# Alternative Broiler Bedding Materials Fact Sheet

The purpose of this fact sheet is to inform the reader of differences between experimental broiler bedding materials. These include switchgrass, miscanthus grass, and biomass willow. The results depicted in the tables are the results of experimental trials performed both at Penn State's Poultry Education and Research Center and in the field at cooperators' farms.

Ranges of initial moisture, density (lb/ft$^3$), initial fuel value (BTU/lb), and spent single-cycle litter (BTU/lb) of biomass bedding materials tested at Penn State

| Bedding type | Initial moisture | Density (lb/ft$^3$) | Initial fuel value "as-is" (BTU/lb) | Spent single-cycle litter "as-is" (BTU/lb) |
|---|---|---|---|---|
| Kiln-dried Softwood Shavings | 6.69%- 11.49% | 3.48 – 5.92 | 5950[c] | 5050[b] |
| Switchgrass | 11.09% - 16.34% | 4.54 – 6.49 | 5800[c] - 5900[c] | 3750[d] - 4850[b] |
| Miscanthus Grass | 7.66% - 10.96% | 3.57 – 6.36 | 6800[a] | 5300[a] |
| Biomass Willow[d] | 24.22% | 10.95 | 6050[c] | 5700[c] |

[a] BTU content 5 weeks of use, initial bedding depth of 3 inches, conventional stocking density.
[b] BTU content 8 weeks of use, initial bedding depth of 4 inches, organic stocking density.
[c] BTU content 7 weeks of use, initial bedding depth 3.25 inches, organic stocking density.
[d] Values for willow bedding after 9 weeks of storage. Initial moisture of green willow chips is typically around 50%.

Particle size, density (lb/ft$^3$), and yd$^3$/ton of biomass bedding materials as a result of harvesting and processing technique

| **Switchgrass** | | | | |
|---|---|---|---|---|
| Equipment used | Setting | Average particle size (in) | Density (lb/ft$^3$) | Volume (yd$^3$)/ton |
| JD 6750 Forage Harvester | # Knives: 48<br>Transmission Speed: 1 | 0.21 | 4.11 | 18.0 |
| JD 6750 Forage Harvester | # Knives: 24<br>Transmission Speed: 4 | 1.24 | 2.60 | 28.5 |
| JD 6750 Forage Harvester | # Knives: 12<br>Transmission Speed: 4 | 2.47 | 1.91 | 38.8 |
| Bale Chopper | Round Hole Screen<br>½" Down, 1" Up | --- | 6.49 | 11.4 |
| Bale Chopper | Round Hole Screen<br>1" Down, 2" Up | --- | 4.54 | 16.3 |

| **Miscanthus Grass** | | | | |
|---|---|---|---|---|
| Equipment Used | Setting | Average Particle Size | Density (lb/ft$^3$) | yd$^3$/ton |
| Unknown | Unknown | --- | 6.14 | 12.1 |

| **Biomass Willow**[c] | | | | |
|---|---|---|---|---|
| Equipment Used | Setting | Average Particle Size | Density (lb/ft$^3$) | yd$^3$/ton |
| New Holland Woody Crops Cutting Header | Unknown | --- | 10.95 | 6.8 |

[a] For reference, an average broiler barn measures 50' x 500'. Bedding depth of 3-4" suggested. At a depth of 3", a 50' x 500' barn would need 231.5 yd$^3$. At a depth of 4", a 50' x 500' barn would need 308.6 yd$^3$.

[b] Our studies indicate that 0.21" material from the JD 6750 forage harvester and the ½" down/ 1" up screen configuration from the balechopper for biomass grasses is the preferred bedding size for broilers.

[c] Willow % moisture for this table is 24.22%. Typical willow moisture is around 50%.