Moisture Basis Conversions for Grain Composition Data

The rapid growth of specialty corn and soybean production has created a need for composition measurements to meet contract specifications. Composition includes protein, oil, starch, and fiber measured as percentages by weight. By fall 1995, more than 20 Iowa elevators will have the near-infrared test instruments for composition testing.

Weight percentages change with variations in moisture content. Dry samples have larger percentages of protein, oil, starch, and fiber than wet samples. Calculation of these percentages on a moisture basis other than the actual moisture at the time of test is strictly a mathematical formula. Composition data are meaningless and confusing if the moisture basis of the data is not clear. Think of moisture basis correction as if the grain were all at the same moisture.

There are three general methods for expressing moisture basis:

1. As-is: The moisture content at the time of the test. Nutritionists refer to this as "as-fed" moisture basis.

2. A fixed moisture basis, such as 15 percent or 13 percent. Percentages are converted mathematically to this basis.

3. Dry-basis. A special case of Item 2 in which the moisture basis is 0 percent moisture. Dry-basis percentages are percentages of the grain dry matter, water excluded.

Let's compare some percentages by the three methods. Assume a high-oil corn sample is tested at 20 percent moisture content.

Method	Moisture basis (%)	Percentage oil (%)
As-is	20	6.0
Fixed moisture basis	15	6.4
Fixed moisture basis	13	6.5
Dry-basis	0	7.5

All of these oil percentages correctly represent the sample. Confusion arises when various data sources (e.g. hybrid information, contractual requirements, etc.) use different moisture bases. When a purchase contract, such as a high-oil corn contract, has fixed specifications, different moisture basis figures can be hard to interpret.

One company's contract currently specifies a sliding premium scale, starting at 6 percent dry-basis oil. If other moisture basis percentages are applied against the same six percent starting point, the premium will be different than if dry-basis oil percentages are used. Because there is no agreement on a universal moisture basis, handlers and producers will need to convert and interpret data on varying moisture bases.

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Conversion Formula

$$P_2 = \left(\frac{100 - M_2}{100 - M_1}\right) P_1$$

P$_2$ = adjusted constituent percentages at moisture M$_2$ (percent)

M$_2$ = moisture basis (percent)

P$_1$ = original (as-is) constituent percentage

M$_1$ = original moisture (percent)

For the example, if M$_1$ = 20.0 percent, P$_1$ = 6.0 percent, and M$_2$ = 0 percent (dry-basis):

$$P_2 = \left(\frac{100 - 0}{100 - 20}\right)(6.0) = 7.5\ \%$$

This formula also will convert between two moisture basis percentages, M$_2$ being the final moisture basis, and M$_1$ being the initial moisture basis. For example, if M$_1$ = 0 percent, P$_1$ = 7.5 percent, and M$_2$ = 15.0 percent then:

$$P_2 = \left(\frac{100 - 15}{100 - 0}\right)(7.5) = 6.4\%$$

Moisture basis conversions are purely mathematical adjustments that do not change the fundamental quality of the grain. Contact your county extension office for more information.

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