



Task Force

High Oil Corn Composition

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We have received numerous inquiries about oil levels measured in high oil corn (HOC) samples submitted to our Grain Composition Analysis Service. This fact sheet summarizes the composition data compiled for HOC samples received in our lab since the fall of 1996. These samples were submitted by individual HOC producers or elevators. They do not represent samples from a scientific survey.

According to surveys by the U.S. Feed Grains Council, 1996 yields for corn raised under DuPont's Top Cross system averaged between 90% and 105% of standard corn hybrids. Typical high oil corn premiums received by farmers ranged from 15 to 30 cents/bushel, with an average of 27 cents/bushel. The marketing channel received between 6 to 11 cents/bushel for contracting and segregating HOC hybrids. Current premiums for HOC in Indiana range from 10 cents/bushel for a minimum of 6.0% (dry basis) to as high as 40 cents/bushel for a minimum of 8.5% oil (dry basis). Late this summer, premiums of up to 80 cents/bushel

were reported from one location for old crop HOC. According to researched published by DuPont, the total opportunity value of high oil corn for feeding dairy, beef, swine, and poultry ranges from 25 to 64 cents/bushel (Fig. 1).

At least 12 elevators in Indiana are contracting high oil corn for the 1997 season. Call our lab for more information on HOC analysis and a list of contracting locations.

Dry vs. Wet Basis

There appears to be some confusion about the moisture basis used to report composition results. In the grain industry, no one moisture basis is standard. Accepted practice among many elevators in the Western Corn Belt has been to report composition on a 15% moisture basis for corn and a 13% moisture basis for soybeans. However, elevators that deal specifically with HOC contracts tend to specify premiums on a dry basis. Conversion from one to the other is easily accomplished by using the

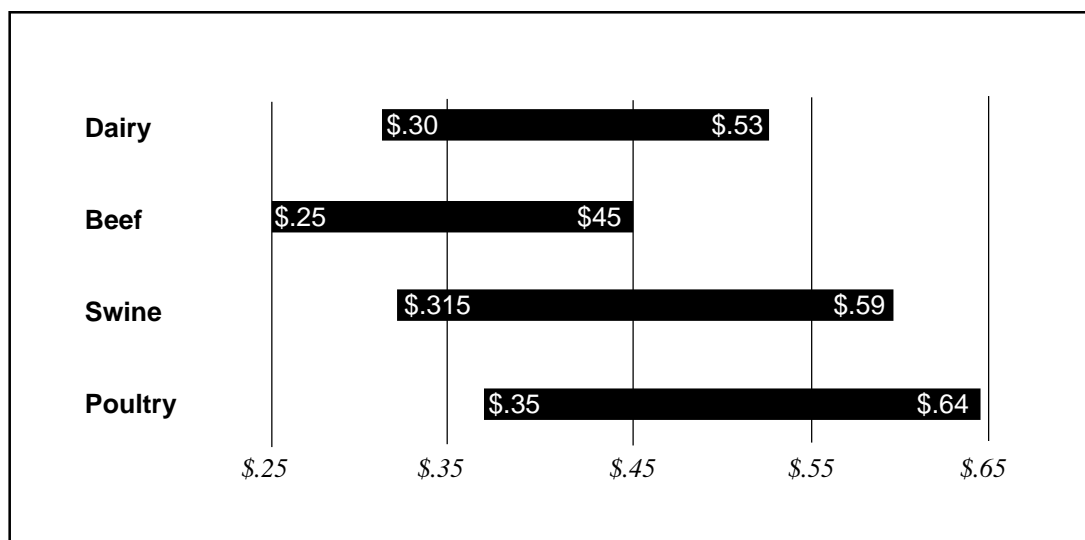


Figure 1. Total opportunity value of high oil corn when fed to various livestock (Source: DuPont Optimum Grains).

following equations:

$$C_{DB} = 100 * \frac{C_M}{100 - M}$$

[1]

or

$$C_M = \frac{C_{DB} (100 - M)}{100}$$

[2]

where M is the given percent moisture; C_{DB} is the percent component (oil, starch, or protein) on a dry basis; and C_M is the percent component based on M moisture. For example, a corn sample with a 6.0% oil content on a 15% moisture basis has 7.1% (Eq. [1], $100 * 6.0 / (100 - 15)$) oil on a dry basis. A corn sample with an oil content of 7.5% on a dry basis has an oil content of 6.4% (Eq. [2], $7.5 * (100 - 15) / 100$) on a 15% moisture basis.

HOC Sample Data

All samples were analyzed using a near-infrared whole grain analyzer (Infratech 1229) located in our Grain Quality Lab. Table 1 summarizes the compositional data for 1996 HOC samples. Data from only three hybrids are available. Oil content from samples analyzed in 1996 averaged 8.2% and ranged from 7.2 to 8.8% on a dry basis. HOC samples received thus far for analysis from the 1997 harvest averaged 8.1% oil and ranged from 6.8 to 8.7% on a dry basis (Table 2). 1997 data includes two different hybrids. Based on samples analyzed in our lab from 1996 to the present, the average oil content has remained unchanged. Assuming hybrid is the only factor that affects oil content, the oil averages among the five hybrids presented in Tables 1 and 2 are statistically different based on a one-way ANOVA at a 95% confidence level.

Table 3 shows samples received from two private plot tests in Southwest Indiana harvested in late September and early October 1997. Oil

contents of the HOC samples averaged 7.1 and ranged from 4.8 to 8.5% on a dry basis (Table 3a). The results indicate that one sample (Garst 8396TC) had an oil content below 6.0% dry basis, which would not qualify for a premium. Additionally, farm samples of Wyffells 7115TC (Table 2) averaged 0.7-0.8 percentage points of oil higher than the two plot samples. NK6423TC farm samples averaged 0.7 points of oil higher than the NK6423TC sample from plot 1 and 0.2 points lower than the sample from plot 2. None of the 1996 HOC hybrids analyzed in 1996 were included in the 1997 HOC plot tests.

There were several regular corn hybrids grown in these test plots as well (Table 3b). Lower oil contents in the HOC hybrids may have been caused by cross pollination effects. This observation is supported by the somewhat higher oil levels in the regular corn hybrids, ranging from 4.3 to 5.3% on a dry basis compared to "normal" corn oil levels of about 4.3% dry basis. Further studies are needed to quantify this effect. Plans are currently being formulated by Purdue University agronomists to plant several HOC plot trials throughout Indiana in 1998. Additionally, Purdue animal scientists are initiating several HOC feeding studies this fall with swine, beef, and poultry. Drying behavior and storability research is currently being undertaken in the Purdue Grain Quality Lab.

As was pointed out in Grain Quality Fact Sheet #32, one of the 1996 state survey samples analyzed was a high oil corn hybrid. The composition values for this sample were 7.1% oil, 10.6% protein, and 55.7% starch (all values based on 15% moisture). It is expected that the 1997 state survey will include several HOC samples.

Table 1. 1996 HOC Composition Samples.

Variety	% Protein*	% Oil*	% Oil (dry basis)	% Starch*	Density (g/ml)
Agrigold 6510TC	8.8	6.1	7.2	56.9	1.27
	8.8	6.1	7.2	56.9	1.27
Average	8.8	6.1	7.2	56.9	1.27
Wyffels 5875TC	10.2	7.5	8.8	54.6	1.28
	8.9	7.5	8.8	55.7	1.27
	9.5	7.3	8.6	55.2	1.28
	9.5	7.3	8.6	55.2	1.28
	9.3	7.3	8.6	55.5	1.28
	9.3	7.3	8.6	55.5	1.28
	9.3	7.3	8.6	55.0	1.28
	9.3	7.3	8.6	55.0	1.28
	9.3	7.2	8.5	55.4	1.28
	9.3	7.2	8.5	55.4	1.28
	8.1	7.1	8.4	56.6	1.24
	9.8	7.0	8.2	56.0	1.27
	9.8	7.0	8.2	56.0	1.27
	8.1	7.0	8.2	56.1	1.24
	8.2	6.9	8.1	55.0	1.23
	7.9	6.9	8.1	56.8	1.24
	8.8	6.8	8.0	57.4	1.25
	7.2	6.8	8.0	53.3	1.24
	7.2	6.8	8.0	53.3	1.24
	6.9	6.8	8.0	54.4	1.25
	6.9	6.8	8.0	54.4	1.25
	6.9	6.8	8.0	54.0	1.25
	6.9	6.8	8.0	54.0	1.25
	6.6	6.8	8.0	54.8	1.25
	6.6	6.8	8.0	54.8	1.25
	8.3	6.7	7.9	56.2	1.24
	8.3	6.7	7.9	57.0	1.25
	8.2	6.7	7.9	57.3	1.27
Average	8.4	7.0	8.3	55.3	1.26
Wyffels 7001TC	9.3	7.0	8.2	55.9	1.26
	9.3	7.0	8.2	55.9	1.26
	9.2	7.0	8.2	55.9	1.26
	9.2	7.0	8.2	55.9	1.26
	9.7	6.9	8.1	55.4	1.25
	9.7	6.9	8.1	55.4	1.25
	9.2	6.9	8.1	55.8	1.26
	9.2	6.9	8.1	55.8	1.26
	9.1	6.9	8.1	56.2	1.26
	9.1	6.9	8.1	56.2	1.26
	8.6	6.9	8.1	56.1	1.27
	9.5	6.6	7.8	56.8	1.28
Average	9.3	6.9	8.1	55.9	1.26
1996 Average	8.7	6.9	8.2	55.6	1.26
1996 Minimum	6.6	6.1	7.2	53.3	1.23
1996 Maximum	10.2	7.5	8.8	57.4	1.28

*based on 15% moisture

Table 2. 1997 HOC Composition Samples (as of October 31, 1997).

Hybrid	% Protein*	% Oil*	% Oil (dry basis)	% Starch*	Density (g/ml)
NK 6423TC	8.7	7.4	8.7	53.6	1.27
	9.4	6.6	7.8	54.7	1.29
	8.5	6.6	7.8	55.5	1.27
	8.6	6.3	7.4	55.4	1.28
	8.1	6.3	7.4	55.0	1.27
	8.7	6.0	7.1	54.9	1.27
	8.0	5.8	6.8	56.2	1.27
Average	8.6	6.4	7.6	55.0	1.27
Wyffels 7115TC	9.0	7.4	8.7	54.0	1.28
	8.6	7.4	8.7	54.1	1.28
	8.3	7.4	8.7	54.9	1.27
	8.6	7.3	8.6	54.1	1.27
	8.6	7.2	8.5	54.5	1.28
	8.5	7.1	8.4	54.5	1.28
	8.4	7.1	8.4	55.0	1.27
Average	8.6	7.3	8.6	54.4	1.27
1997 Average	8.6	6.9	8.1	54.7	1.27
1997 Minimum	8.0	5.8	6.8	53.6	1.27
1997 Maximum	9.4	7.4	8.7	56.2	1.29

*based on 15% moisture

Table 3a. 1997 Composition Values for HOC Hybrids in Two Southwest Indiana Private Test Plots.

Hybrid	Plot	% Protein*	% Oil*	% Oil (dry basis)	% Starch*	Density (g/ml)
NX 6607	2	8.6	7.2	8.5	53.6	1.28
Wyffels 7075TC	1	9.4	6.8	8	53.9	1.26
NX 6205	2	8.5	6.8	8	55.6	1.28
Wyffels 7115TC	1	9.4	6.7	7.9	54.5	1.28
NX 5526	2	9.2	6.7	7.9	54.7	1.28
Wyffels 7115TC	1	8.4	6.6	7.8	54.9	1.26
NK 6423TC	2	8.2	6.6	7.8	55.0	1.27
Wyffels 7025TC	1	8.8	6.0	7.1	55.2	1.26
Agrigold XA4306TC8	1	8.4	6.0	7.1	54.7	1.23
NK 6423TC	1	8.8	5.9	6.9	55.5	1.26
NK NX7105	2	8.1	5.9	6.9	55.8	1.27
Agrigold 6460TC	1	8.2	5.6	6.6	55.4	1.25
Agrigold XA4503TC	1	8.3	5.5	6.5	55.7	1.24
Agrigold 6595TC	1	8.3	5.3	6.2	56.4	1.24
Wyffels 6775TC	1	8.7	5.2	6.1	56.3	1.25
Garst 8396TC	1	9.2	4.0	4.8	56.6	1.28
Average		8.7	6.1	7.1	55.2	1.26
Minimum		8.1	4.0	4.8	53.6	1.23
Maximum		9.4	7.2	8.5	56.6	1.28

*based on 15% moisture

Where to Submit Samples

The Purdue University Grain Quality Laboratory continues to offer composition analysis for whole corn, soybeans, wheat, and soybean meal FREE of charge to any Indiana farmer, elevator, or processor for the second year in a row. Send 450 g (about 1 lb.) samples to:

Grain Quality Laboratory
1146 ABE
Purdue University
West Lafayette, IN 47907-1146

For further information, call (765) 494-2285; send e-mail to grainlab@ecn.purdue.edu; or visit us on the World Wide Web at <http://pasture.ecn.purdue.edu/~grainlab>. For submission of larger numbers of samples, please call ahead to make special arrangements.

Grain Quality Fact Sheets can be accessed on-line through:

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Table 3b. 1997 Composition Values for Regular Hybrids in Two Southwest Indiana Private Test Plots.

Hybrid	Plot	% Protein*	% Oil*	% Oil (dry basis)	% Starch*	Density (g/ml)
NK 6423	2	9.1	4.5	5.3	56.8	1.30
Garst 8330	1	8.3	4.1	4.8	56.8	1.27
NK 4394	2	9.1	4.0	4.7	58.0	1.30
NK 6423	2	8.8	4.0	4.7	56.9	1.29
NK N7070	2	8.5	4.0	4.7	57.5	1.28
Garst 8451	1	7.9	4.0	4.7	58.1	1.26
Garst 8242	1	8.9	3.9	4.6	56.7	1.26
Garst 5336	1	7.9	3.9	4.6	57.7	1.26
Garst 8325	1	7.9	3.9	4.6	57.4	1.25
Garst 8366	1	8.2	3.8	4.4	57.2	1.25
Garst 5440	1	8.4	3.6	4.3	57.7	1.27
Average		8.5	4.0	4.7	57.3	1.27
Minimum		7.9	3.6	4.3	56.7	1.25
Maximum		9.1	4.5	5.3	58.1	1.3

*based on 15% moisture