Yak Exhibition 2018

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Nutrition

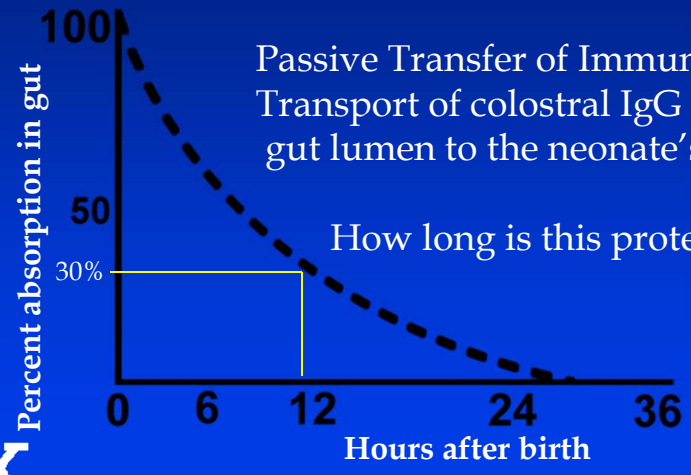
- Good Nutrition in the Pregnant/ Lactating Cow is Essential for a Healthy Calf
  - Cows need adequate energy level in late pregnancy, early lactation, and cold weather
  - Do not allow cows to lose weight the last 30 days of pregnancy-Critical time
  - Heifers-still growing themselves! Extra demands.

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

UK

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

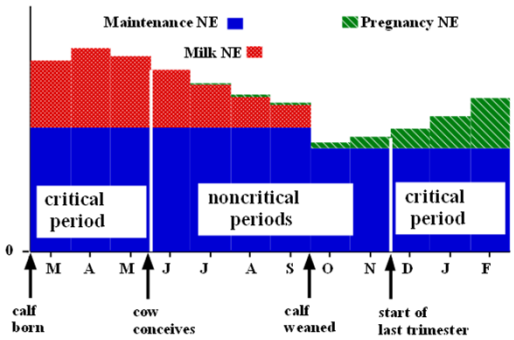


Passive Transfer of Immunity: Transport of colostral IgG from the gut lumen to the neonate's system

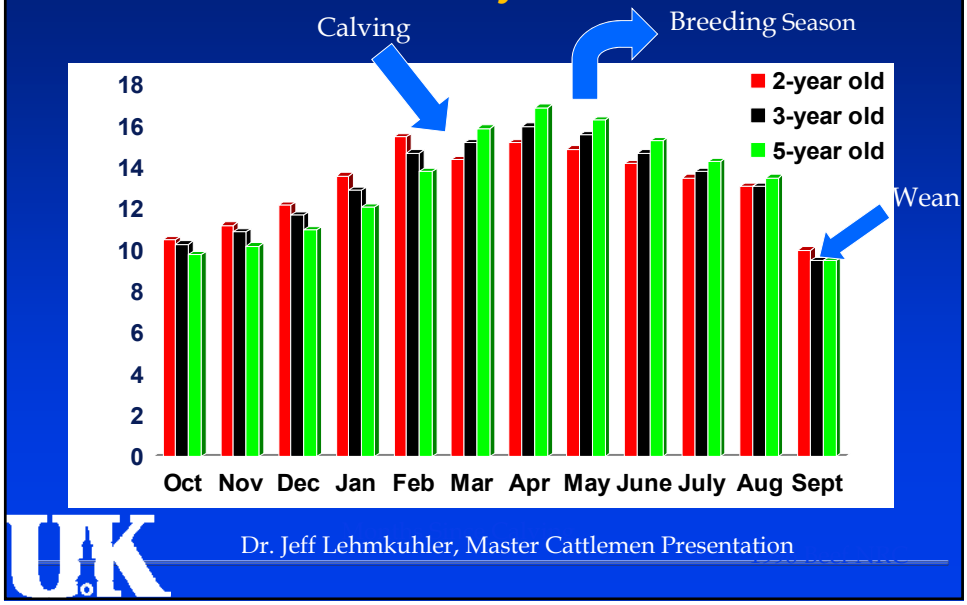
How long is this protective?

UK

Don't skimp on Energy



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



Dr. Jeff Lehmkuhler, Master Cattlemen Presentation

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

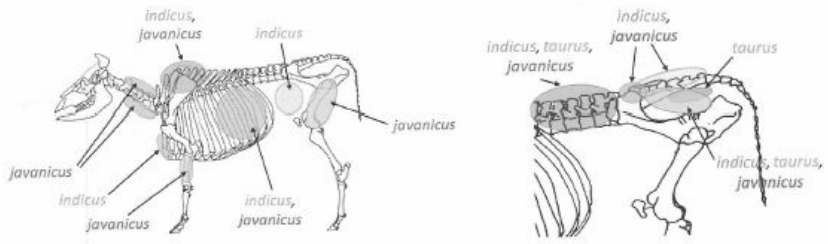


Fig. 5. Comparison of the features used in assessing the body condition of *Bos indicus*, *B. taurus* (dairy) and *B. javanicus* cattle (from Nicholson and Butterworth 1986; Soares and Dryden 2011; Dairy Australia 2013).

Bos Taurus (English breeds), Bos indicus (Zebu breeds), Bos javanicus (Bali cattle-Southeast Asia)

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

Specimen	Test Name	Result	Ref. Range- Result
No ID - Mammalian - Bovidae - Bovine - Mixed - Female - 8 Years			
Liver - Tissue, fresh - S	PANEL: Mineral Panel - Liver - 1/20/2016 12:48 PM		
	Cobalt - Liver	0.042 ppm	0.02 - 0.08 ppm
	Copper - Liver	6.40 ppm	25 - 100 ppm
	Iron - Liver	131 ppm	45 - 300 ppm
	Manganese - Liver	1.70 ppm	2 - 6 ppm
	Molybdenum - Liver	0.411 ppm	0.14 - 1.4 ppm
	Selenium - Liver	< 0.03 ppm	
	Zinc - Liver	50.4 ppm	25 - 100 ppm

The liver copper and selenium concentrations in this animal are low. The liver selenium concentration is so low that it is below the minimum level of quantification for the method used (normal reference range for liver selenium in adult cattle: 0.25 - 0.5 ppm, on a wet weight basis). This selenium concentration is low enough to be associated with deficiency disorders. Investigation in the herd and dietary trace mineral status might be warranted.

Method: ICP-MS. All values are reported on a wet weight basis.

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

Specimen	Test Name	Result	Ref. Range
#12 - Mammalian - Bovidae - Bovine - 7 Years			
Liver - Tissue, fresh - 5	PANEL: Metal Panel - Liver - 8/27/2018 4:02 PM		
	Arsenic - Liver	< 0.10 ppm	(0 - 0.4 ppm)
	Cadmium - Liver	0.0878 ppm	(0.01 - 0.5 ppm)
	Chromium - Liver	< 0.10 ppm	(0.04 - 3.8 ppm)
	Cobalt - Liver	0.0519 ppm	(0.02 - 0.08 ppm)
	Copper - Liver	1.05 ppm	(Lo) (25 - 100 ppm)
	Iron - Liver	263 ppm	(45 - 300 ppm)
	Lead - Liver	< 0.05 ppm	(0 - 0.5 ppm)
	Magnesium - Liver	145 ppm	(100 - 250 ppm)
	Manganese - Liver	0.910 ppm	(Lo) (2 - 6 ppm)
	Molybdenum - Liver	1.01 ppm	(0.14 - 1.4 ppm)
	Selenium - Liver	0.327 ppm	(0.25 - 0.5 ppm)
	Zinc - Liver	62.1 ppm	(25 - 100 ppm)

The copper concentration in the liver tissue is extremely low in this animal. This level is low enough to be associated with deficiency disorders. Other elements such as molybdenum, iron, and zinc are not excessive in the liver tissue, suggesting the copper deficiency is most likely primary in nature (low dietary copper), but evaluation of the diet can help determine this. Also, excessive dietary sulfur can cause secondary copper deficiency. In adult cattle, primary copper deficiency can cause a number of disorders, including myocardial atrophy, sudden death, anemia, lameness, coarse hair coat, hair coat color changes, diarrhea, and fertility

Copper

- 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.

Parameter	Treatment 1 (Control)	Treatment 2 (5 ml)[a]	Treatment 3 (10 ml)[b]
Birth weight of calves (kg)	13.17[b]±0.60	14.33[a]±0.92	14.83[a]±0.40
Mortality at first month (%)	14.3 (1/7)	0.0	0.0
Growth rate of calves up to weaning (gm/day)	0.18±0.19	0.19±0.11	0.20±0.02
Survival rate up to weaning	5/7 (71.4%)	6/7(85.7%)	6/7(85.7%)
Total milk yield (liters)	267.95[b]±13.14	283.52[b]±10.52	484.33[a]±15.65
Lactation length (days)	245.40[b]±12.57	264.67[b]±15.31	357.67[a]±14.55

[a]Five ml of 50 mg/ml Vitamin E and 1.5 mg/ml sodium selenite twice a day at 7 days interval.
[b]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
Philipp. J. Vet. Med., 52(2): 121-124, 2015

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

Parameters	Group I (5 mL)	Group II (10 mL)	Group III (control)
Placental expulsion period (hrs)	$5.90^{ab} \pm 0.76$	$3.81^{a} \pm 0.31$	$6.16^{b} \pm 1.05$
Percent calving abnormalities	0.00	0.00	28.6
Uterine involution period (days)	$31.83^{ab} \pm 0.70$	$29.33^{a} \pm 0.49$	$34.83^{b} \pm 1.51$
Calving to first estrus interval (days)	$143.51^{ab} \pm 17.09$	$110.25^{a} \pm 7.56$	$162.04^{b} \pm 21.36$
Days open (days)	$171.36^{ab} \pm 17.03$	$140.53^{a} \pm 12.12$	$185.30^{b} \pm 23.11$
Number of services per conception	$2.91^{ab} \pm 0.96$	$2.13^{a} \pm 0.83$	$3.21^{b} \pm 0.71$

[a,b] 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).

DEORI, S., J. BAM, V. PAUL: Efficacy of prepartal vitamin E and selenium administration on fertility in Indian yaks (*Poephagus grunniens*). Vet. arhiv 84, 513-519, 2014.

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)

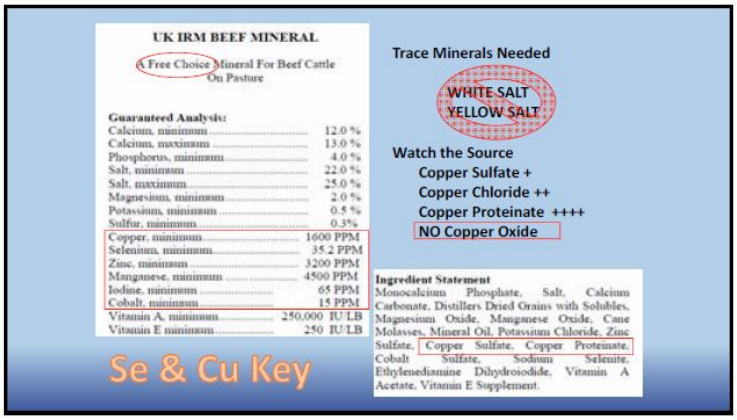
	Req	Fescue*
Cu	10	6
Se	.1-.3	.06
Zn	30	19
Mn	40	119
Co	.1	.2
Fe	50	100

*CHAPA, 1996

Not Only What is in the Forage, Mineral Availability Important

	%
Ca	50-68
Mg	10-45
P	65-70
Cu	5-15
Se	28-32
Fe	30-70
Mn	3-4

Read the label



New Reloader 250™ Mineral Bolus (250 days)

Nutrient	Amount Delivered Daily
Zinc, mg	**200**
Manganese, mg	12
Copper, mg	**48**
Iodine, mg	12
Cobalt, mg	**1.9**
Selenium, mg	2.1
Vitamin A, IU	**4,000**
Vitamin D, IU	800
Vitamin E, IU	**20**

"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)

Limitations

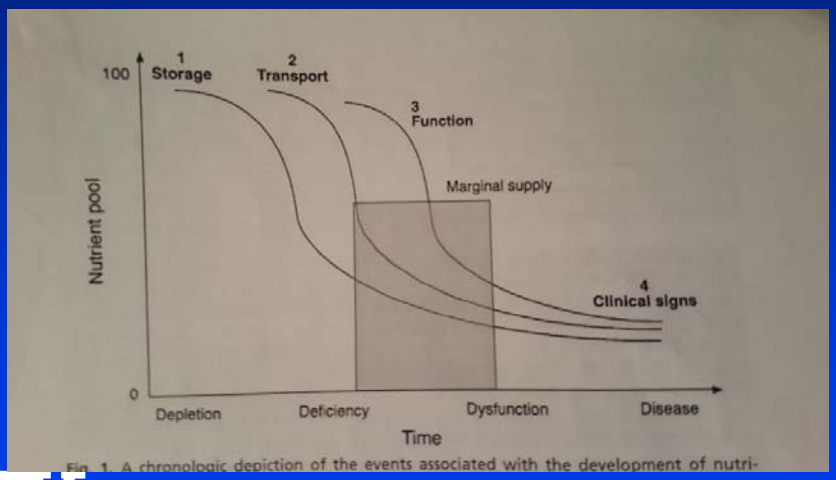


Fig. 1. A chronologic depiction of the events associated with the development of nutri-

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