CALCULATING GRAIN SHRINKAGE

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Following harvest, a grower must usually decide whether to sell wet grain “as is” at a moisture-discounted market price or mechanically dry the grain (on-farm or by custom drying) at a total cost the grower hopes is less than the moisture discount. One of the expenses involved in mechanically drying grain is the “cost” of the weight loss that occurs during the drying process. This weight loss by drying is referred to as “shrink” and is expressed as a percentage of the original shrinkage in order to accurately determine the total cost of mechanical drying.

Over-drying grain results in loss of weight (water) that could have been sold since grain is usually sold on a weight basis. If the initial weight, initial moisture and final moisture contents are known, the final weight can be calculated as follows:

\[
\text{Final weight} = \frac{\text{Initial weight} \times \left(\frac{100 - \text{Initial % moisture}}{100 - \text{Final % moisture}}\right)}{100}
\]

To find the increase in value due to drying, multiply the selling price of dry grain by the volume and compare it with the selling price of wet grain with discount.

Table 1 shows the loss in weight in percent due to drying grain.

<table>
<thead>
<tr>
<th>Initial Moisture Content (%)</th>
<th>15½</th>
<th>14</th>
<th>13</th>
<th>12</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percent Shrinkage</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>17.2</td>
<td>18.6</td>
<td>19.6</td>
<td>20.4</td>
<td>22.2</td>
</tr>
<tr>
<td>25</td>
<td>11.2</td>
<td>12.8</td>
<td>13.6</td>
<td>14.8</td>
<td>16.7</td>
</tr>
<tr>
<td>20</td>
<td>5.4</td>
<td>7.0</td>
<td>8.1</td>
<td>9.0</td>
<td>11.0</td>
</tr>
<tr>
<td>17</td>
<td>1.8</td>
<td>3.5</td>
<td>4.6</td>
<td>5.7</td>
<td>7.8</td>
</tr>
</tbody>
</table>

To use Table 10, multiply the initial weight by 1.00 minus (the percent shrinkage given in the table divided by 100). For example, if grain is dried from 25 percent down to 12, take the initial weight X (1.00 - 0.148) = final weight.

Handling Loss

Although most of the weight loss during drying is water, a small portion is dry matter. This loss is often called (“invisible shrink,” but we prefer to call it “handling loss.” Some of the handling loss is due to loss of volatile compounds such as oils, mechanical losses from broken kernels and foreign material, and possibly also due to respiration of the seed itself. Handling loss will normally be far less than that due to water.

The actual amount of handling loss will depend on the initial physical quality of the corn, the method of drying, and the handling processes during drying. Research at Iowa State University determined that on-farm handling losses ranged from 0.22 to
1.71%. Losses from commercial drying systems ranged from 0.64 to 1.33%. The 3-year on-farm average was 0.82% compared to 0.88% for the commercial facilities.

Some people prefer to use a shrinkage chart (does not include handling loss) as in Figure 1 to determine weight loss in grain drying.

Figure 1. Guide for estimating percent weight lost in grain drying. To use chart, place straight edge at final and original moisture content and read off the percentage loss (does not include handling losses).

EXAMPLE: Grain dried from 30 to 12% = 20.4% loss from original weight.