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Wheat Straw Ammoniation

Many producers are searching for hay or other forage sources to replenish depleted hay reserves. One option to fill hay needs might come in the form of ammoniated wheat straw. In order to be successful, straw needs to be baled and treated soon after grain harvest.

Bales need to be covered to seal in the anhydrous ammonia. Use either 6 or 8 mil black or clear UV resistant plastic sheets for covering the stack. A 40' X 100' sheet of plastic will completely cover 38 round bales of straw. Stack two bottom rows of 13 bales and one top row of 12 bales. Anhydrous ammonia should be applied at a rate of 60 pounds per ton of wheat straw, so it is important to weigh some bales to get an average bale weight. Once the weight of 38 straw bales is known, the correct amount of anhydrous ammonia can be purchased and the anhydrous tank can be slowly emptied under the covered stack.

To treat the straw, insert a 1-inch pipe into the center of the stack under the plastic and attach it to a steel fence post to keep it in place. Apply the ammonia slowly to the center of the stack. Three to 5 hours is suggested. Be sure to seal the sides of the plastic against the ground with dirt, waste lime, etc. Enough fill should be placed on the plastic to keep it from being pulled loose by winds and ballooning when the ammonia gas fills the covered stack.

Bales should be stacked in an area that has excellent air flow. Be aware that vegetation under the stack will be killed. Stacking the bales on gravel will help keep moisture from wicking up from the ground below, but be absolutely sure to get the plastic sealed to the ground completely around the stack in order to prevent the anhydrous ammonia from escaping.

Safety when working with anhydrous ammonia is of the utmost concern. Safety instructions: 1) Wear goggles, rubber gloves and protective clothing. 2) Work upwind when releasing ammonia. 3) Have fresh water available to wash off any anhydrous ammonia that comes in contact with the skin. 4) Check all valves, hoses and tanks for leaks. 5) Check the plastic cover for leaks and patch with duct tape. 6) Do not smoke near anhydrous ammonia. 7) Keep children away from treatment area.

Keep the straw pile covered until 2 to 3 weeks before feeding begins. The ends of the stack can be opened to allow the stack to air out. The chemical reactions occur within a couple weeks during the summer months, but the pile must remain covered to maintain forage quality of the treated straw. When feeding begins, some producers will remove several bales from the pile a few days before feeding to allow the straw time to air out.

Toxicity can occur in animals when some forages are ammoniated, so only treat low quality forages such as wheat straw or fescue stubble following seed harvest. If toxicity issues do occur, avoid working the cattle and remove ammoniated hay from the diet for several days. A mixture of 50% ammoniated hay and 50% untreated hay should eliminate any problems. Treating wheat straw with anhydrous ammonia does improve the straw's feeding value and can stretch tight hay supplies. However, utmost care should be taken when treating and handling the straw. Supplementation programs will also be different than for traditional grass hay. **Source:** *Gene Schmitz, Livestock Specialist*

Building Soil Health Potential

In production agriculture, soil health can be broadly defined as the ability of the soil to perform to its agronomic potential. For hundreds of years, many societies failed to consider soil as the foundation of an environmentally sound sustainable web of life. Ignoring the essential roles of millions of species of soil organisms (fungus, algae, bacteria, nematodes, earthworms, etc.) was another critical oversight in understanding soil as a living breathing organism. While physical properties and chemical nutrients were extensively studied, little consideration was given to the soil biological component until most recently.

The introduction of chemical fertilizers following WWII and the subsequent replacement of draft animals by mechanization followed by synthetic pesticides provided major changes in US production management strategies. Eventually, crop diversity was replaced by monocultures or short-term crop rotations for temporary improved economic gain. This change in management strategies provided considerable neglect to soil biological impact, reductions in soil health potential and the subsequent negative long-term legacy effect.

Soil health research and understanding continues to improve through scientific interest and newer methodologies and technologies. Now management strategies should focus on the benefits of utilizing new soil tillage and crop management practices, such as cover crops, specifically designed to more closely imitate natural ecosystems. The resulting effect has shown reduced need for herbicides, pesticides and fertilizers, thus reducing farming costs while improving environmental quality. Building soil health is a legacy that can be passed on through the generations. The scientific challenge is quantifying the impact of various management decisions and their impact on building soil health potential.

Studies by Veum et.al (2014) (Fig. 1), indicated that soil health potential is a continuum which improves with perennial vegetation including grasses and legumes; a reduced tillage/soil disturbance; incorporation of livestock grazing and manure into the system; increased rotation diversity including cash crops and forages; and cover crops for increased soil cover and diversity of the microbial population. Utilizing all of these options for improving soil health may not be practical in every management scenario. However, implementing some of these considerations in an integrated and diversified systems-management approach will likely improve soil health potential and benefit production agricultural overall. Predicting soil performance requires a better understanding of the relationship between various soil properties and the potential for improved management decisions.

Research has confirmed that biologically diverse systems are much more resilient in the face of environmental stresses. Reliance upon current production system during times of increased weather variability, especially increased frequency and duration of drought, is a potential recipe for economic and environmental disaster. It is expected that along with the new interest in Soil Health, increased rigorous research will help guide producers in best management practices to improve our nation's food security while increasing environmentally sustainable agriculture production for generations. **Source:** *Todd Lorenz, Agronomy Specialist*

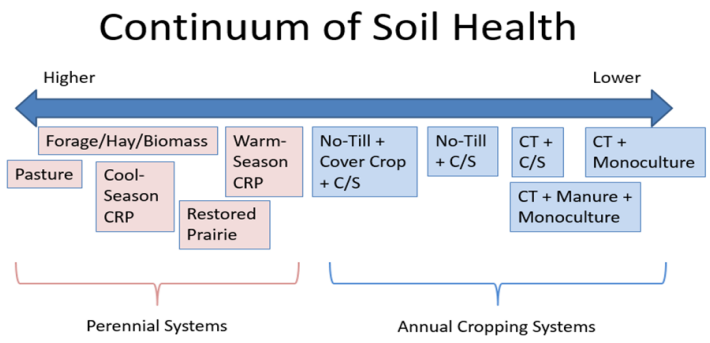

Figure 1.
Continuum of soil health in various systems (Veum et al. 2014). {Conservation Reserve Program (CRP), Corn (C), Soybean (S), Continuous Tillage (CT)}

Veum, K.S., R.J. Kremer, K.A. Sudduth, N.R. Kitchen, R.N. Lerch, C. Baffaut, D.E. Stott, D.L. Karlen, and E.J. Sadler. 2015. Conservation Effects on Soil Quality Indicators in the Missouri Salt River Basin. Journal of Soil and Water Conservation 70:232-246.

Prussic Acid and Nitrate Toxicity in Cattle

Prussic acid and nitrate toxicity can be potential problems with some forages for grazing cattle or hay being baled this time of year. Therefore, I would like to discuss the various environments that cause these problems, symptoms associated with toxicity, how to prevent against these problems and treatment if prevention does not work.

Usually nitrate toxicity is a problem when cattle are grazing or eating hay that was baled from specific summer annuals grasses and weeds during hot, dry conditions. The specific summer annual grasses are pearl millet, sorghum x sudangrass hybrids, and johnsongrass, as well as summer annual weeds such as pigweed and lambs quarter. Symptoms can also present if cattle are grazing these specific forages during long periods of cloudy or cool weather, or following herbicide application. These conditions will stress the plant leading to sudden reduction in growth and accumulation of nitrate in the plant.

When cattle consume forages that are high in nitrate, methemoglobin increases in the blood. This decreases the oxygen carrying capacity of blood, reduces oxygen transportation, and leads to animal death. Early toxicity symptoms present within 6 to 8 hours after consumption and include labored breathing, frothing at the mouth, frequent urination, diarrhea, staggering, and a brown coloration of the mucous membranes. Collapse, convulsion, and death follows if treatment is not provided within 30 minutes after symptom onset. Other less noticeable symptoms of nitrate toxicity are poor breeding rate due to abortions, and reduced calf gain.

If nitrate toxicity symptoms are noticed prior to cattle dying, here are some treatment protocols. First, if you notice symptoms remove the cattle from these specific forages immediately. Consult a veterinarian for treatment instructions. Proper dosage of methylene blue has shown to be a therapy for nitrate toxicity.

Prevention of nitrate toxicity is the best option, since the first symptom people usually notice is dead animals. The first prevention step is to test susceptible forages, and if level of nitrate is excessive, do not graze or harvest for hay until nitrates drop to an acceptable level. Visit with a local MU Extension agriculture specialist to determine if the level is safe. Another way to reduce nitrate is to ensile the forage. Higher levels of nitrate will accumulate in the lower 6 inches of the stalk, so if the cutter bar is raised above this level during mowing or if cattle are not forced to graze the lower portion of the stalk, they are less likely to consume excessive nitrate. Finally do not turn hungry cattle on these susceptible fields because it is likely they will consume excessive nitrate and lead to toxicity symptoms.

Prussic acid toxicity is a problem when cattle consume feedstuffs in plant families of sorghum, prunus and flax. Symptoms usually present when cattle are consuming immature forages of the sorghum family such as sorghum, sorghum x sudangrass hybrids, and johnsongrass. Symptoms can also present with the consumption of wilted leaves of wild cherry, chockcherry and pin cherry trees. These feedstuffs contain hydrocyanic acid or prussic acid, which leads to toxicity symptoms in cattle.

Prussic acid inhibits cellular utilization of oxygen, and the animal can die very quickly of asphyxiation. Prussic acid toxicity symptoms begin with accelerated, deep respirations. Then the nose and mouth fill with foam and the animal has involuntary urination. The animal experiences depression, is unable to stand, has severe difficulty breathing, and without treatment, dies.

Consult a veterinarian for proper treatment if you see toxicity symptoms. Prevention is also the best option with prussic acid poisoning because usually animal death is the first symptom noticed. One management strategy to prevent prussic acid poisoning is to defer grazing forages in the sorghum family until they reach a height of 24 inches. In addition, do not graze these forages after a frost until all the plants in the field are cured. If you want to utilize these forages and think they might be a problem, baling for hay is an alternative because once the forage is cut, wilted, and baled there is no prussic acid problem.

This is the time of year when nitrate toxicity and or prussic acid toxicity can be a problem resulting in lost performance or livestock death, which affect profit potential of cattle operations. I hope these tips will help reduce the chances of toxicity problems and provide information on treatment options if toxicity problems occur. If you have further questions please contact your local MU Extension Agriculture Specialist.

Source: *Patrick Davis, Livestock Specialist*

'Mulch ado' about something — Help gardens beat the heat with mulch.

Mulches can help garden soil stay cool during the heat of summer. Maintain 2-4 inches of an organic mulch to keep the soil cool. This promotes root growth and curbs soil moisture loss. By blocking sunlight, mulch also prevents weeds from germinating. Finally, organic mulches improve soil structure as they decompose and add nutrients to the soil.

Mulch materials include dried grass clippings, shredded leaves, pine needles and ground softwood tree bark. Commercially bagged “wood chip” mulch made from recycled shipping pallets has become popular, but shipping pallets are made from less valuable hardwoods such as cottonwood or sycamore. Wood chip mulches tend to break down more rapidly than softwood mulches such as pine bark or shredded cypress. For best results, us pine bark or shredded cypress over hardwood mulches, especially for annual flowerbeds. Dried grass clippings also work well.

Gardeners may see problems with nitrogen deficiency when they plant into existing mulched areas. Mulch can fall into the planting holes, where soil microbes will break down organic matter in the mulch, consuming nitrogen in the process. To counter this, spread a fertilizer high in nitrogen on the soil surface before applying mulch. For established mulch, add more nitrogen fertilizer during the growing season as mulch decomposes.

Sour mulch has become a problem in recent years. Sour mulch is mulch that has decomposed improperly. The result is a foul-smelling mulch that often gives rise to compounds toxic to plants. Symptoms such as leaf scorch, defoliation or death of the plant can result from sour mulch. While sour mulch is not common, hardwood mulches tend to break down more rapidly, which makes them more likely to become sour than softwood mulches. Good mulch should have the aroma of freshly cut wood or good garden soil. Sour mulches smell of ammonia, sulfur, vinegar or, perhaps, silage. The benefits of mulching greatly outweigh the concern of plant damage from sour mulch. However, be aware of the problem and check mulches before applying.

Once mulch is established, it may not be necessary to add new mulch every year. A depth of new mulch equal to the amount of decomposition during the past season is adequate. Mulches help make gardening more sustainable. Their ability to conserve water, retard weed growth and eventually add nutrients to the soil make their use a logical way to reduce the inputs needed to grow an attractive garden.

Source: *David Trinklein, State Horticulturist*