



Grass for Forage, Biomass, or Bedding

Perennial grass is being seriously considered as a biomass crop. Primary biomass uses are direct combustion or conversion of plant cellulose and other sugar-based compounds to ethanol ("cellulosic ethanol"). Some perennial grass species will have to be considered "dedicated" biomass and not a dairy forage source, but all species may have multiple uses on a dairy farm. Ideal composition of grass for biomass is essentially the opposite of that for dairy forage. Biomass should be as high as possible in fiber content and as low as possible in CP.



Figure 1. Perennial grass must be mature when harvested as biomass for pelleting.

The variable and marginal soil types found in much of the Northeast are not well suited to row crop production. Abandoned fields quickly become mixed grass meadows, with rapid encroachment of woody species if not mowed. New York State has approximately 1.5 million acres of unused or underutilized agricultural land. Most of this land will not grow row crops profitably, all of this land will support grass production for biomass. Grass stores solar energy and recycles carbon, and is about 90% carbon neutral.

Many European countries use biomass combustion as a significant portion of their total energy useage. Pelleting or briquetting not only provides the densification necessary

for economical transportation of bulky biomass, but also allows controlled feeding of the fuel so as to maximize energy efficiency and allow clean burning of the feedstock. Grass biomass for combustion has the following positive characteristics:

- High grower acceptance.
- High rural economic development potential.
- Very efficient conversion.
- Efficient use of marginal cropland.
- Ideal for soil conservation.
- Compatible with wildlife nesting.
- Ideal for maintaining open spaces.
- Sustainable one-cut harvest system.
- Nearly greenhouse gas neutral.

High producing grasses such as reed canarygrass or switchgrass can be sown for biomass production, or an existing mixture of grass species can be utilized. Animal manure can be spread in the spring or after harvest to increase productivity. Forage is cut when mature, ideally leaving it subject to rainfall on the field, to allow leaching out of nutrients that will otherwise end up as undesirable ash. Baling at normal hay crop moisture allows stable storage of feedstock until densification.



Figure 2. Mixed grass stand on marginal land harvested as biomass.

The Biomass Crop Assistance Program (BCAP) has been operated by the USDA Farm Service

Agency since 2009 to provide incentives for farmers to establish and cultivate biomass crops. Producers can receive annual payments for herbaceous biomass for up to five years, as long as they sell the biomass to an FSA-approved biomass processor.

Multiple Uses of Grass

If warm-season grasses such as switchgrass or big bluestem are sown for biomass, their only other alternative use is for bedding. The forage is unsuitable for dairy cows or even heifers. Cool-season grasses can be managed for lactating or dry cow forage, or biomass or bedding. There is one exception, if reed canarygrass cultivars with high alkaloid content are developed for high-yielding biomass, they will not be suitable for livestock forage.



Figure 3. Grass can be pelleted, or can be made into less dense cubes or briquettes (shown here) for lower cost.

Grass for Bedding

Poorly drained fields in the Northeast are often seen as good candidates for reed canarygrass establishment. Reed canarygrass can tolerate extended flooding, but it cannot solve a drainage problem. This means soils can be waterlogged at the optimum harvest stage. One solution is to let the grass mature and harvest it for bedding. Dairy quality forage can be obtained in a regrowth cutting.

Bedding is also considered an alternative use for pelleted grass. Pelleted grass and straw can be ideal for horse bedding, particularly in more urbanized areas. Pelleted material is very absorbent, and permits selective removal of waste-contaminated bedding. Pelleted biomass sold by the bag for bedding is considerably more valuable than the energy value of the grass for combustion. Pelleted wheat straw is readily available in NY for horse bedding.

There is one major concern for using grass or straw pellets for horse bedding. It is very unhealthy for horses to eat their bedding, the bedding must be seen as unpalatable. Horses will eat oat straw pellet bedding. Some pelleting operations in Europe mix lavender with pelleted biomass to ensure the material is unpalatable bedding for horses. Pelleted bedding is likely not cost-effective for most dairy farms.

Summary

Grass biomass production does not need to compete with production of feed and forage on dairy farms. Grass biomass fields can provide a site for distribution of animal manure. Grass that cannot be harvested for forage in a timely fashion may be utilized to provide a portion of the heat energy needed on the farm.

Additional Resources

- 2011 Cornell Guide for Integrated Field Crops Management. Electronically accessible at: <http://ipmguidelines.org/Fieldcrops/>.
- Cherney, J.H. Grass Bioenergy in the Northeast USA. Bioenergy Information Sheet #1. www.GrassBioenergy.org.
- Cherney, J.H. Benefits of Grass Biomass. Bioenergy Information Sheet #2. www.GrassBioenergy.org.
- Cherney, J.H. Management of Grasses for Biofuel. Bioenergy Information Sheet #4. www.GrassBioenergy.org.

Disclaimer

This information sheet reflects the current (and past) authors' best effort to interpret a complex body of scientific research, and to translate this into practical management options. Following the guidance provided in this information sheet does not assure compliance with any applicable law, rule, regulation or standard, or the achievement of particular discharge levels from agricultural land.

For more information



Cornell University
Cooperative Extension

Grass Management Manual
<http://forages.org>

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