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Anti-Nutritive Factors

Anti Nutritive factors is a broad term that covers many components of feed that interfere with normal digestion or metabolism. Many feeds contain these anti nutritive factors and these need to be considered when using them. Some of the more common feeds that contain anti nutritive factors are cottonseed, soy beans, sorghum, leucaena and browse trees such as mulga. The rumen is very adaptable and many feeds that are problems for monogastrics can be safely fed at certain levels in ruminant diets as the rumen microbes can detoxify or neutralise the factors involved.

One classic example of an anti nutritive factor is the presence of mimosine in Leucaena. When the right microbes to detoxify this in the rumen are absent mimosine causes photosensitisation but by introducing the right bacteria leucaena can be safely fed. Other common feeds that are detoxified in the rumen include trypsin inhibitors in soy beans and gossypol in cottonseed. Trypsin is an enzyme necessary to digest protein and the inhibitor can seriously reduce protein digestion. The trypsin inhibitors in soybeans are detoxified by heat in the process of making soy bean meal but ruminants can handle up to 15% raw soy beans in their diet without adverse effects. Gossypol in cottonseed can cause infertility in males but cattle can handle 2 to 3 kg of whole cottonseed without any problems for bulls.

Prussic acid is present in sorghum particularly when it is stressed. Modern forage sorghums have been bred with lower prussic acid levels but if they are stressed or when feeding grain sorghum stubble or failed crops, care should be taken. Adequate sulphur in the diet is required to help the rumen bacteria detoxify the prussic acid.

Tannins are present in many feeds but are a particular problem in browse shrubs. Tannins bind with proteins and so prevent their digestion and absorption. Polyethylene glycol can bind with tannins to allow the protein to be digested but this is rarely economic. Mineral and protein supplementation has been shown to increase feed intake and digestion on high tannin diets such as feeding mulga. The rumen can adapt to some extent to high tannin diets and there has been a lot of research done attempting to introduce rumen bacteria from species that live on high tannin diets into domesticated ruminants.

Excess levels of fat in the diet of ruminants can depress rumen function. Fat is a high energy component of the diet but can only be fed at up to 4 to 5% of the diet. Above this level the digestion of all other components of the diet is reduced. Feeds that are high in fat include whole cottonseed, soybean and full fat soybean meal.

Ergot in sorghum can be a serious problem when feeding grain. Even at the low levels of infection accepted by grain receival standards, feed intakes can be reduced. The ergot toxin reduces the beast's ability to regulate body temperature which can be a serious problem when grain feeding during summer.

There are potential anti nutritive substances in many feeds commonly fed to livestock. By being aware of which feeds can be fed safely to ruminants and at what level they can be fed at, diets and supplements can be formulated to maximise performance.