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Extension

AG CONNECTION

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Controlling Fescue Alkaloids

Ergovaline is the ergot alkaloid produced by the fungal endophyte in tall fescue that causes fescue toxicosis. When ergovaline, the most concentrated ergopeptine alkaloid found in fescue, reaches 200 to 300 parts per billion (ppb), symptoms begin to be seen.
The toxins from the endophyte cause several conditions in animals grazing or feeding on infected fescue.

- Animal's rate of gain is reduced and they can actually lose body weight despite unlimited forage access. Part of this is reduced consumption. Grazing animals can sense or taste the toxins.
- Livestock can experience reproductive problems such as low conception rates and poor offspring survival. Lowered milk production is another condition. For mares, an additional problem is a thickened placental membrane which can cause foals to suffocate after birth.
- Grazing infected tall fescue causes elevated body temperatures and loss of blood flow to the extremities causing rough appearing hair coat, "fescue foot" (loss of hoof) and other symptoms. Effects (loss of ears, nose and tail) can be extreme in cold weather.
- Infected tall fescue fertilized with high levels of nitrogen can also lead to bovine fat necrosis. Hard masses appear in the fatty tissues surrounding the intestines. This condition causes digestive problems and can also interfere with calving.

In all, it is estimated that the losses attributed to fescue toxicosis cost the beef cattle industry well over $609 million a year (1990 data).

The methods to reduce the intake of ergovaline include:

Dilution

- Feeding non-fescue hay when pasturing or feeding fescue hay high in ergovaline.
- Growing legumes like red clover or lespedeza in endophyte infected fescue pastures and hay fields.
- Feeding corn at a rate of 0.004 percent of body weight (four pounds per 1000 pounds of body weight) offers an economic compromise. This allows efficient digestion of forage fiber and reduces the effects of toxins. Other energy sources may be substituted for corn.

Rotation

- Move livestock off fescue during the hot summer months when ergovaline levels peak. High temperatures can intensify the toxic effect of infected fescue. Missouri research suggests 88° F may be a threshold for significantly decreased gain.
- Management Intensive Grazing (MIG) or rotational grazing also helps keep the fescue vegetative. Endophyte infected fescue leaves have lower levels of ergovaline than leaf sheaths, stems and seed heads.

Early Hay Production

- Tall fescue hay should be harvested in the spring before the seed stalk emerges.
- Quality reduction from rain on the hay is less than the quality reduction from late harvested hay. In late harvested fescue hay, toxins are higher and relative feed value is lower.

Grazing During Periods of Low Concentration

- Winter stockpiling fescue provides winter grazing with the lowest levels of endophyte toxins.
- Spring grazing before seed stalks appear and especially before seeds appear.

Ammoniation of High Ergovaline Fescue Hay

- Anhydrous ammonia breaks cell walls increasing digestibility.
- Ammoniation requires hay to be covered; therefore, it indirectly provides an excellent storage facility.
- Ammonia can reduce the effect of endophyte toxins.
- Ammoniation of toxic fescue can increase daily gains and prolactin (milk hormone) levels by at least 50 percent. This is not a response from merely improving digestibility.

Reduced Nitrogen Fertilizer Applications

- High nitrogen fertilizer applications stimulate endophyte toxin production.
- Legume/fescue combinations provide nitrogen, increase production and increase forage feed value. Only low to no nitrogen fertilization is recommended with legume/fescue combinations.

Fescue Replacement

- Spray – Smother – Spray! In the spring, spray the fescue with glyphosate to get an initial kill. Plant a summer annual forage to smother surviving and sprouting fescue. Then spray in the fall before planting to kill any remaining fescue.
- Plant a different, adapted forage. Manage that forage so it will be competitive against fescue re-establishment.
- Plant fescue with the "friendly" endophyte. This fungal endophyte produces toxins that help in pest resistance and provides the other factors making the fescue stand persistent without causing the harmful effects to grazing animals

What Doesn't Work

- Haylage preserves the fescue toxins.
- High nitrogen fertilization increases toxin production
- Harvesting hay after seed stalks emerge and, even worse, when seeds develop
- Holding endophyte infected hay for several years. The toxins are stable.
- Planting endophyte free tall fescue. Without an endophyte, tall fescue stands are not persistent.

For more information see MU Guide Sheets:

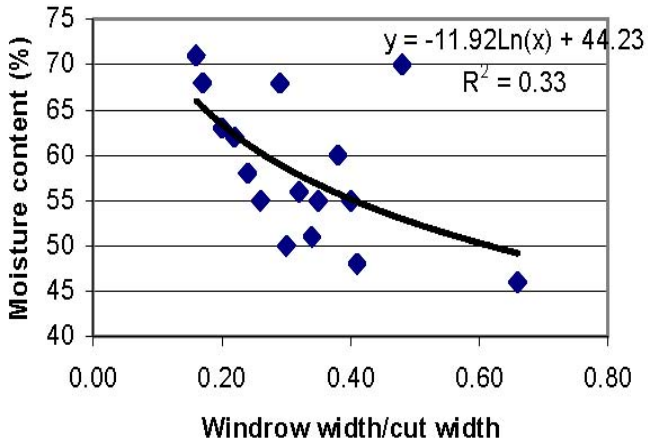
- G4669 — Tall Fescue Toxicosis http://extension.missouri.edu/explore/agguides/crops/g04669.htm
- G4646 – Tall Fescue http://extension.missouri.edu/xplor/agguides/crops/g04646.htm

Author: Jim Jarman, Agronomy Specialist

Harvesting For Quality Hay

Assuming you harvest at the correct stage, there are some techniques you can use in harvesting to preserve the most of your forage crop. It is important to get the crop to dry as soon as possible. A wide windrow allows for faster drying than narrower windrows. The following chart illustrates that. The one reading that is off the line illustrates the effect of a mower conditioner not being correctly adjusted. The chart is taken from a demonstration at a Wisconsin Farm Technology Day in 2002.

Figure 4. Moisture content of Alfalfa 5.5 hours after cutting with various windrow width to cut width ratios

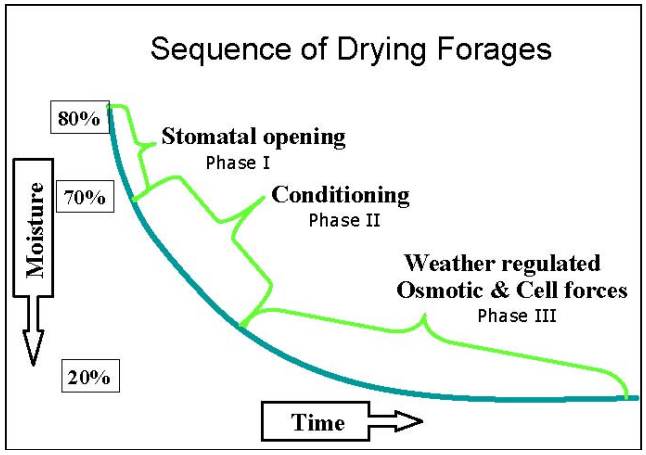


Forage has about 75-80% moisture when cut. It must be dried to 60-65% for haylage or 14-18% for hay. For large bales of hay, bale at 14%.

There are three phases of drying forages. They are shown in the following table. The first phase of moisture loss is through the stomates. Stomates are openings in the leaf surface that allow moisture loss to the air to cool the plant and for carbon dioxide uptake. They open in the daylight and close at night. Cutting the forage in a wide swath will maximize stomata exposure to sunlight and encourage rapid drying. Rapid initial drying to lose the first 15% moisture will reduce the loss of starches and sugars and preserve more total digestible nutrients in the forage. This initial loss is not affected by conditioning.

The second phase is moisture loss from the leaf surface and the stem. Conditioning can help increase this drying rate especially on the lower end of the stems.

The final phase is loss of more tightly held water, especially in the stems. Conditioning to break the stems every two inches allows more opportunities for water loss. The following chart shows the phases that have just been discussed. This material is taken from a publication, "Harvesting Impacts on Forage Quality", Dr. Dan Undersander:
http://alfalfa.ucdavis.edu/symposium/proceedings/2006/06-245.pdf



There are two types of conditioners — roll and flail. Roll conditioners have two adjustments — roll clearance and pressure. These may need to be adjusted often for crop conditions. Adjustment of roll clearance and pressure is important. Minimum clearance must be maintained. If the clearance is too close, excessive damage and loss of plant material occurs. With too much clearance, plant material is not crushed. Too little and too much pressure on the rollers also has the same affect as misadjustment of clearance.

On flail type conditioners, the clearance between the rotating flails and a startionary bar can be adjusted to control the amount of breaking and abrasion that occurs. Flail conditioners were originally developed to condition grasses but are now often used on legumes. Rotor speed should be reduced by about 30% to reduce the impact effect when conditioning legumes. Flail conditioners will likely result in a faster drying rate, but may result in more leaf losses.

Swath manipulation is accomplished with tedders, swath inversion machines and/or raking in phase III of the drying process. Tedding improves drying by spreading the hay over more of the field surface increasing exposure to the radiant solar energy and drying air.

Tedding is most effective if done before the crop gets too dry (above 40% moisture). Tedding has the disadvantage of increased losses, increased fuel, labor and machinery costs. It is sometimes difficult to justify the added costs. Occasional use under difficult drying conditions may bring an economic benefit. When purchasing a tedder look at the total operational costs.

Swath inversion machines gently lift and invert the swath. This exposes the wetter bottom of the swath and speeds drying and reduces the average field-curing time by several hours. The added labor, fuel and machinery costs of the operation are generally greater than the benefit received.

Raking rolls the wetter bottom layer to the top and improves drying. The best moisture content to rake for low loss and good drying is 40%. In dry weather, rake in the evening or early morning when leaves are moist and less prone to shatter. Rake in a manner that will minimize leaf loss. Rake when the hay is dry but tough. Use rakes that handle hay gently or slow the speed of the rake.

Hay should be baled at moisture levels of 14 to 22 %. Use the lower level for large bales. Some people use the twist method for determining moisture. It is probably advisable to compare that to other methods to be sure you are accurate. There are moisture testers on the market today that make this easy for you. You can also use a microwave oven to check moisture. The following is the procedure for checking moisture using a microwave:

- Get permission to use the microwave – there might be some bad smells during this process.
- Get a representative sample of the hay.
- Weigh the sample.
- Dry in the microwave until no weight loss occurs.
- Use the following formula to determine percent moisture.

$$\% \text{ moisture} = \frac{(\text{initial wt.} - \text{final wt.}) \times 100}{(\text{initial wt.} - \text{plate wt.})}$$

For more details on the microwave method, see the following web sites:

- http://www.age.psu.edu/extension/factsheets/i/I106.pdf
- http://www.ext.vt.edu/pubs/bse/442-106/442-106.html

After you go to all this trouble, don't forget to store your hay for the least loss. Field losses can often be very high. This last year should remind us of the importance of keeping as much of the hay as possible.

For more information on making quality hay see the following web sites:

- http://extension.missouri.edu/explore/agguides/crops/g04575.htm
- http://www.wvu.edu/~agexten/pubnwsltr/TRIM/5811.pdf
- http://www.oznet.ksu.edu/library/agENG2/mf989.pdf

Author: Don Day, Natural Resource Engineer

Calving Problems This Spring?

Reports of calving problems in central Missouri have varied significantly. Some producers and veterinarians have reported significant problems with dystocia, stillborn and weak calves in their areas. Other areas have indicated a normal calving season.

If you have been one of the unlucky producers who experienced more problems than normal, it could have been the impact of several environmental factors. These factors include:

- Longer periods of feeding hay and supplements.
- More low quality hay being fed.
- Overall quality and quantity of nutrients fed to cows was lower this year (reduced micro nutrient intake).
- Colder than normal periods in January and February with little acclimation time may have caused blood flow to be shunted internally – possibly increasing calf weights 2 – 8 lbs.

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AG CONNECTION

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