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Harvesting Freeze Damaged Small Grains for Forage

Dr. Dennis Hancock, Extension Forage Agronomist, Crop and Soil Sciences Dept., University of Georgia, Athens Campus

Producers who have small grains that were freeze-damaged have an option to harvest the crop by grazing the standing forage or to cut it for hay or silage. This is a reasonable option and should be considered when i) damage is severe enough to drastically reduce grain yields and ii) the forage can be utilized or sold as livestock feed. However, there are a number of issues to consider.

There is a significant potential for nitrate accumulations in small grains, particularly when growth has been abruptly halted by freezing temperatures. Nitrate concentrations may be high (> 5,000 ppm) following a hard freeze. This most commonly occurs in intensively managed systems receiving substantial amounts of nitrogen. I suspect this will be a common problem where the small grains received a N topdress at jointing. However, relatively dry conditions prior to the freeze may have caused nitrate accumulations that are higher than normal, even in crops that received relatively low N rates or that were only topdressed at tillering. Given these conditions, I recommend that ALL small grains that are grazed or harvested as hay or silage should be tested for nitrate concentrations.

Another minor but potential animal health issue, particularly on bearded wheat varieties, is that awns may puncture the lining inside the animal's mouth and these areas may become infected. This infection, clinically known as actinomycosis, is sometimes called "big jaw" or "lumpy jaw." Producers should closely observe for the development of this disease, particularly when very mature wheat is fed. This is often less of a problem when the forage has been ensiled.

Curing the forage for hay may be quite difficult, depending on rainfall, soil moisture, and temperatures. Since the stem size of the tillers of small grains that are in boot stage (Feekes 9) or less mature is relatively small, immature forage will be easier to dry to a moisture that is sufficient for hay (~15% moisture concentration) than crops that are flowering (Feekes 10.5) or filling. Such difficulty in curing makes silage production a superior option. One very good option is to make baled silage. Care should be taken to allow sufficient wilt so that a moisture of 50-65% (45-50% dry matter) is achieved. This enhances silage stability during both the ensilage and storage phases. Stemmy or more mature small grains should be wrapped with 6 layers of plastic to minimize the effect of any plastic punctures.

Grazing is the least expensive and most efficient harvesting method. However, bloat can occur if animals are turned out on small grains when they are hungry. Ensure that animals grazing small grains have other roughage (e.g., medium quality hay). In addition to reducing the

risk of bloat, having roughage available will make the transition to small grains less abrupt and allows rumen microbial populations and the digestive system to adjust. Animals should also have adequate access to an ionophore (for appropriate animal classes) and mineral supplements high in magnesium (Mg).

Table 1. The effect of maturity stage on the yield, protein, and digestibility of small grains harvested for forage.

	Maturity Stage					
	Boot	Headed	Bloom	1/2 Seed	Milk	Dough
Yield	----- Dry tons/acre -----					
Rye	2.2	2.4	2.8	3.1	3.3	3.6
Wheat	2.3	2.6	3.3	3.3	3.6	3.9
Oat	1.3	1.6	2.0	2.6	2.6	2.9
Protein	----- CP % -----					
Rye	13	11	9	7	6	5
Wheat	10	10	8	9	7	6
Oat	12	10	9	9	8	7
Digestibility	----- TDN % -----					
Rye	63	52	46	45	47	50
Wheat	60	59	53	54	56	56
Oat	65	60	53	53	56	57

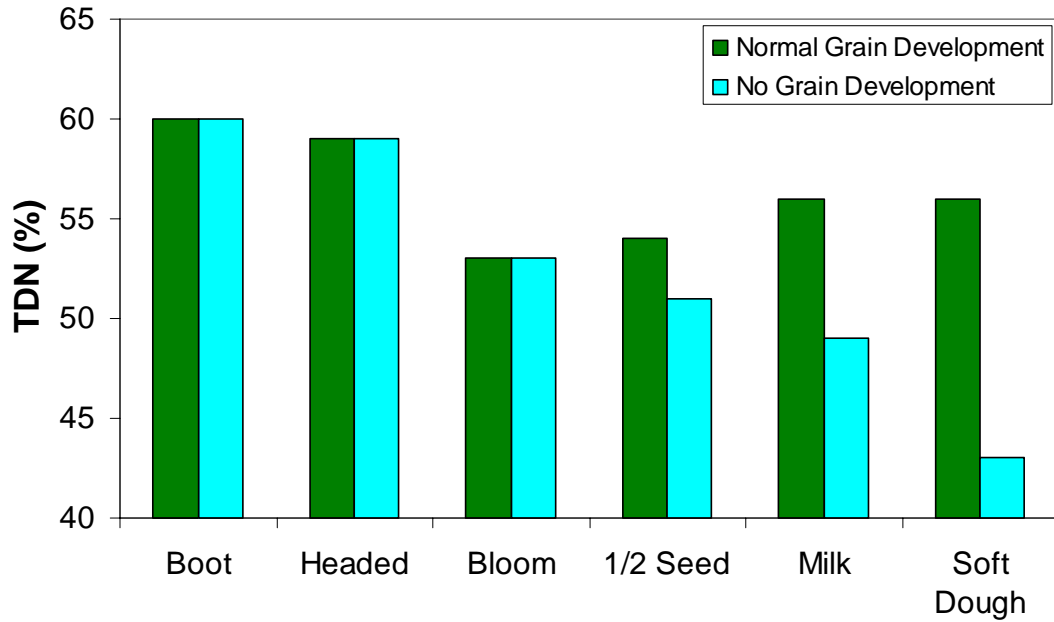
Adapted from Ball et al., 2007: Southern Forages, 4th edition and Univ. of Kentucky Extension Publication AGR-160 “Managing Small Grains for Livestock Forage.”

The quality of small grains differs considerably with the stage of maturity and the amount of grain. Unlike many other forage species, the contribution of the seed stabilizes and often improves the amount of total digestible nutrients (TDN). Table 1 describes expected yield and forage quality at advancing stages of maturity. It is important to note that a small grain crop that has a seed head that does not develop grain will obviously not benefit from the added quality of the grain (Figure 1). In these cases, TDN values should be expected to be equal to or less than small grains harvested at anthesis (bloom or Feekes 10.5).

It is also important to consider the potential for pesticide residue to remain on the forage. Be sure to read the label of any product that was applied to ensure that there are no haying or grazing restrictions on treated stands. Some examples include herbicides containing thifensulfuron-methyl/Tribenuron-methyl (Harmony Extra) and diclofop-methyl (Hoelon).

In conclusion, freeze-damaged small grain crops may have substantial forage value. However, it is important to consider and to account for the quality and management issues associated with the use of a freeze-damaged small grain crop as forage for livestock.

Figure 1. The effect of maturity on the digestibility of wheat that has normal grain development compared to wheat with little or no grain development.



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