

Wheat straw availability and quality changes during harvest, collection, and storage

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The economics of growing wheat are marginal and many people are interested in extracting more value from the crop by utilizing the straw for industrial purposes. Examples of these uses are strawboard, pulping and ethanol plants. To accurately analyze the economic viability of a plant and to ensure straw supply is sustainable, it is vital that reliable data on straw availability exists. Maps describing straw availability on the prairies have previously been developed by PFRA. Because of the limited amount of data available, some assumptions of straw to grain ratio, straw recovery and the effect of variety had to be made. Three projects were carried out to provide current data on straw availability throughout Saskatchewan as a function of grain yield and to relate this data to the actual amount of straw realized after combining, baling and storage.

The first project consisted of collecting wheat samples from six areas of the province just prior to harvest. Eight samples from a square metre area were collected from each of four fields in each area. All samples were cut at ground level. The amount of straw, grain and chaff for each sample was determined in the lab, and the amount of straw at various cut heights was also determined. The data was used to determine straw to grain (S/G) ratios for all samples.

The second project consisted of combining and baling wheat using different combinations of conventional and rotary combines, round and square balers, baling times and wheat type. Metre square samples were collected before harvest, and these results were compared to the grain and straw collected after combining and after baling with each combination tested. This data was used to relate the amount of straw actually baled to the total amount of straw available before cutting.

The third project is ongoing, and is a study on straw quality and quantity changes while being stored for fourteen months. Round and square bales are being stored using three different stacking methods, and monthly samples are being collected to assess straw quality changes. The amount of straw available after fourteen months of storage will be determined later this calendar year.

Results from the first project indicate that, as expected, there is a definite relationship between the S/G ratio and the area of the province, and that it appears to be affected by rainfall. The average S/G ratios (at 0 cut height and 0% moisture) for CWRS, CWAD, and CPS wheat were 1.37, 1.20, and 1.00 respectively. The S/G ratio for all six areas was compared to the average rainfall for the area, and a good correlation between the two was found. A good relationship was also determined for the straw mass vs. straw length. The results from this project indicate that relationships exist that can be used to predict straw yield based on rainfall, straw type, straw height and cutting height.

Results from the combining and baling study showed a good relationship between the straw and grain yields determined from metre square samples and samples collected from the combine. To use this information, it was important to know the cut height, as a great proportion of the straw is at the bottom of the plant. The type of baler used did not affect the straw recovery much, and neither did the timing of baling in this test. The combine type greatly affected the straw recovery, as there was noticeably less straw after using a rotary combine, and this straw made poorer bales than those from a conventional combine. The total straw recovered (baled) with CPS wheat was about 40% of that available from the standing plant. With CWRS wheat, the total straw recovered varied from slightly under 50% in a good

crop to under 40% in a poor crop. This data, combined with that collected in the first project, can be used to determine total recoverable straw in different areas of the province.

In the spring of 2001, straw samples have been collected from all storage stacks monthly, but no sample analysis has been done to date. As expected, there is no visible degradation of any stack over the winter. It is expected that the straw will begin to degrade as the stacks are exposed to rain and warmer temperatures.