

Prussic Acid, Nitrate Can Be Toxic In Drought-Stricken Forages

COLLEGE PARK, Md. — A drought year like 1986 can turn certain forages into poisonous feed for livestock. Some thoughts on how livestock and dairy farmers can cope with this phenomenon have been assembled by Lester R. Vough and E. Kim Cassel, Extension professionals at the University of Maryland in College Park.

Severe drought occurring throughout much of Maryland and southeastern Pennsylvania this year is cause for concern by livestock producers—not only because of reduced feed supplies but also because of the potential for livestock poisoning. Drought stress increases the risks of prussic acid poisoning in sudangrass, sorghum, and sorghum-sudangrass hybrids. Severe drought conditions also can result in nitrates accumulating in these plants as well as in corn.

Prussic Acid

Sudangrass and sorghum produce cyanogenetic glucosides during their growing stage. Plants producing cyanogenetic glucosides are sometimes referred to as cyanogenetic plants. Glucosides are compounds that break down or decompose into glucose sugars by hydrolysis (addition of water). In cyanogenetic plants this decomposition process releases cyanide and it becomes toxic hydrocyanic acid—frequently called prussic acid—abbreviated HCN.

Under normal growing conditions, the intact glucoside occurs in the plant. When plants containing such glucosides are eaten by animals, they are readily eliminated before enough concentration occurs to be harmful. However, certain conditions involving climate, fertility, stage of growth, and anything that retards plant growth and development may increase cyanogenetic glucosides in the plants.

A rapid regrowth following retardation favors the increase of

glucosides. Wilting and frost injury may cause a rapid increase of hydrocyanic acid (prussic acid) in a plant that would otherwise have been nontoxic.

Sorghum is much higher than sudangrass in prussic acid; and, in general, it is unsafe for pasturing except after plants reach maturity and no new growth is present. As a group, sorghum-sudangrass hybrids also contain more prussic acid than sudangrasses.

Sorghum silage may contain toxic quantities of prussic acid, but the acid escapes in a gaseous form when the silage is moved and fed. Under most circumstances, silage and well-cured stalk residue can be fed with safety. Prussic acid is released very quickly from the glucoside form in frozen leaves. Thus frosted sorghum is very dangerous until it begins to dry out.

Usually there is little danger of prussic acid poisoning in grazing most varieties of sudangrass. However, the young growth that follows clipping, drought, frost, or grazing may contain appreciable quantities of prussic acid.

Stage of growth. Leaf blades normally contain higher levels of prussic acid than leaf sheaths or stems. Tillers and branches have higher levels than older plants because they are mostly leaves with little stalk material present. Upper leaves contain more prussic acid than older leaves. The prussic acid content of sudangrass and sorghum is highest in the earlier stages of growth.

As plants mature, the stalk content increases, causing the prussic acid content in the total forage to decrease. However, the hazards associated with poisoning decrease only slightly with age if animals selectively graze the more tender new growth—those plant parts high in prussic acid.

When, due to drought, water is withheld from sudangrass which is less than 18 inches in height, a high

prussic acid content may persist because the grass is unable to grow out of the high prussic acid stage. Thus, drought probably operates as a factor—largely by keeping the plants small, in which stage they are generally higher in prussic acid content than when larger.

Utilizing Potentially Hazardous Forages

Pasture. Deaths on pasture are partially caused by animals preferring to graze leaves and young shoots. These plant parts may contain two to 25 times more prussic acid than stems. Sudangrass should not be grazed until it has reached a height of at least 18 inches.

Green chop. Green chop forage is usually safer than the same material used for pasture because it is not selectively grazed. In the case of pasture, only the leaves may be eaten; with green chop material, the total plant is consumed. Stems may be regarded as safety devices, since they dilute the high prussic acid content of the leaves.

Wilted silage. Silage is generally safe for feeding. It may contain toxic levels of prussic acid while in storage, but much of the poison

escapes as a gas when the silage is moved for feeding. Do not feed new silage for at least three weeks after ensiling.

Hay. The prussic acid content of sudangrass hay decreases by as much as 75 percent while curing and is rarely hazardous when fed to livestock.

Nitrate

Environmental factors controlling nitrate accumulation in plants are fertilization, light intensity and drought. Generally there is a direct response in plant nitrate concentration to increasing fertilizer N, and nitrate accumulation is greater from ammonium sulfate or urea. Nitrate accumulation also is greater with delayed applications of fertilizer. Both low light intensity and drought conditions increase the concentration of plant nitrate.

In a Missouri study, sudangrass, orchardgrass, and tall fescue accumulated nitrate at high levels; smooth brome grass, timothy and ladino clover were intermediate; and alfalfa, Kentucky bluegrass and wheat had only low nitrate levels. Pearl millet builds up higher concentrations of nitrate than does

sudangrass. Most plant investigations show that nitrate concentrations reach their maximum value at the pre-bloom stage and then gradually decline with age.

We have had questions concerning harvesting corn that is two to three feet tall—in some cases in tassel—corn that is considered to be a crop failure at this point. The growers are considering planting another crop such as sudangrass or sorghum. Since nitrate concentrations reach their maximum level at the pre-bloom stage, nitrate levels in this corn could be potentially high enough to be toxic.

Drought conditions are different this year than in 1983. Very few of the feed samples analyzed for nitrates in 1983 were high in nitrate. But the drought conditions occurred later in the season in 1983, and corn generally had more growth.

It is recommended that drought-stressed sorghum-sudangrass or corn harvested for hay or silage be analyzed for nitrate. While harvesting as hay or silage generally will alleviate prussic acid problems, it may have little, if any, effect on nitrate levels.

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30 YEARS AGO THIS WEEK

—According to the Department of Agriculture, all Pennsylvania farm field crops except oats have recovered from adverse spring weather. The total yields at harvest are now expected to be greater than last year.

—What is perhaps one of the oldest farm organizations in the nation, the Octorara Farmers Club will celebrate its hundredth anniversary in August at the middle Octorara Presbyterian Church. The farm organization was founded by 11 farmers with mutual agricultural interest. Howard Walton has family members who were associated with the farmers club for more than 50 consecutive years.

—Eight hundred and three new members have been admitted to the Holstein Freisian Association of American. This brings total membership in the association to an all time-high of 46,713.

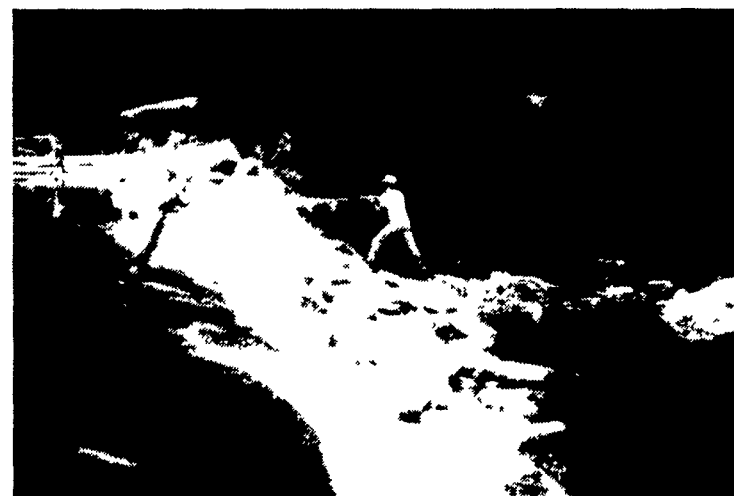
—Members of the Bareville Church of the Brethren have contributed three bred dairy heifers that joined a shipment of 23 sent to needy families in West Germany by the Heifer Project, Incorporated.

—John W. Eshelman and Sons, North Queen Street, Lancaster, have announced plans to construct a feed mill in Chamblee, Georgia, with completion expected early next year. Most of the raw materials to be used in the manufacturer of feeds, about 350 tons daily, will come from Lancaster county. Other Eshelman plants are in Pennsylvania, Ohio, North Carolina and Florida.

—Increased farm milk prices for the last six months of the year are forecast by Dr. C. J. Blanford, marketing administrator of the New York Metropolitan Milk Marketing area. Milk production is expected to be slightly under that for last year. "Uniform prices to farmers should average 19 cents per hundredweight, above those for the last half of 1955," the administrator said. Prices paid by handlers for fluid Class 1A are forecast at 16 cents per hundredweight over those of a year ago. The average uniform price for the last six months is estimated at \$4.36 per hundredweight. For Class 1A prices the average is predicted to \$5.52 per hundredweight.

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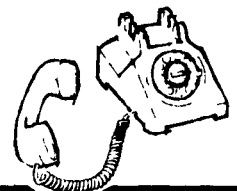


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