

# AURI FUELS INITIATIVE

Agricultural Renewable Solid Fuels Data



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### Preface

All provided information is based on the Proximate Analysis testing for solid fuels in accordance with American Society for Testing and Materials (ASTM)<sup>1</sup>.

The compiled information should be used only as a general comparative guide for agricultural renewable fuels.

The evaluated agricultural renewable fuel groups include grains, crop residues, fibers, and agricultural processing co-products.

Agricultural products naturally contain variability which is dependent on geographical regions, grain/plant varieties, and seasonal changes.

British Thermal Unit (BTU) information gathered followed ASTM standards and will vary from actual combustion performance. Ash percentage and BTU output are dependent on moisture, combustion efficiency, operation, and operating conditions. Dry matter results are a calculated value for use only as a comparative guide.

Cost comparative analysis must be done on a case by case basis. In addition to solid fuel proximate analysis information, consideration must be given to cost of fuel, transportation and physical processing of the fuel (grinding, milling, pelleting). These factors affect fuel cost.

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Testing results are from AURI - Marshall, MN; MVTL - Bismark, ND; Twin Ports Testing - Superior,WI  
Twin Ports Testing - Superior,WI

### Averages

Product	Testing	Averages	
		As Is	Dry Matter <sup>2</sup>
<b>Alfalfa</b> (leaf and stem)	Moisture	12.25%	
	BTU / lb.	6934	7729
	Ash %	7.94%	9.06%
	Sulfur %	0.195	0.22
<b>Aspen</b>	Moisture	6.02%	
	BTU / lb.	7786	8501
	Ash %	2.48%	2.67%
	Sulfur %	0.02	0.02
<b>Corn Gluten Feed</b>	Moisture	12.06%	
	BTU / lb.	7199	8097
	Ash %	3.78%	4.30%
	Sulfur %	0.33	0.375
<b>Corn - shell</b> 54.5 lb/bu. T.W. 13 % moist.	Moisture	13.43%	
	BTU / lb.	6924	8100
	Ash %	1.13%	1.23%
	Sulfur %	0.11	0.13
<b>Corn - high oil</b> 56.2 lb/bu. T.W. 12.9 % moist.	Moisture	12.49%	
	BTU / lb.	7398	8480
	Ash %	1.17%	1.34%
	Sulfur %	0.095	0.11
<b>Corn - waxy</b> 56.6 lb/bu. T.W. 13 % moist.	Moisture	13.09%	
	BTU / lb.	7073	8113
	Ash %	1.26%	1.44%
	Sulfur %	0.12	0.135
<b>Corn Cob</b>	Moisture	7.12%	
	BTU / lb.	7369	7911
	Ash %	2.16%	2.32%
	Sulfur %	0.04	0.04
<b>Corn Stover/Stalks</b>	Moisture	9.14%	
	BTU / lb.	7057	7768
	Ash %	6.81%	7.64%
	Sulfur %	0.035	0.04
<b>Dried Distillers Grain w/ solubles</b>	Moisture	9.27%	
	BTU / lb.	8459	9422
	Ash %	4.16%	4.13%
	Sulfur %	0.4	0.45
<b>Dried Distillers Grain with out solubles</b>	Moisture	13.35%	
	BTU / lb.	8473	9848
	Ash %	1.96%	2.24%
	Sulfur %	0.34	0.4

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<b>Hardwood Pellet</b>	Moisture	7.08%	
	BTU / lb.	7955	8573
	Ash %	0.34%	0.36%
	Sulfur %	0.01	0.01
<b>Oats</b>	Moisture	12.49%	
	BTU / lb.	7143	8242
	Ash %	3.17%	3.58%
	Sulfur %	0.135	0.16
<b>Soybeans</b>	Moisture	10.25%	
	BTU / lb.	8783	10230
	Ash %	5.19%	6.22%
	Sulfur %	0.29	0.33
<b>Soybean Hulls</b>	Moisture	11.38%	
	BTU / lb.	6660	7570
	Ash %	4.17%	4.22%
	Sulfur %	0.07	0.08
<b>Straw - wheat</b>	Moisture	8.26%	
	BTU / lb.	6839	7375
	Ash %	10.40%	11.33%
	Sulfur %	0.07	0.075
<b>Straw - oat</b>	Moisture	6.91%	
	BTU / lb.	7153	7626
	Ash %	7.90%	8.49%
	Sulfur %	0.05	0.055
<b>Sugar Beet Pulp</b>	Moisture	9.70%	
	BTU / lb.	6597	7345
	Ash %	3.80%	4.31%
	Sulfur %	0.14	0.16
<b>Sunflower Hulls</b>	Moisture	8.65%	
	BTU / lb.	8474	9654
	Ash %	2.86%	3.13%
	Sulfur %	0.14	0.15
<b>Wheat Middlings</b>	Moisture	12.58%	
	BTU / lb.	7228	8415
	Ash %	5.18%	6.00%
	Sulfur %	0.15	0.17
<b>Wheat</b> (Hard Red Spring)	Moisture	10.38%	
	BTU / lb.	7159	8063
	Ash %	2.08%	2.28%
	Sulfur %	0.20	0.22

<sup>1</sup>Methods: Moisture: ASTM D3173; Ash: ASTM D3174; Btu/lb: ASTM D1989; Sulfur: ASTM D4293

<sup>2</sup>Calculated value using ASTM Standard D3180-89