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# Hybrid Variation for Yield, Crude Protein, and Feed Value of Corn

Z. Hu
*University of Kentucky*

C. G. Poneleit
*University of Kentucky*

K. O. Evans
*University of Kentucky*

Michael Collins
*University of Kentucky*

D. O. Liptrap
*University of Kentucky*

UNIVERSITY OF KENTUCKY
COLLEGE OF AGRICULTURE
Lexington, Kentucky 40546

COOPERATIVE EXTENSION SERVICE

# AGRONOMY NOTES

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## HYBRID VARIATION FOR YIELD, CRUDE PROTEIN, AND FEED VALUE OF CORN

Z. Hu, C. G. Poneleit, K. O. Evans, M. Collins, and D. O. Liptrap[1]

The value of corn as a feed grain depends on the yield per acre, the protein content of the grain, and for some livestock, the lysine level of the protein. Most farmers are aware of yield differences among hybrid corn varieties but may not realize that protein content can also vary significantly. Grain protein level should be accounted for to determine how much protein supplementation will be needed to balance an appropriate animal diet. However, since corn protein is deficient in the amino acid lysine, which is essential for non-ruminant animals, lysine content as well as crude protein content should be considered in diet formulations for these animals.

Comparative yield performance of hybrid corn varieties sold in Kentucky are available in Ky Agric. Exp. Sta. Prog. Rep. No. 331, Kentucky Hybrid Corn Performance Test - 1990, and protein level of these same hybrids are now available in this report. To make this data useful as a hybrid selection aide, we have calculated the relative amount and cost of production of a 16% protein base diet for all hybrids. Unfortunately, lysine levels of the corn protein are not available and a final decision about feed value of the corn hybrid for swine or poultry formulations should be made only after a lysine analysis has been obtained. Nevertheless, these data will provide comparative data from which to choose a corn hybrid(s) for most economical feed production based on acre grain yield and crude protein level.

## MATERIALS AND METHODS

In 1990, commercially available corn hybrids were evaluated at three locations in Kentucky: Benton, Lexington, and Shelbyville. Benton and Shelbyville were planted no-till into a soybean residue while Lexington was planted in a seedbed prepared by conventional tillage. Nitrogen fertilization was 150 lb/Ac at Lexington and 175 lb/Ac at Benton and Shelbyville. All areas were treated with recommended herbicides and insecticides. The hybrids were planted on April 23 (Shelbyville), May 11 (Lexington), and May 15 (Benton) in 11 X 12 rectangular lattice designs with three replications at each location. Final stands were between 20,000 and 22,000 plants per acre. Additional details of crop management can be obtained in Ky. Agric.

[1]Visiting scholar, Professor, Research Specialist, and Professor, Dept. of Agronomy, and Extension Professor, Department of Animal Sciences, University of Kentucky, Lexington, KY 40456.

Exp. Sta. Progress Report 331 (Poneleit and Evans, 1991).

At harvest, about 250-grams of grain from each plot were collected for protein analysis in addition to the agronomic data normally collected for the performance evaluation. Protein analyses were determined using Near-Infrared Reflectance Spectroscopy (NIRS) (Marten et al., 1985) that was standardized by duplicate micro Kjeldahl analyses (Bradstreet, 1965). Protein content was calculated as percent total N multiplied by 6.25. All protein and yield data were adjusted to reflect grain at 15.5% harvest moisture.

Feed value was evaluated by calculation of the quantity of a 16% protein base diet (BD) produced per acre (T/AC) and cost per ton ($/T) of the base diet considering per acre corn yield and production cost as well as protein supplement cost. A 16% base diet was chosen since this protein level is commonly used for swine and dairy. It is to be used only as a reference since other categories of livestock may require different levels of protein in their diets.

Amount (T/AC) and cost of the 16% protein base diet per ton ($/T) were calculated using the acre yield of corn grain, corn production costs of $200.00 per acre, and cost of 40% protein supplement as $230.00 per ton. The amount of BD per acre was calculated as the tons of corn grain per acre plus the amount of 40% soybean protein supplement needed to make 16% BD (i.e. 100 BU/AC corn with 9.0% protein will require 0.813 tons of 40% soybean protein supplement to make 3.6 tons of BD per acre at a cost of $107.49 per ton). The necessary formulae for these calculations are:

BD(T/AC) =
(BU/ACX56/2000)/(24/40-CP%),
BD($/T) = (200/BD T /AC) +
{[(16-CP%)/(40-CP%)]X230}

where

BD = Base Diet
BU/AC = Bushels of corn per acre obtained from "Kentucky Hybrid Corn Performance Test - 1990", Prog. Rep. 331 (Poneleit and Evans, 1991).
pounds of corn per bushel = 56,
pounds per ton = 2000,
corn grain protein percent = CP%,
corn grain needed per ton BD = 24/ 40-CP%,
dollars per acre for corn production = $200.00,
protein supplement needed per ton BD = 16-CP% / 40-CP%, and
dollars per ton of protein supplement = $230.00.

Livestock producers should be most interested in the cost/ton of Base Diet. Comparisons of $/T estimates among hybrids provides an evaluation of the relative feed costs as influenced both by grain yield and protein content. Tons of base diet is important in calculating the number of acres required to produce a given quantity of feed or to estimate the number of tons of feed which could be manufactured from a given number of acres.

The cost per ton of base diet, of course, will vary with corn production cost per acre and cost of protein supplement per ton. Producers may wish to recalculate the cost per ton of base diet for selected varieties using their own corn production and protein supplement costs.

## RESULTS AND DISCUSSION

### Grain Yield and Grain Protein Content

Significant differences were found among the corn hybrids for both grain yield and grain crude protein percent at each location and for the combined data (Table 1). Grain yield ranged from 50.7 to 105.2 BU/AC at Benton, from 111.1 to 190.6 BU/AC at Lexington, and from 85.7 to 140.6 BU/AC at Shelbyville. Crude protein content ranged from 7.3 to 9.4% at Benton, from 7.5 to 9.5% at Lexington, and from 7.2 to 8.8% at Shelbyville. The wide ranges of grain yield (as much as 54.5 BU/AC at Benton) as well as the wide differences in crude protein content at a location (as much as 2.1% at Benton) suggested that choice of corn hybrid can have a significant effect on feed value of the hybrid. Variety differences in grain yield were much larger at each location and for combined data than were differences in protein content, thus, hybrid grain yield is more likely to influence differences in BD than is protein content. However, the statistically significant variations among corn hybrids (differences greater than the LSD) do indicate that there are real genetic differences among hybrids for crude protein content. Significant tests for environments and the hybrid X environment interaction indicate that some corn hybrids perform differently at one site than another although hybrids with high or low grain yield or protein content usually tended to be either high or low at each location.

The correlation between protein content and grain yield was very low and not significant (r = - 0.07). Therefore it should be possible to choose a hybrid with both high grain yield and high protein content.

### Tons Per Acre and Cost of Base Diet

Significant differences for both 16% protein base diet produced per acre (T/AC) and cost of 16% protein base diet per ton ($/T) were also found among corn hybrids at each location and for the combined data (Table 1). BD ranged from 1.7 to 3.7 T/AC at Benton, from 4.1 to 7.1 T/AC at Lexington, and from 3.1 to 5.4 T/AC at Shelbyville . Cost per ton ranged from 104.0 to 186.9 $/T at Benton, from 83.0 to 131.0 $/T at Lexington, and from 96.7 to 122.1 $/T at Shelbyville. There also were significant interactions of hybrids X environments for T/AC and $/T.

Both T/AC and $/T result from the combined effects of grain yield and grain protein percent of the corn hybrids. T/AC will increase as grain yield increases, with fixed protein content, whereas $/T would be reduced. For example, for the combined data, if protein percent remains constant at 8.5% but grain yield is increased 7.5 bushels per acre (one LSD unit), BD quantity would be increased by 0.276 T/AC and BD cost would be reduced by 2.82 $/T.

Both BD quantity and cost would be slightly reduced as protein percent increases assuming that grain yield remained constant. Based on the average combined location data, if yield remains constant at 115.3 BU/AC, for example, an increase of 0.5% for average protein content (one LSD unit) would produce 0.067 fewer T/AC of BD and reduce the cost per ton by $2.07. The effects on cost of BD for increasing yield per acre by 1.0 bushel or increasing protein percent by 0.1% were nearly the same, about 0.4 $/T of BD. Total BD production was obviously most significantly affected by changes in grain yield per acre. Since both quantity of feed produced and cost per unit of feed are important economic considerations, the choice of hybrid to use for feed production should be made using both yield and percent protein data.

**CONCLUSIONS**

Large and statistically significant variations were found among corn hybrids for grain yield and crude protein percent. Hybrids responded differently to the environmental effects of test locations for both grain yield and protein percent. The correlation between grain yield and protein was near zero and indicated that high grain yield and high protein percent can occur together.

Variations of grain yield and crude protein content resulted in significantly different BD production and cost for different corn hybrids. The large differences of BD amount and cost among corn hybrids at a location (as much as 3.0 tons per acre at Lexington and 82.9 dollars per ton at Benton, respectively) indicate that the choice of hybrid corn seed for feed grain production may influence economic returns in an animal feeding operation. Our results indicate that increasing grain yield would increase BD quantity and decrease BD unit cost while increasing protein content would decrease both BD quantity and cost. Equivalent reductions in cost per ton of BD were obtained with a yield increase of one BU/AC and a protein percent increase of 0.1%.

Although these data include evaluations at three distinct locations in Kentucky, additional location and year environments would provide increased assurance that the observed hybrid differences are valid. Similar measures of grain yield and crude protein content with computation of BD amount and cost will be made in 1991. Additionally, lysine analyses will be obtained for some hybrids.

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Table 1. Grain crude protein percent (CP%), grain yield (BU/AC), quantity of 16% protein base diet (T/AC), and cost of base diet ($/T) for corn hybrids grown at three locations of the Kentucky Hybrid Corn Performance Test - 1990*

| Variety | Benton | | | | Lexington | | | | Shelbyville | | | | Average | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | CP% | BU/AC | T/AC | $/T | CP% | BU/AC | T/AC | $/T | CP% | BU/AC | T/AC | $/T | CP% | BU/AC | T/AC | $/T |
| ADLERS 6130 | 8.5 | 89.5 | 3.1 | 118.1 | 8.5 | 159.6 | 5.9 | 88.1 | 8.3 | 123.3 | 4.6 | 99.7 | 8.4 | 124.1 | 4.5 | 102.0 |
| ADLERS 88X | 9.1 | 60.1 | 2.1 | 156.9 | 8.5 | 153.4 | 5.7 | 90.8 | 7.8 | 108.0 | 4.1 | 108.0 | 8.5 | 107.2 | 4.0 | 118.6 |
| AGRATECH GK900 | 8.9 | 88.3 | 3.0 | 107.6 | 8.8 | 152.2 | 5.5 | 90.3 | 8.5 | 100.9 | 3.7 | 111.2 | 8.7 | 113.8 | 4.1 | 103.0 |
| AGRATECH 825 | 9.3 | 79.2 | 2.7 | 123.4 | 8.9 | 164.1 | 5.9 | 85.6 | 8.7 | 121.3 | 4.4 | 99.1 | 9.0 | 121.5 | 4.3 | 102.7 |
| AGRATECH 888 | 8.7 | 73.7 | 2.6 | 131.3 | 8.6 | 156.0 | 5.7 | 89.3 | 8.4 | 106.6 | 3.9 | 106.0 | 8.6 | 112.1 | 4.1 | 108.9 |
| AGRIGOLD A-6715 | 8.8 | 73.1 | 2.5 | 130.5 | 8.4 | 168.7 | 6.2 | 87.2 | 8.1 | 100.0 | 3.7 | 111.5 | 8.4 | 113.9 | 4.1 | 109.7 |
| AGRIGOLD A-6655 | 8.7 | 78.1 | 2.7 | 125.7 | 8.8 | 176.9 | 6.4 | 83.9 | 8.5 | 105.9 | 3.9 | 106.5 | 8.7 | 120.3 | 4.3 | 105.4 |
| AGRIGOLD A-6720 | 9.2 | 70.3 | 2.4 | 130.1 | 9.0 | 157.1 | 5.7 | 86.5 | 8.3 | 112.7 | 4.2 | 104.5 | 8.8 | 113.4 | 4.1 | 107.0 |
| AGRIGOLD A-6796W | 9.0 | 74.7 | 2.6 | 128.8 | 9.1 | 159.2 | 5.7 | 86.1 | 8.4 | 102.3 | 3.8 | 110.0 | 8.8 | 112.1 | 4.0 | 108.3 |
| ASGROW RX908 | 8.9 | 72.5 | 2.5 | 131.9 | 9.0 | 172.7 | 6.2 | 83.9 | 8.4 | 119.0 | 4.4 | 101.7 | 8.8 | 121.4 | 4.4 | 105.8 |
| ASGROW RX911 | 8.8 | 69.8 | 2.4 | 136.5 | 8.8 | 175.5 | 6.4 | 84.4 | 8.3 | 103.6 | 3.8 | 108.2 | 8.6 | 116.3 | 4.2 | 109.7 |
| ASGROW RX947 | 8.7 | 77.5 | 2.7 | 127.3 | 9.0 | 157.3 | 5.7 | 86.3 | 8.4 | 101.0 | 3.7 | 109.7 | 8.7 | 111.9 | 4.0 | 107.8 |
| ASGROW RX956W | 9.3 | 85.4 | 2.9 | 120.2 | 9.2 | 156.9 | 5.6 | 86.6 | 8.7 | 98.7 | 3.6 | 109.7 | 9.1 | 113.7 | 4.0 | 105.5 |
| BECK'S 72X | 8.1 | 82.8 | 2.9 | 122.9 | 8.1 | 166.2 | 6.2 | 90.7 | 8.2 | 101.0 | 3.7 | 110.4 | 8.1 | 116.7 | 4.3 | 108.0 |
| BECK'S 81X | 8.5 | 87.0 | 3.0 | 118.0 | 9.1 | 157.3 | 5.7 | 86.9 | 7.9 | 112.3 | 4.2 | 106.6 | 8.5 | 118.9 | 4.3 | 103.8 |
| BECK'S 83X | 8.9 | 74.2 | 2.6 | 134.2 | 9.1 | 152.2 | 5.5 | 87.8 | 8.7 | 99.0 | 3.6 | 109.7 | 8.9 | 108.5 | 3.9 | 110.6 |
| BO-JAC 601 | 8.4 | 75.4 | 2.6 | 132.9 | 8.7 | 159.5 | 5.8 | 87.4 | 8.1 | 94.7 | 3.5 | 113.9 | 8.4 | 109.9 | 4.0 | 111.4 |
| BO-JAC 905 | 8.5 | 88.0 | 3.1 | 112.7 | 8.6 | 160.8 | 5.9 | 88.4 | 8.3 | 115.7 | 4.3 | 103.1 | 8.5 | 121.5 | 4.4 | 101.4 |
| BO-JAC 9250 | 8.0 | 91.6 | 3.3 | 121.6 | 8.8 | 158.8 | 5.8 | 87.5 | 8.0 | 128.2 | 4.8 | 101.7 | 8.3 | 126.2 | 4.6 | 103.6 |
| CALLAHAN C773A | 8.7 | 89.0 | 3.1 | 116.3 | 8.4 | 134.3 | 4.9 | 95.1 | 8.3 | 104.1 | 3.9 | 109.3 | 8.5 | 109.1 | 4.0 | 106.9 |
| CALLAHAN C776 | 9.2 | 95.3 | 3.2 | 110.5 | 9.0 | 160.9 | 5.8 | 85.7 | 8.6 | 119.3 | 4.4 | 104.3 | 8.9 | 125.2 | 4.5 | 100.2 |
| CALLAHAN C781 | 8.9 | 68.8 | 2.4 | 137.7 | 8.8 | 172.0 | 6.3 | 85.9 | 8.0 | 115.8 | 4.3 | 103.9 | 8.6 | 118.9 | 4.3 | 109.2 |
| CARGILL 8427 | 9.0 | 93.9 | 3.2 | 109.5 | 9.0 | 163.0 | 5.9 | 88.1 | 8.6 | 103.5 | 3.8 | 107.3 | 8.9 | 120.1 | 4.3 | 101.6 |
| CARGILL 9027 | 7.3 | 101.1 | 3.7 | 115.2 | 7.8 | 168.2 | 6.3 | 90.8 | 7.8 | 113.0 | 4.2 | 108.0 | 7.6 | 127.4 | 4.7 | 104.7 |
| CARGILL 9400W | 9.0 | 79.2 | 2.7 | 125.5 | 9.4 | 171.9 | 6.2 | 83.0 | 8.8 | 100.1 | 3.7 | 111.5 | 9.1 | 117.1 | 4.2 | 106.7 |
| CARGILL 9427 | 8.2 | 73.7 | 2.6 | 133.7 | 8.3 | 151.3 | 5.6 | 92.0 | 8.0 | 96.3 | 3.6 | 118.9 | 8.2 | 107.1 | 3.9 | 114.9 |
| CAVERNDALE FM. CF6065 | 8.7 | 84.4 | 2.9 | 115.2 | 8.9 | 154.3 | 5.6 | 89.1 | 8.4 | 98.1 | 3.6 | 111.7 | 8.7 | 112.3 | 4.0 | 105.3 |
| CAVERNDALE FM. CF925 | 9.3 | 79.4 | 2.7 | 124.3 | 8.9 | 162.9 | 5.9 | 86.7 | 8.5 | 120.0 | 4.4 | 100.4 | 8.9 | 120.8 | 4.3 | 103.8 |
| CAVERNDALE FM. CF950 | 8.6 | 82.8 | 2.9 | 122.0 | 9.5 | 165.5 | 5.9 | 83.8 | 8.5 | 117.0 | 4.3 | 101.4 | 8.9 | 121.8 | 4.4 | 102.4 |
| CAVERNDALE FM. CF975 | 9.0 | 83.6 | 2.9 | 120.1 | 8.9 | 154.3 | 5.6 | 88.4 | 8.5 | 88.7 | 3.3 | 117.5 | 8.8 | 108.9 | 3.9 | 108.7 |
| COLBERT 313 | 8.7 | 87.8 | 3.0 | 115.3 | 8.8 | 162.9 | 5.9 | 86.8 | 8.4 | 99.2 | 3.7 | 110.7 | 8.6 | 116.6 | 4.2 | 104.3 |
| COLBERT 324 | 8.7 | 82.8 | 2.9 | 123.1 | 8.5 | 184.6 | 6.8 | 85.1 | 7.8 | 109.5 | 4.1 | 107.7 | 8.3 | 125.6 | 4.6 | 105.3 |
| COLBERT 326 | 8.5 | 90.4 | 3.2 | 116.8 | 8.2 | 176.8 | 6.6 | 87.9 | 8.0 | 110.8 | 4.1 | 107.9 | 8.2 | 126.0 | 4.6 | 104.2 |

Table 1. (Continued)

| Variety | Benton | | | | Lexington | | | | Shelbyville | | | | Average | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | CP% | BU/AC | T/AC | $/T | CP% | BU/AC | T/AC | $/T | CP% | BU/AC | T/AC | $/T | CP% | BU/AC | T/AC | $/T |
| CROW'S 669 | 8.8 | 74.9 | 2.6 | 134.2 | 8.9 | 146.4 | 5.3 | 91.5 | 8.6 | 111.0 | 4.1 | 103.3 | 8.8 | 110.8 | 4.0 | 109.7 |
| CROW'S 670 | 9.0 | 74.6 | 2.5 | 130.8 | 8.7 | 172.4 | 6.3 | 85.9 | 8.4 | 114.7 | 4.2 | 102.9 | 8.7 | 120.6 | 4.3 | 106.5 |
| CROW'S 682 | 8.6 | 74.5 | 2.6 | 129.9 | 8.6 | 151.9 | 5.6 | 90.5 | 8.1 | 111.6 | 4.2 | 105.7 | 8.4 | 112.7 | 4.1 | 108.7 |
| CROW'S 688 | 8.1 | 98.7 | 3.5 | 115.2 | 8.3 | 160.6 | 5.9 | 89.6 | 8.2 | 116.9 | 4.4 | 105.3 | 8.2 | 125.4 | 4.6 | 103.4 |
| DEKALB DK643 | 9.3 | 84.7 | 2.9 | 118.4 | 9.1 | 164.7 | 5.9 | 86.3 | 8.7 | 121.0 | 4.4 | 101.0 | 9.0 | 123.5 | 4.4 | 101.9 |
| DEKALB DK677 | 9.1 | 81.0 | 2.8 | 121.3 | 9.0 | 156.1 | 5.6 | 87.2 | 8.3 | 119.1 | 4.4 | 101.8 | 8.8 | 118.7 | 4.3 | 103.4 |
| DEKALB DK689 | 8.0 | 85.7 | 3.0 | 122.6 | 8.2 | 157.4 | 5.8 | 91.5 | 8.1 | 97.6 | 3.6 | 113.0 | 8.1 | 113.6 | 4.1 | 109.0 |
| DEKALB DK711 | 8.4 | 105.2 | 3.7 | 110.3 | 8.9 | 159.5 | 5.8 | 87.2 | 8.4 | 115.1 | 4.2 | 102.9 | 8.6 | 126.6 | 4.6 | 100.1 |
| DEKALB DK715 | 8.8 | 78.5 | 2.7 | 125.1 | 8.5 | 153.7 | 5.7 | 90.5 | 8.6 | 113.8 | 4.2 | 104.5 | 8.6 | 115.3 | 4.2 | 106.7 |
| FR27 X LH38 | 8.8 | 72.5 | 2.5 | 134.9 | 8.9 | 117.5 | 4.3 | 99.2 | 8.3 | 105.7 | 3.9 | 109.0 | 8.7 | 98.6 | 3.6 | 114.4 |
| FR27 X MO17 | 8.3 | 102.5 | 3.6 | 108.4 | 8.7 | 145.2 | 5.3 | 91.3 | 8.3 | 96.8 | 3.6 | 117.0 | 8.4 | 114.8 | 4.2 | 105.6 |
| FR27 X PA91 | 8.9 | 65.3 | 2.2 | 147.8 | 8.6 | 149.0 | 5.5 | 91.3 | 7.7 | 110.0 | 4.1 | 108.9 | 8.4 | 108.1 | 3.9 | 116.0 |
| FUNK'S G-4543 | 8.4 | 95.7 | 3.4 | 115.1 | 8.5 | 151.7 | 5.6 | 91.5 | 8.2 | 114.0 | 4.2 | 104.6 | 8.4 | 120.5 | 4.4 | 103.7 |
| FUNK'S G-4660W | 9.0 | 72.7 | 2.5 | 133.5 | 9.4 | 160.2 | 5.7 | 85.4 | 8.7 | 100.3 | 3.7 | 108.4 | 9.0 | 111.1 | 4.0 | 109.1 |
| FUNK'S G-4666 | 8.3 | 81.7 | 2.9 | 125.8 | 8.5 | 178.0 | 6.5 | 85.9 | 8.4 | 107.1 | 3.9 | 106.1 | 8.4 | 122.3 | 4.4 | 105.9 |
| GARST SEED 8250 | 9.2 | 90.0 | 3.1 | 116.4 | 8.9 | 170.6 | 6.2 | 84.8 | 8.5 | 112.0 | 4.1 | 103.3 | 8.9 | 124.2 | 4.5 | 101.5 |
| GARST SEED 8315 | 8.4 | 84.8 | 3.0 | 119.7 | 8.6 | 187.2 | 6.9 | 84.4 | 7.6 | 111.6 | 4.2 | 108.4 | 8.2 | 127.9 | 4.7 | 104.2 |
| GLICK SEED GH75X | 8.6 | 74.7 | 2.6 | 130.9 | 8.8 | 152.6 | 5.6 | 89.6 | 8.1 | 104.0 | 3.9 | 109.2 | 8.5 | 110.4 | 4.0 | 109.9 |
| GLICK SEED GH80X | 8.5 | 88.8 | 3.1 | 119.7 | 8.6 | 111.1 | 4.1 | 131.0 | 8.3 | 109.3 | 4.0 | 105.8 | 8.5 | 103.1 | 3.7 | 118.8 |
| GLICK SEED GH82X | 8.3 | 82.8 | 2.9 | 124.3 | 8.1 | 135.4 | 5.0 | 96.9 | 8.1 | 94.4 | 3.5 | 114.1 | 8.2 | 104.2 | 3.8 | 111.8 |
| GOLDEN AC. T-E 6996 | 9.2 | 80.7 | 2.7 | 120.1 | 9.1 | 145.3 | 5.2 | 89.8 | 8.4 | 108.8 | 4.0 | 107.8 | 8.9 | 111.6 | 4.0 | 105.9 |
| GOLDEN ACRES GA8559 | 8.6 | 75.9 | 2.7 | 134.8 | 8.8 | 134.8 | 4.9 | 94.0 | 8.2 | 106.7 | 4.0 | 108.3 | 8.5 | 105.8 | 3.9 | 112.4 |
| GOLDEN ACRES GA9586 | 8.1 | 88.3 | 3.1 | 121.4 | 8.4 | 161.3 | 5.9 | 89.0 | 7.5 | 115.0 | 4.4 | 106.7 | 8.0 | 121.5 | 4.5 | 105.7 |
| HUBNER SEED H3315 | 8.5 | 78.8 | 2.7 | 127.0 | 8.6 | 163.0 | 6.0 | 87.5 | 8.3 | 108.8 | 4.0 | 106.0 | 8.5 | 116.9 | 4.2 | 106.8 |
| HUBNER SEED H3717 | 8.6 | 67.7 | 2.4 | 149.4 | 8.7 | 167.7 | 6.1 | 86.5 | 8.7 | 110.1 | 4.0 | 104.5 | 8.7 | 115.2 | 4.2 | 113.5 |
| HUBNER SEED H8819W | 9.2 | 57.3 | 1.9 | 149.9 | 9.3 | 164.2 | 5.9 | 84.3 | 8.5 | 113.4 | 4.2 | 103.7 | 9.0 | 111.6 | 4.0 | 112.6 |
| HYPERFORMER HS97 | 9.2 | 53.5 | 1.8 | 165.4 | 8.9 | 145.9 | 5.3 | 91.6 | 8.5 | 115.3 | 4.2 | 102.7 | 8.9 | 104.9 | 3.8 | 119.9 |
| HYPERFORMER HS9773 | 8.4 | 85.2 | 3.0 | 123.4 | 8.4 | 151.8 | 5.6 | 91.5 | 8.0 | 112.7 | 4.2 | 105.6 | 8.3 | 116.6 | 4.3 | 106.8 |
| HYPERFORMER HS9911 | 8.6 | 67.4 | 2.3 | 137.9 | 8.7 | 172.1 | 6.3 | 85.6 | 8.2 | 103.1 | 3.8 | 109.2 | 8.5 | 114.2 | 4.1 | 110.9 |
| JACOBI 6720 | 8.1 | 72.1 | 2.6 | 151.6 | 8.4 | 177.1 | 6.5 | 86.3 | 8.3 | 120.4 | 4.5 | 101.0 | 8.3 | 123.2 | 4.5 | 113.0 |
| JACOBI 6780 | 8.7 | 88.4 | 3.1 | 119.4 | 9.1 | 170.9 | 6.2 | 83.5 | 7.9 | 110.3 | 4.1 | 106.7 | 8.6 | 123.2 | 4.5 | 103.2 |
| JACOBI 6901 | 8.6 | 79.1 | 2.7 | 127.5 | 8.3 | 142.2 | 5.3 | 94.2 | 8.0 | 110.2 | 4.1 | 105.9 | 8.3 | 110.5 | 4.0 | 109.2 |
| JACOBI 8901 | 9.0 | 82.2 | 2.8 | 127.1 | 9.4 | 117.0 | 4.2 | 96.1 | 8.4 | 104.1 | 3.8 | 109.8 | 8.9 | 101.1 | 3.6 | 111.0 |

Table 1. (Continued)

| Variety | Benton | | | | Lexington | | | | Shelbyville | | | | Average | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | CP% | BU/AC | T/AC | $/T | CP% | BU/AC | T/AC | $/T | CP% | BU/AC | T/AC | $/T | CP% | BU/AC | T/AC | $/T |
| JACQUES 7910 | 8.6 | 74.5 | 2.6 | 131.5 | 8.9 | 137.0 | 5.0 | 91.9 | 8.5 | 113.1 | 4.2 | 104.2 | 8.7 | 108.2 | 3.9 | 109.2 |
| JACQUES 8210 | 9.1 | 78.9 | 2.7 | 124.7 | 8.8 | 151.9 | 5.5 | 88.6 | 8.5 | 112.0 | 4.1 | 104.8 | 8.8 | 114.3 | 4.1 | 106.0 |
| JACQUES 8400 | 9.3 | 76.2 | 2.6 | 127.2 | 8.8 | 184.2 | 6.7 | 82.9 | 8.5 | 98.7 | 3.6 | 109.5 | 8.9 | 119.7 | 4.3 | 106.5 |
| JACQUES 8510 | 8.7 | 80.1 | 2.8 | 125.9 | 8.7 | 146.0 | 5.3 | 91.2 | 8.0 | 94.5 | 3.5 | 114.5 | 8.5 | 106.9 | 3.9 | 110.5 |
| JADER 115 | 8.4 | 95.1 | 3.3 | 113.8 | 8.3 | 147.3 | 5.4 | 92.4 | 8.5 | 92.4 | 3.4 | 113.8 | 8.4 | 111.6 | 4.0 | 106.7 |
| JADER 316 | 8.6 | 72.2 | 2.5 | 130.8 | 8.6 | 173.2 | 6.3 | 85.6 | 8.1 | 94.5 | 3.5 | 114.5 | 8.4 | 113.3 | 4.1 | 110.3 |
| MCCURDY 7477 | 8.9 | 78.4 | 2.7 | 134.9 | 8.7 | 160.4 | 5.9 | 86.8 | 8.2 | 111.5 | 4.1 | 105.5 | 8.6 | 116.8 | 4.2 | 109.1 |
| MCCURDY 7660 | 8.5 | 78.5 | 2.7 | 122.4 | 8.0 | 144.3 | 5.4 | 93.9 | 8.1 | 102.4 | 3.8 | 109.9 | 8.2 | 108.4 | 4.0 | 108.7 |
| MCCURDY 7777 | 8.2 | 95.1 | 3.4 | 113.4 | 8.3 | 149.8 | 5.5 | 91.2 | 7.6 | 130.3 | 4.9 | 100.7 | 8.0 | 125.1 | 4.6 | 101.8 |
| NOBLEBEAR NBX720W | 8.5 | 73.7 | 2.6 | 132.1 | 9.1 | 139.3 | 5.0 | 91.0 | 8.0 | 112.8 | 4.2 | 104.9 | 8.5 | 108.6 | 3.9 | 109.3 |
| NOBLEBEAR NB855 | 8.9 | 95.4 | 3.3 | 113.1 | 8.9 | 156.9 | 5.7 | 87.6 | 8.6 | 87.6 | 3.2 | 115.9 | 8.8 | 113.3 | 4.1 | 105.5 |
| ORO HYBRIDS ORO180 | 7.9 | 85.6 | 3.1 | 122.1 | 8.1 | 153.2 | 5.7 | 91.7 | 7.8 | 111.4 | 4.2 | 106.4 | 7.9 | 116.7 | 4.3 | 106.7 |
| ORO HYBRIDS ORO188 | 8.1 | 87.4 | 3.1 | 124.0 | 8.2 | 171.2 | 6.4 | 88.1 | 7.8 | 104.0 | 3.9 | 110.0 | 8.0 | 120.9 | 4.5 | 107.4 |
| PIONEER BRAND 3140 | 7.6 | 79.8 | 2.9 | 134.4 | 7.5 | 177.6 | 6.7 | 89.2 | 7.6 | 115.7 | 4.4 | 105.7 | 7.6 | 124.4 | 4.7 | 109.8 |
| PIONEER BRAND 3142 | 8.0 | 78.4 | 2.8 | 127.5 | 7.6 | 183.3 | 6.9 | 87.8 | 7.7 | 112.8 | 4.3 | 108.8 | 7.8 | 124.8 | 4.7 | 108.0 |
| PIONEER BRAND 3144W | 8.6 | 84.3 | 2.9 | 116.8 | 8.6 | 151.0 | 5.5 | 91.6 | 8.3 | 105.2 | 3.9 | 109.2 | 8.5 | 113.5 | 4.1 | 105.9 |
| PIONEER BRAND 3154 | 7.9 | 96.6 | 3.5 | 116.6 | 7.8 | 165.7 | 6.2 | 92.8 | 7.6 | 131.1 | 5.0 | 100.2 | 7.8 | 131.1 | 4.9 | 103.2 |
| PIONEER BRAND 3165 | 7.5 | 63.6 | 2.3 | 150.5 | 7.6 | 173.5 | 6.6 | 90.3 | 7.2 | 140.6 | 5.4 | 99.0 | 7.4 | 125.9 | 4.8 | 113.3 |
| PIONEER BRAND 3180 | 8.1 | 95.7 | 3.4 | 111.2 | 8.2 | 155.0 | 5.7 | 90.2 | 7.9 | 104.4 | 3.9 | 109.6 | 8.1 | 118.4 | 4.3 | 103.7 |
| PIONEER BRAND 3295 | 8.4 | 79.1 | 2.8 | 130.7 | 8.1 | 190.6 | 7.1 | 85.1 | 8.1 | 94.5 | 3.5 | 116.4 | 8.2 | 121.4 | 4.5 | 110.7 |
| PIONEER BRAND 3343 | 8.5 | 69.4 | 2.4 | 152.0 | 8.3 | 165.3 | 6.1 | 88.5 | 8.1 | 107.2 | 4.0 | 107.3 | 8.3 | 114.0 | 4.2 | 115.9 |
| PRAIRIE STREAM M7000 | 9.2 | 66.5 | 2.3 | 137.7 | 9.2 | 155.6 | 5.6 | 87.4 | 8.7 | 116.6 | 4.3 | 101.5 | 9.0 | 112.9 | 4.1 | 108.9 |
| PRAIRIE STREAM SX702 | 8.6 | 79.7 | 2.8 | 121.5 | 8.2 | 150.6 | 5.6 | 91.8 | 8.4 | 120.6 | 4.4 | 101.2 | 8.4 | 117.0 | 4.3 | 104.8 |
| PRAIRIE STREAM SX726 | 8.7 | 69.5 | 2.4 | 132.8 | 9.3 | 159.0 | 5.7 | 85.2 | 8.6 | 104.6 | 3.8 | 107.6 | 8.9 | 111.0 | 4.0 | 108.5 |
| SCOTT SEED LR3345 | 8.8 | 78.4 | 2.7 | 122.4 | 9.0 | 164.6 | 6.0 | 86.9 | 8.8 | 85.7 | 3.1 | 120.6 | 8.9 | 109.6 | 3.9 | 110.0 |
| SCOTT SEED LR3350 | 8.3 | 82.5 | 2.9 | 122.7 | 8.5 | 178.8 | 6.6 | 86.0 | 7.6 | 117.6 | 4.4 | 104.9 | 8.1 | 126.3 | 4.6 | 104.5 |
| SCOTT SEED LR5241 | 8.6 | 62.1 | 2.2 | 142.1 | 8.6 | 130.3 | 4.8 | 99.1 | 8.3 | 98.9 | 3.7 | 111.4 | 8.5 | 97.1 | 3.6 | 117.5 |
| SEEDEX 1135 | 8.9 | 91.8 | 3.2 | 113.5 | 9.2 | 160.7 | 5.8 | 85.3 | 8.6 | 116.8 | 4.3 | 101.4 | 8.9 | 123.1 | 4.4 | 100.1 |
| SEEDEX 1155 | 8.5 | 88.8 | 3.1 | 120.3 | 8.7 | 163.9 | 6.0 | 87.8 | 8.3 | 104.6 | 3.9 | 108.1 | 8.5 | 119.1 | 4.3 | 105.4 |
| SEEDEX 1175 | 9.3 | 88.9 | 3.0 | 114.6 | 8.9 | 157.7 | 5.7 | 87.1 | 8.6 | 97.6 | 3.6 | 112.4 | 8.9 | 114.7 | 4.1 | 104.7 |
| SO. CROSS 411 | 8.3 | 89.9 | 3.2 | 120.5 | 8.8 | 142.6 | 5.2 | 93.1 | 8.3 | 114.4 | 4.2 | 103.7 | 8.5 | 115.6 | 4.2 | 105.8 |
| SO. CROSS 511 | 8.4 | 76.9 | 2.7 | 127.1 | 8.4 | 138.8 | 5.1 | 95.6 | 7.9 | 100.9 | 3.8 | 112.0 | 8.2 | 105.5 | 3.9 | 111.6 |
| SO. CROSS 611 | 8.5 | 82.3 | 2.9 | 125.2 | 8.4 | 134.4 | 5.0 | 97.8 | 7.9 | 107.8 | 4.0 | 111.3 | 8.3 | 108.2 | 4.0 | 111.4 |
| SO. CROSS 711 | 9.0 | 76.1 | 2.6 | 126.9 | 9.1 | 146.3 | 5.3 | 88.8 | 8.7 | 107.4 | 3.9 | 106.7 | 8.9 | 109.9 | 3.9 | 107.5 |

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Table 1. (Continued)

| Variety | Benton | | | | Lexington | | | | Shelbyville | | | | Average | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | CP% | BU/AC | T/AC | $/T | CP% | BU/AC | T/AC | $/T | CP% | BU/AC | T/AC | $/T | CP% | BU/AC | T/AC | $/T |
| SO. STATES SS790 | 8.4 | 88.5 | 3.1 | 119.9 | 8.7 | 171.0 | 6.2 | 85.2 | 8.3 | 127.0 | 4.7 | 100.2 | 8.5 | 128.8 | 4.7 | 101.8 |
| SO. STATES SS793 | 8.3 | 97.3 | 3.4 | 104.0 | 8.9 | 155.3 | 5.6 | 88.1 | 8.3 | 110.1 | 4.1 | 105.0 | 8.5 | 120.9 | 4.4 | 99.0 |
| SO. STATES SS847 | 9.2 | 80.5 | 2.7 | 118.3 | 9.0 | 150.8 | 5.5 | 89.8 | 8.4 | 113.2 | 4.2 | 103.6 | 8.9 | 114.8 | 4.1 | 103.9 |
| SO. STATES SS907 | 9.4 | 75.3 | 2.5 | 126.2 | 8.6 | 165.7 | 6.1 | 87.2 | 8.2 | 104.6 | 3.9 | 108.7 | 8.7 | 115.2 | 4.2 | 107.4 |
| SO. STATES SS917W | 9.2 | 71.5 | 2.4 | 130.8 | 8.8 | 166.2 | 6.0 | 86.5 | 8.6 | 92.1 | 3.4 | 114.0 | 8.9 | 109.9 | 3.9 | 110.4 |
| SPEC. GRAINS SGI 1300 | 8.8 | 83.4 | 2.9 | 121.1 | 8.6 | 135.8 | 5.0 | 94.7 | 8.3 | 112.9 | 4.2 | 105.7 | 8.6 | 110.7 | 4.0 | 107.2 |
| SPEC. GRAINS SGI 3100 | 8.5 | 67.9 | 2.4 | 136.6 | 8.6 | 124.1 | 4.6 | 98.8 | 8.2 | 99.8 | 3.7 | 110.6 | 8.4 | 97.3 | 3.6 | 115.3 |
| STEWART HYBRIDS 37L3L | 8.6 | 85.1 | 3.0 | 119.6 | 8.8 | 131.0 | 4.8 | 95.6 | 7.8 | 106.3 | 4.0 | 110.0 | 8.4 | 107.5 | 3.9 | 108.4 |
| STEWART HYBRIDS 8432 | 8.4 | 82.4 | 2.9 | 117.6 | 8.3 | 154.0 | 5.7 | 91.4 | 8.3 | 121.6 | 4.5 | 101.4 | 8.3 | 119.3 | 4.4 | 103.5 |
| STEWART HYBRIDS 8815 | 8.7 | 64.6 | 2.2 | 141.6 | 8.6 | 143.3 | 5.2 | 91.6 | 8.1 | 115.2 | 4.3 | 104.3 | 8.5 | 107.7 | 3.9 | 112.5 |
| STEWART HYBRIDS 9012 | 8.5 | 87.7 | 3.1 | 116.5 | 9.0 | 147.0 | 5.3 | 89.9 | 8.2 | 101.3 | 3.8 | 114.8 | 8.6 | 112.0 | 4.1 | 107.1 |
| SUPER CROST W700 | 8.9 | 67.6 | 2.3 | 138.3 | 9.0 | 146.2 | 5.3 | 90.8 | 8.1 | 85.8 | 3.2 | 122.1 | 8.7 | 99.9 | 3.6 | 117.1 |
| SUPER CROST W707 | 8.6 | 77.2 | 2.7 | 130.5 | 8.8 | 146.0 | 5.3 | 91.3 | 8.1 | 122.2 | 4.6 | 101.1 | 8.5 | 115.1 | 4.2 | 107.6 |
| SUPER CROST 1839 | 8.7 | 64.8 | 2.2 | 139.3 | 8.9 | 167.9 | 6.1 | 84.9 | 8.2 | 113.5 | 4.2 | 104.5 | 8.6 | 115.4 | 4.2 | 109.6 |
| SUPER CROST 7810 | 8.8 | 81.2 | 2.8 | 122.7 | 8.8 | 149.6 | 5.5 | 89.9 | 8.2 | 98.1 | 3.6 | 111.9 | 8.6 | 109.6 | 4.0 | 108.2 |
| TERRA SEEDS TR1170 | 9.1 | 85.2 | 2.9 | 120.8 | 8.8 | 154.0 | 5.6 | 88.4 | 8.3 | 124.8 | 4.6 | 99.9 | 8.7 | 121.3 | 4.4 | 103.0 |
| TERRA SEEDS TR1180 | 8.6 | 81.1 | 2.8 | 122.8 | 8.8 | 159.0 | 5.8 | 87.6 | 8.3 | 109.8 | 4.1 | 106.0 | 8.6 | 116.6 | 4.2 | 105.5 |
| TERRA SEEDS TR1190 | 8.4 | 77.7 | 2.7 | 126.4 | 8.7 | 168.2 | 6.1 | 87.6 | 8.4 | 90.5 | 3.3 | 116.0 | 8.5 | 112.1 | 4.0 | 110.0 |
| TERRA SEEDS TR367E | 9.1 | 83.6 | 2.9 | 121.0 | 9.4 | 153.3 | 5.5 | 86.4 | 8.4 | 122.5 | 4.5 | 100.8 | 9.0 | 119.8 | 4.3 | 102.7 |
| THE NEW N-K C8625 | 8.6 | 85.5 | 3.0 | 119.8 | 8.7 | 144.4 | 5.3 | 91.7 | 8.3 | 119.5 | 4.4 | 101.4 | 8.5 | 116.5 | 4.2 | 104.3 |
| THE NEW N-K N6330 | 8.7 | 84.5 | 2.9 | 119.4 | 8.4 | 148.4 | 5.5 | 91.9 | 8.5 | 89.3 | 3.3 | 116.2 | 8.5 | 107.4 | 3.9 | 109.2 |
| THE NEW N-K N8565W | 8.8 | 75.7 | 2.6 | 121.9 | 8.9 | 150.4 | 5.5 | 89.3 | 8.3 | 103.2 | 3.8 | 114.3 | 8.7 | 109.8 | 4.0 | 108.5 |
| THE NEW N-K N8727 | 8.9 | 91.7 | 3.2 | 116.4 | 9.1 | 161.0 | 5.8 | 86.2 | 8.2 | 114.4 | 4.2 | 103.8 | 8.7 | 122.4 | 4.4 | 102.1 |
| UN. AGRIC PROD. UAPX5001 | 8.8 | 72.9 | 2.5 | 129.4 | 8.9 | 150.9 | 5.5 | 89.4 | 8.3 | 128.4 | 4.7 | 98.1 | 8.7 | 117.4 | 4.2 | 105.6 |
| UN. AGRIC PROD. UAPX5002 | 8.8 | 94.1 | 3.3 | 110.9 | 8.6 | 145.2 | 5.3 | 91.6 | 8.5 | 105.1 | 3.9 | 107.3 | 8.6 | 114.8 | 4.2 | 103.3 |
| UN. ARGIC PROD. UAPX5003 | 8.0 | 80.3 | 2.9 | 128.2 | 8.2 | 146.7 | 5.5 | 93.9 | 7.9 | 100.0 | 3.7 | 111.9 | 8.0 | 109.0 | 4.0 | 111.3 |
| ZIMMERMAN Z14W | 9.3 | 50.7 | 1.7 | 186.9 | 8.8 | 135.6 | 4.9 | 94.8 | 7.8 | 107.4 | 4.0 | 108.1 | 8.6 | 97.9 | 3.5 | 129.9 |
| ZIMMERMAN Z20 | 8.7 | 75.0 | 2.6 | 132.2 | 9.1 | 140.7 | 5.1 | 90.6 | 8.2 | 96.4 | 3.6 | 112.8 | 8.7 | 104.0 | 3.8 | 111.9 |
| ZIMMERMAN Z27 | 8.5 | 91.4 | 3.2 | 117.8 | 8.2 | 180.6 | 6.7 | 86.5 | 8.0 | 130.6 | 4.9 | 99.0 | 8.2 | 134.2 | 4.9 | 101.1 |
| ZIMMERMAN Z36 | 8.7 | 73.3 | 2.5 | 138.5 | 8.4 | 138.2 | 5.1 | 94.9 | 8.3 | 92.7 | 3.4 | 114.2 | 8.5 | 101.4 | 3.7 | 115.9 |
| ZIMMERMAN Z61W | 8.6 | 71.5 | 2.5 | 130.8 | 8.9 | 158.3 | 5.7 | 87.2 | 8.6 | 91.5 | 3.4 | 114.6 | 8.7 | 107.1 | 3.9 | 110.9 |
| Average | 8.7 | 80.3 | 2.8 | 126.5 | 8.7 | 156.3 | 5.7 | 89.5 | 8.2 | 108.6 | 4.0 | 107.4 | 8.5 | 115.3 | 4.2 | 107.8 |
| LSD(0.10) | 0.4 | 17.7 | 0.6 | 21.4 | 0.3 | 19.4 | 0.7 | 9.2 | 0.4 | 20.3 | 0.8 | 10.0 | 0.5 | 7.5 | 0.62 | 8.4 |
| C.V. | 3.7 | 16.4 | 16.9 | 12.6 | 3.0 | 9.3 | 9.4 | 5.7 | 3.7 | 13.9 | 14.2 | 6.9 | 3.7 | 6.5 | 6.9 | 4.3 |

*All values are adjusted to a grain harvest moisture of 15.5%.