

# Sainfoin In Alberta.

## Bulletin 3: Innovation To Maximize Animal Performance

### Pasture Quality and Quantity

#### Palatability and Selectivity

Animals sense the quality of a food as a feeling of satiety or insufficiency. They can associate this feeling with taste and smell. Instinctively they know to compare, and decide which food is better, and they exhibit preferences that their owner can observe and manipulate to adjust their intake of nutrients.

In two separate grazing trials on vegetative, irrigated pastures of 70% alfalfa and 30% sainfoin at Lethbridge and Raymond Alberta, steers naïve to sainfoin:

- After about one hour of orientation, ate all the dandelions in the field in the first few hours of grazing, then all the orchardgrass, followed by the alfalfa. They avoided the sainfoin until the day before they were moved to a new paddock.
- The grazing preference pattern was repeated for the second paddock.
- In the third paddock, they ate the dandelions and orchardgrass first, followed by all the sainfoin, switching to alfalfa only when the other forages were gone. Average daily gains for the Raymond field exceeded 2 kg/d (Berg, B. unpubl. data, 1999).

Grazing trials on mid-blossom alfalfa/sainfoin in Saskatchewan reported an unusual selective grazing pattern; steers ate all the blossoming tops from the sainfoin first before eating other components.

#### Pasture Performance

An extensive evaluation of legume/grass pastures in four European countries found:

- Total daily liveweight gain of dairy cattle and sheep, per head and per hectare, was consistently greater for swards containing a tanniniferous legume.

- Sainfoin/grass pasture outperformed or was equivalent to alfalfa/grass in all key nutritional parameters such as

dry matter digestibility (.650 vs .647); concentration of crude protein (114.0 vs 104.5 gm/kg DM) and net energy (5.96 vs 5.92 MJ/kg DM) in the diet.

- Sheep were the grazing model in this trial. Daily intake of dry matter (2365 vs 2344 gm/d), crude protein (287.5 vs 270.0 g/d) and net energy (15.04 vs 14.81 MJ/d) all favoured sainfoin/grass.
- The proportion of the legume in the sainfoin/grass sward was lower (.125 vs .139) but the animal intake of legume was higher (.450 vs .305) than in the alfalfa/grass sward. (two year means from Molle, G., et. al. 2008).

Daily organic matter intake of steers grazing early bloom alfalfa/sainfoin pasture was similar to alfalfa alone but the incidence of bloat was significantly reduced (Wang Y., et.al. 2006).

#### Feed Value

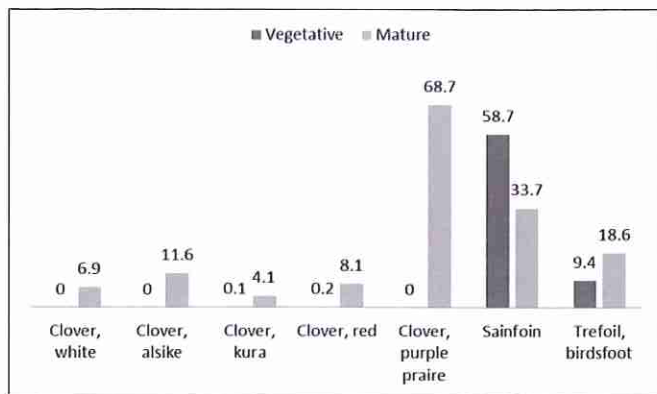
Sainfoin and other tanniniferous legumes can significantly improve the value of traditional feeds.

- North American grazing trials with sheep and cattle show improved gains, and feeding trials report higher nitrogen retention rates and increased essential amino acid titres in the blood stream.
- Silage made from a mixture of alfalfa and sainfoin (60:40) is more digestible than pure alfalfa silage, and wethers fed the mix grew more, ate less and had greater nitrogen retention.

## Tannins in Legumes

The improved feed characteristics of sainfoin are attributed to the bioactivity of condensed tannins (CT) produced by the plant. The amount, kind, and bioactivity of CT varies with the species and maturity. Alfalfa has no CT's in its foliage; there is a quantity in the seed coat.

CT's bind with proteins at normal ruminal pH values preventing the degradation of proteins in the rumen. CT's in high concentration can be toxic to the animal because they interfere with digestion. Early research on the efficacy of CT's to bind with alfalfa proteins found that sainfoin CT's bound best, and interfered with digestibility the least.



**Figure 1** Amount of CT (g/kg DM) found in legumes in Alberta (from Berard et. al. 2011)

### CT's and Bloat

Domesticated ruminants can bloat on some legumes, such as alfalfa and white or red clover. The condition occurs when animals consume very highly digestible vegetative material. Rapid fermentation of the forage in the rumen creates a great amount of gas (more than 200 liters per hour). The gas mixes with the rumen fluid creating bubbles. Proteins, liberated from the plant tissues during fermentation, coalesce with the bubbles into a stable foam that prevents the animal from burping and releasing the excess gas.

When CT's are available they bind with the proteins in the rumen, preventing them from stabilizing the bubbles.

**Ruminant animals grazing alfalfa pasture need to eat a sufficient quantity of sainfoin CT's to forestall bloat.**

**CT's are maximized at 50% bloom in sainfoin when alfalfa is at 20% bloom.**

### CT's Other Benefits

In addition to preventing bloat, tannins have an effect on gastrointestinal parasites; they appear to have some efficacy in reducing *E.coli* O157:H7 shedding, and may have a preventative role in atypical pneumonia /emphysema infections in pastured cattle. Additionally tannins in the diet may improve the flavour of pasture raised meat. The challenge is to find solutions that will manage preferential grazing and maintain sufficient quantities of the grazed CT-containing forage during periods of high bloat risk.