of cow size in general. One indicator is the shift in EPD genetic trends for cattle weights. As depicted in the following figure, the genetic trend through time for the Angus breed has displayed a steady increase in weaning, yearling, and mature cow weight. In particular, yearling weight, which is considered a reliable indicator of mature weight, has increased by 96 lb over the span represented in this graph. We can expect that an increasing trend has occurred in other breeds as well.

![Angus EPD Genetic Trend for Weight](image)

Another source of information about mature cow weights is the USDA Germplasm Evaluation Program being conducted at the Meat Animal Research Center near Clay Center, Nebraska. Based on direct head-to-head comparison of cow weights from several sire breeds, they report the following mature weights using 2009 data:

<table>
<thead>
<tr>
<th>Breed</th>
<th>5-year-old weight, lb</th>
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<tbody>
<tr>
<td>Hereford</td>
<td>1419</td>
</tr>
<tr>
<td>Angus</td>
<td>1410</td>
</tr>
<tr>
<td>Red Angus</td>
<td>1409</td>
</tr>
<tr>
<td>Simmental</td>
<td>1404</td>
</tr>
<tr>
<td>Gelbvieh</td>
<td>1323</td>
</tr>
<tr>
<td>Limousin</td>
<td>1391</td>
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<tr>
<td>Charolais</td>
<td>1371</td>
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</table>
These weights suggest two things. First, the average cow weight across all breeds shown here is 1390 lb. Second, there is difference among breeds. Our perception of which are the “big” breeds may not be supported by these data. That may be a function of genetic trends that are changing the size of cows in each breed at different rates. The breeds that produce big cattle may be changing.

Finally, a third way to estimate mature cow size is to evaluate weight of finished offspring. The general rule of thumb is that mature cow weight and live weight at slaughter of their progeny should be the same. Again, USDA Meat Animal Research Center data supports this relationship. In 1990, average market weight for slaughter cattle was 1180 lb; and it had increased to 1343 lb in 2009. This indicates that mature cow weight has increased by 163 lb over the last 19 years.

**Cow Size and Nutrient Requirements**

It is a fact that nutrient requirements increase as the size of an animal increases, but is it a straight-line, direct relationship? For mammals in general, nutrient requirements per lb of body weight increase at a decreasing rate. Said another way, the nutrient requirements per lb are lower for a large animal than for a small animal. This is particularly true for the requirement for energy. Basically, nutrient requirements rise more directly as a function of surface area of the animal than body weight, and surface area increases at a lower rate than weight does, i.e. the surface area per lb is much less for an elephant than a mouse. This relationship is described mathematically based on the basal metabolic rate, which is essentially the rate of energy consumption for an animal to maintain itself (i.e. energy of maintenance). The mathematical relationship is that net energy for maintenance (\(\text{NE}_m\)) rises as a function of body weight to the \(0.75\) power. This is the basis for calculating the energy requirements for domestic livestock species. The equation for \(\text{NE}_m\) for beef cattle (NRC, 2000) is:

\[
\text{NE}_m = 0.007 \text{ Mcal/BW}^{0.75}
\]

The practical importance of this is not the specifics of this equation, but the results that it provides when we calculate the nutrient requirements of a cow so that we can balance a ration to meet her energy requirement. Modern computerized ration balancing programs take care of the particulars of the math for us. It is important to realize that this relationship causes a dramatic difference in the energy requirements of animals with vastly different sizes, as in a mouse vs. an elephant. Within the range of variation within a particular species, i.e. cattle, it is less dramatic, but still exists. The maintenance energy (ME) requirement (based on NRC, 2000) for two different sizes of beef cows is depicted in the following figure:
The ME required by the 1400 lb cow is about 11% higher than that required by the 1200 lb cow, despite the fact that she is about 16% heavier.

The final question about nutrient requirements is how do we get the additional nutrients into the larger cow using similar resources (i.e. the rangeland on your ranch) to those that were used for smaller cows in the past? The nutrient densities of the forages are about the same, so forage intake needs to increase. Continuing with the same example using 1200 vs. 1400 lb cows, forage intake will need to be:

![Effect of Cow Weight on DM Intake](image)

Annual dry matter intake will be 9353 and 10,406 lb for the 1200 and 1400 lb cows, respectively. This is a difference of 1053 lb, or about an 11% increase for the larger cow.

**Production Capability**

Bigger cows have to eat more, so they have to produce bigger calves to cover their additional feed costs. We can calculate how many more lb of weaned calf will be needed to compensate for the additional feed consumption by the cow. To do this, we divide the annual feed consumption by potential calf weaning weight to determine the equivalency in lb of calf weaned per lb of forage consumed:
To achieve the same number of lb of feed used per lb of weaned calf, the 1400 lb cow will have to wean a calf that weighs 50 lb more.

The next question is whether this is a reasonable expectation. One way to evaluate this is to reconsider the Angus EPD genetic trend for weaning weights depicted earlier. If we assume that cows increased in size from about 1200 to about 1400 over the last 20 years (1990 to present) as suggested earlier, then we can look at the trend for the weaning weight EPD from 1990 to present. That trend has increased by 26 lb from 1990 to present, suggesting that the genetic potential for a 50 lb increase in weaning weight is not available. As a disclaimer, I am not criticizing the Angus breed. I have simply used them as an example. This exercise could be completed for many of the popular breeds in the US, and I suggest that the results would be similar. Additionally, using an overall breed trend does not indicate the potential for improvement in specific herds.

What I think this means is that other management factors need to be improved (and probably have been over the last 20 years) to gain at least a 50 lb increase in weaning weights. Among these are better grazing management, range improvements, strategic supplementation, and alternative management strategies such as adjusting calving and weaning dates to change nutrient demand by the cow-calf pair.

**Conclusions**

The bottom line that can be drawn from this discussion:

1. Cattle have changed dramatically over the last 2 or more decades:
   a. Cows are bigger; probably 200 lb bigger than 2 decades ago.
   b. The reason cows have gotten bigger is genetic selection for increased rates of growth, which leads to larger size.
2. Bigger cows take more feed to meet their nutrient requirements.
3. Bigger cows need to wean bigger calves to pay for the increased feed costs.
4. Improved management needs to provide increased opportunity for cows and their calves to achieve the increased production needed to overcome the increased feed costs.

**Literature Cited**

SIRE SELECTION FOR YOUR ENVIRONMENT AND COW HERD

David W. Schafer

Sire selection is the most important decision a cow/calf producer makes. A bull contributes fifty percent of the genes in your calf crop. Your herd’s rate of genetic improvement revolves around the herd bulls you choose to use either naturally or via artificial insemination (AI). Assuming, a producer uses a bull for four years and his daughters are retained, his influence, be it positive or negative, will easily extend into the next decade. Additionally, if you have retained granddaughters or great-granddaughters, his influence could potentially last up to 25 years. Therefore, it behooves every cow/calf producer to really put some thought into their breeding program and their production goals.

Start by writing down some goals you would like to achieve with your cow herd. Do you want to be a seedstock provider or a commercial producer? Think about specific production goals you have relative to weaning weight, cow pregnancy rates, or any other traits or practices that are important to you. Also, will you keep your own replacement heifers or do you plan on purchasing them? Once you have some goals in mind, then you can begin to formulate a plan to achieve them.

Next, take time to evaluate the resources at your disposal. Consider feed availability, labor, facilities and marketing opportunities. Categorize the feed and labor into low, medium or high availability. Table 1 shows an example of how you can use these classifications to make selection decisions. Not all traits are represented but it gives you an idea of how to use this information and you can build your own table. Finally, make a list your marketing options. Taking the time to write these things down will help you in selecting the genetics that best fit your environment and production goals. If you already have an established cowherd, do a herd assessment. If your cows are individually identified and you have already collected data on them, this should be fairly straightforward. However, you can do this even if you have not individually identified your cows. Determine the breed makeup, the production level and mature size of your current herd. If your breed makeup is largely one breed, maybe you want to consider using a bull of a different breed. If you feel your weaning weights are lighter than they should be, then maybe you need to place some selection emphasis on that trait. The point is that you know your herd and you should be able to characterize them in such a way that you can use that information to help you make selection decisions.
## Table 1. Matching genetic potential for different traits to production environments.\(^1\)

<table>
<thead>
<tr>
<th>Production Environment</th>
<th>Traits</th>
<th>Feed Availability</th>
<th>Environmental Stress(^2)</th>
<th>Milk Production</th>
<th>Mature Size</th>
<th>Ability to store Energy(^3)</th>
<th>Adaptability to Stress(^4)</th>
<th>Calving Ease</th>
<th>Lean Yield</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>High</td>
<td>L to M</td>
<td>L to M</td>
<td>M</td>
<td>M to H</td>
<td>M to H</td>
<td>H to H</td>
<td>M to H</td>
<td>H</td>
</tr>
<tr>
<td>High</td>
<td>High</td>
<td>M</td>
<td>L to H</td>
<td>L to H</td>
<td>H</td>
<td>H</td>
<td>M to H</td>
<td>M to H</td>
<td>H</td>
</tr>
<tr>
<td>Medium</td>
<td>Low</td>
<td>M to H</td>
<td>M</td>
<td>M to H</td>
<td>M</td>
<td>M</td>
<td>M to H</td>
<td>M to H</td>
<td>M</td>
</tr>
<tr>
<td>High</td>
<td>Low</td>
<td>L to M</td>
<td>M</td>
<td>M to H</td>
<td>H</td>
<td>H</td>
<td>H to H</td>
<td>M to H</td>
<td>H</td>
</tr>
<tr>
<td>Low</td>
<td>High</td>
<td>L to M</td>
<td>L to M</td>
<td>H</td>
<td>M to H</td>
<td>M</td>
<td>H to H</td>
<td>M to H</td>
<td>M</td>
</tr>
</tbody>
</table>
| Breed role in terminal crossbreeding systems

<table>
<thead>
<tr>
<th>Maternal</th>
<th>M to H</th>
<th>L to H</th>
<th>M to H</th>
<th>M to H</th>
<th>H</th>
<th>L to M</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paternal</td>
<td>L to M</td>
<td>H</td>
<td>L</td>
<td>M to H</td>
<td>M</td>
<td>H</td>
</tr>
</tbody>
</table>

L = Low; M = Medium; H = High.

1 Adapted from R. Bourdon, 2002, Cow-Calf Management Guide

2 Heat, cold, parasites, disease, mud, altitude, etc. and quantity and quality of labor.

3 Ability to store fat and regulate energy requirements with changing (seasonal) availability of feed.

4 Physiological tolerance to heat, cold, internal and external parasites, disease, mud, and other stresses.

Now that you have your goals and resources identified, it is time to choose the genetics that match your resources and production goals. Take time to study the various breeds, get to know the strengths and weaknesses of the different breeds. Where would they fit relative to the classifications in Table 1. Recognize that no one breed can do it all whether you are a seedstock provider or a commercial cattleman. Seedstock breeders need to know not only the strengths and weaknesses of their chosen breed but also the strength and weaknesses of other common breeds so that they can assist their customers with their breeding programs. Commercial cattlemen should also learn about the breeds so that they may make well informed decisions when it comes to choosing their next herd sire. Do not fall victim to the “bull of the month club”. Do your homework, make a plan and try to stick to it. Be careful though not to develop “tunnel vision”. Try to remain flexible and open to new ideas while always keeping your goals in mind.

Part of the process of selecting the breeds to use in your program should include researching available breeds in your area. If you plan to use AI, then pretty much any breed can be purchased. However, if you plan to mate your cows through natural service, it may not make sense to select a breed that is hard to find or that you have to travel hundreds of miles to get. Try to identify seedstock sources that raise their cattle in an environment similar to yours. Selecting bulls that have been overly pampered or raised in a lush environment and then turning them out on the desert is not likely to end well.
Commercial cattlemen should really consider using a crossbreeding system to take advantage of heterosis and breed complementarity. Heterosis is that extra boost in performance that you get from crossing two unrelated breeds. The technical definition would be when the average of the progeny exceeds the average of the two parental breeds. For instance, Breed A has an average weaning weight (WW) of 550 pounds and breed B has an average WW of 500 pounds. When you average those two parental breeds you get 525 pounds. However, the average WW of the AB cross calves is found to be 546 pounds or 21 pounds heavier than the parental breed average. The amount of heterosis in this example would be 4% or 21 divided by 525. Breed complementarity simply refers to crossing animals of differing strengths and weaknesses that complement each other. For example, crossing a non-heat tolerant breed with a more heat tolerant animal to form an individual better suited to a particular environment and market place.

Let us now turn to the tools that are available to help you make your selection decisions. There continues to be numerous advances on the molecular side to enhance our selection decisions. However, we are still a ways off from having that information incorporated into mainstream sire evaluations. So, today Expected Progeny Differences (EPDs) remain the most accurate and significant tools we have to date for making genetic change. EPDs can be defined as the expected performance of future offspring of a parent compared to the expected performance of future offspring of other parents within the analysis when bred to mates of equal value. In other words, when two bulls are mated to the same cows what is the expected difference in performance of the offspring for the trait in question? EPDs should not be directly compared across breeds. They are designed to be used within the breed in which they were calculated.

EPDs are calculated for a number of economically important traits. An EPD is calculated using the individual’s performance records in conjunction with the performance records of all his ancestors and progeny. If the animal does not have any progeny, an EPD can still be calculated and is usually called an “Interim EPD” and is so designated with an “I” preceding the EPD. A “Pedigree EPD” is calculated simply by adding together the Sire and Dam’s EPDs and dividing by two. Pedigree estimates are usually designated with the letter “P”. When an EPD is calculated there is an “accuracy” value associated with it. This accuracy value is the reliability that can be placed on the EPD. Accuracy values range from 0 to 1.0. An accuracy value close to 1.0 indicates a higher reliability. An Interim EPD usually has a low accuracy value and a Pedigree EPD has very low accuracy associated with it. As animals produce progeny the accuracy value increases.

EPDs are expressed as a relative value, not an absolute. A WW EPD of +35 pounds does not mean the calves will be 35 pounds heavier than the breed average. EPDs are a means of comparing animals. Take a look at the example below:
We see that Sire A has a BW (birth weight) EPD 5 pounds heavier than Sire B, the WW EPD is 18 pounds greater, the YW (yearling weight) EPD is 26 pounds greater, and milk is 5 pounds less.

So, how do we interpret the above differences? If we were to breed both bulls to the same group of cows, we would expect the calves from Sire A to be 5 pounds heavier at birth than calves from Sire B due to their genetics for birth weight. Calves from Sire A would also be 18 pounds heavier at weaning and 26 pounds heavier at yearling due to the genetics of Sire A for each of those traits. The daughters of Sire B, if used in the same environment as those daughters of Sire A, would be expected to add 5 pounds of weaning weight to their calves than the daughters of Sire A due to their milk production and maternal characteristics.

It is important to remember that these values are not relative to a breed average; rather, they are relative to the production system in which the bulls are used. If for example, Sire A was siring calves with an 80 pound average birth weight in your cow herd, you would expect calves from Sire B to weigh and average 75 pounds when used across the same group of cows.

Sire selection is one of the most important decisions a cow-calf producer makes in any given year. If you are retaining replacement heifers then the future of your cow herd depends on the selection decisions you make now. Genetic change is permanent change. Sire selection has a long-term impact and should be viewed as a long term investment into the efficiency and adaptability of your beef operation.

The National Beef Cattle Evaluation Consortium has compiled a “Beef Sire Selection Manual” that provides greater detail than can be covered in this article. The manual is available online at [http://www.ansci.cornell.edu/nbec/produces/sire.html](http://www.ansci.cornell.edu/nbec/produces/sire.html) or if you prefer a hard copy, there is information regarding who to contact. The manual is free you simply pay shipping and handling.
Supplement Strategies for Grazing Livestock, and Managing the Supplement Therein

Jon A. Abrams, Sr. Account Manager Ridley Block Operations
2011 AZ Strip Meetings

Average Cow/Calf Profit (Loss)

Beef Cow Inventory

Forecasted 2011 55.75M - 450,000 [2PN]
Lower 13 of last 15 years.
Small calf since 1993
What is Supplementation?
TO IMPROVE OR HELP

1. It's the Cows That Count
2. Applications of Supplement
3. Supplementation is only a tool
4. Supplement Management with respect to Low Moisture Blocks (Crystalyx)

Is there a history?
1700 – 1900’s: Fresh air & Scenery
1910’s – 1930’s: Trace Min. Salt & Cottonseed
1930’s – 1940’s: Grain as a forage substitute - NOT Supplementation
1940’s – 1950’s: Loose Mineral & Grain “cakes,” protein blocks
1980’s – 1990’s: More focus on mineral and “chelated” trace minerals
2000’s: Current: Supplementation and Grazing Distribution effects – Fine tuning and “optimization.”
Livestock Production

- Nutrient Requirements
- Current Condition
- Feed Intake
- Health
- Reproduction
- Weight Gain
- Body Condition
- Increase Forage Utilization
- Grazing Comfort
- Prevent or Combat Disease or Metabolic Problems

Beef Cow Forage Options:

- Convert stored forage efficiently.
- Graze the plant where it grew.

How Much Accessible Forage Offered? Digestible?
What is 1 BCS Worth?

- Calving Interval
- Calf Weaning Weight
- Pregnancy Rate
- Calf ADG
- Culling .... $200-400 / cow
- Dystocia .... $300 / calf
- Calf Vigor & Cold Tolerance
- Calf Immunity / Weaning Rate

Value in the Difference of BCS

<table>
<thead>
<tr>
<th>BCS</th>
<th>Prog. Rate%</th>
<th>Calving Interval d</th>
<th>Calf ADG lb</th>
<th>Calf WW lbs</th>
<th>Calf Price $/CWT</th>
<th>Income Per Calf Born/Weaned</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>43</td>
<td>414</td>
<td>1.60</td>
<td>374</td>
<td>135</td>
<td>$ 217</td>
</tr>
<tr>
<td>4</td>
<td>61</td>
<td>381</td>
<td>1.75</td>
<td>460</td>
<td>130</td>
<td>$ 385</td>
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<tr>
<td>5</td>
<td>83</td>
<td>364</td>
<td>1.85</td>
<td>514</td>
<td>120</td>
<td>$ 512</td>
</tr>
<tr>
<td>6</td>
<td>93</td>
<td>364</td>
<td>1.85</td>
<td>514</td>
<td>120</td>
<td>$ 574</td>
</tr>
</tbody>
</table>

*Income per calf's pregnancy view
and Bizzle et al., 1995. UWPS Publication SP-114.
### Which 10% Pays Best?

<table>
<thead>
<tr>
<th>Change</th>
<th>Breakeven Calf Price $/CWT</th>
<th>Increase Income $ / Cow / Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weaned Calf Crop</td>
<td>($10)</td>
<td>$52</td>
</tr>
<tr>
<td>Weaned Calf Weight</td>
<td>($9)</td>
<td>$43</td>
</tr>
<tr>
<td>Weaned Calf Price</td>
<td>($9)</td>
<td>$43</td>
</tr>
<tr>
<td>Total Feed Costs</td>
<td>($5)</td>
<td>$23</td>
</tr>
</tbody>
</table>

### Cowman’s Goal:

The primary goal for cow/calf producers is to obtain one live calf, from each cow, every year.

G.C. Lamb, U of Minnesota 1999

### Depreciation is the cost of replacing assets with a limited life (cows)
The Message is More Clear Today and the Need is Even Greater

Early Nutrition Pays Huge Dividends!

What is Fetal Programming?

"Fetal programming is the concept that a maternal stimulus or insult, at a critical period of fetal development, has a long-term impact on the offspring."

Vonahme -- NDSU 2009

Maybe known as Developmental Programming

Impacts growth, reproductive efficiency and carcass merit
Actual Profit Differences Are Large

- It takes the profit from one early-calving cow to cover the loss from one late-calver.
- A cow that calved in the first 21-day calving interval her entire 3- or 8-year life, will produce the weekly weight equivalent of 1% to 1.5% additional calves in her lifetime compared to one that starts late and stays late.

From Larson et al, 2009

<table>
<thead>
<tr>
<th>Diet: In-Utero</th>
<th>Supplement</th>
<th>No Supplement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weaning Weight, lb</td>
<td>6734 lb</td>
<td>6726 lb</td>
</tr>
<tr>
<td>DMI, lb/day</td>
<td>28.3 lb</td>
<td>19.8 lb</td>
</tr>
<tr>
<td>ADG, lb/day</td>
<td>3.75 lb</td>
<td>3.65 lb</td>
</tr>
<tr>
<td>F:G</td>
<td>5.38</td>
<td>5.37</td>
</tr>
<tr>
<td>SCBW, lb</td>
<td>1022 lb</td>
<td>794 lb</td>
</tr>
<tr>
<td>Other</td>
<td>10.6%</td>
<td>10.6%</td>
</tr>
</tbody>
</table>

*Means with a common superscript differ (P < 0.05).
*Means with a common superscript differ (P < 0.10).

Proper Nutrition Does Affect You?

- Do you sell calves based on weight? (muscle mass)
- Do you retain ownership of calves? (feedlot performance)
- Do you sell your fat cattle on a “grid”? (carcass merit)
- Do you retain heifers? (reproductive performance)

Take Care of the Cows that Take Care of You
CRYSTALX: Low moisture blocks (LMB) have been used successfully as an attractant in studies at 5 ranches in Montana and 2 in New Mexico.

In this 833 acre pasture, the effective distance of 600 yards (m) resulted in additional cattle grazing (15% to 25% forage utilization increase) in area of 22% acres for a two week low moisture block placement.
Block/Barrel Management

- Proper or improper Barrel Management will impact
  - Intake
  - Performance
  - Grazing Management
  - Cost per head per day
Rules of Thumb
The Ratio

• Most Crystalynx products are "labeled" as to feed 1 container per 20-30 head of cattle.
• Some are labeled
  – 1: 10-30 - Omega-Lyx
  – 1: 45-70 - Crystal-Plex
  – Specific recommendations in groups – Brigade

Rules of Thumb
Placement areas

• The label says, "place containers in areas that achieve desired supplement intake."
• It then says, "containers may be moved to underutilized pasture areas to improve grazing distribution and forage utilization."

Rules of Thumb
Placement in the pasture

• Near water or feeding areas but not necessary once cattle are acclimated.
• Spread the containers out (put 50-100 feet or more distance between them)
• Place in a line or in a circular/triangular pattern
• Multiple locations with large groups
Supplement Arrangement

- 150' X 20' when grazing
- 100' X 20' when fed harvested forage

Common Errors
- Not enough containers or too many
  - Place one barrel for every 20-30 head
- Keeping Barrels in the same spot all the time
- Having Barrels in an area cattle absolutely will not want to go
- Letting Barrels go empty – How good is that?
Move the Barrels or place new sets in new areas

Above is after just a few days with approx. 20 head. Average barrel last roughly 2 weeks with average intake.

Hard to find many areas where cattle may not go.

Barrels can be the reason to go.
What should intake be with proper container management?

- Intake range will vary by product but normally is in the 0.25-1.5 lbs range. For beef cattle, 0.5-0.75 is the common target range with products providing some protein.
- For calves (emerged or back-grounded) it is normally 0.25-0.50 lbs.
- Mineral products such as Crystal-Plex are normally 0.35 lbs per day.

Exceptions to the “rule”

- In confinement – higher animal: barrel ratio can be used meaning “fewer barrels”
- Tricks to limit or increase consumption
- Yearling or naive cattle may require a lower animal: barrel ratio meaning “more barrels”

How Many Barrels are in the picture?
Intake Management
- Crystalux is a supplement, not a feed. Excessive intake may occur with limited forage quantity.
- Place one barrel for every 25-30 head.
- Small groups under 15-20 head would be fine with one barrel.
- Formula fed will influence intake.
- Generally, the higher the fortiﬁcation, the lower the intake and cost per head per day.

Summary for Barrel Management
- Follow general barrel: animal ratio guidelines.
- Use the barrels as an advantage for management.
- Relocate feeding sites when adding new barrels.
- Use common sense on where to place barrels.
- Don’t let product run out.
- Guidelines are the same for BioBarrels and Steel.

Crystalux
The Most Efﬁcient Supplement
- Less labor & equipment.
- Reduced waste.
- Equal or better performance on less volume.
- Nutrition in one package.
- Accuracy of nutrient delivery.
THANKS FOR LISTENING

Crystalyx®, Programs That Work: Not Just Another Tub
Why an Arizona Range Program?

Because the diet of Arizona's range cows is quite different than in other regions of the United States.

What are the cows eating?

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indian Broomgrass</td>
<td>Grass</td>
</tr>
<tr>
<td>Needle and Thread</td>
<td>Grass</td>
</tr>
<tr>
<td>Jicama</td>
<td>Grass</td>
</tr>
<tr>
<td>Guayusa</td>
<td>Grass</td>
</tr>
<tr>
<td>Fiddleneck Sages</td>
<td>Grass</td>
</tr>
<tr>
<td>Wooly Sages</td>
<td>Grass</td>
</tr>
<tr>
<td>Neotoma Mexican Tea</td>
<td>Browsing</td>
</tr>
<tr>
<td>Saguaro</td>
<td>Browsing</td>
</tr>
<tr>
<td>Saguaro</td>
<td>Browsing</td>
</tr>
</tbody>
</table>
Daily Protein intake vs. Requirements

Based on the intake level of grasses, browse and forbs by month reported in Nutritional Characteristics of Arizona Browse, Sprinkle, et. al., 2002.

Precision vs. Accuracy

Composition of cow diets on Arizona range*

<table>
<thead>
<tr>
<th></th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protein</td>
<td>7.1%</td>
<td>7.6%</td>
<td>8.4%</td>
<td>10.8%</td>
<td>12.7%</td>
<td>9.7%</td>
<td>8.4%</td>
<td>7.9%</td>
<td>8.9%</td>
<td>9.3%</td>
<td>7.9%</td>
<td>7.9%</td>
</tr>
<tr>
<td>Phosphorus ppm</td>
<td>0.13</td>
<td>0.14</td>
<td>0.16</td>
<td>0.21</td>
<td>0.19</td>
<td>0.17</td>
<td>0.16</td>
<td>0.19</td>
<td>0.11</td>
<td>0.11</td>
<td>0.11</td>
<td>0.13</td>
</tr>
<tr>
<td>Copper ppm</td>
<td>5.7</td>
<td>6.3</td>
<td>8.1</td>
<td>10.5</td>
<td>8.8</td>
<td>8.5</td>
<td>7.5</td>
<td>7.3</td>
<td>7.3</td>
<td>6.6</td>
<td>6.6</td>
<td>6.6</td>
</tr>
<tr>
<td>Zinc ppm</td>
<td>19.6</td>
<td>21.6</td>
<td>21.2</td>
<td>18.0</td>
<td>18.5</td>
<td>20.2</td>
<td>19.4</td>
<td>17.5</td>
<td>17.5</td>
<td>18.2</td>
<td>15.6</td>
<td>18.0</td>
</tr>
<tr>
<td>Selenium ppm</td>
<td>0.04</td>
<td>0.04</td>
<td>0.04</td>
<td>0.04</td>
<td>0.06</td>
<td>0.06</td>
<td>0.05</td>
<td>0.05</td>
<td>0.06</td>
<td>0.05</td>
<td>0.04</td>
<td>0.04</td>
</tr>
</tbody>
</table>

* Based on the intake level of grasses, browse and forbs by month reported in Nutritional Characteristics of Arizona Browse, Sprinkle, et. al., 2002.
Nutrient flow for cows on Arizona range

<table>
<thead>
<tr>
<th>Daily Intake</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percent BW</td>
<td>1.70</td>
<td>1.75</td>
<td>1.80</td>
<td>2.20</td>
<td>2.20</td>
<td>2.20</td>
<td>2.10</td>
<td>2.06</td>
<td>2.00</td>
<td>2.00</td>
<td>1.90</td>
<td>1.09</td>
</tr>
<tr>
<td>Dry Matter, kg</td>
<td>8.5</td>
<td>8.7</td>
<td>9.3</td>
<td>11.4</td>
<td>13.5</td>
<td>13.5</td>
<td>10.4</td>
<td>10.4</td>
<td>10.0</td>
<td>10.0</td>
<td>9.6</td>
<td>8.5</td>
</tr>
<tr>
<td>Crude Protein, %</td>
<td>1.37</td>
<td>1.37</td>
<td>1.37</td>
<td>2.24</td>
<td>2.24</td>
<td>2.24</td>
<td>1.98</td>
<td>1.98</td>
<td>1.98</td>
<td>1.98</td>
<td>1.98</td>
<td>1.98</td>
</tr>
<tr>
<td>Phosphorus, g</td>
<td>10.9</td>
<td>12.4</td>
<td>14.3</td>
<td>21.8</td>
<td>20.4</td>
<td>17.9</td>
<td>12.4</td>
<td>10.2</td>
<td>10.8</td>
<td>10.2</td>
<td>10.2</td>
<td>10.0</td>
</tr>
<tr>
<td>Copper, mg</td>
<td>40.3</td>
<td>42.2</td>
<td>47.2</td>
<td>57.5</td>
<td>69.6</td>
<td>74.6</td>
<td>72.5</td>
<td>72.5</td>
<td>72.5</td>
<td>72.5</td>
<td>72.5</td>
<td>72.5</td>
</tr>
<tr>
<td>Zinc, mg</td>
<td>160.6</td>
<td>180.6</td>
<td>190.6</td>
<td>200.6</td>
<td>200.6</td>
<td>200.6</td>
<td>190.6</td>
<td>190.6</td>
<td>190.6</td>
<td>190.6</td>
<td>190.6</td>
<td>190.6</td>
</tr>
</tbody>
</table>

* Monthly intake driven by diet quality and stage of production (calving in March).

Daily Phosphorus Intake vs. Requirements

![Daily Phosphorus Intake vs. Requirements](image)

Nutrient requirement based on calving beginning in March.

New Phosphorus Requirements for Beef Cows

- Absorption coefficient adjusted from 68% to 75%
- Daily requirements lowered by 2-3 grams
- New requirements (1,250 lb. cow, 25 lb. peak lactation)
  - Early Lactation - 25 grams/day
  - Late Lactation - 21 grams/day
  - Med Gestation - 23 grams/day
  - Pre-calving - 16 grams/day
- Active phosphorus retention when supply is low

* Guirey and McMurry, Feedstuffs, November 17, 2008,
Phosphorus Requirements for Arizona Cows

- Requirements (1,100 lb. cow, 15 lb. peak lactation)
  - Early Lactation – 22 grams/day
  - Late Lactation – 19 grams/day
  - Med Gestation – 11 grams/day
  - Pre-calving – 15 grams/day

Daily Phosphorus Intake vs. Requirements

Daily Copper Intake vs. Requirements

Nutrient requirement based on calving beginning in March.
Reproductive rate of cows in Arizona*

<table>
<thead>
<tr>
<th>Region</th>
<th>Weaning Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strip</td>
<td>72%</td>
</tr>
<tr>
<td>Plateau</td>
<td>80%</td>
</tr>
<tr>
<td>Central Mountain</td>
<td>65%</td>
</tr>
<tr>
<td>Western Desert</td>
<td>80%</td>
</tr>
<tr>
<td>Southeastern</td>
<td>72%</td>
</tr>
</tbody>
</table>

* Estimates of reproduction

Source of Reproductive Loses

- Conception Rate – 5 to 50%
- Calving Rate – 8 to 35%
- Weaning Rate – 1 to 10%

Beal et al. reported 16% embryonic mortality from day 25 to 65 of gestation. Other investigations have reported that rates of embryonic mortality from 21 to 60 d of gestation range from 8% (Boyd et al., 1980) to 33% (Bagnell et al., 1986).

Beal et al., J Anim Sci 1982: 70:934-939
Nutrients and Intake

- Even with the variety of forages available, cows remain critically mineral deficient.
- A correctly formulated mineral can meet the year-round mineral needs of Arizona cows.
- Mineral intake is a critically important component of that formulation.

Arizona Range Mineral Consumption

Santa Fe Ranch, Nogales, AZ. Dean Fish, 2010.
Mineral Block Consumption

Preliminary Mineral Consumption Data
V Bar V Ranch (herd level)

NutreBeef® Arizona Range Mineral

Loose Mineral Form
Block Mineral Form
### NutreBeef® Arizona Range Mineral

<table>
<thead>
<tr>
<th>Month</th>
<th>Daily Intake (oz.)</th>
<th>Cost/Head/Day (lb)</th>
<th>Monthly Intake (lbs)</th>
<th>Cost/Head/Month</th>
</tr>
</thead>
<tbody>
<tr>
<td>April</td>
<td>3</td>
<td>$0.075</td>
<td>5.6</td>
<td>$2.20</td>
</tr>
<tr>
<td>May</td>
<td>3</td>
<td>$0.075</td>
<td>5.8</td>
<td>$2.27</td>
</tr>
<tr>
<td>June</td>
<td>3</td>
<td>$0.073</td>
<td>5.6</td>
<td>$2.20</td>
</tr>
<tr>
<td>July</td>
<td>3</td>
<td>$0.073</td>
<td>5.8</td>
<td>$2.27</td>
</tr>
<tr>
<td>August</td>
<td>3</td>
<td>$0.073</td>
<td>5.8</td>
<td>$2.27</td>
</tr>
<tr>
<td>September</td>
<td>3</td>
<td>$0.073</td>
<td>5.6</td>
<td>$2.20</td>
</tr>
<tr>
<td>October</td>
<td>3</td>
<td>$0.073</td>
<td>5.8</td>
<td>$2.27</td>
</tr>
<tr>
<td>November</td>
<td>3</td>
<td>$0.073</td>
<td>5.6</td>
<td>$2.20</td>
</tr>
</tbody>
</table>

---

Is this your mineral program?

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NutreBeef®

Arizona Range Program
Grazing Cheatgrass in Skull Valley

Jeff Young

Ensign Ranches is primarily a cow-calf operation with farming and feedlot operations that complement the production and marketing of home raised calves. Cattle are wintered in Skull Valley, Utah on winter range that consists primarily of public land. Cattle graze the winter range from November through April. In April they are gathered to private lands in Skull Valley where they are sorted and processed for shipping to the summer ranges. While some cattle are summered in Skull Valley the majority of the cattle are shipped to private summer range in Summit County, Utah and Uinta County, Wyoming.

Skull Valley is typical of most basins and ranges in north western Utah. It is located about 50 miles west of Salt Lake City. The Stansbury and Onaqui Mountains create the east side of the basin and the Cedar Mountains the west. The valley bottoms are dominated by greasewood and other salt tolerant species. Salt desert shrub species historically occupied other low elevation sites and large sagebrush communities were found on the higher benches. The conversion of thousands of acres of native salt desert shrub range and sagebrush to a landscape dominated by cheatgrass has introduced production variability and management challenges previously unknown.

The greatest challenge cheatgrass invasion poses is in dealing with a short and volatile fire cycle. The once stable and predictable ecosystem now experiences boom and bust type production cycles with fire risk added during the boom periods. Grazing cheatgrass range is challenging because of this variability and uncertainty. There are some management practices we have employed to mitigate some of these challenges. Livestock water improvements are a big part of our program. We have also partnered with the BLM in green stripping strategic areas to aid in fire suppression and to minimize the size and frequency of fires. We also work closely with the BLM to manage our grazing program to aid in controlling cheatgrass during high production periods. Reseeding burned areas is a costly, but necessary practice. Areas that have burned once are likely to re-burn once cheatgrass is the dominant ground cover. Areas that burn more than once are very hard to revegetate and may remain devoid of vegetation for many years.
Why Fall Grazing?

- Spring Grazing Drawbacks
  - Difficult to assemble and congregate enough animals
  - Perennials plants may be at risk
  - Short grazing window
  - Difficult to plan
- Negatives Become Positive in Fall

Target Key Areas

Overall Goal

- Investigate the efficacy of fall grazing of cheatgrass by cattle:
  - As a large scale fuels reduction tool
  - Without affecting livestock performance
  - Without harming the perennial plant species
Methods – Sampling Methods

- 25% Subsample of Total Grazing Animals
- Pre-graze and Post-graze
  - Weights
  - DCS
  - Pictures

Methods – Sampling Methods

- Transsect Length – 427 m in length
- Sample adequacy and Area coverage
- Cover
  - Point frame 15 points per transect
- Density
  - Plant count in .89 m² Quadrats
- Utilization
  - Clipped pre- and post-graze from each quadrant
- Plant Nutritional Assay

Methods – Sampling Methods

- Seedbank Assay
  - 3 x 5 x 2 inch deep soil cores
  - 10 per transect
  - Grown in Greenhouse
  - Seedlings counted after emergence
2009 Cheatgrass nutritional content:
TDN: 49.0%  CP: 3.8%

2009 Creasted wheatgrass:
TDN: 40.5%  CP: 3.6%

Cow Performance

<table>
<thead>
<tr>
<th>Year</th>
<th>Pre-Grass</th>
<th>Post-Grass</th>
<th>Pre-Grass</th>
<th>Post-Grass</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007</td>
<td>1178 lbs</td>
<td>1221 lbs</td>
<td>5.5</td>
<td>5.75</td>
</tr>
<tr>
<td>2008</td>
<td>1192 lbs</td>
<td>1236 lbs</td>
<td>5.6</td>
<td>6.0</td>
</tr>
<tr>
<td>2009</td>
<td>1210 lbs</td>
<td>1242 lbs</td>
<td>4.75</td>
<td>5.0</td>
</tr>
</tbody>
</table>
Cheatgrass Biomass Production

<table>
<thead>
<tr>
<th>Year</th>
<th>Control</th>
<th>Grazed</th>
<th>%Removal</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>497 lbs ac⁻¹</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>2007</td>
<td>221 lbs ac⁻¹</td>
<td>44 lbs ac⁻¹</td>
<td>94%</td>
</tr>
<tr>
<td>2008</td>
<td>75 lbs ac⁻¹</td>
<td>16 lbs ac⁻¹</td>
<td>87%</td>
</tr>
<tr>
<td>2009</td>
<td>204 lbs ac⁻¹</td>
<td>87 lbs ac⁻¹</td>
<td>60%</td>
</tr>
</tbody>
</table>

2007 Comparison

Pre-graze          | Post-graze

Results – Cheatgrass Density

<table>
<thead>
<tr>
<th>Year</th>
<th>Cheatgrass Density</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007</td>
<td>1000 lbs</td>
</tr>
<tr>
<td>2008</td>
<td>500 lbs</td>
</tr>
</tbody>
</table>

P = .09
P = .001
### Cheatgrass Seed Bank

<table>
<thead>
<tr>
<th>Year</th>
<th>Grazed</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007</td>
<td>10,700</td>
<td>8,920</td>
</tr>
<tr>
<td>2008</td>
<td>1,930</td>
<td>3,570</td>
</tr>
<tr>
<td>2010</td>
<td>1,751</td>
<td>3,326</td>
</tr>
</tbody>
</table>

### Results – Perennial Preference

#### Percent Remained

<table>
<thead>
<tr>
<th>Year</th>
<th>CR</th>
<th>SB</th>
<th>NT</th>
<th>PG</th>
<th>Cheat</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>81.5%</td>
</tr>
<tr>
<td>2007</td>
<td>52.3%</td>
<td>68.2%</td>
<td>100.0%</td>
<td>61.6%</td>
<td>80.4%</td>
</tr>
<tr>
<td>2008</td>
<td>43.7%</td>
<td>88.4%</td>
<td>50.0%</td>
<td>59.2%</td>
<td>76.4%</td>
</tr>
</tbody>
</table>

### Summary

- Cheatgrass: Density ↓, Cover ↓, Biomass ↓, Seedbank density ↓
- Perennial Grasses: ↑
Summary

- We removed cheatgrass below 100 lbs per acre without affecting cattle performance
- Cattle gained weight
- Cattle preferred cheatgrass
- Critical to know:
  - Nutritional content of cheatgrass
  - Yearly production data

Conclusion

Fall grazing cheatgrass with cattle is a viable, large scale fuels reduction tool.
Area of Responsibility
- Working with private landowners in:
  - Iron
  - Washington
  - Kane
  - Beaver
  - Garfield
  - Occasionally asked to work in Sevier, Utah, and Millard

NRCS Statement of Work
Conservation Planning
- The delivery of technical assistance support and field services such as:
  - Wildlife practice installation plans
  - Practice layout
  - Practice checkout
- Most field work is anticipated to be providing technical assistance to landowners and operators with potential or approved Farm Bill program contracts.

NRCS Programs
- EQIP – Environmental Quality Incentive Program
- WHIP – Wildlife Habitat Incentive Program
- WRP – Wetlands Reserve Program
- EWP – Emergency Wetland Protection (USF)
- FRPP – Farmland and Ranchland Protection Program
- CRP – Conservation Reserve Program
Sage Grouse Initiative
- NRCS program – EQIP or WHIP
- Started in 2010 in 11 western states
- 2011 – 1 million dollars for Utah
- Candidate species – Spring 2010
  - Warranted, but precluded
  - Avoid listing. Trying to make a positive impact on the species

What’s Good for Rangelands is Good for Grouse
- Large expanses of rangeland
- Rangeland plant diversity
- Healthy rangeland
- Well-designed grazing plan
- Perennial native grass cover and forbs
- Invasive species management
- Healthy riparian areas
- Unfragmented rangeland
- Productive sagebrush grassland with a healthy perennial grass understory

Other Programs & Funding
- FT&SL Fire Programs
  - Fire Rehabilitation
  - Green Stippling
  - Fire Protection
  - Discretionary Seed
- GIP Program
- LUPD
- ISIP
UPC D

- Utah Partners for Conservation and Development – Chair, secretary, agencies, etc
- Utah Watershed Initiative
- Website is www.utah.gov/watersheds/
- Database of all projects in the Utah – Link on the above address
- In FY 2010 – 13.9 million, 162 projects, 112,000 acres treated

Project Planning

- Meeting With Landowner, Application
  - Explain Programs and Funding
  - Explain How the Landowner Can Benefit from Work
  - On the Ground Assessment/Agreement
  - Locate Problems, Resources
  - Develop Resource Solutions (NSA/MSA)
  - Design and Plan Implementation
  - Prioritize Treatments
  - Plan for RMS Invoicing and Reporting

Resource Inventory

- Wildlife Surveys – Terrestrial or Aquatic
- Vegetative Inventories
- NEPA and Cultural Resources
- Land Control, Water Rights, etc.
Paradise Fire Rehab

June 2009

Coordination

- Fish and Wildlife Service
- Farm Service Agency
- Conservation District Personnel
- Utah Department of Agriculture and Food
- IRASL
- SITLA
- BLM
- USFWS
- Landowners
- Conservation Groups (MDF, BLMF, NWTF, SFW)
- Other NRCS Personnel