

CROP RESIDUE



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Sources for Crop Residue

The information for tables in this section was obtained primarily from:

U.S. Department of Agriculture, National Agricultural Statistics Service – Quik Stats: Wyoming County Data, Crops, 2004 and 2005. Cheyenne Wyoming. Available on-line at <http://www.nass.usda.gov/census/>, click on Data Queries. (Verified August, 2006.)

U.S. Department of Agriculture, Natural Resources Conservation Service – Electronic Field Office Technical Guides (eFOTG). Available on-line at <http://www.nrcs.usda.gov/technical/efotg/>. (Verified August, 2006).

NOTE: This section of the report provides information about crops and crop residue by county. For several counties, no information was available. However, several tables include “other” after county specific information. Data for “other” includes data which was withheld to avoid disclosing data for individual farms or for counties which reported information in either 2004 or 2005, but not in both years.

Barley Residue

Barley field residue is used for baling straw as animal bedding or other purposes. Residue remaining in fields also has value as erosion control, plant nutrients, and organic matter.

Biomass Data Collection

Barley residue was determined based on the average production of 2004 and 2005 Wyoming County crop data (USDA, NASS). Air dry field residue was calculated assuming 80 lbs of residue per bushel of production (USDA, NRCS, 1997). No specific information was available for counties not listed.

Tons Dry Biomass equals:

$[(\text{average yield, bushel, for 2004 and 2005}) * 80 \text{ lbs/BU}] / 2000 \text{ lbs per ton}$

Table IV-1. Barley Field Residue: Tons of Dry Biomass Produced Annually. (average of 2004 and 2005)^A.

County	Dry Biomass (tons)
Big Horn	53,100
Fremont	10,860
Goshen	5,720
Hot Springs	2,340
Lincoln	21,680
Park	75,200
Platte	7,600
Washakie	60,200
Other ^B	15,900
State Total	252,600

A. USDA NASS - [Quick Stats: Wyoming County Data, Crops](#).

B. Other is based on the sum of those counties not reporting.

Agricultural Processing Residue - A small proportion of barley is grown for livestock feed. Small amounts of waste may be generated during livestock feeding of grain. However, this residue will generally be in a location such that livestock can still utilize it as feed, or it remains in the soil providing nutrient and organic matter value.

Food Processing Residue - The majority of barley grown in Wyoming is sold to Coors and Anheuser-Busch for beer production. Their beer processing plants are not located in Wyoming. Therefore, there is no food processing residue of barley in Wyoming. If barley does not meet contractual quality control requirements, it is often sold or used as livestock feed.

Alternative Uses for Residue - Since there is essentially no food or agricultural processing barley residue in Wyoming, alternative uses for barley residue were not considered.

Dry Beans

Beans grown in Wyoming are dry edible beans such as pinto beans. Only infrequently is bean straw collected. Generally, it remains in the field for erosion control and contributes nutrients and organic matter for soil.

Biomass Data Collection

Bean residue was determined based on the average production of 2004 and 2005 Wyoming County crop data (USDA, NASS). Air dry field residue was calculated assuming 1.0 lb of residue per pound of production (USDA, NRCS, 1997). No specific information was available for counties not listed.

Tons Dry Biomass equals:

$[(\text{average yield, lbs, for 2004 and 2005}) * 1.0 \text{ lbs/lb production}] / 2000 \text{ lbs per ton}$

Table IV-2. Dry Bean Field Residue:
Tons of Dry Biomass Produced Annually
(average of 2004 and 2005)^A.

<i>County</i>	<i>Dry Biomass (tons)</i>
Big Horn	53
Fremont	12
Goshen	82
Hot Springs	10
Laramie	42
Park	110
Washakie	14
Other ^B	11
State Total	335

A. USDA NASS - [Quick Stats: Wyoming County Data, Crops](#).

B. Other is based on the sum of those counties not reporting.

Agricultural and Food Processing Waste - After harvest, beans are screened to remove dirt, rocks, and stems. Dry edible beans are then bagged or sent to processing facilities located outside of Wyoming. A private seed company located in the Powell area bags beans for shipment. Very small amounts of waste are expected to be generated in this process.

Alternative Uses for Residue - Since there is little unused agricultural or food processing waste, alternative uses were not considered.

Oats

Oat straw which remains in fields provides erosion control, nutrients, and organic matter for plant growth and soil. Some oat straw may be baled.

Biomass Data Collection

Oat residue was determined based on the average production of 2004 and 2005 Wyoming County crop data (USDA, NASS). Air dry field residue was calculated assuming 50 lbs of residue per bushel of production (USDA, NRCS, 1997). No specific information was available for counties not listed.

Tons Dry Biomass equals:

$[(\text{average yield, bushel, for 2004 and 2005}) * 50 \text{ lbs/BU}] / 2000 \text{ lbs per ton}$

Table IV-3. Oat Field Residue: Tons of Dry Biomass Produced Annually (average of 2004 and 2005)^A.

County	Dry Biomass (tons)
Big Horn	3,664
Fremont	1,530
Goshen	2,139
Hot Springs	545
Johnson	594
Laramie	1,691
Park	1,368
Sheridan	420
Washakie	456
Weston	328
Other ^B	4,704
State Total	17,438

A. USDA NASS - Quick Stats: Wyoming County Data, Crops.

B. Other is based on the sum of those counties not reporting.

Agricultural Processing Residue - Oats are grown in Wyoming primarily for livestock feed. Any agricultural processing residue would remain in the field during harvest. Residue generated during livestock feeding will generally be in a location such that livestock can utilize it as feed, or it may provide nutrients and organic matter to soil.

Food Processing Residue - There is virtually no food processing residue for oats in Wyoming.

Alternative Uses for Residue - Since there is essentially no food or agricultural processing oat residue in Wyoming, alternative uses for oat residue were not considered.

Sugarbeets

Some farmers remove beet tops with the beet harvest, and some farmers leave beet tops in the field. Sugarbeet tops remaining in the field after harvest can be windrowed. Sheep or cattle are allowed to feed on them during the winter.

Biomass Data Collection

Sugarbeet residue was determined based on the average production of 2004 and 2005 Wyoming County crop data (USDA, NASS). Air dry field residue was calculated assuming 150 lbs of residue per ton of production (USDA, NRCS, 1997). No specific information was available for counties not listed.

Tons Dry Biomass equals:

$[(\text{average yield, ton, for 2004 and 2005}) * 150 \text{ lbs/ton}] / 2000 \text{ lbs per ton}$

Table IV-4. Sugarbeet Field Residue: Tons of Dry Biomass Produced Annually (average of 2004 and 2005)^A.

<i>County</i>	<i>Dry Biomass (tons)</i>
Big Horn	13,346
Fremont	5,033
Goshen	1,673
Laramie	1,286
Park	20,921
Platte	2,865
Washakie	15,364
State Total	60,488

A. USDA NASS - Quick Stats: Wyoming County Data, Crops.

Food Processing By-products - Sugarbeets are grown primarily in Big Horn, Park, and Washakie Counties. Platte and Fremont also produce lesser amounts of sugarbeets. Processing facilities for sugarbeets are located Torrington, Worland, and Lovell.

By-products include pressed pulp, pellets, and tailings (crowns and leaves), all of which are used for cattle and sheep feed. Pressed pulp has a high water content. There is essentially no unused waste from sugar beet processing. The tailings are separated, and processing plants allow ranchers to transport the tailings from the plants. Tailings, which are crowns and leaves, are 90% to 95% water. Since tailings have a high water content, the cost of drying the tailings is too great to make it economically feasible.

Alternative Uses for Residue - Individuals interviewed, and literature investigated, revealed no major alternative uses for sugarbeet residue. All sugarbeet residues are presently used for purposes which seem to satisfy the economic needs of both sugarbeet processors and producers. Other uses for sugarbeet residues have been considered or pursued on a limited basis. Agriculture, Wyoming Business Council and the Wyoming Department of Agriculture can provide additional resource information for those who may wish to pursue other uses for sugarbeet residues.

Wheat

Wheat straw is commonly baled and used for animal bedding and other applications such as insulation of structures.

Biomass Data Collection

Wheat residue was determined based on the average production of 2004 and 2005 Wyoming County crop data (USDA, NASS). Air dry field residue was calculated assuming 100 lbs of residue per bushel of production for spring wheat, and 120 lbs of residue per bushel for winter wheat (USDA, NRCS, 1997). No specific information was available for counties not listed.

Tons Dry Biomass equals:

$[(\text{average yield, bushel, for 2004 and 2005}) * 150 \text{ lbs/ton}] / 2000 \text{ lbs per ton}$

Table IV-5. Wheat Field Residue: Tons of Dry Biomass Produced Annually (average of 2004 and 2005)^A.

<i>County</i>	<i>Spring Wheat Dry Biomass (tons)</i>	<i>Winter Wheat Dry Biomass (tons)</i>
Big Horn	2,150	
Campbell		8,205
Crook		5,232
Fremont	3,900	
Goshen		54,756
Laramie		131,235
Niobrara		8,181
Sheridan		3,240
Other ^B	7,825	24,951
State Total	13,875	235,800

A. USDA NASS - [Quick Stats: Wyoming County Data, Crops](#).

B. Other is based on the sum of those counties not reporting.

Agricultural and Food Processing Residue - The majority of wheat grown in Wyoming is transported to other states for processing. Therefore, there is virtually no processing residue of spring and winter wheat.

Alternative Uses for Residue – A recent development for the use of straw has been to combine it with recycled plastic to produce a wood substitute. In the fall of 2006, the Heartland BioComposites LLC plant opened in Torrington. The company is supplied with wheat straw from regional farmers and produces composite fencing, decking, and pallets.

Wheat straw can also be used for housing, insulation around the base of buildings, and mulch for areas which must be reclaimed and revegetated.

Corn

Corn growers may decide during the growing season or at harvest whether corn will be used for grain or silage. Date of the first hard frost, available irrigation water and precipitation, general growing season factors, and farm goals are considered by each corn grower to determine if the corn crop will be harvested for grain or silage.

Biomass Data Collection

Field residue was calculated for grain only. Any field residue remaining after silage harvest is assumed to be non-recoverable due to harvesting techniques. After grain has been harvested, some farmers bale cornstalks for bedding. This bedding may be used on the farms and ranches from which the cornstalks were produced.

Corn residue was determined based on the average production of 2004 and 2005 Wyoming County crop data (USDA, NASS). Air dry field residue was calculated assuming an average of 75 lbs of residue per bushel of production (USDA, NRCS, 1997). No specific information was available for counties not listed.

Tons Dry Biomass equals:

$[(\text{average yield, bushel, for 2004 and 2005}) * 75 \text{ lbs/BU}] / 2000 \text{ lbs per ton}$

Table IV-3. Corn Field Residue: Tons of Dry Biomass Produced Annually (average of 2004 and 2005)^A.

County	Dry Biomass (tons)
Big Horn	14,953
Converse	-
Fremont	5,402
Goshen	165,956
Laramie	25,538
Niobrara	1,073
Park	7,134
Platte	17,846
Other ^B	13,536
State Total	251,438

A. USDA NASS - [Quick Stats: Wyoming County Data, Crops](#)

B. Other is based on the sum of those counties not reporting.

Agricultural Processing Residue - During harvest of corn grain and corn silage, processing residue remains in the field and can be utilized as field residue to minimize wind and water erosion of soil. Some residue will be generated during livestock feeding of grain and silage. This residue will generally be in a location such that livestock can utilize it as feed or it may be incorporated into the soil with value as organic matter and plant nutrients.

There is an ethanol plant located near Torrington that processes corn. The residue from this operation is sold as livestock feed due to the high protein content. Other possibilities may exist

in the state for smaller systems. Breilsford Engineering, Inc. (www.beienginc.com) has designed a small scale ethanol plant for use in rural settings. This plant will use approximately 240 bushels of corn per day to produce 25 gallons of ethanol per hour. With a collective effort from farmers, Big Horn, Fremont, Goshen, Laramie, Park, and Platte Counties all produce enough corn to maintain an ethanol plant of this design.

Food Processing Residue - There is no food processing of corn in Wyoming.

Hay

The amount of acreage planted is considered to be equal to the acreage harvested. In some cases, acreage planted for hay is not harvested with the intention of utilizing the land as pasture. A small percentage (possibly less than 5%) of planted acreage that is not harvested may also include roadsides, irrigation ditch shoulders, fence rows, and similar types of areas which are more difficult to harvest due to the physical constraints of equipment.

Alfalfa hay may be replanted every eight to ten years. Grass hay may be replanted every fifteen years or more. Hay is harvested such that essentially no field residue remains. Since hay is not replanted annually, residue removal would be at cross purposes to crop production.

Agricultural Processing Residue - There is virtually no agricultural processing residue associated with hay. Agricultural processing residue is generated when bales are broken, and these are fed to livestock.

Alternative Uses for Residue - Hay may be used as a mulch for projects at mines, roadsides, and other sites where reclamation and revegetation are required. Although hay is more expensive than straw for this purpose, native grass hay offers a secondary seed source for revegetation.

Since there is essentially no field or agricultural processing hay residue, no other alternatives for hay residue were considered.

Irrigated Acreage

The Wyoming Water Development Commission has made available the Statewide Water Resources Data Inventory for electronic viewing and download, via the World Wide Web at: <http://waterplan.state.wy.us/sdi/sdi.html>. This plan summarizes, among many other topics, the source of irrigation water for agricultural, municipal, domestic, industrial, recreational, and environmental uses. The data is organized by basin and sub-basin.

The following agencies can provide more information about the state's water planning process:

Wyoming State Engineer's Office
122 W 25th St., 4th Floor E
Cheyenne, Wyoming 82002
(307) 777-7354
Web: <http://seo.state.wy.us/>

Water Resources Data System
University of Wyoming
1000 E. University Ave., Dept. 3943
Laramie, Wyoming 82071
(307) 766-6651
Web: <http://www.wrds.uwyo.edu/>

Wyoming Water Development Commission
Attn: River Basin Planning Division
Herschler Building, 4W
Cheyenne, Wyoming 82002
(307) 777-7626
Web: <http://wwdc.state.wy.us/>

Food Processing Residue

Wyoming currently has no large food processors other than sugarbeet processors in Torrington, Worland, and Lovell. Residues from sugarbeet processors are used by local ranchers and farmers for livestock feed.

There are currently at least two potato growers in the state which grow potatoes for chipping (potato chips) or for seed potatoes. Some residue may be returned to the field through their processing system. (Smaller potatoes will pass through a screen, and larger potatoes will be used for seed or chipping.)

The Wyoming Business Council publishes the Ag Trade Directory which includes a comprehensive list of products and services provided by and to the agribusiness community. Government agencies and trade associations which assist the agribusiness community are listed, including the Wyoming Processed Food Directory. To obtain this directory, the Wyoming Business Council can be contacted at:

214 West 15th Street
Cheyenne, Wyoming 82002-0240
(307) 777-2807 or 1-800-262-3425
Web: <http://www.wyomingbusiness.org>

Many of Wyoming's food processors (including slaughterhouse and meat processing facilities) are believed to generate relatively small amounts of waste. In many cases, the processor may

use (or may make available to others) waste for animal feed, soil nutrients, or soil organic matter. Due to the volume of food processing residue and distances to markets, potential users of this waste may consider evaluating local uses.

Potential Uses for Crop Residue

Erosion Control

Crop residues remaining in fields after harvest offer great benefit for erosion control. Tillage practices such as minimum tillage or no till, have become more widely accepted in the last few years and contribute to reduction of soil erosion and retention of moisture. Field residues provide a multitude of benefits to the soil such as: surface protection from wind and water erosion; nutrients; increased cation exchange capacity and thus increased retention of anions found in fertilizers such as nitrates; reduction of bulk density; increased moisture infiltration and retention; and energy for activity of microorganisms.

Although field residues provide nutrients to growing crops, residues often do not provide sufficient nutrients for high yields of many crops such as corn. Commercial fertilizers are necessary for most field crops.

The benefits of crop residues have both short term and cumulative impacts. The advantages of surface protection, cation exchange capacity, bulk density, and moisture are most apparent over longer periods of time. Since it can take more than fifty years for an inch of soil to form, precautions should be taken to prevent soil loss and to improve soil characteristics. Dollar values are not easily assigned to crop residue, but the long term benefits can be invaluable. Once lost, topsoil is difficult to regain.

The U.S. Department of Agriculture has developed two erosion prediction tools: water erosion and wind erosion. The Natural Resources Conservation Service (NRCS) State Agronomist can provide specific information about the use of either erosion prediction tool. The NRCS office is located at:

U.S. Department of Agriculture, Natural Resources Conservation Service (NRCS)
P.O. Box 33124
100 East B Street, 3rd Floor
Casper, Wyoming 82601-5011
(307) 233-6750
Web: <http://www.wy.nrcs.usda.gov/>

The NRCS uses the ***Field Office Technical Guide*** when making recommendations. It contains five sections, by state and county, available on-line at <http://www.nrcs.usda.gov/technical/efotg/>. The wind and water erosion prediction tools are in Section I.

- Section I - General References
- Section II – Natural Resource Information
- Section III – Conservation Management Systems
- Section IV - Practice Standards and Specifications
- Section V - Conservation Effects