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RESEARCH

Prussic Acid Poisoning in Grazing Livestock



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Plants in the sorghum family can grow in dry climatic conditions, where summer temperatures are above 68 degrees Fahrenheit (20 degrees

Celsius), and on somewhat marginal lands. Sorghums are C4 crops in the grass family and are characterized by their high photosynthetic efficiency.

Sorghum-sudan grass hybrids are well suited as forage crops since they can produce more biomass than forage or grain sorghums. With these characteristics, sorghum-sudan grasses could be an ideal forage crop for low-input agriculture in the Great Plains. However, sorghum or sorghum-sudan grasses can potentially cause prussic acid poisoning in livestock animals.

WHAT IS PRUSSIC ACID POISONING?

Prussic acid poisoning is a result of the release of hydrocyanic acid (HCN) from sorghum-type forages under certain conditions during livestock grazing. Stress factors (drought, frost, herbicide drift, insect damage and mechanical injury) and rapid plant growth rate can increase the production of the cyanogenic glycoside, dhurrin. In addition, high nitrogen fertilization in older plants will also increase the production of dhurrin.

After the plants are stressed and then begin to regrow, dhurrin comes in contact with certain plant enzymes and liberates toxic prussic acid or HCN compound. The young, leafy regrowth has a higher concentration of HCN compared to older leaves or stems. The young, leafy regrowth is also preferentially grazed by animals and hence results in a higher level of exposure.

HCN once consumed by animals prevents oxygen from being released from

the hemoglobin to the body cells, resulting in possible death due to suffocation at the cellular level. This process happens very rapidly, as early as 10 to 15 minutes, after grazing toxic pastures.

SYMPTOMS

Symptoms of animals that ingest prussic acid include rapid breathing, excessive salivation and muscle spasms that eventually lead to collapse and death. Upon observing such symptoms, animals must be immediately removed from toxic pastures.

HOW TO AVOID POISONING

To prevent prussic acid poisoning, livestock should not graze sorghum or sorghum-sudan grass hybrids immediately after frost, drought or other stress. Once there is approximately 24 inches of new growth after the stress is over, they should be safe to graze.

Also, sorghums or sorghum-sudan grass hybrid plants that have been wilted due to drought or a hard freeze should not be grazed until they are thoroughly dried down. HCN evaporates during the curing process, making dry standing plants or cured hay safe from prussic acid poisoning.

PLANT BREEDERS SEEK TO REDUCE THE PROBLEM

Interestingly, highly cyanogenic plants are preferred by some fungi and insects compared to plants with lower cyanogenic potential. Therefore, to increase food/feed safety and possible plant health (in some instances), it is desirable to reduce cyanogenic compounds in sorghum-sudan grass hybrids through either classical breeding or biotechnology. Since most of the prussic acid in sorghum-sudan grass hybrids is coming from sorghum, it is desirable to reduce prussic acid in the sorghum parent that will be used for the crosses. 🐄

