Oat, Barley, Snow Peas and Brassica Swath Grazing

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Swath Grazing Forage Blends

Blend 1: Oats, Barley, Peace Diverse Annual Mix. Seeded July 7, 2015.

Peace Diverse Annual Mix - GRAZA Forage Radish, WINFRED Forage Brassica, HUNTER Forage Brassica, CORRINE Ethiopian Cabbage, Sorghum, Millet, Ryegrass, Hairy Vetch and Crimson Clover.

Blend 2: Oats, Barley, Snow Peas, Peace Diverse Annual Mix. Seeded May 23, 2015.

Blend 3: Peace Diverse Annual Mix.

Table 1: Swath Feed Samples - September 2015

	Blend 1	**Blend 2**	**Blend 3**
Dry Matter %	18.2	72.1	15.7
Crude Protein %	19.80	11.2	19.8
Ca %	0.56	0.5	0.87
P %	0.28	0.26	0.38
Mg %	0.19	0.17	0.26
Na %	0.18	0.045	0.088
K %	2.39	1.35	3.16
Iron ppm	588.00	102	180
Cu ppm	8.00	4	4
Mn ppm	45.00	41	42
Zn ppm	31.00	22	38
Nitrates %	0.59	0.14	0.98

Understanding Nitrate Levels

% Nitrate	**Comment**
<0.44	Safe to feed
0.44 - 0.66	Safe for non-pregnant animals. Limit to 50% of ration dry matter intake. Animals may go off feed, experience a slow drop in mild production or abort in some cases.
0.66 - 0.88	Limit to 50% of ration dry matter. Above symptoms, some death.
0.88 - 1.54	Limit to 35-40% of ration dry matter. DO NOT FEED TO PREGNANT ANIMALS.
1.54 - 1.76	Limit to 25% of ration dry matter. DO NOT FEED TO PREGNANT ANIMALS.
>1.76	TOXIC - DO NOT FEED

Table 2: Soil Samples

0-6"	May, 2015 **Blend 1**	October, 2015 **Blend 1**	October, 2015 **Blend 2**	October, 2015 **Blend 3**
OM (%)	7.6	11.4	8.9	14.3
N (ppm)	44	29.0	8	10
P (ppm)	27	>60	24	>60
K (ppm)	482	>600	293	>600
S (ppm)	7	14.0	452	11
Ca (ppm)	2400	2090.0	4820	2170
Mg (ppm)	245	358.0	652	524
Fe (ppm)	140	150.0	24	120
Cu (ppm)	0.8	0.9	0.5	1.2
Zn (ppm)	3.2	5.9	2	11
B (ppm)	1.2	1.5	1.8	1.7
Mn (ppm)	50.1	28.2	3.5	14.5
Chloride (mg/kg)	11	12.0	5.1	8.6
pH	5.4	6.4	7.7	6.6

Soil Quality

Soil is a living system that represents a finite resource that is essential to life on earth. It forms a thin skin made up of mineral and organic matter on the earth's surface. It develops slowly and is influenced by parent materials, time, climate, and living organisms.

Soil quality is mainly an indication how well it performs the functions that we want it to. Soil quality can be influenced by the land use decisions made by its stewards. In agriculture our thoughts immediately turn to crop production. Some of the key functions include:

- Water holding capacity
- Water and air movement
- Providing nutrients for the crop
- Nutrient cycling
- Hosting the biological life forms that aid nutrient mineralization

Soil organic matter is a very important to soil quality since it affects both the physical and chemical properties of the soil. It improves soil quality by influencing water and air movement, water infiltration rate, water holding capacity, soil structure, bulk density, tilth and nutrient holding ability. Organic matter provides nutrients as well as binding them as a reservoir for future use. It also helps bind soil particles together, reduces surface crusting, stabilizes soil aggregates and reduces both water run-off and soil erosion.

Providing the crop with a complete and balanced nutrient package, according to its needs, not only improves the yield but also has a direct effect on the soil organic matter component. As the root grows it is a continuous process of shedding dead tissue as new cells grow. The root tip consists of specialized cells, containing glomalin, which sloughs off to make the movement through the soil easier. This material adds to the organic content of the soil. Old roots die as new roots are established. In a swath grazing scenario both the left behind plant material and the manure from the animals add to the organic content and the nutrient of the soil.

Water and air movement through the soil is accomplished through the channels caused by decaying roots as well as those caused by burrowing insects and worms. Worms through their castings help bind smaller soil particles into larger stable aggregates.

Soil Compaction can deprive crops of water and nutrients even in a situation where moisture and nutrients are in adequate supply. Roots cannot absorb water and nutrients if air is not available to them. Compacted soil also make root penetration more difficult, limiting their ability to access, phosphorous, potash and certain micronutrients that are immobile and must be sought out by the roots. To prevent soil compaction swath grazing animals should be removed when the ground starts to thaw.

Nitrogen, after swath grazing it is not unusual to see an increase in soil test N. If a single urine spot is included in the sample an increase in soil test N is expected. With peas, fixed nitrogen goes to the production of protein and only after the peas are mature (physiological maturity) does any residual N remain for the next season. Another benefit of peas is that their fibrous root system can leave the top soil in a rich condition.

Phosphorous in soils moves between three, perhaps four pools of varying availability. The numbers in all soil tests are moderately low with 40 ppm a desirable working number. Phosphorous serves as the instrument of energy exchange in plant, animal and human cells.

Potassium activates protein synthesis and is required for enzyme activation. It also acts to make plants more water use efficient and resistant to freezing. Alfalfa is a heavy user of potassium.

Sulfur is required for protein synthesis. N + S = protein. Sulfur is also instrumental in the efficient use of nitrogen. It is also highly variable in soils due to sulfate being water soluble and very mobile. At the Acme site sulfur is extremely low in 3 of the 4 samples.

Calcium is essential for cell wall development and the structure that binds cell walls together. It also controls the rate of water uptake and transpiration. Our soils are calcareous in nature and large amounts are naturally present.

Magnesium is the nutrient at the center of the chlorophyll molecule and directly governs the rate of photosynthesis. This activity also translates into CO_2 fixing and control of several respiratory enzymes. There seems to be a slight reduction between September 2013 and

May 2014, more likely a soil variability issue since during that time period soil biological activity has been at a minimum.

Iron is essential for the formation of chlorophyll and photosynthesis. It is also the activating element in several enzyme reactions. Alfalfa and forage grasses have a significant need for iron. Iron is usually present in the soil as a sulfate and has a lack of uniformity in the soil as seen particularly in the May O/B sample.

Copper is another important enzyme activator and has an important role in plant reproduction. Lack of copper is associated with ergot. Copper from plant source also has an effect on the animal's immune system. Low soil copper is considered to be 0.4 – 0.8.

Zinc is involved in the transformation of carbohydrates into sugars and regulates sugar consumption in the plant. This soil has adequate amounts of zinc.

Boron is a non-metallic element that plays a major role in plant reproduction. It plays a role in cell differentiation and development in the meristematic tissue. The boron content is considered adequate.

Manganese plays a role in carbohydrate consumption for energy as well as the use of nitrogen in the production proteins. The soil test numbers show an adequate level of manganese.

Chlorine in the soil at low levels has a fungicidal effect suppressing root diseases. It has no known use in the plant despite there being many chlorinated organic compounds.