Effective Supplementation of the Cow Herd

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2018 Montana Nutrition Conference and Livestock Forum

Montana Feed Association
2017 and 2018 what happened?

- Drought – New Name – **Flash Drought**
- Entire State on Fire
- Early / Wet Large Snowfall – Pre-weaning
- Worst Winter on record in some areas
  - Record Snow Falls
  - Record Low temps for consecutive days
- Which Means….
  - We will be playing catch up all year and possibly for several years
Drought and Supplementation talk

- Asked for Direction for the Talk?
  - Just talk about what you discussed with Beef Producers this year...
    - Where do I get - find grass? Hay
    - What can I buy to get the cows through
      - Just about anything you can think of was fed this year
        » I am turning my cattle out into 2000 acres of failed SW anything I should be concerned with?
    - Less about effective supplementation than Emergency Supplementation to get by and preserve genetics
  - How do I recover in the next few years
  - How do we Drought proof our-your herd and range?
Jim asked me to locate one of the mystical creatures - Supplementation Paradigm

One Plan for everybody?

Ideas, Concepts and Questions

Great News:
Extension Educators and Industry Nutritional Reps
Feed Resources and Supplementation is one of the most important individual decisions on any ranch in any year, let alone in a Flash Drought, Unprecedented Fire Season, and Historic 100 year Winter Climate Event.
Goal of Effective Supplementation

- Meet Contract Weights
- Preserving High Conception Rates
  - 1st cycle conception
- Recovery of Range Conditions
- Preservation of Herd Genetics
- Maximize Profits
  - long-term
1992 Supplementation Talk

Paradigm Shifts or Same Old Thing

Reactive, Proactive or Long Term Planning

Look to Unbiased Independent Research and Reputable Industry Partners
Supplementation

What are we actually talking about?

- Salt
- Hay
- Grain
- Protein
- Liquid products
- Minerals
Supplementation

Goal

- To provide nutrients to the cow herd that are not available in:
  - Sufficient quantity
  - Adequate balance

- # 1 task to identify your management goals and the resources available to you
  - Money
  - Hay base
  - Winter grazing
  - BCS of cows
  - Delivery Contract Weights

Sometimes this discussion takes longer than what product to use
Nutrient Requirements and Supplementation

- **NO Supplementation**
- **Change the Paradigm**
  - Reduce the gap between lacking nutrients and requirements for the class of livestock
  - Early Wean, deliver higher nutrients to calf
    - Reduce Cow pressure and supplementation need
    - Residues – use your highest nutrient profile feed for immediate cash flow, calves
      - Alternative Forages, Pastures and AUMs
  - Recovery of cows, Younger cows may / will need supplementation or attention
- Don’t play catch up be proactive
Supplementation

Directions supplementation can take

1. Complement or enhance forage utilization without replacing or decreasing forage intake
   - Late season grazing
2. Substitute for or Limit forage use
   - Hay or Range is in short supply
1992 Supplementation Talk

- Basic Concepts, Strategies and Goals
  - Industry, Extension Educators and producers
    - Energy and Protein concepts –
  - Paradigm shift with current products
    - Single Component vs Complete Supplement
      - Protein or Energy
      - Minerals
      - Biologics
  - Goal 100% usage and to the specific class
    - Delivery Techniques, Ingredients, Intakes for closer target consumptions
Supplementation

Types: when talking about forage based diet

- Energy
- Protein

- Each type contains the other (protein and energy). The difference is the relative amount of protein to energy.
  - Protein supp should contain at least 30 % CP
Supplementation

Which supplement should I use?
- Depends upon your goals and forage quality available to you.
- Goal:
  - Forage is in short supply \(\Rightarrow\) Energy
  - Low quality forage (hay or grazing) \(\Rightarrow\) Protein
Low Quality Forage – Winter Grazing

- Protein is the limiting nutrient
  - Energy may also be limiting, however, it is usually not as deficient as protein
  - Energy that is available in low quality forages is of little use without protein to support microbial digestion
    - PROTEIN Supp (> 30 % CP) should be utilized
To Review – Winter Grazing

What type of response can we expect:

- From a **Protein** supp?
  - Increased intake of the forage
  - Increased forage digestion

- In contrast to an **Energy** Supp
  - Decreased forage intake
  - Decreased forage digestion

When I look at grass hay sample analysis in MT, usually it is good to high quality, just not enough
We decide - we have to Supplement

- Delivery Method?
- When to Supplement?
- What Class to Supplement or All
  - Do we sort the herd
- How much?
  - Intake, Additional ingredients and $$$

- GOAL - 100% usage and meeting INTAKE
  - Specifically the younger animals
- If Winter Grazing
  - Distribution on Range
  - Increasing intakes of forage
Decisions for Max Forage Consumption, Protein

- Alfalfa Hay, cubes or hand delivered Supplement
  - Everyday, skip a day or twice a week
    - Maintains high forage intake

- VS

- Self fed Supplements
  - Tubs, creep, liquid,
    - Remoteness of pastures, 2 hours to North Pasture
    - Perhaps a reduction of Labor
Decisions for Max Forage Savings, Energy

- Energy cubes (barley/corn) hand delivered ENERGY
  - Stretching hay or forage reserves
  - May be very attractive with low grain prices
    - Pulse production increases moderate energy and moderate protein

- VS

- Self fed Supplements – that do not increase forage intake
  - Tubs, creep, liquid,
    - Remoteness of pastures
    - Labor reductions
Breaking the Paradigm

- **Complete Supplementation** – Rather than single nutrient supplementation
  - Required nutrient, Protein, energy or both
  - Minerals, Probiotics, Vitamins or other ingredients in one package

- Stressful period of high production
  - Last trimester
  - Breeding Season – April 1
  - still no grass
Winter....
### Table 2. Lower Critical Temperatures for Beef Cattle

<table>
<thead>
<tr>
<th>Coat Condition</th>
<th>Critical Temperature °F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wet or Summer Coat</td>
<td>59°</td>
</tr>
<tr>
<td>Dry, Fall Coat</td>
<td>45°</td>
</tr>
<tr>
<td>Dry, Winter Coat</td>
<td>32°</td>
</tr>
<tr>
<td>Dry, Heavy Winter Coat</td>
<td>18°</td>
</tr>
<tr>
<td>Dry, Heavy Winter Coat</td>
<td>18°</td>
</tr>
</tbody>
</table>

### Table 3. Daily Dry Matter Intake of Beef Cows Based on Temperatures

<table>
<thead>
<tr>
<th>Temp. °F</th>
<th>&lt;5°</th>
<th>5-22°</th>
<th>22-41°</th>
<th>41-59°</th>
<th>59-77°</th>
<th>77-95°</th>
<th>&gt;95°</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intake Ratio</td>
<td>116</td>
<td>107</td>
<td>105</td>
<td>103</td>
<td>102</td>
<td>90</td>
<td>65</td>
</tr>
</tbody>
</table>
Consecutive days below Zero

oh year don’t forget 4 feet of snow

Table 1. Example of effect of temperature on Energy Needs

<table>
<thead>
<tr>
<th>Temperature</th>
<th>Extra TDN Needed</th>
<th>Hay (lbs/cow/day)</th>
<th>Grain (lbs/cow/day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>50F</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>+30F</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>10F</td>
<td>20%</td>
<td>3.5-4</td>
<td>2-2.5</td>
</tr>
<tr>
<td>-10F</td>
<td>40%</td>
<td>7-8</td>
<td>4-6</td>
</tr>
</tbody>
</table>

-20 for three weeks

Un. Wisc

Have to ahead of the weather if possible - drought
Weak Calf Syndrome

Weak calf syndrome presents as a newborn calf that is weak, unable or slow to rise, stand or nurse. These calves often die within three days of birth. They may be also called “dummy calves” or “fading calves.”

Cow nutrition – Weak calf syndrome has been associated with low energy and protein nutrition in late pregnant cows. Researchers from the University of Idaho studied 19 herds to identify the role that pre–calving nutrition might play in "weak calf syndrome" and found the problem was associated with the amount of protein consumed by the cow during the last 60 days of pregnancy. Cows eating hay containing more than 10 percent crude protein had no problems with weak calf syndrome but cows eating hay with less than 10 percent crude protein had an average of 8.5 percent weak calves. Calves born to protein–deficient cows cannot generate body heat as well after birth. Therefore, during the last two months of gestation cows should receive at least 2 pounds of protein per head per day to reduce the incidence of weak calves. Energy in the diet of cows also seems to be important because calves born to thin cows are at increased risk of weak calf syndrome. Cow body condition is frequently used as an indicator of energy balance. The following table shows the impact of cow body condition score at calving on calf time to standing after birth, colostrum production, and immune function (IgG or immunoglobulins in the colostrum).

<table>
<thead>
<tr>
<th>Cow body condition at calving:</th>
<th>BCS 3</th>
<th>BCS 4</th>
<th>BCS 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time to standing (minutes)</td>
<td>60</td>
<td>64</td>
<td>43</td>
</tr>
<tr>
<td>Colostrum production (ml)</td>
<td>1525</td>
<td>1112</td>
<td>1433</td>
</tr>
<tr>
<td>IgG1 (an immunoglobulin)</td>
<td>146</td>
<td>157</td>
<td>193</td>
</tr>
</tbody>
</table>
Alternative Forages as a Supplement?
Planned use of Annual Forages

- Fall – Winter alfalfa or hay field residue grazing
  - Rather haying, increase the grazing period and reducing machinery cost of putting up harvested forage
  - Warm season forages – Millet, Sorghum-Sudan Grass, Corn
- Cover Crops
  - Planned grazing of the cover crop
    - High intensity, short duration -
Alternative Forages as a Supplement?

- Planned use of Annual Forage
  - Fall – Winter alfalfa or hay field residue
  - Grazing
  - Rather haying
  - Cover Crops
  - Planned grazing of residue
## Forage Nutrient Composition

<table>
<thead>
<tr>
<th>Forage Type</th>
<th>Cool Season</th>
<th>Warm Season</th>
<th>Cool/Warm Season</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>%</td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td><strong>CP</strong></td>
<td>14.2&lt;sup&gt;a&lt;/sup&gt;</td>
<td>21.6&lt;sup&gt;c&lt;/sup&gt;</td>
<td>18.0&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td><strong>ADF</strong></td>
<td>35.7&lt;sup&gt;a&lt;/sup&gt;</td>
<td>33.2&lt;sup&gt;b&lt;/sup&gt;</td>
<td>33.8&lt;sup&gt;ab&lt;/sup&gt;</td>
</tr>
<tr>
<td><strong>TDN</strong></td>
<td>59.9&lt;sup&gt;b&lt;/sup&gt;</td>
<td>64.3&lt;sup&gt;a&lt;/sup&gt;</td>
<td>61.7&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td><strong>NO3</strong></td>
<td>1.70</td>
<td>0.05</td>
<td>1.70</td>
</tr>
</tbody>
</table>

### Cool Season

<table>
<thead>
<tr>
<th>CP</th>
<th>ADF</th>
<th>TDN</th>
<th>NO3</th>
</tr>
</thead>
<tbody>
<tr>
<td>14.2&lt;sup&gt;a&lt;/sup&gt;</td>
<td>35.7&lt;sup&gt;a&lt;/sup&gt;</td>
<td>59.9&lt;sup&gt;b&lt;/sup&gt;</td>
<td>0.02</td>
</tr>
</tbody>
</table>

### Warm Season

<table>
<thead>
<tr>
<th>CP</th>
<th>ADF</th>
<th>TDN</th>
<th>NO3</th>
</tr>
</thead>
<tbody>
<tr>
<td>21.6&lt;sup&gt;c&lt;/sup&gt;</td>
<td>33.2&lt;sup&gt;b&lt;/sup&gt;</td>
<td>64.3&lt;sup&gt;a&lt;/sup&gt;</td>
<td>1.00</td>
</tr>
</tbody>
</table>

### Cool/Warm Season

<table>
<thead>
<tr>
<th>CP</th>
<th>ADF</th>
<th>TDN</th>
<th>NO3</th>
</tr>
</thead>
<tbody>
<tr>
<td>18.0&lt;sup&gt;b&lt;/sup&gt;</td>
<td>33.8&lt;sup&gt;ab&lt;/sup&gt;</td>
<td>61.7&lt;sup&gt;b&lt;/sup&gt;</td>
<td>0.03</td>
</tr>
</tbody>
</table>

### Forage Barley

<table>
<thead>
<tr>
<th>CP</th>
<th>ADF</th>
<th>TDN</th>
<th>NO3</th>
</tr>
</thead>
<tbody>
<tr>
<td>13.0&lt;sup&gt;a&lt;/sup&gt;</td>
<td>29.6&lt;sup&gt;c&lt;/sup&gt;</td>
<td>66.8&lt;sup&gt;a&lt;/sup&gt;</td>
<td>0.02</td>
</tr>
</tbody>
</table>

### 7d post Killing Frost

<table>
<thead>
<tr>
<th>CP</th>
<th>ADF</th>
<th>TDN</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.65</td>
<td>40.7</td>
<td>56.1</td>
</tr>
</tbody>
</table>

### Warm Season

<table>
<thead>
<tr>
<th>CP</th>
<th>ADF</th>
<th>TDN</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.97</td>
<td>37.7</td>
<td>59.6</td>
</tr>
</tbody>
</table>
The area can grow tremendous amount to season-long warm season Forage or Cover Crops depending upon the year

Targeting high quality forage and preservation of deep subsoil moisture (cereal begins to head)

Above Ground Biomass

<table>
<thead>
<tr>
<th>Planting Statewide</th>
<th>CARC</th>
<th>EARC</th>
<th>NARC</th>
<th>NWARC</th>
<th>SARC</th>
<th>WARC</th>
</tr>
</thead>
<tbody>
<tr>
<td>23 Cool Season Cool</td>
<td>Cool</td>
<td>1404.5 b</td>
<td>938.75 b</td>
<td>1547.78 a</td>
<td>1205.83 bc</td>
<td>2654.12 abc</td>
</tr>
<tr>
<td>24 Cool Season Warm</td>
<td>Warm</td>
<td>2156.2 a</td>
<td>1489.4 a</td>
<td>1633.95 a</td>
<td>2922.59 a</td>
<td>3820.13 a</td>
</tr>
<tr>
<td>25 Warm Season Cool</td>
<td>Cool</td>
<td>394.7 c</td>
<td>410.55 c</td>
<td>446.3 b</td>
<td>186.55 c</td>
<td>499.77 d</td>
</tr>
<tr>
<td>26 Warm Season Warm</td>
<td>Warm</td>
<td>1286.7 b</td>
<td>1070.55 b</td>
<td>1870.47 a</td>
<td>1166.09 bc</td>
<td>1647.37 ed</td>
</tr>
<tr>
<td>27 Diversity Early</td>
<td>Cool</td>
<td>1149.2 b</td>
<td>862.59 b</td>
<td>1209.94 ab</td>
<td>950.69 bc</td>
<td>2211.57 abcd</td>
</tr>
<tr>
<td>28 Diversity Late</td>
<td>Warm</td>
<td>2153.5 a</td>
<td>1414.71 a</td>
<td>1938.52 a</td>
<td>2811.69 a</td>
<td>3440.4 ab</td>
</tr>
<tr>
<td>29 Alternative Cool</td>
<td>Cool</td>
<td>447.2 c</td>
<td>500.86 c</td>
<td>573.47 b</td>
<td>184.63 c</td>
<td>558.19 d</td>
</tr>
<tr>
<td>30 Alternative Warm</td>
<td>Warm</td>
<td>1472.7 b</td>
<td>1502.82 a</td>
<td>1258.08 ab</td>
<td>1676.37 b</td>
<td>2018.7 bcd</td>
</tr>
</tbody>
</table>

Entry  P= 0.0001
SE  156.51

Entry*Location  P= 0.0079
SE  114.54  268.29  351.57  585.21  122.07

Western Triangle removed from entire data set.
Southern removed from Warm season and Cocktail comparisons due poor emergence related to drought.
When water is not a limiting factor other options exist

We are double cropping our pivots to break disease cycles, cover the ground, weed competition, option for hay or late direct or windrow grazing.
4 Year Cash Returns – 2 full Cover Crop / Wheat Cycles

<table>
<thead>
<tr>
<th>Term Trt</th>
<th>4 Yr $/ac</th>
<th>Term Trt</th>
<th>4 Yr $/ac</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mow/Hay</td>
<td>$910.10 a</td>
<td>Mow/Hay</td>
<td>$681.95 a</td>
</tr>
<tr>
<td>Graze</td>
<td>$765.85 b</td>
<td>Graze</td>
<td>$625.95 b</td>
</tr>
<tr>
<td>Chemical</td>
<td>$690.55 c</td>
<td>Chemical</td>
<td>$579.99 c</td>
</tr>
</tbody>
</table>

- **Annual Forage Barley**
- **Mix #1 Legume #1**
- **Mix #2 Legume #2**
- **Mix #3 Legume #3**
- **Mix #4 Diversity**
- **Mix #5 Deep Rooted #1**
- **Mix #6 Legume #1**
- **Mix #7 Legume #2**
- **Mix #8 Diversity**
- **Mix #9 Deep Rooted #2**
- **Mix #10 Deep Rooted #2**
- **Mix #11 Legume #1**
- **Mix #12 Legume #2**
- **Mix #13 Deep Rooted #1**
- **Mix #14 Deep Rooted #2**
- **Mix #15 C/W Diversity**

- **Fallow**

Cash Returns: $716.39

Term Trt 4 Yr $/ac

- **Mow/Hay**: $910.10
- **Graze**: $765.85
- **Chemical**: $690.55

Cool Season

- **Mow/Hay**: $681.95
- **Graze**: $625.95
- **Chemical**: $579.99

Cool/Warm Season

- **Mow/Hay**: $561.96
- **Graze**: $550.00
- **Chemical**: $700.00

Warm Season

- **Mow/Hay**: $850.00
- **Graze**: $600.00
- **Chemical**: $900.00

Chemical $690.55 **c**
Long Term Response – Epigenetics

- Funston et al., Univ. Nebraska
  - “In 11 years of studies we have seen no benefit of supplementing cows on winter range to her ability to breed or breed back,”

- 1 lb. per day of a 30% protein supplement

- Grazing Corn Stalks or winter range
Long Term Response – Epigenetics

- Big difference was seen in pregnancy rates
  - Heifers from cows grazing winter range and supplementation
    - Pregnancy rates 14% higher
    - than those from non-supplemented dams.
  - Heifers from cows grazing corn crop residue and supplemented had
    - Pregnancy rates 5% higher than those from non-supplemented dams.

- “So, we’re not only impacting weaning weight and carcass weight of the steers, we’re impacting the fertility of heifers before they’re ever born,” Funston said.
Wyffels et al., 2018

- Strategic Supplementation
  - Optimal nutrient delivery systems
  - Optimal use of Low-Quality Forages
  - Optimal use of Rangelands
Winter Grazing Research at Havre
- Winter of 2016/2017 and 2017/2018

- Influence of Supplement Intake and Cow Age on Grazing Behavior and Rangeland Use Patterns
  - Sam Wyffels, Jan Bowman, Lance McNew, Darrin Boss, Cory Parsons, Julia Dafoe, Alyson Hicks-Lynch, and Tim DelCurto
    - Vegetation: production and cover by species, forage quality, robel structure estimates
    - Soil organic matter, temperature maps (GIS Layers)
Figure 1. The influence of cow age on supplement intake and variation in intake. Age class 1 = yearling heifers, age class 2 = 2 & 3 yr cows, age class 3 = 4 & 5 yr cows, age class 4 = 6 & 7 yr cows, age class 5 = 8 & 9 yr cows, and age class 6 = 10 & older (Wyffels et al., 2018).
Figure 2. The influence of environment and cow age on supplement intake behavior. Best-Fit model involved mean daily temperature and cow age (Wyffels et al., 2018).
Effective Supplementation

- Continue to fill the hole
  - Use appropriate delivery techniques
  - Monitor Intakes and young animals
- Use Supplementation as an integrated approach rather than just emergency
  - Early Spring Forage – Mid-Season Grazing
    - cover crop – Fall Weaning Windrow Grazing
- Begin to think long term about epigenetics and how that can or may be used as a tool on your operation
  - Increase early Pregnancy Rates and 1st service conception
Thank you
dboss@montana.edu
Field Day June 21, 2018
Focus on Forages & After Burn Management