Yak Exhibition 2018

Dr. Michelle Arnold, DVM
DABVP (Food Animal)
Ruminant Extension Veterinarian
University of Kentucky Veterinary Diagnostic Laboratory

Nutrition

- Good Nutrition in the Pregnant/Lactating Cow is Essential for a Healthy Calf

  Cows need adequate energy level in late pregnancy, early lactation, and cold weather
  Do not allow cows to lose weight the last 30 days of pregnancy-Critical time
  Heifers-still growing themselves! Extra demands.
Don’t skimp on Energy

- Cows that lose weight in the last 30 days of pregnancy are at higher risk for:
  - Weak or stillborn calves due to prolonged delivery-oxygen deprivation
  - Poor quality/quantity of colostrum
  - Calf is slow to stand and nurse-increased risk of navel infections, failure of passive transfer
  - Slow to rebreed

Calf Colostrum Absorption is best in the first 6 hours of life and steadily declines to zero in 24 hours

Passive Transfer of Immunity: Transport of colostral IgG from the gut lumen to the neonate’s system

How long is this protective?
Don’t skimp on Energy

Estimated Net Energy Requirements for 2-, 3-, and 5-year old Cows

Calving
Breeding Season
Wean
Beef Cattle Body Condition Scoring

- Reflects adequacy of feeding program
- BCS is a visual assessment of body fat
- Scoring range of 1 to 9, 1=thin, 9=obese
- A change in score = 4 to 5% empty body fat and 65 to 85 lbs of body weight

Examples of Thin or Low BCS

Note the sharpness of the shoulder blade, hip area, visible ribs.

To Increase from BCS 4 to BCS 5 in 90 days
~ 20% increase in Energy req’t = ~ 3 lb corn
Dry, Mid-Gestation, no cold stress
Body Condition Scoring

Repro Effects

- In general, the reproductive rate of free-ranging yak is low under normal grazing and rearing conditions (Li and Wiener 1995)
- Females are most likely to calve every two years, and many will have only one annual estrus, with much of the relatively low productivity being directly attributed to malnutrition in winter and early spring (Li and Wiener 1995).
Trace Mineral Deficiencies

- The immune system fails to respond in:
  - Chronically diseased animals
  - Poor nutritional status—especially trace mineral deficient (selenium and copper)
  - Stressed, sick, or heavily parasitized cattle

Se Mineral Deficiencies lead to:

- Abortion and perinatal mortality
- Fewer immunoglobulins in colostrum
- Delayed Conception, cystic ovaries, Retained placentas
- Muscular degeneration, myocardial necrosis in calves
- Poor immunity to infectious diseases
- Decreased vaccination efficacy
Copper Deficiencies

- Important for growth, immune function, nervous system. Component of many enzymes.
- Deficiency is primary or secondary
- Primary-inadequate intake
- Secondary-Interfering substances (Molybdenum and Sulfur)
- Liver is best for assessment
Shakeback Disease

- Pica, emaciation, unsteady gait, obvious shivering and trembling
- Coat color unaffected
- Anemia, susceptible to fractures
- Secondary Cu deficiency due to high Molybdenum in soils and forage

Production Performance of Yaks (Poephagus grunniens L.) and Their Calves Given Vitamin E and Selenium During Late Gestation

Table. Effect of Vitamin E and Selenium treatment on the productive characteristics of yaks.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Treatment 1 (Control)</th>
<th>Treatment 2 (5 mL)</th>
<th>Treatment 3 (10 mL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Birth weight of calves (kg)</td>
<td>13.87±0.60</td>
<td>14.38±0.52</td>
<td>14.89±0.40</td>
</tr>
<tr>
<td>Mortality at first month (%)</td>
<td>14.3 (1/7)</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Growth rate of calves up to weaning (gm/day)</td>
<td>0.18±0.19</td>
<td>0.19±0.11</td>
<td>0.20±0.02</td>
</tr>
<tr>
<td>Survival rate up to weaning</td>
<td>97 (71.4%)</td>
<td>97 (65.7%)</td>
<td>97 (65.7%)</td>
</tr>
<tr>
<td>Total milk yield (liters)</td>
<td>267.60±13.14</td>
<td>283.42±19.82</td>
<td>344.39±43.65</td>
</tr>
<tr>
<td>Lactation length (days)</td>
<td>245.40±12.57</td>
<td>264.67±15.31</td>
<td>357.67±14.55</td>
</tr>
</tbody>
</table>

*Five ml of 50 mg/ml Vitamin E and 1.5 mg/ml sodium selenite twice a day at 7 days interval.
*Ten ml of 50 mg/ml Vitamin E and 1.5 mg/ml sodium selenite twice a day at 7 days interval.
*Values with different superscripts within a row differ (P<0.05).

Treatment 2: 250 mg Vit E, 7.5 mg Selenium
Treatment 3: 500 mg Vit E, 15 mg Selenium
1 dose Multimin @ 1ml/200# BW 30 days prebreeding/precalving:
2 ml= 10 mg Selenium, 20 mg Mn, 120 mg Zn, 30 mg Copper
1 dose MuSe= 10 mg Selenium, 100 mg Vitamin E

Sourabh Deori*, BVSc and AH, MVSc, Joken Bam, BVSc and AH, MVSc and Vijay Paul, BSc, MSc, PhD

Efficacy of prepartal vitamin E and selenium administration on fertility in Indian yaks (*Poephagus grunniens*)


### Table 1. Influence of the group on fertility in yak

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Group I (5 mL)</th>
<th>Group II (10 mL)</th>
<th>Group III (control)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Placental expulsion period (hrs)</td>
<td>5.90± 0.76</td>
<td>3.81± 0.31</td>
<td>6.10± 1.05</td>
</tr>
<tr>
<td>Percent calving abnormalities</td>
<td>0.00</td>
<td>0.00</td>
<td>28.6</td>
</tr>
<tr>
<td>Uterine involution period (days)</td>
<td>31.83± 0.70</td>
<td>29.33± 0.49</td>
<td>34.83± 1.51</td>
</tr>
<tr>
<td>Calving to first estrus interval (days)</td>
<td>143.51± 17.00</td>
<td>110.25± 7.56</td>
<td>162.00± 21.36</td>
</tr>
<tr>
<td>Days open (days)</td>
<td>171.36± 17.03</td>
<td>140.53± 12.12</td>
<td>185.30± 23.11</td>
</tr>
<tr>
<td>Number of services per conception</td>
<td>2.91± 0.96</td>
<td>2.13± 0.83</td>
<td>3.21± 0.71</td>
</tr>
</tbody>
</table>

*Values within the row marked with different letters in superscript differ significantly: Group I (n = 7): animals received 5 mL of vitamin E and selenium twice in 7 days period. Group II (n = 7): animals received 10 mL of vitamin E and selenium twice in 7 days period. Group III (n = 7): animal receiving no prepartal treatment (controls).*

**Very little information**

- Only a few authors have reported diseases caused by deficiencies of trace elements for yaks in China (Liu et al., 1995; Shen et al., 2005).
- Compared with normal values in cattle and sheep:
  - iron, cobalt, manganese and calcium within the normal range for ruminants
  - mean zinc concentration was half of that in sheep and cattle
  - mean copper level (21.6±8.6 mg/kg) in liver was very much lower than that in other ruminants (Liu et al., 1995)
From Vijay Paul, PhD Principal Scientist (Animal Physiology)
ICAR-National Research Centre on Yak

- **Area specific mineral formulation:** Area specific mineral (ASMM) formulation for yak feeding is prepared with zinc (Zn), copper (Cu), cobalt (Co) and manganese (Mn) in the ratio of 40:20:2:1. Soil, feed and fodder of yak rearing regions are found deficient in certain trace minerals, therefore, hampering animal health and productivity. The above mentioned area specific mineral formulation is already proved to improve the yak health and production. Area specific minerals can further be supplemented in complete feed blocks made through locally available feed resources. This has an additional advantage of an ease in transport and storage in difficult hilly terrain due to compact size of voluminous feed. (630 mg per head per day)

- Location in India is Eastern Himalaya with high rain fall 2500 to 3000mm/annually. These four minerals were below the critical levels in the above mentioned samples.

### Beef Cow Requirements vs. Fescue
**(ppm or mg/kg)**

<table>
<thead>
<tr>
<th></th>
<th>Req</th>
<th>Fescue*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cu</td>
<td>10</td>
<td>6</td>
</tr>
<tr>
<td>Se</td>
<td>.1-.3</td>
<td>.06</td>
</tr>
<tr>
<td>Zn</td>
<td>30</td>
<td>19</td>
</tr>
<tr>
<td>Mn</td>
<td>40</td>
<td>119</td>
</tr>
<tr>
<td>Co</td>
<td>.1</td>
<td>.2</td>
</tr>
<tr>
<td>Fe</td>
<td>50</td>
<td>100</td>
</tr>
</tbody>
</table>

*CHAPA, 1996
Not Only What is in the Forage, Mineral Availability Important

<table>
<thead>
<tr>
<th></th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ca</td>
<td>50-68</td>
</tr>
<tr>
<td>Mg</td>
<td>10-45</td>
</tr>
<tr>
<td>P</td>
<td>65-70</td>
</tr>
<tr>
<td>Cu</td>
<td>5-15</td>
</tr>
<tr>
<td>Se</td>
<td>28-32</td>
</tr>
<tr>
<td>Fe</td>
<td>30-70</td>
</tr>
<tr>
<td>Mn</td>
<td>3-4</td>
</tr>
</tbody>
</table>

Read the label
New Reloader 250™ Mineral Bolus (250 days)

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<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Amount Delivered Daily</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zinc, mg</td>
<td>200</td>
</tr>
<tr>
<td>Manganese, mg</td>
<td>12</td>
</tr>
<tr>
<td>Copper, mg</td>
<td>48</td>
</tr>
<tr>
<td>Iodine, mg</td>
<td>12</td>
</tr>
<tr>
<td>Cobalt, mg</td>
<td>1.0</td>
</tr>
<tr>
<td>Selenium, mg</td>
<td>2.1</td>
</tr>
<tr>
<td>Vitamin A, IU</td>
<td>4,000</td>
</tr>
<tr>
<td>Vitamin D, IU</td>
<td>800</td>
</tr>
<tr>
<td>Vitamin E, IU</td>
<td>20</td>
</tr>
</tbody>
</table>
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“By going through the composition of 'Reloader' preparation, you may recommend it to yaks, if this preparation is recommended for the cattle.”- V. Paul

Blood Trace Mineral Analysis

- Yak (*Bos grunniens* or *poephagus gruniens*)- lack of available reference ranges
- Practical and relatively inexpensive test
- ICP/MS (Inductively coupled plasma/ mass spectroscopy)- fast, sensitive, precise accurate
- Many limitations to direct measurement
Limitations

- If inadequate intake from the diet, depletion of storage pool and transport forms of trace elements before development of disease
- Factors other than nutrition affect trace mineral concentrations (homeostasis, pregnancy, lactation, gestation, inflammation)
Challenges

- Adequate intake of energy, protein and trace minerals.
- Knowing nutrient quality of forages. Do you test your forages?
- How to correctly assess body condition with long, fluffy hair?
- Questions: michelle.arnold@uky.edu