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MALTING QUALITY OF BARLEY VARIETIES AND SELECTIONS
GROWN IN THE MISSISSIPPI VALLEY UNIFORM NURSERY AND
AT CENTRAL AND EASTERN STATIONS IN 2001

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This is a joint progress report of cooperative investigations being conducted in the Agricultural Research Service of the U.S. Department of Agriculture and State Agricultural Experiment Stations. It contains preliminary data that have not been sufficiently confirmed to justify general release; interpretations may be modified with additional experimentation. Confirmed results will be published through established channels. The report is primarily a tool available to cooperators and their official staffs and for those persons who have direct and special interest in the development of improved malting barleys.

This report includes data furnished by the Agricultural Research Service as well as by the State Agricultural Experiment Stations. The report is not intended for publication and should not be referred to in literature citations nor quoted in publicity or advertising. Use of the data may be granted for certain purposes upon written request to the agency or agencies involved.

Samples malted and analyzed by the Cereal Crops Research Unit, Madison WI

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MALTING QUALITY OF BARLEY VARIETIES AND SELECTIONS GROWN AT CENTRAL AND EASTERN STATIONS IN 2001

Introduction

At the Cereal Crops Research Unit, we malt barleys received from public sector breeders and evaluate each line for its commercial malting quality. We malt and analyze each submission as consistently as possible, which allows us to compare the lines with each other. Our objective is to provide accurate data and evaluations of new selections and to facilitate the development of improved malting barleys.

Materials

The 1642 samples upon which this report is based came from several locations; either as a part of the Mississippi Valley Uniform Barley Nursery or as experimental selections from several research programs. Individual breeders' experimental lines from stations in Maine, Minnesota and North Dakota were processed and evaluated.

Methods

Most of our analyses were performed according to the Methods of Analysis of the ASBC, 8th edition, 1992. Details of the analyses are listed in Appendix A.

Rankings and Quality Scores

The best performing entries in each table can be found by consulting the Overall Rank Value column. The rank values were assigned based on the quality scores that were generated for each submission, with the rank order proceeding from

low (best) to high (poorest). The quality scores were computed for each line on the basis of the sum of its individually scored parameters. Numbers are assigned to each of the malt quality traits, and their magnitudes are related to how closely the trait values conform to what industry wants them to be. The closer the analytical data are to the ideal, the more points are awarded. The most important quality traits (extract, soluble protein, etc.) are awarded more points than those of lesser importance. This gives a relative assessment of the overall performance of each line. The criteria used to generate the quality scores have been listed in Appendix B.

Mississippi Valley Uniform Barley Nursery - 2001

Nursery samples were received for malting quality evaluation from four experimental stations located in three states. Eleven of 28 entries (#18 - #28) were new in this year's nursery (Table 1).

These samples were germinated for 5 days and rotated for 3 minutes every half hour, which should have yielded malts having modification levels that are similar to those produced by industry. The malting conditions and analytical methods employed are listed in Appendix A. The criteria and value assignments used to calculate quality scores are listed in Appendix B.

The mean values of 11 quality factors are listed over the three stations located in the Mississippi Valley area (Table 2) and over all varieties (Table 3). Tables 8 and 9 report the same factors, but also include data from samples that were grown in Aberdeen, Idaho. Individual station data are reported in Tables 4 through 7. The parentages of the nursery entries are listed in Table 1. Evaluations of data from individual locations and overall performance evaluations, derived primarily from Tables 2, 3, 8 and 9, are presented below.

The protein contents of the plump barleys from Crookston, MN (Table 4) were good, with only two lines having unacceptably high levels. The extract values ranged from good to exceptional, except for those of Barbless and Larker. The soluble protein levels ranged from very good to five that were unacceptably high, while nearly half of the S/T ratios exceeded the desired upper limit. A third of the diastatic power values were too low, while over half of the α -amylase levels were too high. The β -glucan levels were generally good, although that of MNBrite was quite low, indicating possible over-modification, and that of ND16903 was high, indicating poor modification. The best performers were 6B95-2482, M109, Robust, 6B95-2089, 6B97-2245, 6B96-3733, M110, Drummond and Lacey.

Most of the plump barleys from Morris, MN (Table 5) had elevated protein contents. The extract values were generally good, with only six falling below the minimum desired limit. Most soluble protein levels were high, with over half exceeding the upper limit. Nearly half of the S/T ratios were high due to the high soluble protein contents. The diastatic power levels were generally a bit high, as would be expected with the high total protein levels. Half of the α -amylase values exceeded the desired upper limit, while β -glucan levels ranged from very good to four that were too high. The best performers were ND16301, 6B95-2089, Lacey, 6B95-2482 and M110.

The barleys submitted from Bottineau, ND (Table 6) were thin, and except for some of the older varieties, had excellent protein contents. The extract values were excellent, except for that of Barbless. The soluble protein and wort color values tended to be a bit high, and nearly all of the S/T ratios exceeded the upper limit. Two thirds of the diastatic power values were too low, while nearly all of the α -amylase levels exceeded the acceptable upper limit. The β -glucan contents were very good, except for that of ND16903, which was too high. The best performers were 6B95-2482, Drummond and ND16301.

The plump barleys grown at Aberdeen, ID (Table 7) had protein contents that ranged from very good to eleven that were unacceptably high. The extract values were generally good, averaging nearly 80%. The soluble protein levels were mostly good, with only three exceeding the upper limit, but over half of the S/T ratios were unacceptably low. The diastatic power levels varied considerably ranging from four that were too low to five that exceeded the upper limit. Half of the α -amylase values were too high. There were many excellent β -glucan levels, with only those of ND16903 and Barbless exceeding the upper limit. The best performers were ND16301, 6B95-2482, 6B97-2195, 6B97-2245, M109 and M110. A couple of the additions to this nursery, 98AB12362 and 92AB5180, also performed very well.

Overall, the submissions from Crookston and Aberdeen (Tables 2 and 8) performed well. The barleys from these locations were plump and yielded malts with high extract values. The Crookston barleys had better protein levels than those from Aberdeen, while the malts made from the lines grown in Aberdeen had excellent amyloitic levels. The barleys grown in Bottineau had excellent protein contents and good extract values, but the thinness of the kernels and the high soluble protein levels detracted from their quality scores. The barleys grown in Morris were not as plump as the submissions from Crookston or Aberdeen and the high β -glucan, soluble protein and total protein values negatively impacted the malting quality of these submissions.

In general, the samples in this year's nursery had good extract and β -glucan levels, however the soluble protein, S/T and α -amylase values tended to be a bit high (Tables 3 and 9). The new and second year nursery submissions were generally plumper and had lower protein contents than those of the established varieties. The lines that performed best were 6B95-2482, 6B95-2089, ND16301, Robust, Drummond, Lacey, M109 and M110.

2001 Crop Year Evaluations

Submissions from Maine

2001 Malting Barley X Nitrogen Study – Presque Isle

Table 10 – 52 Entries

Most of these barleys were plump, with unacceptably high protein contents. Eight extract values were too low, while over half of the soluble protein levels were too high. About half of the diastatic power values were too low, while nearly all of the β -glucan and α -amylase levels were too high. None of these lines showed promise for commercial use, mostly because they modified poorly as indicated by their high β -glucan contents.

Submissions from Minnesota

2001 Advanced Lines (Group 1) – St. Paul

Table 11 – 31 Entries

The protein contents of these plump barleys tended to be a bit high, although only six exceeded the maximum limit. The extract values were generally good, and the soluble protein levels ranged from excellent to eight that were unacceptably high. Three quarters of the submissions had diastatic power values that were too low, but most had very good α -amylase values. The β -glucan levels tended to be high, with half exceeding the maximum limit. The best performers were Drummond, M109 (M96-80), M96-56, and 6B95-2482; however it is worth noting that all of these samples gave hazy extracts.

2001 Advanced Lines (Group 2) – St. Paul

Table 12 – 26 Entries

Most of these barleys were plump and had very good protein contents. The extract values were generally good, while soluble protein levels ranged from very good to a third that exceeded the maximum limit. The diastatic power values were a bit low, while the α -amylase levels were very good. The β -glucan levels were generally a bit high, indicating that these barleys did not modify well with our malting protocol. The best performers were Lacey, M110 (M96-191) and M97-16.

2001 Advanced Lines (Group 3) – Crookston

Table 13 – 31 Entries

Most of these barleys were plump, but nearly a third of the submissions had unacceptably high protein contents. Seven of the extract values fell below the minimum limit. The soluble protein levels ranged from very good to five that exceeded the maximum limit. The diastatic power values were good to a bit low, while half of the α -amylase levels were too high. The β -glucan values ranged from very good to just over the upper limit. The best performers were M110 (M96-191), M96-64, M97-30, M96-185, M109 (M96-80), Lacey and M96-56, all of which showed good promise for commercial use.

2001 Advanced Lines (Group 4) – Crookston

Table 14 – 26 Entries

Most of these plump barleys had excellent protein contents and extract values. The soluble protein levels ranged from very low to very high, although most of the values were very good. Diastatic power values tended to be too low, while half of the α -amylase values were too high. The β -glucan levels ranged from

excellent to a bit high. The best performers were M109 (M96-80), M97-31, Lacey, M97-22, M96-105 and M97-51, all of which looked very promising.

2001 Advanced Lines (Group 5) – Morris

Table 15 – 31 Entries

Half of these plump barleys had unacceptably high protein contents. A quarter of the extract values were too low, while the soluble protein levels ranged from excellent to seven that were too high. Five lines had diastatic power values that were too low and four exceeded the maximum limit. Nearly half of the α -amylase values were too high. The β -glucan levels ranged from excellent to a bit high. The best performers were M96-67 and M109 (M96-80).

2001 Advanced Lines (Group 6) – Morris

Table 16 – 26 Entries

The protein contents were generally high in these plump barleys, with seven exceeding the upper limit. The extract values were generally good, while soluble protein values ranged from excellent to ten that exceeded the upper limit. The diastatic power values were pretty good, while half exhibited elevated α -amylase levels. The β -glucan levels ranged from excellent to a bit high. The best performers were M110 (M96-191), M97-118, M109 (M96-80), M97-28, M96-186, M96-177 and M97-22.

2001 FHB Experimental Lines (Group 7) – St. Paul

Table 17 – 31 Entries

Most of these barleys were plump, with excellent protein contents. The extract values were quite good, with three exceptions. The soluble protein levels ranged from excellent to eleven that exceeded the upper limit. Most of the diastatic power values were too low, while half of the α -amylase levels were too high.

The β -glucan levels ranged from two that were too low to four that exceeded the maximum limit. The best performers were Lacey, FEG38-12, FEG29-47, Robust and FEG26-93.

2001 FHB Experimental Lines (Group 8) – Crookston

Table 18 – 31 Entries

Most of these plump barleys had excellent protein contents. The extract values were generally quite good, while soluble protein levels ranged from four that were too low to four that were too high. Most of the diastatic power values were too low, while thirteen α -amylase values exceeded the upper limit. Most of these lines were well modified as indicated by their excellent β -glucan levels. The best performers were Lacey, FEG39-66, FEG26-93, FEG20-19 and FEG32-107.

2001 Experimental Lines (Group 9) – Crookston

Table 19 – 27 Entries

Most of these plump barleys had excellent ‘low’ protein contents. The extract, soluble protein and β -glucan values were generally very good. Most of the diastatic power values were too low, while over half of the α -amylase values were too high. The best performers were M99-02, M97-190, M97-115, M96-203, M97-194, M97-195, M99-04, M97-196 and BT459.

2001 Experimental Lines (Group 10) – St. Paul

Table 20 - 27 Entries

These plump barleys had very good protein contents. Their extract values were all quite good, but the soluble protein levels were generally high, with half exceeding the maximum limit. Nearly all of the diastatic power values were too low, while half of the α -amylase values were too high. The β -glucan levels tended to be on the high side, although only a quarter of them exceeded the

upper limit. The best performers were M97-195, BT459, M99-06 and M99-10, but note that their soluble protein levels were quite high.

2001 Experimental Lines (Group 11) – St. Paul

Table 21 – 27 Entries

These plump barleys had excellent protein contents. The extract, β -glucan and soluble protein values were generally good, but the S/T ratios were too high. The diastatic power values were too low, while over half of the α -amylase levels were too high. The best performers were M98-100, M98-75, M98-91, M98-101, Robust and M98-97.

2001 Experimental Lines (Group 12) – St. Paul

Table 22 – 38 Entries

The protein contents of these plump barleys ranged from a bit low to two that exceeded the desired limit. The extract values were very good and nearly all of the soluble protein contents were within the desired range. The diastatic power levels were unacceptably low, except for that of MN Brite, while half of the α -amylase values exceeded the upper limit. The β -glucan levels ranged from excellent to sixteen that exceeded the upper limit. The best performers were M98-78, M98-102, M98-94 and M96-03, however note that these lines had hazy worts.

2001 Experimental Lines (Group 13) – Crookston

Table 23 – 27 Entries

These plump barleys had excellent protein contents. The extract, β -glucan and soluble protein values were generally good. Most of the diastatic power values were too low, while most of the α -amylase levels were too high. The best performers were Robust, Lacey, Stander, M98-59, M98-71, M98-81 and M98-97.

2001 Experimental Lines (Group 14) – Crookston

Table 24 – 38 Entries

A quarter of these barleys were thin, but their protein contents ranged from too low to just below the upper desired limit. All of the extract and most of the β -glucan and soluble protein values were good. Most of the diastatic power levels were too low, while most of the α -amylase values were too high. The best performers were Robust, Lacey, M98-26 and M98-23.

2001 Experimental Lines (Group 15) – Crookston

Table 25 – 34 Entries

A quarter of these plump barleys had unacceptably high protein contents. The extract, α -amylase and β -glucan values were generally quite good, but half of the soluble protein and diastatic power values were too low. The best performers were 3191, Lacey and 3199.

2001 Experimental Lines (Group 16) – Crookston

Table 26 – 35 Entries

Only six of these plump barleys had unacceptably high protein contents. A quarter of the extract values were too low and many of the worts were hazy. The soluble protein levels ranged from very good to four that exceeded the maximum limit. Most of the diastatic power levels were too low, while the α -amylase levels were excellent. Two thirds of the β -glucan values exceeded the maximum limit, indicating most of these malts were poorly modified. The best performer was 4157.

2001 Experimental Lines (Group 17) – Crookston

Table 27 – 35 Entries

Most of these plump barleys had good protein contents. Only five of the extract values were too low, but half of the soluble protein levels were too high. Over half of the diastatic power values were low, while the α -amylase levels ranged from good to a bit high. Nearly a quarter of the β -glucan levels were too high. The best performers were 4209, 4315, 4217, 4259, 4265, M106 4270 and 4339.

2001 Experimental Lines (Group 18) – Crookston

Table 28 – 39 Entries

Sixteen of these plump barleys had unacceptably high protein contents. A third of the extract values were too low, while over half of the soluble protein contents were too high. The S/T ratios ranged from eight that were too low to sixteen that exceeded the desired limit. Three quarters of the diastatic power values were too low, while the α -amylase and β -glucan levels were generally good. The best performers were Robust 4350 and Lacey 4360.

2001 Experimental Lines (Group 19) – Crookston

Table 29 – 30 Entries

Most of these plump barleys had unacceptably high protein contents. Two thirds of the extract values were too low, while most of the soluble protein levels were elevated, with eleven exceeding the upper limit. The β -glucan and diastatic power levels were generally good, while over two thirds of the α -amylase contents exceeded the upper limit. The best performers were C113-55 and Lacey.

2001 Experimental Lines (Group 20) – Crookston

Table 30 – 37 Entries

Most of these barleys were plump, however two thirds of the protein contents exceeded the upper limit. Three quarters of the extract values were too low, while half of the soluble protein levels were too high. A third of the diastatic power and three quarters of the α -amylase levels were above the desired limits. The β -glucan levels ranged from very good to six that exceeded the upper limit. The best performer was C113-63.

2001 Experimental Lines (Group 21) – Crookston

Table 31 – 37 Entries

Most of these barleys were plump, but over half had unacceptably high protein contents. The extract values were generally too low, while soluble protein levels ranged from excellent to fourteen that exceeded the upper limit. The β -glucan and diastatic power values were generally good, while half of the α -amylase levels exceeded the upper limit. The best performers were C113-96 and C113-62, however neither of these lines had a good extract value.

2001 Experimental Lines (Group 22) – Crookston

Table 32 – 19 Entries

Two thirds of these plump barleys had unacceptably high protein contents. All but one of the extract values were too low, while soluble protein contents ranged from excellent to four that were too high. The β -glucan and amylolitic values were generally good. The best performers were C113-60 and C113-54, however both had low extract values.

2001 Experimental Lines (Group 23) – Crookston

Table 33 – 6 Entries

These barleys were thin, had unacceptably high protein contents and unacceptably low extract values. The other malt quality factors, such as soluble protein, S/T, β -glucan diastatic power and α -amylase generally had poor values, thus none of these submissions performed well.

Submissions from North Dakota

2001 Experiment FA41, Fargo Preliminary Yield Trial – Fargo

Table 34 – 28 Entries

Two thirds of these plump barleys had unacceptably high protein contents. Their soluble protein contents were generally good, but the high total protein levels resulted in nearly all of the S/T ratios being too low. A quarter of the submissions' extract values were too low, as were a third of the diastatic power levels. A third of the β -glucan and two thirds of the α -amylase values were too high. The best performers were 2N19832 and 2N19836.

2001 Experiment FA42, Fargo Preliminary Yield Trial – Fargo

Table 35 – 26 Entries

Two thirds of these plump barleys had unacceptably high protein contents, but only five had extract values that were too low. The soluble protein levels were generally good, but two thirds of the S/T ratios were below the minimum limits. About half of the lines had low diastatic power values, while the α -amylase levels were generally high in all. Seven β -glucan levels exceeded the maximum limit. The best performers were 2N19873 and 2N19869.

2001 Experiment FA43, Fargo Preliminary Yield Trial – Fargo

Table 36 – 30 Entries

Two thirds of these plump barleys had unacceptably high protein contents. Less than a third of the extract values were too low and the soluble protein levels were generally good. Most of the S/T ratios were too low due to the elevated total protein contents. A third of the lines had low diastatic power values, while most of their α -amylase values were too high. The β -glucan levels were generally good, with only five exceeding the maximum limit. The best performers were 2N19929, Conlon and 2N19926.

2001 Experiment FA44, Fargo Preliminary Yield Trial – Fargo

Table 37 – 21 Entries

Nearly all of these plump barleys had elevated protein contents, while half of the extract values were too low. The soluble protein levels were quite good, but the high total protein contents caused unacceptably low S/T ratios in all but one of the submissions. The diastatic power levels were generally good, but the α -amylase values were too high. The β -glucan levels ranged from very good to seven that exceeded the upper limit. The best performers were Conlon, 2N19957 and 2N19970, however the high protein contents would detract from their commercial consideration.

2001 Experiment FA45, Fargo Preliminary Yield Trial – Fargo

Table 38 – 26 Entries

Three quarters of these plump barleys had unacceptably high protein contents, and half had low extract values. The soluble protein levels were very good, but the S/T ratios were too low due to the high total protein contents. In spite of the elevated total protein levels, over half of the lines had diastatic power contents

that were too low. Eighteen of these lines had α -amylase values that were too high, while eleven β -glucan levels exceeded the upper limit. The best performers were 2N20020 and 2N20032.

2001 Experiment FA46, Fargo Preliminary Yield Trial – Fargo
Table 39 – 23 Entries

Three quarters of these extremely plump barleys had unacceptably high protein contents. Most of the extract, β -glucan and two thirds of the soluble protein values were good. About half of the diastatic power levels were too low, while nearly all of the α -amylase values were too high. The best performers were 2N20049 and 2N20086.

2001 Experiment FA47, Preliminary Yield Trial – Fargo
Table 40 – 27 Entries

All but three of these plump barleys had unacceptably high protein contents. Most of the extract and soluble protein values were good. Half of the diastatic power values were too low, while most of the α -amylase values were too high. Over a third of the β -glucan levels exceeded the upper limit. The best performer was 2N20121.

2001 Experiment FA48, Fargo Preliminary Yield Trial – Fargo
Table 41 – 25 Entries

All but one of these extremely plump barleys had unacceptably high protein contents. Half of the lines had extract values that were too low, while half had elevated β -glucan levels. Ten lines had low diastatic power levels, in spite of the high total protein levels, and most of the α -amylase values exceeded the upper limits. The best performer was Lacey, but its high protein content would render this submission unacceptable for commercial malting.

2001 Experiment FA49, Fargo Preliminary Yield Trial – Fargo
Table 42 – 31 Entries

Most of these plump barleys had unacceptably high protein contents. In a third of the submissions, the extract values were too low, while a third exhibited elevated β -glucan levels. The soluble protein levels ranged from excellent to nine that exceeded the upper limit. A third of the diastatic power values were too low, while most of the α -amylase values were too high. The best performers were Conlon, 2N20206 and 2N20205.

2001 Experiment 21, Preliminary Yield Trial – Fargo
Table 43 – 29 Entries

Sixteen of these very plump barleys had unacceptably high protein contents. The extract values were very good averaging over 79%. A third of soluble protein and two thirds of the α -amylase levels were too high. The diastatic power levels ranged from ten that were too low to four that exceeded the upper limit, while a third of the β -glucan levels were too high. The best performers were ND19552, Foster, Robust and ND19491.

2001 Experiment 22A, Preliminary Yield Trial – Fargo
Table 44 – 32 Entries

Two thirds of these extremely plump barleys were unacceptably high. Most of the extract and β -glucan values were good. Nearly half of the soluble protein, a third of the diastatic power and most of the α -amylase levels were too high. The best performers were ND19632, ND19618, ND19610, ND19590, ND19642, ND19609 and ND19619.

2001 Experiment 22B, Preliminary Yield Trial – Fargo

Table 45 – 39 Entries

Nearly half of these plump barleys had unacceptably high protein contents. A quarter of the extract values fell below the minimum limit. Two thirds of the soluble protein levels were too high – high enough that half of the S/T ratios exceeded the maximum limit, even with the generally high total protein contents. Two thirds of the diastatic power levels were too low, while nearly all of the α -amylase values were too high. The β -glucan levels were generally high, however only a dozen exceeded the maximum limits. The best performers were Foster, Morex and ND19668.

2001 Experiment 23, Preliminary Yield Trial – Fargo

Table 46 – 32 Entries

Three quarters of these plump barleys had unacceptably high protein contents. The extract values were pretty good, however, a quarter of these worts were hazy and two thirds of the soluble protein levels were too high. The diastatic power values were generally good, while most of the α -amylase values were too high. The β -glucan levels were generally high, with nine exceeding the maximum limit. None of these lines performed well.

2001 Experiment 25A, Preliminary Yield Trial – Fargo

Table 47 – 46 Entries

Most of these plump barleys had elevated total protein contents. The extract values were generally good, averaging almost 79%. The soluble protein levels were generally high, with half exceeding the maximum limit. A third of the diastatic power values were too low, while almost all of the α -amylase values were too high. Most of the β -glucan levels were elevated, suggesting that these

entries modified poorly under our malting conditions. The best performers were ND19250, Foster, ND19224 and ND19258.

2001 Experiment 25B, Preliminary Yield Trial – Fargo

Table 48 – 38 Entries

Half of these plump barleys had unacceptably high protein contents. The extract values were generally good, with only eight below the minimum limit. Over a third of the entries had soluble protein levels that were too high, while half of the S/T ratios were outside the desired limits, with ten too high and ten too low. The diastatic power values were too low in two thirds of the submissions, while half of the α -amylase levels exceeded the desired limit. The β -glucan levels tended to be a bit high, with a third of them exceeding the maximum limit. The best performers were Foster, ND19290, ND19284 and ND19297.

2001 Experiment 3, Intermediate Malting Barley Yield Trial – Fargo

Table 49 – 31 Entries

All of these plump barleys had unacceptably high protein contents. The extract values were generally good, however, all of the soluble protein levels exceeded the maximum limit. The diastatic power values ranged from three that were too low to nine that exceeded the maximum limit. The α -amylase and β -glucan values were generally high. None of these submissions would be considered by industry because of the elevated total and soluble protein levels.

2001 Experiment 3, Intermediate Malting Barley Yield Trial – Carrington

Table 50 – 31 Entries

Nearly all of these thin barleys had unacceptably high protein contents. A third of the extract values were too low and all of the soluble protein levels exceeded the maximum limit. The exceptionally high soluble protein levels resulted in nearly all

of the S/T ratios being unacceptably high, even though the total protein contents were also elevated. The amylolitic values were generally too high, while the β -glucan levels were good. None of these submissions would appeal to industry due to their high soluble and total protein contents.

2001 Experiment 3, Intermediate Malting Barley Yield Trial – Minot
Table 51 – 31 Entries

Nearly all of these barleys had unacceptably high protein contents. A third of the extract values were below the minimum limit. Over half of the soluble protein and most of the amylolitic levels were too high. The β -glucan levels were generally very good. None of these lines performed well.

2001 Experiment 2, Advanced Malting Barley Yield Trial – Fargo
Table 52 – 91 Entries

Most of these barleys had unacceptably high protein contents. Nearly half of the extract values were too low, while two thirds of the soluble protein contents were too high. Over half of the diastatic power and most of the α -amylase values were too high, while β -glucan levels were mostly good. The best performers were ND16301, ND17655, Lacey, Foster and Drummond.

2001 Experiment FA11, Fargo Variety Yield Trial – Fargo
Table 53 – 11 Entries

Most of these plump barleys had elevated protein contents. The extract values were generally good, but the soluble protein levels were high, except for those of Baronesse, ND16461-11, Conlon and Logan. The diastatic power values ranged from four that were too low to two that exceeded the desired limit, while most of the α -amylase and β -glucan levels were too high. None of these lines performed very well.

2001 Experiment FA12, Fargo Advanced Yield Trial – Fargo

Table 54 – 15 Entries

Over two thirds of these plump barleys had unacceptably high protein contents. The extract values were generally good, while nearly two thirds of the soluble protein levels were within the desired limits. A third of the diastatic power levels were too low, while all of the α -amylase values exceeded the maximum limit. Half of the β -glucan levels were unacceptably high. The best performer was 2918380.

2001 Experiment FA13, Fargo Intermediate Yield Trial – Fargo

Table 55 – 17 Entries

All but one of these plump barleys had unacceptably high protein contents. The extract values were generally quite good and only a third of the soluble protein levels were too high. Half of the diastatic power levels were too low, which was surprising considering the elevated total protein contents. Most of the α -amylase and β -glucan levels were high. None of these lines performed very well.

2001 Experiment FA14, Fargo Intermediate Yield Trial – Fargo

Table 56 – 17 Entries

Half of these plump barleys had unacceptably high protein contents. The extract values were generally quite good, but half of the soluble protein levels exceeded the maximum limit. Two thirds of the diastatic power values were too low, while all of the α -amylase values exceeded the maximum limit. Most of the β -glucan levels were unacceptably high. None of these lines performed well.

2001 Experiment FA15, Fargo Intermediate Yield Trial – Fargo

Table 57 – 16 Entries

Two thirds of these plump barleys had unacceptably high protein contents. The extract values were generally quite good and only three of the soluble protein values exceeded the maximum limit. Two thirds of the diastatic power values were too low, while most of the α -amylase and β -glucan levels were too high. The best performer was 2N19130, however the β -glucan level of this line was very high.

2001 Experiment MI11, Minot Variety Yield Trial – Minot

Table 58 – 11 Entries

Most of these lines were thin and had unacceptably high protein contents. A third of the extract values were too low, while most of the soluble protein values were good. The diastatic power levels ranged from three that were too low to four that exceeded the maximum limit. Most of the α -amylase values were too high, while the β -glucan levels ranged from three that were excellent to three that were unacceptably high. None of these lines performed well.

2001 Experiment MI12, Minot Advanced Yield Trial – Minot

Table 59 – 15 Entries

Most of these plump barleys had unacceptably high protein contents. Three quarters of the extract, soluble protein and diastatic power values were good. Most of the α -amylase values were too high, while the β -glucan levels ranged from four that were excellent to three that exceeded the maximum limit. None of these lines performed very well.

2001 Experiment MI13, Minot Intermediate Yield Trial – Minot
Table 60 – 17 Entries

Even though most of these barleys were plump, all had unacceptably high protein contents. The extract, soluble protein, diastatic power and β -glucan values were generally good, but three quarters of the α -amylase levels were too high. None of these lines performed very well.

2001 Experiment MI14, Minot Intermediate Yield Trial – Minot
Table 61 – 17 Entries

Half of these plump barleys had unacceptably high contents. The extract and soluble protein values were generally good. A third of the diastatic power levels were too low, while most of the α -amylase and β -glucan values exceeded the upper limits. The best performer was 2N19012.

2001 Experiment MI15, Minot Intermediate Yield Trial – Minot
Table 62 – 16 Entries

Although most of these barleys were plump, nearly three quarters of their protein contents were too high. The extract and soluble protein values were generally good, while most of the β -glucan levels were too high. Half of the diastatic power values were too low, while three quarters of the α -amylase levels were too high. The best performers were Stander and 2ND19152.

Table 1 Entries in the Mississippi Valley Uniform Barley Nursery - 2001 Crop

Entry No.	New Entry	Cl# or Contributor	Name	Rowed	Parentage
1	5105	Barbless		6	Oderbrucker/Lion
2	10648	Larker		6	Titan/Kindred/3/Newal/Peatland//Montcalm
3	15773	Morex		6	Cree/Bonanza
4	476976	Robust		6	Morex/Manker
5	Minnesota	Stander (M64)		6	Robust 2*/3/Cree/Bonanza//Manker/4/Robust/Bumper
6	PI 592758	Foster (ND 11055)		6	Robust/3/ND5570//Glenn/Karl
7	Busch Ag. Res.	Legacy (6B93-2978)		6	Bumper/Karl//Bumper/Manker/3/Bumper/Karl/4/Excel
8	PI 603050	MNBrite (MNS85)		6	M90-89/M69
9	North Dakota	Drummond (ND15477)		6	ND9712//Stander/ND12200
10	Minnesota	Lacey (M98)		6	M78/M79
11	Minnesota	M103		6	M84/M81
12	North Dakota	ND16301		6	Foster//ND12200/6B88-3213
13	Busch Ag.	6B95-2482		6	6B89-2126/ND10981
14	Busch Ag.	6B96-3733		6	6B88-3213//6B89-2126/Foster
15	Minnesota	M106		6	M92-334/M81
16	Minnesota	M108		6	M92-395/M83
17	Busch Ag.	6B95-2089		6	6B84-2912/B1601//6B88-3213
18	X	Minnesota	M109	6	Lacey/M95
19	X	Minnesota	M110	6	M93-117/M95
20	X	North Dakota	ND16318	6	ND13063//ND12200/6B88-3213
21	X	North Dakota	ND16903	6	ND14156/ND14296
22	X	North Dakota	ND16922	6	ND14161/ND14296
23	X	Busch Ag.	6B97-2037	6	6B92-7098/6B91-6086
24	X	Busch Ag.	6B97-2195	6	6B92-7098/M75
25	X	Busch Ag.	6B97-2245	6	6B92-7098/M75
26	X	Manitoba	BT386	6	CDC Sisler/M75

MISSISSIPPI VALLEY UNIFORM BARLEY NURSERY - 2001 Crop

Table 2 - Station Means* of Barley and Malt Quality Factors for 28 Varieties or Selections**.

Location	Barley												Ave. Quality Score
	Kernel Weight (mg)	on 6/64" (%)	Barley Color (Agtron)	Malt Extract (%)	Wort Color (%)	Barley Protein (%)	Wort Protein (%)	S/T (%)	DP (°)	Alpha- amylase (20° DU)	Beta- glucan (ppm)		
Crookston, MN	34.1 A	89.9 A	39.6 B	79.7 A	2.3 A	13.0 B	5.62 A	45.7 A	133 B	63.3 A	184 B	40	
Morris, MN	32.3 B	80.3 B	46.4 A	78.7 B	2.3 A	14.2 C	6.32 C	46.3 A	160 A	62.0 A	224 C	31	
Bottineau, ND	28.8 C	60.5 C	46.8 A	79.9 A	3.1 B	12.4 A	5.93 B	50.2 B	126 B	71.0 B	122 A	29	

* Within each column, means followed by the same letter are not significantly different (alpha=0.05), according to Duncan's Multiple Range test

** Barbless, Larker, Morex, Robust, Stander, Foster, Legacy, MNBrite, Drummond, Lacey, M103, ND16301, 6B95-2482
6B96-3733, M106, M108, 6B95-2089, M109, M110, ND16318, ND16903, ND16922, 6B97-2037, 6B97-2195, 6B97-2245

BT386, BT484, CDC Battleford

MISSISSIPPI VALLEY UNIFORM BARLEY NURSERY - 2001 Crop

Table 3 - Varietal Means* of Barley and Malt Quality Factors for 3 Stations**.

Variety	Rowed	Barley		Malt Extract (%)	Wort Color	Barley Protein (%)	Wort Protein (%)	S/T (%)	DP (°)	Alpha-amylase (20° DU)		Beta-glucan (ppm)	Ave. Quality Score	Overall Rank
		Kernel Weight (mg)	on 6/64"							Alpha-amylase (20° DU)				
Barbless	6	30.9	64.3	42.3	76.3 G	1.9 A	13.9 ABC	5.38 A	36.3 A	140 ABCD	52.3 AB	232 CDE	29	21
Larker	6	32.1	78.0	41.0	78.0 F	2.3 ABC	14.5 B	5.58 ABC	41.0 AB	157 AB	58.6 ABC	225 CDE	28	23
Morex	6	29.3	59.2	45.3	78.4 EF	2.3 ABC	14.2 ABC	6.14 ABCD	44.1 ABCD	159 AB	67.9 CDEFG	135 ABCD	28	23
Robust	6	32.1	72.8	43.3	78.8 CDEF	1.8 A	13.6 ABC	5.80 ABCD	44.0 ABCD	157 AB	52.0 AB	209 BCDE	40	3
Stander	6	32.0	81.9	44.0	80.6 ABC	2.9 ABC	12.8 ABC	6.45 BCDE	53.4 EF	127 BCD	80.3 H	183 ABCD	35	10
Foster	6	32.1	77.0	44.0	78.4 F	2.5 ABC	12.9 ABC	5.68 ABCD	47.2 BCDEF	132 BCD	64.5 CDE	260 DE	29	21
Legacy	6	29.9	73.1	40.3	79.5 ABCDEF	2.6 ABC	13.3 ABC	6.43 BCDE	50.7 CDEF	147 ABC	78.1 GH	232 CDE	27	26
MNBrItE	6	31.1	74.1	43.7	78.9 CDEF	3.6 C	14.7 C	7.15 E	50.7 CDEF	181 A	70.9 DEFGH	74 AB	23	27
Drummond	6	32.2	82.8	47.7	79.4 ABCDEF	2.3 ABC	13.3 ABC	5.71 ABCD	45.3 ABCD	158 AB	62.9 BCD	146 ABCD	39	5
Lacey	6	32.1	75.6	43.7	79.3 BCDEF	2.2 BC	13.2 ABC	5.53 AB	43.1 ABC	137 BCD	58.6 ABC	161 ABCD	39	5
M103	6	32.2	78.1	43.7	79.7 ABCDEF	2.7 ABC	12.9 ABC	6.11 ABCD	50.0 CDEF	115 CD	68.5 CDEFG	176 ABCD	34	11
ND16301	6	32.7	83.7	47.3	80.1 ABCDE	2.7 ABC	12.4 AB	5.66 ABCD	48.0 BCDEF	143 ABC	63.0 BCD	145 ABCD	40	3
6B95-2482	6	32.3	80.2	46.3	79.6 ABCDEF	2.4 ABC	12.8 ABC	5.44 A	43.6 ABCD	151 ABC	57.2 ABC	203 ABCD	46	1
6B96-3733	6	31.8	82.8	45.3	79.7 ABCDEF	2.5 ABC	13.0 ABC	5.53 AB	44.3 ABCD	150 ABC	63.7 BCDE	202 ABCD	38	7
M106	6	32.0	77.7	43.7	80.4 ABC	2.6 ABC	12.9 ABC	5.99 ABCD	49.7 CDEF	136 BCD	66.2 CDEF	152 ABCD	31	18
M108	6	32.2	78.3	45.7	80.5 ABC	2.7 ABC	12.6 AB	6.15 ABCD	51.4 DEF	113 CD	67.5 CDEFG	189 ABCD	32	14
6B95-2089	6	31.3	76.7	45.0	79.7 ABCDEF	2.2 ABC	13.1 ABC	5.57 ABC	44.5 ABCD	148 ABC	60.2 ABCD	177 ABCD	41	2
M109	6	32.0	72.0	44.7	80.7 AB	2.3 ABC	12.4 A	5.71 ABCD	47.4 BCDEF	143 ABC	64.6 CDE	110 ABC	38	7
M110	6	32.2	76.4	42.7	80.2 ABCD	2.5 ABC	12.6 AB	5.53 AB	45.8 ABCDE	142 ABC	58.3 ABC	202 ABCD	38	7
ND16318	6	32.5	85.1	41.0	79.2 BCDEF	2.7 ABC	12.5 AB	6.00 ABCD	49.1 CDEF	120 BCD	62.8 BCD	233 CDE	32	14
ND16903	6	31.9	82.4	45.0	79.5 ABCDEF	2.4 ABC	13.4 ABC	6.23 ABCD	48.4 BCDEF	144 ABC	68.4 CDEFG	340 E	30	19
ND16922	6	31.4	83.9	48.0	79.6 ABCDEF	2.6 ABC	13.0 ABC	6.19 ABCD	50.2 CDEF	142 ABC	75.1 EFGH	198 ABCD	33	13
6B97-2037	6	33.6	84.7	43.0	79.6 ABCDEF	2.7 ABC	13.7 ABC	6.09 ABCD	46.0 ABCDE	137 BCD	63.2 BCD	167 ABCD	32	14
6B97-2195	6	32.8	76.6	42.0	78.6 DEF	2.5 ABC	13.2 ABC	5.54 AB	44.5 ABCD	139 BCD	50.7 A	81 AB	32	14
6B97-2245	6	31.1	73.8	42.7	78.1 F	2.2 BC	13.2 ABC	5.56 ABC	44.2 ABCD	142 ABC	61.1 ABCD	64 A	34	11
BT386	6	30.6	71.5	48.7	79.8 ABCDEF	3.0 ABC	13.0 ABC	6.58 DE	53.4 EF	127 BCD	76.9 FGH	135 ABCD	28	23
BT484	6	31.6	81.3	44.0	80.2 ABCD	3.2 ABC	12.9 ABC	6.51 CDE	53.1 EF	122 BCD	77.0 FGH	159 ABCD	30	19
CDC Battleford	6	30.4	68.8	45.7	81.2 A	3.3 B	12.7 ABC	6.47 BCDE	53.8 F	101 D	81.2 H	158 ABCD	31	18

* Within each column, means followed by the same letter are not significantly different ($\alpha=0.05$), according to Duncan's Multiple Range test.

** Crookston and Morris, MN, and Bottineau, ND

2001 MISSISSIPPI VALLEY REGIONAL NURSERY - CROOKSTON, MN

Table 4

Lab No.	Variety or Selection	Rowed	Kernel	on	Barley	Malt	Barley	Wort				Alpha-	Beta-	Quality	Overall	
			Weight (mg)	6/64" (%)	Color (Agtron)	Extract (%)	Wort Color	Wort Clarity	Protein (%)	Protein (%)	S/T (%)	DP (°ASBC)	amylase (20°DU)	glucan (ppm)		
4588	Barbless	6	32.9	71.6	38	76.6	1.6	1	13.3	4.99	38.4	118	50.1	238	32	25
4590	Larker	6	34.4	88.2	34	77.4	2.4	2	14.6	5.07	36.3	157	50.2	216	35	20
4591	Morex	6	30.0	70.5	42	78.6	2.0	1	13.5	5.71	43.3	145	66.7	125	38	15
4592	Robust	6	34.5	92.2	40	79.2	1.5	1	13.6	5.52	41.6	156	49.4	146	53	3
4593	Stander	6	35.3	97.0	43	81.2	2.7	1	12.3	6.32	54.6	123	80.7	128	39	12
4594	Foster	6	36.1	95.1	41	79.4	2.4	2	12.2	5.45	48.5	117	61.1	225	34	23
4595	Legacy	6	32.0	91.2	*28	79.8	2.5	1	13.2	6.36	51.4	146	78.9	209	34	23
4596	MNBright	6	32.7	85.3	39	80.2	*5.4	1	14.4	*7.93	57.6	166	75.3	36	26	28
4597	Drummond	6	33.4	91.8	45	79.7	1.9	1	12.9	5.54	45.6	151	64.7	123	46	8
4598	Lacey	6	34.9	91.2	38	79.5	2.1	2	13.4	5.33	41.0	132	57.5	139	46	8
4599	M103	6	34.3	90.2	42	80.4	2.5	1	11.7	5.97	54.1	90	70.4	153	38	15
4600	ND16301	6	35.7	97.1	48	80.7	n.d.	3	12.2	5.62	48.6	130	63.6	154	40	11
4601	6B95-2482	6	35.0	94.4	41	80.0	n.d.	3	12.5	5.13	42.5	140	55.2	234	56	1
4602	6B96-3733	6	33.7	93.5	41	79.4	n.d.	3	13.2	5.20	40.3	151	58.9	172	48	6
4603	M106	6	34.0	88.5	36	80.7	2.2	2	12.6	5.50	46.4	129	66.2	100	36	19
4604	M108	6	33.0	86.7	39	80.7	2.4	1	12.2	5.82	50.2	107	66.8	158	38	15
4605	6B95-2089	6	34.3	92.1	42	80.1	1.9	2	12.8	5.16	42.0	141	56.9	168	52	4
4606	M109	6	35.6	93.4	40	81.3	2.0	2	12.1	5.16	45.1	132	62.3	127	54	2
4607	M110	6	36.1	94.4	38	80.3	n.d.	3	13.0	5.32	43.4	150	57.3	207	47	7
4608	ND16318	6	34.8	96.9	38	79.8	2.5	1	12.2	5.77	49.2	100	64.0	261	35	20
4609	ND16903	6	35.2	93.0	40	79.4	2.1	1	13.8	5.91	44.9	149	67.7	393	39	12
4611	ND16922	6	34.6	98.0	46	80.1	2.0	1	12.2	5.57	48.5	133	74.3	263	42	10
4612	6B97-2037	6	36.1	96.0	38	79.9	1.7	2	13.5	5.38	41.1	122	55.5	227	38	15
4613	6B97-2195	6	35.1	90.5	37	78.7	1.7	1	13.0	4.76	39.2	126	44.1	145	39	12
4614	6B97-2245	6	33.3	88.2	37	78.2	1.6	1	13.3	4.98	38.8	141	53.9	94	49	5
4615	BT386	6	32.4	84.7	40	79.5	2.5	1	13.2	6.13	49.5	131	73.0	202	31	26
4616	BT484	6	33.7	90.0	38	79.8	2.4	1	13.3	6.07	47.6	133	70.4	251	31	26
4617	CDC Battleford	6	31.2	74.3	40	80.6	2.2	1	12.5	5.62	48.5	98	75.9	255	35	20

Table 4

Lab No.	Variety	Rowed	Kernel	on	Barley	Malt	Barley	Wort	Alpha-	Beta-			
			Weight	6/64"	Color	Extract	Wort	Wort	Protein	Protein	amylase	glucan	Quality
		(mg)	(%)	(Agtron)	(%)	Color	Clarity	(%)	(%)	(°ASBC)	(20°DU)	(ppm)	Score
4589	MOREX MALT CHECK	6	31.3	70.8	75	80.4	2.0	1	13.0	6.15	51.0	122	72.9
4610	MOREX MALT CHECK	6	31.5	72.0	74	80.3	2.2	1	12.2	6.06	51.9	124	76.7
Minima			30.0	70.5	34	76.6	1.5		11.7	4.76	36.3	90	44.1
Maxima			36.1	98.0	48	81.3	2.7		14.6	6.36	57.6	166	80.7
Means			34.1	89.9	40	79.7	2.1		12.9	5.53	45.6	133	63.2
Standard Deviations			1.5	7.2	3	1.1	0.3		0.7	0.42	5.3	19	9.6
Coefficients of Variation			4.4	8.0	8	1.3	16.5		5.4	7.56	11.6	14	15.1

Malt Check Data are Excluded from Rank Sorting and Statistics

Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics

For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by K. Smith, University of Minnesota - St. Paul

2001 MISSISSIPPI VALLEY REGIONAL NURSERY - MORRIS, MN

Table 5

Lab No.	Variety or Selection	Rowed	Kernel	on	Barley	Malt	Barley	Wort	Alpha-	Beta-	Quality	Overall				
			Weight (mg)	6/64"	Color (Agtron)	Extract (%)	Wort Color	Wort Clarity	Protein (%)	Protein (%)						
4618	Barbless	6	32.2	73.0	46	75.7	1.9	2	14.6	5.77	40.1	153	49.3	304	31	12
4619	Larker	6	33.3	82.9	44	76.6	1.9	2	15.5	5.66	38.8	175	51.5	249	24	24
4620	Morex	6	31.9	72.8	48	78.4	2.0	1	14.9	6.31	43.2	178	65.0	193	21	28
4621	Robust	6	33.4	80.1	45	78.3	1.8	1	14.5	6.18	44.6	181	50.9	298	31	12
4622	Stander	6	32.2	83.1	45	80.0	2.7	1	13.8	6.82	51.5	137	76.2	281	34	7
4623	Foster	6	33.3	84.7	43	76.9	2.1	2	13.7	5.61	42.9	151	56.9	315	35	6
4624	Legacy	6	31.4	81.0	43	79.0	2.4	1	14.4	6.76	49.5	169	70.2	344	22	27
4625	MNBright	6	32.2	81.9	43	77.9	2.3	1	16.0	6.97	44.7	214	63.9	125	24	24
4626	Drummond	6	33.7	85.2	49	78.6	1.9	1	14.6	5.80	41.0	182	59.0	207	31	12
4627	Lacey	6	32.8	78.8	46	78.7	2.1	1	14.1	5.69	41.0	153	53.2	227	41	2
4628	M103	6	32.5	82.7	42	78.3	2.5	1	14.8	6.41	45.1	140	62.6	270	31	12
4629	ND16301	6	32.8	83.6	47	79.0	2.1	1	13.8	5.91	44.8	169	59.3	186	43	1
4630	6B95-2482	6	32.7	81.4	44	78.5	2.0	1	13.8	5.87	42.9	174	54.9	283	39	4
4632	6B96-3733	6	30.3	73.9	49	78.1	2.1	1	14.4	5.80	42.3	178	60.0	261	28	20
4633	M106	6	32.3	78.7	49	79.3	2.2	1	14.1	6.35	47.5	160	62.0	250	26	22
4634	M108	6	33.0	83.1	48	79.7	2.4	1	13.8	6.57	49.1	122	64.7	321	24	24
4635	6B95-2089	6	31.1	78.8	46	79.1	2.1	2	13.8	5.91	44.6	168	59.2	245	41	2
4636	M109	6	31.6	72.0	45	80.1	2.1	1	12.7	6.23	49.0	178	63.3	130	31	12
4637	M110	6	32.0	76.5	46	79.6	2.3	2	13.3	5.93	46.5	159	57.5	226	37	5
4638	ND16318	6	32.3	83.8	44	77.6	2.6	1	13.8	6.59	48.0	146	61.2	258	27	21
4639	ND16903	6	31.3	81.2	49	79.0	2.4	1	14.2	6.96	51.0	161	67.9	286	25	23
4640	ND16922	6	31.2	83.0	52	79.2	2.7	2	14.0	7.09	52.6	168	72.6	220	29	17
4641	6B97-2037	6	34.8	87.6	45	78.2	1.8	1	15.0	6.26	43.4	168	59.9	224	32	10
4642	6B97-2195	6	33.1	78.5	42	78.0	2.2	2	14.1	5.95	43.9	163	48.9	73	33	9
4643	6B97-2245	6	31.6	74.5	44	77.5	2.1	2	14.0	5.87	44.8	161	58.2	72	32	10
4644	BT386	6	31.8	78.0	54	79.4	2.8	1	14.2	7.28	53.6	140	74.1	128	29	17
4645	BT484	6	31.7	83.1	48	80.3	2.9	1	13.7	7.02	53.8	126	72.7	168	29	17
4646	CDC Battleford	6	32.9	84.7	53	81.3	3.0	1	13.8	7.28	56.3	117	80.7	140	34	7

Table 5

Lab No.	Variety	Rowed	Kernel	on	Barley	Malt	Barley	Wort	Alpha-	Beta-					
			Weight	6/64"	Color	Extract	Wort	Wort	S/T	DP	amylase	glucan	Quality		
		(mg)	(%)	(Agtron)	(%)	Color	Clarity	(%)	(%)	(°ASBC)	(20°DU)	(ppm)	Score		
4631	MOREX MALT CHECK	6	31.2	72.4	73	80.3	2.2	1	12.1	6.09	51.9	116	68.5	137	36
Minima			30.3	72.0	42	75.7	1.8		12.7	5.61	38.8	117	48.9	72	21
Maxima			34.8	87.6	54	81.3	3.0		16.0	7.28	56.3	214	80.7	344	43
Means			32.3	80.3	46	78.7	2.3		14.2	6.32	46.3	160	62.0	224	31
Standard Deviations			0.9	4.2	3	1.2	0.3		0.7	0.53	4.5	21	8.2	74	6
Coefficients of Variation			2.9	5.2	7	1.5	14.6		4.6	8.40	9.8	13	13.3	33	19

Malt Check Data are Excluded from Rank Sorting and Statistics

Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics

For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by K. Smith, University of Minnesota - St. Paul

2001 MISSISSIPPI VALLEY REGIONAL NURSERY - BOTTINEAU, ND

Table 6

Lab No.	Variety or Selection	Rowed	Kernel	on	Barley	Malt	Barley	Wort	Alpha-	Beta-	Overall					
			Weight	6/64"	Color	Extract	Wort Color	Wort Clarity	Protein (%)	Protein (%)		Rank				
4494	BARBLESS	6	27.5	48.3	43	*76.6	2.1	2	13.9	5.37	39.3	148	57.5	155	23	25
4495	LARKER	6	28.7	63.0	45	80.0	2.7	1	13.5	6.02	48.0	140	74.2	211	26	19
4496	MOREX	6	26.1	34.4	46	78.2	3.0	1	14.3	6.40	45.9	155	72.0	88	25	21
4497	ROBUST	6	28.3	46.0	45	79.0	2.2	1	12.6	5.70	45.8	133	55.7	184	35	5
4498	STANDER	6	28.4	65.5	44	80.6	3.3	1	12.2	6.22	54.2	120	84.0	139	31	9
4499	FOSTER	6	27.0	51.2	48	78.8	3.0	1	12.7	5.97	50.2	129	75.5	240	17	28
4500	LEGACY	6	26.2	47.0	50	79.6	2.9	1	12.2	6.17	51.3	125	85.3	143	26	19
4501	MNBRITE	6	28.5	55.1	49	78.6	3.1	1	13.8	6.55	49.8	162	73.6	60	20	27
4502	DRUMMOND	6	29.5	71.3	49	80.0	3.0	1	12.4	5.80	49.4	140	64.9	107	41	2
4504	LACEY	6	28.7	56.7	47	79.8	2.4	1	12.2	5.58	47.2	127	65.0	118	31	9
4505	M103	6	29.8	61.5	47	80.4	3.0	1	12.2	5.96	50.9	114	72.6	104	34	7
4506	ND16301	6	29.6	70.3	47	80.7	2.7	1	11.3	5.44	50.5	130	66.0	94	37	3
4507	6B95-2482	6	29.3	64.9	54	80.2	2.5	1	12.2	5.33	45.3	139	61.6	93	43	1
4508	6B96-3733	6	31.3	80.9	46	81.6	2.7	1	11.3	5.58	50.4	121	72.2	173	37	3
4509	M106	6	29.6	65.9	46	81.1	3.3	1	12.0	6.12	55.1	118	70.4	107	31	9
4510	M108	6	30.6	65.1	50	81.0	3.2	1	11.7	6.06	54.8	109	71.1	88	33	8
4511	6B95-2089	6	28.5	59.1	47	79.8	2.7	1	12.7	5.63	47.0	135	64.4	119	30	12
4512	M109	6	28.9	50.6	49	80.8	2.7	1	12.4	5.74	48.2	120	68.3	74	30	12
4513	M110	6	28.5	58.3	44	80.6	2.6	1	11.5	5.35	47.5	117	60.2	173	30	12
4514	ND16318	6	30.4	74.7	41	80.1	2.9	1	11.5	5.64	50.1	115	63.2	180	35	5
4515	ND16903	6	29.2	73.0	46	80.0	2.6	1	12.3	5.83	49.3	121	69.7	*340	27	17
4516	ND16922	6	28.5	70.8	46	79.6	3.2	1	12.8	5.92	49.4	125	78.3	111	29	16
4517	6B97-2037	6	30.0	70.4	46	80.6	4.7	1	12.6	6.64	53.4	120	74.2	49	27	17
4518	6B97-2195	6	30.1	60.8	47	79.0	3.5	1	12.6	5.91	50.4	128	59.1	24	25	21
4519	6B97-2245	6	28.5	58.8	47	78.5	2.8	1	12.2	5.83	49.1	125	71.3	26	21	26
4520	BT386	6	27.6	51.9	52	80.4	3.8	1	11.6	6.33	57.1	110	83.5	76	25	21
4521	BT484	6	29.5	70.9	46	80.6	4.2	1	11.7	6.43	57.9	106	87.9	57	30	12
4522	CDC BATTLEFORD	6	27.2	47.3	44	81.6	4.8	1	11.7	6.52	56.7	87	87.0	80	25	21

Table 6

Lab No.	Variety	Rowed	Kernel	on	Barley	Malt	Barley	Wort	Alpha-	Beta-					
			Weight	6/64"	Color	Extract	Wort	Wort	Protein	Protein	amylase	glucan	Quality		
		(mg)	(%)	(Agtron)	(%)	Color	Clarity	(%)	(%)	(°ASBC)	(20°DU)	(ppm)	Score		
4503	HARRINGTON MALT CHECK	2	38.8	93.5	79	82.2	1.8	1	11.7	5.21	47.4	90	66.2	305	32
4523	HARRINGTON MALT CHECK	2	39.5	94.2	82	81.9	1.8	1	12.1	5.48	49.2	100	72.1	68	39
Minima			26.1	34.4	41	78.2	2.1		11.3	5.33	39.3	87	55.7	24	17
Maxima			31.3	80.9	54	81.6	4.8		14.3	6.64	57.9	162	87.9	240	43
Means			28.8	60.5	47	80.0	3.0		12.4	5.93	50.1	126	71.0	114	29
Standard Deviations			1.3	10.7	3	0.9	0.6		0.8	0.38	4.0	15	8.9	55	6
Coefficients of Variation			4.4	17.7	6	1.1	21.3		6.2	6.38	8.1	12	12.6	48	21

Malt Check Data are Excluded from Rank Sorting and Statistics

Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics

For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by S. Askelson, BARI - Ft. Collins, CO

2001 MISSISSIPPI VALLEY BARLEY NURSERY AND ADDITIONS - ABERDEEN

Table 7

Lab No.	Variety or Selection	Rowed	Kernel	on	Barley	Malt	Barley	Wort	Alpha-	Beta-	Quality	Overall				
			Weight (mg)	6/64" (%)	Color (Agtron)	Extract (%)	Wort Color	Wort Clarity	Protein (%)	Protein (%)						
2422	Barbless	6	34.0	*64.0	74	*73.5	1.4	2	14.9	4.16	29.4	81	*32.1	*542	6	33
2423	Larker	6	36.9	80.9	69	77.1	1.8	2	14.6	4.89	34.5	134	43.6	237	29	29
2424	Morex	6	35.0	73.6	66	77.9	1.6	1	15.4	5.45	36.7	186	53.9	213	23	31
2425	Robust	6	38.7	90.5	68	79.6	1.7	1	15.2	5.66	38.0	171	49.9	173	32	28
2426	Stander	6	36.7	86.3	80	80.5	1.8	1	13.0	5.56	43.2	138	61.4	242	42	16
2427	Foster	6	39.5	92.6	76	79.7	1.8	1	13.2	5.31	41.0	146	56.6	237	46	9
2428	Legacy	6	34.9	84.0	80	80.0	1.7	1	13.9	5.86	43.8	175	68.7	276	35	25
2429	MNBrite	6	37.9	91.1	72	78.5	1.7	1	16.6	6.14	39.3	232	62.7	144	23	31
2430	Drummond	6	35.6	89.4	78	78.6	1.8	2	14.8	5.15	35.6	183	54.3	134	36	22
2431	Lacey	6	37.8	87.6	71	79.4	1.7	1	15.1	5.41	38.0	172	55.7	100	33	26
2432	M103	6	39.4	90.1	73	79.4	1.7	1	14.1	5.49	39.5	149	58.6	156	36	22
2433	ND16301	6	38.6	94.4	80	80.6	1.7	2	12.8	5.08	40.5	162	55.1	130	53	2
2434	6B95-2482	6	38.5	93.0	76	80.2	1.7	2	13.9	4.95	36.8	167	52.3	149	51	3
2435	6B96-3733	6	39.9	93.3	76	81.0	1.9	1	13.6	6.05	47.0	149	66.5	90	41	18
2437	M106	6	38.0	89.2	74	80.7	1.7	1	13.5	5.89	44.4	161	64.7	95	46	9
2438	M108	6	36.6	82.4	75	80.2	1.7	1	13.0	5.63	44.8	137	60.5	156	42	16
2439	6B95-2089	6	37.0	84.3	72	80.2	1.6	1	14.2	5.03	37.5	148	52.9	202	46	9
2440	M109	6	38.1	87.0	76	80.5	1.7	1	14.0	5.24	38.6	164	54.5	149	47	7
2441	M110	6	38.1	90.9	72	80.4	1.9	2	13.3	5.07	39.0	162	51.6	212	47	7
2442	ND16318	6	38.7	93.7	72	80.7	1.8	1	13.3	5.83	43.8	135	60.0	161	46	9
2443	ND16903	6	36.8	89.2	72	79.8	1.6	1	13.9	5.51	41.5	153	60.8	354	39	19
2444	ND16922	6	36.1	90.3	76	80.1	1.7	1	13.9	5.52	40.8	150	65.0	288	45	13
2445	6B97-2037	6	37.1	87.3	73	79.6	1.5	1	14.3	5.30	38.5	149	55.5	201	36	22
2446	6B97-2195	6	37.1	87.1	73	78.9	1.4	1	13.6	4.75	37.2	142	46.1	87	49	4
2447	6B97-2245	6	38.1	90.1	78	78.0	1.5	1	13.9	4.88	36.7	155	50.6	97	49	4
2448	BT386	6	34.8	80.7	79	80.2	1.8	1	13.8	5.71	43.6	144	64.1	218	45	13
2449	BT484	6	36.5	86.8	75	80.1	2.0	1	13.4	5.78	44.5	123	62.9	250	38	20
2450	CDC Battleford	6	33.2	68.3	76	81.3	1.8	1	13.7	5.54	43.2	107	70.6	251	33	26
2451	M104	6	36.5	85.2	76	80.7	1.6	1	13.9	5.62	41.1	144	62.6	233	45	13
2452	ND17190	6	39.0	95.6	74	78.9	*2.5	1	13.3	6.35	51.0	86	75.9	266	24	30

Table 7

Lab No.	Variety or Selection	Rowed	Kernel	on	Barley	Malt	Barley	Wort	Alpha-	Beta-	Quality	Overall				
			Weight 6/64"	(mg)	Color (Agtron)	Extract (%)	Wort Color	Wort Clarity	Protein (%)	Protein (%)						
2453	6B96-3373	6	37.5	91.0	76	79.3	1.6	1	14.3	5.25	38.3	166	57.3	186	37	21
2454	92AB5180	6	37.5	81.2	72	81.9	2.1	1	11.8	5.36	47.6	141	58.3	74	49	4
2455	98AB12362	6	39.4	92.1	81	81.2	1.8	1	12.8	4.95	41.0	136	53.4	141	57	1
2436	MOREX MALT CHECK	6	31.1	70.4	74	80.1	2.1	1	12.2	5.95	50.6	129	69.9	45	35	
Minima			33.2	68.3	66	77.1	1.4		11.8	4.16	29.4	81	43.6	74	6	
Maxima			39.9	95.6	81	81.9	2.1		16.6	6.35	51.0	232	75.9	354	57	
Means			37.3	87.5	75	79.9	1.7		13.9	5.40	40.5	150	58.3	184	40	
Standard Deviations			1.6	5.9	4	1.1	0.1		0.9	0.45	4.2	28	7.1	68	10	
Coefficients of Variation			4.4	6.8	5	1.3	8.3		6.5	8.26	10.5	18	12.1	37	26	

Malt Check Data are Excluded from Rank Sorting and Statistics

Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics

For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by C. Erickson, USDA/ARS - Aberdeen

MISSISSIPPI VALLEY UNIFORM BARLEY NURSERY - 2001 Crop

Table 8 - Station Means* of Barley and Malt Quality Factors for 28 Varieties or Selections**.

Location	Barley											Ave. Quality Score
	Kernel Weight (mg)	on 6/64" (%)	Barley Color (Agtron)	Malt Extract (%)	Wort Color (%)	Barley Protein (%)	Wort Protein (%)	S/T (%)	DP (°)	Alpha- amylase (20° DU)	Beta- glucan (ppm)	
Aberdeen, ID	37.1 A	86.4 A	74.4 A	79.5 A	1.7 A	14.0 C	5.39 A	39.9 A	153 A	56.8 A	198 B	39.1
Crookston, MN	34.1 B	89.9 A	39.6 C	79.7 A	2.3 B	13.0 B	5.62 A	45.7 B	133 B	63.3 B	184 B	40.4
Morris, MN	32.3 C	80.3 B	46.4 B	78.7 B	2.3 B	14.2 C	6.32 C	46.3 B	160 A	62.0 B	224 B	30.9
Bottineau, ND	28.8 D	60.5 C	46.8 B	79.9 A	3.1 C	12.4 A	5.93 B	50.2 C	126 B	71.0 C	122 A	29.4

* Within each column, means followed by the same letter are not significantly different ($\alpha=0.05$), according to Duncan's Multiple Range test

** Barbless, Larker, Morex, Robust, Stander, Foster, Legacy, MNBrite, Drummond, Lacey, M103, ND16301, 6B95-2482
 6B96-3733, M106, M108, 6B95-2089, M109, M110, ND16318, ND16903, ND16922, 6B97-2037, 6B97-2195, 6B97-2245
 BT386, BT484, CDC Battleford

MISSISSIPPI VALLEY UNIFORM BARLEY NURSERY - 2001 Crop

Table 9 - Varietal Means* of Barley and Malt Quality Factors for 4 Stations**.

Variety	Rowed	Barley				Wort Color	Barley Protein (%)	Wort Protein (%)	S/T (%)	DP (°)	Alpha-amylase (20° DU)	Beta-glucan (ppm)	Ave. Quality Score	Overall Rank
		Kernel Weight (mg)	on 6/64 (%)	Barley Color (Agrton)	Malt Extract (%)									
Barbless	6	31.7	64.2	50.3	75.6 J	1.8 A	14.2 ABCD	5.07 A	36.8 A	125 DEFG	47.3 A	310 FG	23	28
Larker	6	33.3	78.8	48.0	77.8 I	2.2 AB	14.6 CD	5.41 ABCDE	39.4 AB	152 BCDEF	54.9 ABCD	228 DEF	29	25
Morex	6	30.8	62.8	50.5	78.3 GHI	2.2 AB	14.5 BCD	5.97 BCDEF	42.3 ABCD	166 AB	64.4 DEFGH	155 ABCDE	27	26
Robust	6	33.7	77.2	49.5	79.0 DEFGHI	1.8 A	14.0 ABCD	5.77 ABCDEF	42.5 ABCDE	160 BCD	51.5 ABC	200 BCDEF	38	8
Stander	6	33.2	83.0	53.0	80.6 ABC	2.6 AB	12.8 AB	6.23 CDEFG	50.9 DE	130 CDEFG	75.6 HI	198 BCDEF	37	11
Foster	6	34.0	80.9	52.0	78.7 FGHI	2.3 AB	13.0 ABC	5.59 ABCDEF	45.7 BCDE	136 BCDEFG	62.5 CDEFG	254 EFG	33	19
Legacy	6	31.1	75.8	50.3	79.6 BCDEFG	2.4 AB	13.4 ABC	6.29 EFG	49.0 CDE	154 BCDEF	75.8 HI	243 EFG	29	24
MNBrute	6	32.8	78.4	50.8	78.8 EFGHI	3.1 B	15.2 D	6.90 G	47.9 BCDE	194 A	68.9 EFGHI	91 ABC	23	27
Drummond	6	33.1	84.4	55.3	79.2 CDEFGH	2.2 AB	13.7 ABCD	5.57 ABCDEF	42.9 ABCDE	164 ABC	60.7 BCDEF	143 ABCDE	39	6
Lacey	6	33.6	78.6	50.5	79.4 BCDEFGH	2.1 AB	13.7 ABCD	5.50 ABCDEF	41.8 ABC	146 BCDEF	57.9 ABCDE	146 ABCDE	38	8
M103	6	34.0	81.1	51.0	79.6 BCDEFG	2.4 AB	13.2 ABC	5.96 BCDEF	47.4 BCDE	123 EFG	66.1 DEFGH	171 ABCDE	35	15
ND16301	6	34.2	86.4	55.5	80.3 ABCD	2.4 AB	12.5 A	5.51 ABCDEF	46.1 BCDE	148 BCDEF	61.0 BCDEF	141 ABCDE	43	2
6B95-2482	6	33.9	83.4	53.8	79.7 BCDEF	2.3 AB	13.1 ABC	5.32 AB	41.9 ABC	155 BCDE	56.0 ABCD	190 ABCDE	47	1
6B96-3733	6	33.8	85.4	53.0	80.0 ABCDEF	2.3 AB	13.1 ABC	5.66 ABCDEF	45.0 ABCDE	150 BCDEF	64.4 DEFGH	174 ABCDE	39	6
M106	6	33.5	80.6	51.3	80.5 ABCD	2.4 AB	13.1 ABC	5.97 BCDEF	48.4 CDE	142 BCDEF	65.8 DEFGH	138 ABCDE	35	15
M108	6	33.3	79.3	53.0	80.4 ABCD	2.4 AB	12.7 A	6.02 BCDEF	49.7 CDE	119 FG	65.8 DEFGH	181 ABCDE	34	17
6B95-2089	6	32.7	78.6	51.8	79.8 BCDEF	2.1 AB	13.4 ABC	5.43 ABCDE	42.8 ABCDE	148 BCDEF	58.4 ABCDE	184 ABCDE	42	3
M109	6	33.6	75.8	52.5	80.7 AB	2.1 AB	12.8 A	5.59 ABCDEF	45.2 ABCDE	149 BCDEF	62.1 CDEFG	120 ABCD	41	4
M110	6	33.7	80.0	50.0	80.2 ABCD	2.3 AB	12.8 A	5.42 ABCDE	44.1 ABCDE	147 BCDEF	56.7 ABCD	205 CDEF	40	5
ND16318	6	34.1	87.3	48.8	79.6 BCDEFG	2.5 AB	12.7 A	5.96 BCDEF	47.8 BCDE	124 EFG	62.1 CDEFG	215 DEF	36	14
ND16903	6	33.1	84.1	51.8	79.6 BCDEFG	2.2 AB	13.6 ABC	6.05 BCDEF	46.7 BCDE	146 BCDEF	66.5 DEFGH	343 G	33	20
ND16922	6	32.6	85.5	55.0	79.8 BCDEF	2.4 AB	13.2 ABC	6.03 BCDEF	47.9 BCDE	144 BCDEF	72.6 FGHI	221 DEF	36	13
6B97-2037	6	34.5	85.3	50.5	79.6 BCDEFG	2.4 AB	13.9 ABCD	5.90 ABCDEF	44.1 ABCDE	140 BCDEF	61.3 BCDEF	175 ABCDE	33	18
6B97-2195	6	33.9	79.2	49.8	78.7 FGHI	2.2 AB	13.3 ABC	5.34 ABC	42.7 ABCDE	140 BCDEF	49.6 AB	82 AB	37	11
6B97-2245	6	32.9	77.9	51.5	78.1 HI	2.0 AB	13.4 ABC	5.39 ABCD	42.4 ABCDE	146 BCDEF	58.5 ABCDE	72 A	38	8
BT386	6	31.7	73.8	56.3	79.9 ABCDEF	2.7 AB	13.2 ABC	6.36 FG	51.0 DE	131 BCDEFG	73.7 GHI	156 ABCDE	33	20
BT484	6	32.9	82.7	51.8	80.2 ABCDE	2.9 AB	13.0 ABC	6.33 FG	51.0 DE	122 EFG	73.5 GHI	182 ABCDE	32	22
CDC Battleford	6	31.1	68.7	53.3	81.2 A	3.0 AB	12.9 ABC	6.24 DEFG	51.2 E	102 G	78.6 I	182 ABCDE	32	23

* Within each column, means followed by the same letter are not significantly different (alpha=0.05), according to Duncan's Multiple Range test.

** Aberdeen, ID, Crookson and Morris, MN, and Bottineau, ND

2001 MALTING BARLEY X NITROGEN STUDY - PRESQUE ISLE, ME

Table 10

Lab No.	Variety or Selection	Rowed	Kernel	on	Barley	Malt		Barley	Wort		Alpha-	Beta-	Quality	Overall		
			Weight	6/64"	Color	Extract	Wort	Wort	Clarity	Protein	Protein	S/T	DP	amylase	glucan	Score
3069	201 - 2	6	35.0	92.1	49	80.5	2.6	1	13.8	6.40	47.8	137	86.5	502	31	8
3070	202 - 4	2	45.4	96.8	56	80.3	2.8	1	13.5	5.71	43.3	114	92.0	400	34	4
3071	203 - 6	2	41.7	94.3	55	79.8	2.6	1	13.8	5.74	43.4	97	77.2	598	30	14
3072	204 - 5	2	*49.3	98.0	45	78.9	n.d.	3	14.8	5.28	36.1	98	61.3	733	21	44
3073	205 - 1	6	39.5	96.4	48	79.5	2.1	1	15.0	6.14	43.4	137	76.0	643	28	22
3074	206 - 3	2	42.7	93.0	51	80.7	3.3	2	13.1	5.46	42.2	111	94.8	576	38	1
3075	401 - 6	2	40.3	87.7	58	79.9	2.9	1	13.3	5.76	44.5	104	86.6	524	33	5
3076	402 - 3	2	41.8	87.4	52	80.6	3.1	1	13.4	5.50	43.2	110	95.0	591	33	5
3077	403 - 1	6	38.0	95.4	46	80.3	2.3	1	14.2	5.87	42.2	130	72.8	649	30	14
3078	404 - 5	2	*47.7	97.6	42	79.2	n.d.	3	14.7	5.31	36.7	109	64.3	636	21	44
3079	405 - 2	6	35.4	93.5	49	81.1	2.5	1	13.3	5.77	43.5	128	89.5	536	35	2
3080	406 - 4	2	42.7	93.8	47	80.1	n.d.	3	14.4	5.72	40.7	102	84.2	386	29	17
3082	201 - 2B	6	37.0	92.6	46	79.3	2.0	1	14.8	5.68	39.5	133	68.0	741	26	32
3083	202 - 5B	6	39.2	96.1	48	80.8	2.4	1	14.4	6.19	44.6	122	80.6	583	27	26
3084	203 - 1B	6	36.9	82.9	50	75.4	1.7	1	16.0	5.19	32.7	155	48.0	605	33	5
3085	204 - 4B	6	38.0	92.5	47	80.4	2.5	1	14.0	6.14	44.3	101	75.7	613	27	26
3086	205 - 3B	6	37.2	94.0	49	79.3	2.3	1	15.3	6.09	42.5	146	85.9	626	31	8
3087	206 - 4C	6	36.6	89.4	50	79.8	2.4	1	14.4	6.28	44.0	97	73.4	591	24	38
3088	207 - 1C	6	34.6	74.6	52	74.9	1.7	1	16.5	5.47	33.3	196	54.7	519	20	47
3089	208 - 2C	6	37.2	90.9	45	78.9	2.0	1	15.3	5.48	37.2	144	71.4	753	29	17
3090	209 - 5C	6	37.1	92.2	50	80.5	2.4	1	14.4	6.20	44.3	133	80.0	642	31	8
3091	210 - 3C	6	37.0	92.2	56	79.0	2.1	1	15.6	6.15	41.1	151	76.1	675	31	8
3092	211 - 2D	6	35.9	92.0	41	79.0	2.0	1	15.4	5.80	39.4	133	67.2	715	26	32
3093	212 - 1D	6	33.9	65.7	53	73.8	1.9	1	*18.1	6.03	34.1	195	52.7	442	14	49
3094	213 - 4D	6	38.3	94.8	46	80.3	2.5	1	14.8	6.31	44.7	103	74.8	560	27	26
3095	214 - 3D	6	38.2	93.6	50	79.6	1.9	1	15.1	5.57	38.7	127	64.7	671	22	41
3096	215 - 5D	6	36.0	93.5	51	79.1	2.3	1	14.7	6.22	43.4	142	80.4	600	31	8
3097	216 - 3A	6	38.0	94.0	53	80.0	2.3	1	14.7	6.18	44.6	129	79.3	633	24	38
3098	217 - 5A	6	38.0	94.8	49	79.6	2.2	1	14.2	5.87	42.2	138	80.0	569	31	8
3099	218 - 2A	6	38.7	96.1	51	81.1	2.4	1	14.6	6.08	43.5	123	79.0	499	27	26

Table 10

Lab No.	Variety or Selection	Rowed	Kernel	on	Barley	Malt		Barley	Wort		Alpha-	Beta-	Quality	Overall		
			Weight	6/64"	Color	Extract	Wort Color	Wort Clarity	Protein (%)	Protein (%)	S/T (%)	DP (°ASBC)	amylase (20°DU)	glucan (ppm)		
3100	219 - 4A	6	38.0	93.8	50	80.8	2.3	1	13.7	5.92	44.6	96	73.8	509	35	2
3101	220 - 1A	6	35.8	77.2	52	76.2	1.7	1	15.2	5.36	35.9	158	53.2	507	29	17
3103	401 - 5C	6	38.8	95.2	49	80.4	2.4	1	14.1	6.17	45.8	113	74.9	685	27	26
3104	402 - 2C	6	38.0	94.4	48	79.0	2.0	1	15.4	5.64	38.3	127	67.5	733	22	41
3105	403 - 4C	6	36.9	91.3	46	79.5	2.2	1	14.7	6.07	41.5	110	75.7	622	24	38
3106	404 - 1C	6	32.5	*61.6	55	74.2	1.9	1	16.9	5.80	34.6	179	55.9	497	14	49
3107	405 - 3C	6	36.3	92.0	52	78.9	2.7	2	15.2	6.52	43.5	147	88.6	495	27	26
3108	406 - 4D	6	35.9	89.7	46	79.8	2.6	1	14.7	6.56	46.9	115	83.9	361	19	48
3109	407 - 1D	6	33.4	63.8	58	73.8	1.9	1	16.8	5.89	36.1	202	57.3	422	14	49
3110	408 - 5D	6	35.9	92.0	45	80.5	3.1	2	14.7	7.29	50.7	131	88.7	364	25	36
3111	409 - 2D	6	35.8	91.9	46	80.0	2.2	2	15.0	6.56	46.4	144	75.9	514	28	22
3112	410 - 3D	6	36.7	93.0	52	79.8	2.7	2	15.9	7.18	47.4	161	93.4	350	22	41
3113	411 - 1A	6	33.8	65.6	59	75.1	2.1	2	16.0	6.24	39.9	185	57.2	280	13	52
3114	412 - 5A	6	38.2	95.1	46	81.0	3.1	2	13.9	7.11	53.6	133	84.8	339	30	14
3115	413 - 2A	6	38.6	96.2	49	80.9	2.1	2	14.7	6.61	46.5	146	70.2	510	28	22
3116	414 - 3A	6	37.9	94.1	54	80.2	2.4	2	15.1	6.93	48.5	150	87.7	409	28	22
3117	415 - 4A	6	37.4	92.3	52	81.2	2.8	2	13.2	6.53	51.6	101	76.6	246	29	17
3118	416 - 1B	6	35.2	69.8	54	75.0	2.0	2	16.7	6.49	40.0	208	54.8	299	21	44
3119	417 - 3B	6	38.1	94.7	52	80.3	2.8	2	15.0	7.03	48.3	167	83.4	380	25	36
3120	418 - 4B	6	38.3	93.4	50	82.0	3.1	2	13.8	7.10	53.5	108	78.0	325	26	32
3121	419 - 2B	6	39.1	95.8	50	80.9	2.3	1	14.8	6.87	47.6	152	69.2	494	29	17
3122	420 - 5B	6	36.9	91.4	52	80.6	2.8	1	14.1	7.01	51.3	130	83.8	411	26	32
3081	MOREX MALT CHECK	6	30.1	68.0	74	79.6	2.1	1	12.3	5.49	45.8	131	76.6	130	42	
3102	MOREX MALT CHECK	6	30.4	67.6	76	79.4	2.0	1	12.4	5.47	44.9	128	72.6	143	38	
3123	MOREX MALT CHECK	6	30.2	66.9	75	79.2	2.0	1	12.5	5.87	49.8	154	77.2	52	31	
Minima			32.5	63.8	41	73.8	1.7		13.1	5.19	32.7	96	48.0	246	13	
Maxima			45.4	98.0	59	82.0	3.3		16.9	7.29	53.6	208	95.0	753	38	
Means			37.6	90.4	50	79.3	2.4		14.7	6.12	43.0	135	75.1	530	27	
Standard Deviations			2.4	8.3	4	2.1	0.4		0.9	0.54	5.0	29	12.0	131	6	
Coefficients of Variation			6.5	9.2	8	2.6	16.8		6.3	8.82	11.6	21	15.9	25	21	

Malt Check Data are Excluded from Rank Sorting and Statistics

Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics

For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by G. Porter, University of Maine - Presque Isle

2001 ADVANCED LINES (GROUP 1) - ST. PAUL, MN

Table 11

Lab No.	Variety or Selection	Rowed	Kernel	on	Barley	Malt	Barley	Wort	Alpha-	Beta-	Overall					
			Weight	6/64"	Color	Extract	Wort	Wort	Protein	S/T	DP	glucan	Quality	Rank		
(mg)	(%)	(Agtron)	(%)	Color	Clarity	Protein	(%)	(%)	(%)	(%)	(°ASBC)	(20°DU)	(ppm)			
95	MOREX	6	30.1	73.5	80	77.3	n.d.	3	14.3	5.11	36.9	141	49.5	242	31	18
96	ROBUST	6	32.8	87.5	71	77.0	1.7	1	14.7	5.40	37.3	128	41.8	450	19	31
97	EXCEL	6	31.3	72.2	79	79.6	n.d.	3	12.6	5.81	49.6	103	62.4	284	25	27
98	STANDER	6	34.5	93.9	71	79.1	n.d.	3	13.9	6.31	48.9	113	69.9	360	22	29
99	MNBRITE	6	31.6	80.6	83	77.6	1.7	1	14.2	6.08	44.3	177	52.7	62	26	25
100	LACEY	6	34.8	92.6	70	78.6	n.d.	3	14.1	5.33	38.7	125	48.7	285	27	24
101	LEGACY (B-2978)	6	31.4	85.8	62	78.8	1.8	1	13.5	6.17	49.1	127	64.6	416	20	30
102	DRUMMOND	6	32.8	86.7	76	78.1	n.d.	3	13.4	5.24	41.7	148	52.3	281	48	1
103	M109(96-80)	6	34.2	84.6	76	79.4	n.d.	3	12.8	5.23	43.5	126	52.3	258	44	2
104	M110(M96-191)	6	34.8	89.4	64	79.3	n.d.	3	12.7	5.28	43.9	127	51.6	421	41	5
105	ND16922	6	33.0	92.1	78	77.5	2.0	2	13.3	5.40	41.7	133	63.4	424	28	20
106	6B95-2482	6	32.3	91.3	85	78.4	n.d.	3	13.2	4.91	38.9	152	52.3	244	43	4
107	6B95-2089	6	34.8	92.9	74	78.6	n.d.	3	13.2	4.93	37.8	118	45.5	332	33	14
108	6B96-3733	6	36.6	96.0	76	79.2	2.1	2	13.6	5.98	46.4	124	60.4	443	26	25
109	6B97-2037	6	34.2	94.2	74	79.0	1.7	2	13.5	5.37	42.5	107	52.4	293	41	5
111	6B97-2195	6	35.5	90.1	71	77.3	1.3	1	13.4	4.71	36.3	129	40.7	275	31	18
112	6B97-2245	6	35.2	90.3	69	77.0	1.5	1	14.2	4.93	34.9	145	47.7	280	36	11
113	M96-48	6	35.0	93.5	71	78.9	2.0	2	13.2	5.68	45.0	116	54.1	166	41	5
114	M96-56	6	34.7	89.0	71	79.1	n.d.	3	13.2	5.58	44.6	135	53.9	283	44	2
115	M96-64	6	35.4	91.0	72	78.8	n.d.	3	13.1	5.34	42.0	114	53.7	207	37	9
116	M96-67	6	36.2	94.2	69	78.8	n.d.	3	13.9	5.49	42.2	115	52.6	215	37	9
117	M96-100	6	35.3	94.0	69	78.1	n.d.	3	13.8	5.50	42.1	109	50.5	479	34	12
118	M96-185	6	33.0	86.7	72	79.5	n.d.	3	13.2	5.21	42.5	126	52.3	379	41	5
119	FEG2-94	6	31.7	78.3	88	78.2	n.d.	3	13.6	5.80	43.7	114	45.5	401	33	14
120	FEG16-30	6	34.5	83.0	73	79.7	1.8	1	13.4	6.22	47.9	113	58.3	317	28	20
121	M97-30	6	35.0	95.1	75	78.7	n.d.	3	13.3	5.73	45.3	117	49.5	450	34	12
122	M97-53	6	34.3	92.1	76	78.8	1.7	2	13.5	5.94	46.8	121	53.0	269	33	14
123	M97-54	6	35.4	92.8	63	79.5	2.0	1	13.2	6.31	49.3	85	57.6	564	28	20
124	M97-68	6	35.2	93.3	64	80.3	2.3	2	13.2	6.25	50.3	93	54.0	555	33	14
125	M97-103	6	34.8	93.4	65	79.4	2.0	1	14.0	6.39	48.9	118	59.3	335	23	28
126	M97-107	6	34.9	93.3	66	79.5	1.9	1	13.7	6.36	48.4	95	56.3	384	28	20

Table 11

Lab No.	Variety or Selection	Rowed	Kernel	on	Barley	Malt	Barley	Wort	Alpha-	Beta-	Quality				
			Weight	6/64"	Color	Extract	Wort	Wort	Protein	S/T	DP	amylase	glucan		
		(mg)	(%)	(Agtron)	(%)	Color	Clarity	(%)	(%)	(%)	(°ASBC)	(20°DU)	(ppm)	Score	
110	MOREX MALT CHECK	6	30.9	94.1	75	79.3	1.6	1	12.3	5.48	47.6	125	66.8	133	38
Minima			30.1	72.2	62	77.0	1.3		12.6	4.71	34.9	85	40.7	62	19
Maxima			36.6	96.0	88	80.3	2.3		14.7	6.39	50.3	177	69.9	564	48
Means			34.0	89.1	73	78.7	1.8		13.5	5.61	43.6	122	53.5	334	33
Standard Deviations			1.6	6.1	6	0.8	0.2		0.5	0.49	4.4	18	6.4	111	8
Coefficients of Variation			4.7	6.9	9	1.1	13.6		3.6	8.70	10.0	15	12.0	33	23

Malt Check Data are Excluded from Rank Sorting and Statistics

Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics

For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by K. Smith, University of Minnesota - St. Paul

2001 ADVANCED LINES (GROUP 2) - ST. PAUL, MN

Table 12

Lab No.	Variety or Selection	Rowed	Kernel Weight (mg)	on 6/64"	Barley Color (Agron)	Malt Extract (%)	Wort Color	Wort Clarity	Barley Protein (%)	Wort Protein (%)	S/T	DP (°ASBC)	Alpha-amylase (20°DU)	Beta-glucan (ppm)	Quality Score	Overall Rank
127	ROBUST	6	31.9	79.0	77	78.0	1.6	2	13.8	5.68	41.5	138	46.1	277	37	9
128	STANDER	6	31.8	83.7	76	79.3	2.0	1	13.0	6.42	52.3	117	76.7	185	26	26
129	LACEY	6	33.6	85.5	78	79.3	1.7	2	12.4	5.25	44.9	124	53.0	149	54	1
130	MNBRITE	6	31.8	75.8	82	78.4	1.8	1	13.8	6.24	47.7	164	55.4	65	29	21
131	M109(M96-80)	6	32.6	75.0	76	79.8	1.6	1	12.7	5.57	47.4	136	56.9	188	36	14
133	M110(M96-191)	6	32.1	79.2	74	79.1	2.0	2	12.0	5.19	46.0	123	54.3	315	47	2
134	M96-149	6	33.9	86.2	81	79.8	1.8	1	12.4	6.06	51.3	113	67.4	114	36	14
135	FEG16-54	6	34.1	68.2	86	80.1	1.8	1	12.5	6.26	52.9	131	66.5	268	29	21
136	M96-105	6	33.4	80.8	83	79.3	1.8	1	12.9	5.89	47.0	116	57.9	188	34	17
137	M96-177	6	30.9	69.8	76	78.0	n.d.	3	12.6	5.02	42.9	124	48.8	322	28	23
138	M96-186	6	33.1	73.9	77	79.7	n.d.	3	12.1	5.62	48.2	120	57.8	314	32	18
139	M97-16	6	32.3	84.5	80	78.6	n.d.	3	13.4	5.49	42.5	156	52.6	212	44	3
140	M97-17	6	30.9	73.8	80	77.8	n.d.	3	12.9	5.20	42.3	142	55.8	247	38	6
141	M97-22	6	33.4	87.2	80	78.4	n.d.	3	12.9	5.51	42.9	120	52.8	260	37	9
142	M97-28	6	32.6	81.8	78	78.6	n.d.	3	12.8	5.37	42.2	126	51.7	187	37	9
143	M97-31	6	34.6	87.5	78	78.0	2.0	2	13.3	5.54	44.6	119	52.0	264	38	6
144	M97-38	6	33.5	84.1	79	79.1	n.d.	3	12.8	5.39	44.2	121	51.6	312	37	9
145	M97-51	6	33.3	88.1	76	80.0	2.0	1	13.0	6.23	48.3	94	57.2	311	31	19
146	M97-57	6	35.0	87.6	74	78.2	n.d.	3	13.0	5.17	41.0	116	54.6	191	41	4
147	M97-63	6	33.1	86.1	80	80.0	1.8	1	12.4	5.97	51.4	99	58.9	397	36	14
148	M97-67	6	33.8	84.0	80	80.0	2.0	1	13.2	6.03	47.5	119	59.4	166	31	19
149	M97-77	6	32.7	83.0	75	79.0	1.8	1	13.0	5.84	45.6	110	58.6	177	39	5
150	M97-95	6	34.4	88.9	77	79.6	2.0	1	13.2	6.15	48.3	108	63.7	209	27	24
151	M97-106	6	34.3	87.2	77	79.3	1.9	1	13.1	6.09	49.5	115	65.1	269	27	24
152	M97-118	6	31.0	66.8	75	78.4	n.d.	3	12.1	4.91	41.9	127	54.3	309	37	9
153	M97-125	6	30.8	55.5	76	79.6	1.6	1	*10.9	4.32	40.3	91	51.6	214	38	6
132	MOREX MALT CHECK	6	30.9	70.7	78	80.1	2.0	1	12.2	6.01	52.1	115	71.1	82	36	
154	MOREX MALT CHECK	6	30.4	70.2	78	79.7	2.1	1	12.4	5.90	51.4	113	72.3	106	36	

Minima 30.8 55.5 74 77.8 1.6 12.0 4.32 40.3 91 46.1 65 26

Maxima 35.0 88.9 86 80.1 2.0 13.8 6.42 52.9 164 76.7 397 54

Means 32.9 80.1 78 79.0 1.8 12.9 5.63 45.9 122 56.9 235 36

Standard Deviations 1.2 8.2 3 0.7 0.2 0.5 0.50 3.7 16 6.6 75 6

Coefficients of Variation 3.7 10.2 4 0.9 8.9 3.7 8.93 8.0 13 11.6 32 18

Malt Check Data are Excluded from Rank Sorting and Statistics

Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics

For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by K. Smith, University of Minnesota - St. Paul

2001 ADVANCED LINES (GROUP 3) - CROOKSTON, MN

Table 13

Lab No.	Variety or Selection	Rowed	Kernel	on	Barley	Malt	Barley	Wort	Alpha-	Beta-	Overall					
			Weight	6/64"	Color	Extract	Wort Color	Wort Clarity	Protein (%)	Protein (%)		amylase (20°DU)	glucan (ppm)	Quality Score	Rank	
155	MOREX	6	31.1	*59.7	40	76.5	1.7	1	14.9	5.36	36.9	151	64.5	182	19	31
156	ROBUST	6	34.2	84.9	35	77.3	1.4	1	14.6	4.96	35.1	128	43.5	365	23	28
157	EXCEL	6	32.5	82.6	40	79.0	2.4	1	14.2	6.54	48.5	136	73.6	237	26	27
158	STANDER	6	32.9	89.2	38	79.8	2.4	1	13.7	6.69	51.2	150	83.2	200	34	21
159	MNBRITE	6	34.0	90.8	40	78.2	*3.4	1	14.9	7.18	48.7	167	76.8	64	23	28
160	LACEY	6	34.9	91.0	38	78.9	1.8	2	13.5	5.16	38.5	134	57.2	115	45	6
161	LEGACY (B-2978)	6	32.8	88.0	40	78.4	2.1	1	14.0	6.24	46.4	146	76.2	196	31	24
162	DRUMMOND	6	34.0	88.4	43	78.7	1.5	1	13.7	5.32	41.7	149	64.0	136	43	9
163	M109(M96-80)	6	36.3	86.8	41	79.5	1.6	1	12.9	5.45	45.4	141	65.0	125	46	5
164	M110(M96-191)	6	35.8	90.8	37	79.0	2.1	2	13.2	5.25	42.3	141	55.3	189	49	1
165	ND16922	6	33.2	93.3	46	78.8	1.7	1	12.3	5.39	44.4	136	68.1	188	41	11
166	6B95-2482	6	33.7	89.7	46	77.9	1.9	2	13.5	4.68	37.1	166	54.1	175	37	17
167	6B95-2089	6	35.1	93.0	40	78.6	1.9	2	12.7	4.85	39.4	127	51.9	157	37	17
168	6B96-3733	6	38.2	98.5	42	80.1	2.2	1	12.8	5.87	48.6	146	69.2	282	40	13
169	6B97-2037	6	36.0	95.5	36	78.4	1.7	1	14.4	5.24	37.1	127	54.5	297	33	22
170	6B97-2195	6	37.9	94.6	39	78.7	2.0	1	13.0	4.98	40.4	128	44.8	156	40	13
171	6B97-2245	6	34.8	83.6	40	77.5	1.4	1	13.3	4.68	35.4	132	52.1	76	38	16
172	M96-48	6	34.6	91.0	39	78.2	1.7	1	14.0	5.12	37.5	134	53.8	103	41	11
173	M96-56	6	36.1	81.8	39	78.1	1.6	1	12.9	5.42	42.4	131	58.2	127	44	7
174	M96-64	6	35.5	89.1	39	78.9	1.8	1	13.5	5.36	42.6	163	59.4	111	47	2
175	M96-67	6	34.3	88.8	37	78.6	1.6	1	13.4	5.50	43.0	143	60.0	92	43	9
177	M96-100	6	36.5	94.9	32	77.9	1.7	2	12.7	4.68	38.2	124	51.8	196	33	22
178	M96-185	6	33.3	82.9	41	79.5	1.6	1	12.7	4.89	41.1	134	59.1	152	47	2
179	FEG2-94	6	33.7	*71.4	38	77.2	1.6	1	14.9	5.53	38.7	161	50.4	208	27	26
180	FEG16-30	6	32.8	*68.5	38	78.4	2.0	1	14.3	6.14	42.9	135	68.6	273	23	28
181	M97-30	6	34.0	87.3	41	78.1	1.6	1	13.3	5.18	40.5	139	54.5	218	47	2
182	M97-53	6	33.2	86.1	40	77.4	1.6	1	13.3	5.12	40.5	132	57.1	129	44	7
183	M97-54	6	33.7	88.2	37	79.7	2.1	1	12.8	5.85	45.9	108	70.5	216	35	19
184	M97-68	6	32.4	84.7	37	79.8	1.9	1	12.8	5.66	45.6	123	67.1	215	35	19
185	M97-103	6	32.3	88.8	41	78.9	1.7	1	12.8	5.46	44.9	130	67.0	209	39	15
186	M97-107	6	33.2	87.5	38	79.0	2.0	1	13.0	5.83	48.6	128	69.7	154	30	25

Table 13

Lab No.	Variety or Selection	Rowed	Kernel	on	Barley	Malt	Barley	Wort	Alpha-	Beta-					
			Weight	6/64"	Color	Extract	Wort	Wort	Protein	Protein	S/T	DP	amylase	glucan	Quality
			(mg)	(%)	(Agtron)	(%)	Color	Clarity	(%)	(%)	(°ASBC)	(20°DU)	(ppm)	Score	
176	MOREX MALT CHECK	6	30.4	72.9	74	80.0	1.9	1	12.3	5.90	51.7	116	76.4	40	32
Minima			31.1	81.8	32	76.5	1.4		12.3	4.68	35.1	108	43.5	64	19
Maxima			38.2	98.5	46	80.1	2.4		14.9	7.18	51.2	167	83.2	365	49
Means			34.3	89.0	39	78.6	1.8		13.5	5.47	42.2	138	61.3	179	37
Standard Deviations			1.6	4.1	3	0.8	0.3		0.7	0.60	4.4	13	9.6	68	8
Coefficients of Variation			4.8	4.7	7	1.1	14.9		5.5	10.94	10.3	10	15.7	38	23

Malt Check Data are Excluded from Rank Sorting and Statistics

Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics

For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by K. Smith, University of Minnesota - St. Paul

2001 ADVANCED LINES (GROUP 4) - CROOKSTON, MN

Table 14

Lab No.	Variety or Selection	Rowed	Kernel	on	Barley	Malt	Barley	Wort	Alpha-	Beta-	Quality	Overall				
			Weight	6/64"	Color	Extract	Wort	Wort	Protein	Protein						
187	ROBUST	6	34.1	90.0	41	79.3	1.4	1	13.2	5.14	39.5	110	51.3	184	41	11
188	STANDER	6	34.2	92.9	40	79.5	2.2	1	12.6	5.86	46.8	125	74.8	125	34	23
189	LACEY	6	35.8	92.7	39	79.5	1.6	1	12.9	5.29	42.5	125	56.7	108	47	2
190	MNBRITE	6	34.5	94.8	44	78.5	*3.07	1	14.4	*7.02	51.3	152	74.0	63	26	26
191	M109 (M96-80)	6	34.4	90.1	41	80.1	1.7	1	12.5	4.97	42.0	124	59.7	120	50	1
192	M110 (M96-191)	6	35.1	93.1	39	79.6	1.9	2	12.5	5.01	42.6	126	55.4	219	42	9
193	M96-149	6	35.2	95.4	45	79.8	2.0	1	12.1	5.33	46.7	110	81.0	99	39	14
194	FEG16-54	6	35.0	86.9	42	79.8	1.8	1	11.9	5.46	46.0	134	69.3	235	39	14
195	M96-105	6	35.7	94.2	38	79.6	2.0	1	12.1	5.41	44.9	121	71.1	141	44	5
196	M96-177	6	34.0	88.6	36	78.7	n.d.	3	11.9	4.42	38.3	114	50.9	129	38	16
197	M96-186	6	34.2	89.7	41	80.4	2.0	1	11.6	5.14	47.7	101	60.9	168	42	9
198	M97-16	6	35.9	95.7	44	78.4	1.7	2	14.3	5.14	37.9	157	51.4	105	43	7
200	M97-17	6	33.0	91.2	43	78.1	1.7	2	13.0	4.58	36.8	137	54.1	85	38	16
201	M97-22	6	35.2	95.5	45	79.3	1.8	2	11.8	5.04	43.4	92	55.1	190	47	2
202	M97-28	6	35.9	94.4	44	78.7	1.9	2	12.5	4.82	38.5	107	51.8	149	41	11
203	M97-31	6	37.6	97.1	47	78.8	1.8	2	12.1	4.75	40.3	112	52.5	165	47	2
204	M97-38	6	34.8	93.3	44	78.9	1.6	2	12.8	4.72	37.1	120	54.5	218	40	13
205	M97-51	6	35.2	94.8	45	79.6	1.8	1	11.9	5.23	45.9	100	62.3	168	44	5
206	M97-57	6	36.4	96.6	42	80.0	1.6	1	12.7	5.52	47.0	104	67.6	190	33	25
207	M97-63	6	34.0	91.2	44	80.1	1.6	1	12.7	5.48	44.4	125	71.5	203	38	16
208	M97-67	6	36.2	94.6	46	79.7	1.7	1	12.3	5.65	46.4	123	67.9	172	35	21
209	M97-77	6	34.0	90.5	40	79.2	1.7	1	12.7	5.63	47.6	99	68.5	134	34	23
210	M97-95	6	35.8	96.2	43	79.9	2.3	1	12.8	5.68	45.8	103	66.0	152	35	21
211	M97-106	6	32.9	87.5	40	78.4	1.9	1	13.2	5.44	42.2	135	69.5	159	36	20
212	M97-118	6	33.7	87.3	37	78.5	n.d.	3	13.0	4.75	38.4	146	53.1	196	43	7
213	M97-125	6	31.7	*77.4	39	79.1	1.7	1	10.6	*3.59	35.2	82	52.7	175	38	16
199	MOREX MALT CHECK	6	30.8	70.9	77	79.2	1.7	1	12.6	5.67	48.2	125	74.8	50	27	
Minima			31.7	86.9	36	78.1	1.4		10.6	4.42	35.2	82	50.9	63	26	
Maxima			37.6	97.1	47	80.4	2.3		14.4	5.86	51.3	157	81.0	235	50	
Means			34.8	92.6	42	79.3	1.8		12.6	5.19	42.9	119	61.7	156	40	
Standard Deviations			1.3	3.1	3	0.6	0.2		0.8	0.38	4.2	18	9.0	44	5	
Coefficients of Variation			3.6	3.3	7	0.8	11.1		6.2	7.33	9.8	15	14.6	28	13	

Malt Check Data are Excluded from Rank Sorting and Statistics

Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics

For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by K. Smith, University of Minnesota - St. Paul

2001 ADVANCED LINES (GROUP 5) - MORRIS, MN

Table 15

Lab No.	Variety or Selection	Rowed	Kernel	on	Barley	Malt	Barley	Wort	Alpha-	Beta-	Quality	Overall				
			Weight	6/64"	Color	Extract	Wort	Wort	Protein	Protein						
214	MOREX	6	32.2	79.1	45	77.2	1.8	1	15.3	5.48	37.1	165	60.7	173	22	30
215	ROBUST	6	32.9	81.0	45	77.2	1.7	1	14.7	5.82	40.0	177	51.1	227	30	21
216	EXCEL	6	32.0	*70.7	44	78.8	2.6	1	13.9	6.53	49.5	126	71.8	225	22	30
217	STANDER	6	33.8	88.1	44	79.5	2.5	1	13.3	6.38	49.8	123	77.0	191	27	26
218	MNBRITE	6	33.0	81.8	51	76.5	2.5	1	16.1	6.87	43.4	201	71.9	93	24	29
219	LACEY	6	33.8	83.4	45	77.9	1.7	1	14.1	5.16	37.9	153	56.9	139	37	12
220	LEGACY (B-2978)	6	33.1	83.9	42	77.0	2.0	1	13.8	5.66	41.4	148	63.5	279	35	16
221	DRUMMOND	6	33.4	86.4	53	78.9	1.8	1	14.4	5.46	39.1	166	59.4	142	37	12
222	M109 (M96-80)	6	34.3	81.0	45	80.2	1.9	1	13.3	5.36	41.8	154	57.5	172	49	2
224	M110 (M96-191)	6	34.6	89.5	44	79.9	n.d.	3	13.4	5.31	42.6	145	55.1	268	44	5
225	ND16922	6	31.8	87.0	49	78.7	1.9	1	14.0	5.79	42.3	161	69.1	252	30	21
226	6B95-2482	6	33.1	87.2	49	78.4	2.0	2	14.7	5.08	35.3	191	58.1	169	29	25
227	6B95-2089	6	34.6	87.6	45	79.3	2.0	2	14.6	5.18	36.7	165	53.8	178	39	10
228	6B96-3733	6	34.9	90.7	46	79.0	2.0	1	13.9	5.66	43.3	161	64.7	264	39	10
229	6B97-2037	6	36.2	92.6	45	78.3	1.7	1	16.4	5.64	36.1	152	55.0	255	33	17
230	6B97-2195	6	36.0	84.9	40	76.6	1.6	1	14.3	4.64	32.5	126	44.1	182	26	27
231	6B97-2245	6	33.4	79.8	45	76.8	1.7	1	14.0	5.03	37.0	143	52.0	121	45	4
232	M96-48	6	32.6	81.2	48	78.9	1.7	1	14.5	5.55	39.3	146	57.6	150	33	17
233	M96-56	6	35.3	82.4	48	79.5	n.d.	3	13.4	5.19	40.6	157	57.0	196	48	3
234	M96-64	6	34.5	86.9	48	78.9	2.4	1	13.8	5.63	41.5	132	61.0	147	43	6
235	M96-67	6	34.6	88.0	49	79.0	1.9	1	13.4	5.29	40.1	146	57.6	131	54	1
236	M96-100	6	35.1	89.8	46	79.2	1.8	1	13.9	5.32	38.4	138	54.1	289	41	9
237	M96-185	6	32.8	79.5	47	78.8	2.2	2	13.8	5.39	40.0	148	55.9	265	37	12
238	FEG2-94	6	32.7	79.1	52	77.8	1.6	1	16.6	5.80	36.4	187	50.8	190	25	28
239	FEG16-30	6	34.9	85.9	48	79.6	2.2	1	14.5	6.38	45.2	137	69.0	251	31	20
240	M97-30	6	33.9	85.8	45	78.6	1.7	1	13.8	5.40	40.4	145	57.2	200	43	6
241	M97-53	6	33.8	85.7	48	78.7	1.7	1	13.5	5.38	40.9	141	58.3	221	43	6
242	M97-54	6	35.1	88.5	47	80.7	2.2	1	13.7	6.18	47.7	112	71.7	287	30	21
243	M97-68	6	34.0	87.4	48	80.9	2.0	1	13.7	5.88	46.1	122	67.8	300	33	17
244	M97-103	6	33.6	85.8	49	78.3	2.0	1	13.2	6.05	45.8	133	70.6	307	30	21
245	M97-107	6	33.1	85.8	48	79.5	2.0	1	13.9	6.15	44.2	131	69.0	264	36	15

Table 15

Lab No.	Variety or Selection	Rowed	Kernel	on	Barley	Malt	Barley	Wort	Alpha-	Beta-	
			Weight 6/64"	Color (Agron)	Extract (%)	Wort Color	Wort Clarity	Protein (%)	Protein (%)	S/T (°ASBC)	DP (20°DU)
223	MOREX MALT CHECK	6	31.2	70.7	77	80.4	2.0	1	12.6	5.71	46.6
									112	77.0	50
									44.1	93	30
Minima			31.8	79.1	40	76.5	1.6	13.2	4.64	32.5	22
Maxima			36.2	92.6	53	80.9	2.6	16.6	6.87	49.8	307
Means			33.8	85.2	47	78.7	2.0	14.2	5.63	41.0	54
Standard Deviations			1.1	3.7	3	1.1	0.3	0.9	0.49	4.1	211
Coefficients of Variation			3.3	4.3	6	1.4	14.0	6.2	8.73	10.1	35
									7.8	59	8
									14	12.8	28
										23	

Malt Check Data are Excluded from Rank Sorting and Statistics

Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics

For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by K. Smith, University of Minnesota - St. Paul

2001 ADVANCED LINES (GROUP 6) - MORRIS, MN

Table 16

Lab No.	Variety or Selection	Rowed	Kernel	on	Barley	Malt	Barley	Wort	Alpha-	Beta-	Overall					
			Weight (mg)	6/64"	Color (Agron)	Extract (%)	Wort Color	Wort Clarity	Protein (%)	Protein (%)	S/T (%)	DP (°ASBC)	amylase (20°DU)	glucan (ppm)	Score	Rank
246	ROBUST	6	32.9	79.0	49	78.4	1.7	1	15.0	5.99	40.0	163	50.1	244	38	13
248	STANDER	6	33.9	91.8	45	80.4	2.7	1	13.7	6.86	52.6	136	81.0	116	38	13
249	LACEY	6	33.4	82.9	48	79.7	1.9	1	14.1	5.83	42.3	153	55.6	206	41	11
250	MNBRITE	6	32.2	80.7	52	78.9	2.4	1	15.5	7.20	47.8	200	72.1	125	26	26
251	M109 (M96-80)	6	34.9	86.8	42	80.2	1.8	1	13.2	5.43	42.4	158	56.3	169	49	2
252	M110 (M96-191)	6	33.5	86.6	47	80.1	2.4	2	12.9	5.37	43.1	143	52.7	273	51	1
253	M96-149	6	34.3	85.8	48	79.8	2.3	1	13.7	6.38	47.8	130	78.2	164	31	21
254	FEG16-54	6	35.6	84.5	46	79.9	2.2	1	13.7	6.31	46.1	152	68.8	256	34	17
255	M96-105	6	33.6	79.5	50	79.3	2.2	1	13.1	6.06	48.2	132	68.6	203	31	21
256	M96-177	6	34.3	86.1	46	79.6	2.0	2	13.7	5.20	39.3	136	50.9	282	44	5
257	M96-186	6	34.4	84.3	46	80.8	2.3	2	13.8	5.68	42.6	146	60.5	199	44	5
258	M97-16	6	34.6	91.1	50	79.1	1.6	1	15.2	5.85	39.1	197	54.2	188	32	20
259	M97-17	6	32.7	79.2	45	78.8	1.8	1	14.5	5.57	39.1	179	58.7	146	30	23
260	M97-22	6	34.6	87.1	46	78.9	1.8	2	13.9	5.24	38.3	150	56.1	208	44	5
261	M97-28	6	34.1	87.5	51	79.2	1.8	2	13.9	5.62	41.6	147	56.0	229	45	4
262	M97-31	6	35.3	87.9	54	78.0	2.0	2	13.8	5.57	41.2	149	56.4	266	42	10
263	M97-38	6	33.3	83.2	53	78.9	1.9	2	14.2	5.50	40.4	145	55.8	384	37	15
264	M97-51	6	36.2	92.3	46	78.5	1.9	2	13.5	5.30	40.7	137	57.1	266	43	8
265	M97-57	6	36.0	89.4	50	80.6	2.5	1	13.6	6.56	49.4	120	69.7	305	27	25
266	M97-63	6	33.2	85.5	47	80.3	2.2	1	13.3	6.22	48.9	132	74.1	280	34	17
267	M97-67	6	34.8	87.3	47	80.4	2.2	1	14.2	6.34	46.2	136	71.5	209	29	24
268	M97-77	6	34.4	88.4	46	79.2	2.0	1	13.7	6.06	45.1	137	74.2	187	36	16
269	M97-95	6	35.4	91.5	48	79.4	2.0	1	13.6	5.99	44.3	134	72.0	195	39	12
270	M97-106	6	33.1	84.1	52	80.6	2.4	1	13.2	6.67	52.5	134	77.1	236	34	17
272	M97-118	6	33.9	80.3	47	79.5	2.4	2	13.0	5.16	42.3	139	52.4	230	49	2
273	M97-125	6	*28.3	*50.0	44	79.7	2.7	2	11.5	4.73	42.6	92	58.3	104	43	8
247	MOREX MALT CHECK	6	30.9	72.1	76	81.5	2.1	1	12.6	5.99	50.8	116	77.0	63	30	
271	MOREX MALT CHECK	6	32.3	74.6	77	81.3	2.1	1	12.1	6.13	51.2	121	82.1	57	33	
Minima			32.2	79.0	42	78.0	1.6		11.5	4.73	38.3	92	50.1	104	26	
Maxima			36.2	92.3	54	80.8	2.7		15.5	7.20	52.6	200	81.0	384	51	
Means			34.2	85.7	48	79.6	2.1		13.7	5.87	44.0	145	63.0	218	38	
Standard Deviations			1.0	4.0	3	0.7	0.3		0.8	0.59	4.1	22	9.7	63	7	
Coefficients of Variation			3.0	4.6	6	0.9	14.5		5.7	9.99	9.4	15	15.3	29	18	

Malt Check Data are Excluded from Rank Sorting and Statistics

Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics

For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by K. Smith, University of Minnesota - St. Paul

2001 FHB EXPERIMENTAL LINES (GROUP 7) - ST. PAUL, MN

Table 17

Lab No.	Variety or Selection	Rowed	Kernel	on	Barley	Malt	Barley	Wort	Alpha-	Beta-	Overall					
			Weight	6/64"	Color	Extract	Wort Color	Wort Clarity	Protein (%)	Protein (%)		glucan (ppm)	Quality Score	Rank		
274	ROBUST	6	32.2	79.5	83	78.3	1.8	1	13.0	5.41	43.7	105	51.7	369	36	11
275	STANDER	6	34.0	91.2	83	80.0	n.d.	3	11.9	6.57	55.9	84	78.8	213	30	26
276	LACEY	6	34.5	89.7	81	79.6	2.9	2	12.2	5.25	44.5	105	58.3	114	51	1
277	FEG10-16	6	34.0	87.5	86	80.0	2.5	1	11.4	5.81	52.7	84	68.6	288	35	13
278	FEG18-27	6	33.3	90.6	81	78.9	2.2	1	11.8	6.14	53.9	102	68.7	135	33	17
279	FEG26-62	6	36.0	97.1	77	80.3	2.2	1	12.6	6.24	53.6	98	69.4	154	30	26
280	FEG27-38	6	33.2	82.2	76	77.0	1.7	1	13.1	5.41	42.2	128	56.1	265	32	19
281	FEG27-56	6	33.8	87.7	84	78.9	1.7	1	12.8	5.06	40.4	109	55.0	351	37	10
282	FEG31-68	6	29.3	62.6	85	*74.9	1.3	1	*15.4	5.44	36.0	150	50.3	309	21	30
283	FEG33-89	6	31.8	88.1	89	78.7	1.6	1	12.6	5.46	46.0	138	70.8	38	32	19
284	FEG37-20	6	31.1	80.7	74	79.0	2.0	1	13.2	5.76	45.3	97	57.3	192	38	9
285	FEG39-05	6	30.2	92.0	76	*75.3	1.9	1	13.8	5.81	42.7	98	57.5	51	31	24
286	FEG39-66	6	35.2	90.0	77	78.5	2.2	1	14.0	5.60	41.3	112	60.8	223	27	28
287	M98-17	6	34.5	82.9	83	78.7	1.9	1	13.6	6.39	47.8	137	72.5	141	32	19
288	ROBUST	6	34.1	85.3	81	79.3	1.7	1	12.5	5.41	44.5	107	55.4	268	44	5
289	STANDER	6	34.5	93.6	82	79.4	2.3	1	11.6	6.07	53.0	73	79.3	284	32	19
290	LACEY	6	35.1	90.2	80	79.5	1.9	1	12.5	5.27	43.7	104	61.7	204	44	5
291	FEG17-51	6	33.1	87.0	83	78.5	1.9	1	13.3	6.06	46.2	130	74.9	135	32	19
292	FEG20-19	6	35.9	90.3	80	78.1	1.9	1	12.0	5.21	46.9	91	60.3	262	36	11
293	FEG25-09	6	31.8	70.0	82	78.1	2.0	1	12.8	6.26	49.9	120	83.1	31	18	31
294	FEG26-93	6	34.2	88.4	77	79.9	1.9	2	11.6	5.15	45.8	96	63.4	191	43	7
296	FEG32-107	6	35.9	88.7	75	79.9	2.4	2	11.7	6.07	54.8	83	69.8	248	31	24
297	FEG38-12	6	31.2	74.6	83	79.2	1.6	2	11.7	4.63	41.6	74	56.8	125	48	3
298	ROBUST	6	33.7	82.8	83	79.7	1.8	2	11.7	5.35	46.7	87	53.7	211	41	8
299	STANDER	6	34.6	93.3	75	79.3	2.6	2	12.9	6.27	52.3	73	73.5	251	26	29
300	LACEY	6	34.3	87.5	84	80.0	2.1	2	11.3	5.02	45.2	96	63.5	90	50	2
301	FEG18-20	6	31.0	79.2	86	80.0	2.3	1	12.5	6.57	55.3	99	79.8	197	34	15
302	FEG26-50	6	37.0	92.9	73	80.0	2.3	1	12.5	6.02	50.4	73	55.3	376	33	17
303	FEG29-47	6	32.9	60.7	*98	79.8	1.9	2	12.3	4.93	42.6	89	48.1	69	45	4
304	M98-16	6	35.8	91.5	84	79.6	2.1	1	12.6	5.90	50.3	74	60.0	108	34	15
305	M98-19	6	36.7	91.0	84	79.5	2.2	1	11.9	5.74	50.3	86	64.8	255	35	13

Table 17

Lab No.	Variety or Selection	Rowed	Kernel	on	Barley	Malt	Barley	Wort	Alpha-	Beta-					
			Weight (mg)	6/64"	Color (Agtron)	Extract (%)	Wort Color	Wort Clarity	Protein (%)	Protein (%)	S/T (°ASBC)	DP (20°DU)	amylase (ppm)	glucan Quality	
295	MOREX MALT CHECK	6	30.9	71.4	78	80.3	2.1	1	11.8	5.86	50.2	114	81.3	65	35
Minima			29.3	60.7	73	77.0	1.3		11.3	4.63	36.0	73	48.1	31	18
Maxima			37.0	97.1	89	80.3	2.9		14.0	6.57	55.9	150	83.1	376	51
Means			33.7	85.4	81	79.2	2.0		12.4	5.69	47.3	100	63.9	198	35
Standard Deviations			1.9	8.6	4	0.8	0.3		0.7	0.51	5.1	21	9.5	95	8
Coefficients of Variation			5.7	10.1	5	1.0	16.2		5.8	8.93	10.7	21	14.9	48	22

Malt Check Data are Excluded from Rank Sorting and Statistics

Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics

For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by K. Smith, University of Minnesota - St. Paul

2001 FHB EXPERIMENTAL LINES (GROUP 8) - CROOKSTON, MN

Table 18

Lab No.	Variety or Selection	Rowed	Kernel	on	Barley	Malt	Barley	Wort	S/T	DP	Alpha-	Beta-	Quality	Overall		
			Weight	6/64"	Color	Extract		Wort			amylase	glucan				
306	ROBUST	6	33.7	91.4	41	78.7	1.6	1	12.5	5.08	41.0	117	44.0	198	40	13
307	STANDER	6	34.4	96.7	45	80.4	2.6	1	12.0	6.05	54.1	106	71.4	180	35	21
308	LACEY	6	34.7	93.8	47	80.2	1.9	2	11.6	4.84	43.7	94	52.6	101	57	2
309	FEG10-16	6	35.2	91.2	47	79.7	2.2	1	12.6	5.93	50.0	96	64.3	196	30	26
310	FEG18-27	6	33.8	75.6	43	79.8	2.1	1	12.6	5.83	50.2	139	67.0	124	36	19
311	FEG26-62	6	35.6	95.0	42	80.3	2.3	1	12.8	5.80	47.6	117	65.2	119	37	18
312	FEG27-38	6	33.6	87.0	42	77.5	1.8	2	13.3	4.60	37.2	119	46.8	216	26	30
313	FEG27-56	6	34.1	89.9	44	78.3	1.7	2	12.5	4.78	38.6	124	51.6	133	41	10
314	FEG31-68	6	30.1	71.5	*52	76.8	1.4	1	14.0	4.87	36.4	125	44.8	116	32	24
315	FEG33-89	6	32.8	86.2	44	78.4	1.7	2	13.5	4.97	38.9	122	52.5	136	41	10
316	FEG37-20	6	30.8	76.3	39	78.2	1.8	2	12.6	4.52	36.8	104	47.0	172	27	27
317	FEG39-05	6	31.0	87.3	40	*75.1	1.8	2	14.4	4.70	34.4	116	46.8	203	27	27
318	FEG39-66	6	34.8	85.7	40	79.1	1.7	1	12.4	4.77	40.2	103	51.9	86	55	3
320	M98-17	6	32.5	83.2	40	78.0	2.3	1	14.4	6.24	45.0	145	72.1	74	27	27
321	ROBUST	6	33.6	93.2	41	79.3	1.6	1	11.6	4.55	42.5	88	43.2	155	41	10
322	STANDER	6	34.6	96.6	41	80.8	2.1	1	11.4	5.58	51.5	102	72.7	144	42	8
323	LACEY	6	34.3	91.8	42	80.1	1.7	1	11.1	4.69	44.3	92	50.5	91	58	1
324	FEG17-51	6	31.9	91.1	46	78.6	2.3	1	13.3	6.01	47.8	131	67.1	84	31	25
325	FEG20-19	6	33.8	85.1	44	78.2	2.0	1	11.9	5.08	46.5	97	53.7	124	47	6
326	FEG25-09	6	31.8	85.6	42	79.0	1.8	1	11.6	5.45	48.3	104	69.8	44	34	23
327	FEG26-93	6	35.2	92.2	40	79.9	1.8	1	11.2	4.80	43.2	107	52.7	201	51	5
328	FEG32-107	6	35.9	96.4	41	80.1	2.0	1	10.8	5.22	51.5	101	65.0	118	46	7
329	FEG38-12	6	33.0	85.8	38	79.3	1.5	1	11.4	4.21	38.1	72	46.7	159	39	15
330	ROBUST	6	33.3	89.1	40	78.7	1.6	1	12.0	4.63	39.7	109	44.3	165	40	13
331	STANDER	6	33.8	93.7	39	80.4	2.5	1	12.2	5.74	50.0	111	74.7	141	42	8
332	LACEY	6	34.2	94.2	40	79.8	1.8	1	12.1	4.68	40.2	96	53.6	114	55	3
333	FEG18-20	6	31.9	78.9	44	79.2	2.9	1	13.7	6.78	51.6	110	78.9	76	26	30
334	FEG26-50	6	36.4	95.5	37	79.3	2.1	1	12.6	5.47	45.0	107	59.7	222	39	15
335	FEG29-47	6	33.9	67.5	45	79.2	2.2	1	10.9	4.07	39.6	86	46.7	83	38	17
336	M98-16	6	35.1	92.4	43	79.2	2.1	1	12.2	5.49	47.1	107	62.6	77	35	21
337	M98-19	6	35.7	88.6	37	78.4	2.1	1	13.2	5.70	44.2	134	64.5	180	36	19

Table 18

Lab No.	Variety or Selection	Rowed	Kernel	on	Barley	Malt	Barley	Wort	Alpha-	Beta-					
			Weight	6/64"	Color	Extract	Wort Color	Wort Clarity	Protein (%)	Protein (%)	S/T (%)	DP (°ASBC)	amylase (20°DU)	glucan (ppm)	Quality Score
319	MOREX MALT CHECK	6	31.7	73.4	75	80.6	1.9	1	12.1	5.80	51.1	123	71.3	49	35
Minima			30.1	67.5	37	76.8	1.4		10.8	4.07	34.4	72	43.2	44	26
Maxima			36.4	96.7	47	80.8	2.9		14.4	6.78	54.1	145	78.9	222	58
Means			33.7	88.0	42	79.2	2.0		12.4	5.20	44.0	109	57.6	137	39
Standard Deviations			1.6	7.4	3	0.9	0.3		1.0	0.65	5.4	16	10.8	48	9
Coefficients of Variation			4.6	8.5	6	1.2	17.7		7.8	12.46	12.2	15	18.7	35	24

Malt Check Data are Excluded from Rank Sorting and Statistics

Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics

For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by K. Smith, University of Minnesota - St. Paul

2001 CROP YEAR EXPERIMENTAL LINES (GROUP 9) - CROOKSTON, MN

Table 19

Lab No.	Variety or Selection	Rowed	Kernel	on	Barley	Malt		Barley	Wort		Alpha-	Beta-	Quality	Overall		
			Weight	6/64"	Color	Extract	Wort	Wort	Protein	Protein	S/T	DP	amylase	glucan		
338	ROBUST	6	32.2	83.5	40	79.2	2.1	1	12.2	5.49	47.1	107	62.7	77	35	21
339	STANDER	6	33.4	89.7	39	78.5	2.1	1	13.1	5.70	44.2	134	64.6	180	36	20
340	LACEY	6	35.1	94.1	47	77.6	1.6	1	13.7	5.03	38.2	115	44.4	214	31	25
341	M96-145	6	31.3	83.6	40	79.8	*3.0	1	13.6	6.68	49.7	132	78.0	222	30	26
342	M96-203	6	32.8	85.3	39	80.3	1.8	2	12.4	5.00	43.4	111	56.0	103	54	4
344	M97-115	6	35.7	95.2	42	80.3	2.2	1	12.1	5.13	43.0	133	57.4	298	55	3
345	M97-119	6	33.4	88.8	38	80.6	1.9	1	12.7	5.79	49.2	116	74.1	54	33	24
346	ROBUST	6	33.7	92.6	42	80.2	1.9	1	12.0	5.69	48.3	125	69.6	232	38	16
347	STANDER	6	33.7	95.3	45	79.1	2.1	1	13.1	5.77	45.8	116	63.2	230	35	21
348	LACEY	6	34.4	94.2	46	80.0	1.5	2	11.6	4.56	40.6	104	45.7	185	43	10
349	M97-189	6	36.3	94.3	43	80.9	2.1	2	11.3	5.58	52.6	95	76.1	137	41	13
350	M97-190	6	34.2	92.2	41	80.8	1.9	2	10.6	4.66	45.0	76	53.6	133	57	2
351	M97-192	6	36.1	92.6	41	78.1	1.9	2	12.9	4.83	38.9	110	51.9	181	37	19
352	M97-193	6	33.3	84.2	42	79.6	2.0	2	11.6	4.47	40.9	97	48.6	218	43	10
353	M97-194	6	35.9	90.1	43	79.6	2.1	2	12.1	4.80	42.6	101	51.2	117	54	4
354	M97-195	6	37.3	95.1	39	79.4	2.1	2	12.2	4.71	42.2	96	50.8	142	54	4
355	M97-196	6	35.6	91.3	45	79.8	2.1	2	12.1	5.11	43.7	111	53.1	164	50	8
356	BT459	6	32.6	85.3	38	79.6	1.9	1	12.8	5.15	42.4	123	53.5	126	50	8
357	M99-02	6	33.9	94.9	39	80.5	2.2	1	11.8	5.11	43.4	118	54.6	115	58	1
358	M99-03	6	31.7	91.5	36	79.7	2.5	1	12.0	5.68	48.9	117	77.8	135	38	16
359	M99-04	6	32.5	91.4	40	80.1	2.0	1	12.0	4.98	42.9	105	65.0	140	51	7
360	M99-05	6	30.2	88.1	41	79.4	2.1	1	12.4	5.23	45.0	99	79.8	169	43	10
361	M99-06	6	29.4	79.8	41	79.4	2.1	1	11.6	5.19	45.4	96	68.8	225	41	13
362	M99-07	6	33.0	87.7	36	80.2	2.2	1	11.5	5.45	51.4	86	78.8	152	38	16
363	M99-08	6	33.5	91.7	38	79.4	2.1	1	11.8	5.40	47.1	100	71.5	193	35	21
364	M99-09	6	32.4	91.0	37	79.9	1.9	1	12.2	5.42	44.5	99	75.4	230	40	15
365	M99-10	6	33.9	97.7	42	79.0	1.9	1	13.2	5.77	46.0	111	68.4	256	30	26
343	MOREX MALT CHECK	6	31.5	72.0	73	79.9	2.3	1	12.1	5.44	45.5	116	83.5	104	41	
Minima			29.4	79.8	36	77.6	1.5		10.6	4.47	38.2	76	44.4	54	30	
Maxima			37.3	97.7	47	80.9	2.5		13.7	6.68	52.6	134	79.8	298	58	
Means			33.6	90.4	41	79.7	2.0		12.2	5.27	44.9	109	62.8	171	43	
Standard Deviations			1.9	4.5	3	0.8	0.2		0.7	0.48	3.6	14	11.3	57	9	
Coefficients of Variation			5.5	4.9	7	1.0	10.3		5.8	9.14	7.9	13	18.0	34	21	

Malt Check Data are Excluded from Rank Sorting and Statistics

Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics

For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by K. Smith, University of Minnesota - St. Paul

2001 EXPERIMENTAL LINES (GROUP 10) - ST. PAUL, MN

Table 20

Lab No.	Variety or Selection	Rowed	Kernel	on	Barley	Malt	Barley	Wort	Alpha-	Beta-	Quality	Overall				
			Weight (mg)	6/64" (%)	Color (Agtron)	Extract (%)	Wort Color	Wort Clarity	Protein (%)	Protein (%)	S/T	DP	amylase (°ASBC)	glucan (20°DU)	(ppm)	Score
366	ROBUST	6	33.2	85.8	71	78.4	1.6	1	14.5	6.40	45.8	134	51.2	337	32	14
368	STANDER	6	35.2	91.2	67	79.9	2.4	1	13.8	6.88	53.3	111	76.9	263	27	21
369	LACEY	6	33.9	89.1	70	80.2	1.8	2	13.5	6.11	47.0	121	59.4	132	37	5
370	M96-145	6	36.2	92.1	70	80.6	2.0	1	13.1	6.49	49.7	119	75.6	163	30	17
371	M96-203	6	34.7	87.1	66	79.2	2.6	2	13.2	6.31	49.2	114	57.5	319	27	21
372	M97-115	6	35.8	92.4	66	79.8	2.0	1	14.3	6.91	49.6	100	61.1	339	19	27
373	M97-119	6	34.2	88.6	67	80.0	2.1	1	13.6	6.48	51.0	91	64.0	326	27	21
374	ROBUST	6	35.1	91.9	70	79.1	1.7	1	12.9	6.20	48.5	112	53.1	275	34	12
375	STANDER	6	36.1	94.7	66	80.0	2.2	1	12.8	6.50	55.0	89	73.2	291	27	21
376	LACEY	6	36.1	94.7	67	79.9	2.2	2	12.6	5.82	46.2	103	54.9	170	36	8
377	M97-189	6	38.6	94.5	65	78.6	2.0	1	13.7	5.75	42.4	113	55.6	279	36	8
378	M97-190	6	36.3	94.3	65	78.1	n.d.	3	13.8	5.61	41.1	121	51.2	423	34	12
379	M97-192	6	37.8	93.2	70	79.2	n.d.	3	12.6	5.83	47.2	113	53.8	188	35	11
380	M97-193	6	36.6	93.2	68	79.1	n.d.	3	12.8	5.66	46.9	119	56.6	150	36	8
381	M97-194	6	36.6	93.8	68	79.0	n.d.	3	13.5	5.76	45.5	117	55.9	163	37	5
382	M97-195	6	38.3	94.7	69	78.6	n.d.	3	13.5	5.84	43.9	133	51.8	202	41	1
383	M97-196	6	37.4	94.1	71	78.4	n.d.	3	12.9	5.86	45.6	122	51.5	223	37	5
384	BT459	6	34.4	91.3	71	80.2	2.3	1	12.5	6.15	53.2	92	67.8	136	39	2
385	M99-02	6	34.9	92.5	68	79.8	2.0	1	12.9	5.87	49.0	109	65.9	281	30	17
386	M99-03	6	34.3	94.8	65	80.6	2.1	1	12.9	6.24	50.0	106	74.0	234	30	17
387	M99-04	6	36.9	96.8	68	79.8	2.1	1	12.9	5.87	49.2	84	62.7	377	27	21
388	M99-05	6	33.2	94.0	74	79.8	2.2	1	12.2	5.93	52.0	74	68.3	330	32	14
389	M99-06	6	34.3	93.3	67	80.9	2.1	1	12.4	5.93	50.1	98	68.0	228	38	3
390	M99-07	6	35.6	91.9	61	80.8	2.1	1	12.6	6.08	50.1	102	67.2	266	30	17
392	M99-08	6	35.6	95.0	62	79.9	2.1	1	13.6	6.25	48.3	122	69.6	274	27	21
393	M99-09	6	35.0	96.9	65	79.8	2.0	1	12.4	5.91	48.7	99	66.7	344	32	14
394	M99-10	6	35.1	95.2	64	80.4	2.0	1	12.4	5.86	49.7	83	72.2	253	38	3
367	MOREX MALT CHECK	6	31.2	72.3	75	80.9	2.1	1	12.4	6.16	51.7	112	72.4	66	32	
391	MOREX MALT CHECK	6	31.3	72.0	76	80.9	2.1	1	12.3	6.18	53.9	115	70.4	83	36	
Minima			33.2	85.8	61	78.1	1.6		12.2	5.61	41.1	74	51.2	132	19	
Maxima			38.6	96.9	74	80.9	2.6		14.5	6.91	55.0	134	76.9	423	41	
Means			35.6	92.9	67	79.6	2.1		13.1	6.09	48.4	107	62.4	258	32	
Standard Deviations			1.4	2.7	3	0.8	0.2		0.6	0.35	3.2	15	8.3	78	5	
Coefficients of Variation			4.0	2.9	4	1.0	10.6		4.7	5.69	6.6	14	13.3	30	16	

Malt Check Data are Excluded from Rank Sorting and Statistics

Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics

For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

2001 EXPERIMENTAL LINES (GROUP 11) - ST. PAUL, MN

Table 21

Lab No.	Variety or Selection	Rowed	Kernel	on	Barley	Malt	Barley	Wort	Alpha-	Beta-	Quality	Overall				
			Weight (mg)	6/64" (%)	Color (Agrton)	Extract (%)	Wort Color	Wort Clarity	Protein (%)	Protein (%)	S/T (%)	DP (°ASBC)	amylase (20°DU)	glucan (ppm)	Score	Rank
2265	ROBUST	6	32.8	79.0	82	79.3	1.0	1	11.9	5.82	53.5	98	58.1	121	43	5
2266	STANDER	6	34.8	92.9	71	79.1	1.4	2	13.1	6.35	50.9	86	74.3	420	23	27
2268	LACEY	6	34.7	91.7	74	80.3	n.d.	3	11.6	5.46	49.9	98	60.5	105	40	9
2269	M98-47	6	34.1	87.0	79	79.1	n.d.	3	11.4	5.40	49.7	83	58.9	180	37	13
2270	M98-56	6	35.9	90.4	73	79.2	1.2	1	11.6	5.68	51.0	79	67.4	203	35	20
2271	M98-57	6	32.1	86.0	79	78.3	n.d.	3	11.4	5.40	48.8	89	59.5	204	34	22
2272	M98-59	6	34.4	92.7	72	79.9	n.d.	3	10.6	5.22	51.1	71	59.0	169	41	7
2273	M98-71	6	34.9	93.0	77	80.3	n.d.	3	11.3	5.39	48.7	83	59.3	178	40	9
2274	M98-81	6	34.3	88.9	72	79.9	2.7	2	12.4	5.96	52.2	93	62.2	256	34	22
2275	M98-82	6	34.9	89.6	74	80.4	2.8	2	11.3	5.70	52.8	77	64.4	280	37	13
2276	M98-87	6	33.5	87.0	77	80.9	3.3	2	10.8	5.19	50.1	87	80.5	160	41	7
2277	M98-97	6	36.3	80.8	70	79.8	2.4	2	11.6	5.21	48.3	68	56.3	162	42	6
2278	M98-98	6	36.5	86.5	71	80.2	2.5	2	11.5	5.45	51.4	70	59.9	340	38	11
2279	M98-48	6	38.4	92.8	77	79.8	2.9	2	11.6	6.06	56.7	76	61.9	132	35	20
2280	M98-49	6	39.1	95.1	76	78.9	n.d.	3	12.5	5.90	48.2	90	56.7	197	34	22
2281	M98-60	6	35.2	91.1	69	80.3	2.4	2	11.7	5.78	52.6	99	63.2	217	37	13
2282	M98-61	6	36.5	93.2	69	80.0	2.7	2	12.0	5.50	47.5	99	63.8	201	37	13
2283	M98-62	6	35.7	92.5	73	79.6	2.6	2	12.4	5.57	48.4	105	65.1	147	38	11
2284	M98-75	6	32.6	86.3	79	80.9	2.7	2	10.9	5.30	51.4	82	59.1	135	45	2
2285	M98-85	6	35.5	93.2	74	80.8	2.5	2	11.2	5.71	55.7	81	61.6	195	37	13
2286	M98-86	6	35.1	90.1	73	79.6	2.7	2	11.9	5.85	50.0	95	65.1	220	34	22
2287	M98-90	6	34.7	90.4	72	80.2	2.8	2	11.2	5.36	50.0	82	71.2	241	37	13
2289	M98-91	6	33.4	84.8	71	80.8	n.d.	3	11.6	5.07	45.7	112	70.3	244	45	2
2290	M98-92	6	35.0	93.7	67	81.1	3.2	2	11.6	5.57	50.2	90	71.0	273	37	13
2291	M98-99	6	34.5	86.1	65	78.6	n.d.	3	12.8	5.74	46.2	88	52.9	377	29	26
2292	M98-100	6	34.9	86.8	68	80.2	n.d.	3	11.2	4.77	46.5	76	54.2	259	47	1
2293	M98-101	6	34.0	82.5	73	79.7	n.d.	3	11.3	4.99	46.1	70	53.6	254	44	4
2267	MOREX MALT CHECK	6	31.7	71.3	78	80.5	0.9	1	12.4	6.02	50.7	114	75.0	82	36	
2288	MOREX MALT CHECK	6	31.5	70.3	76	80.0	2.3	1	11.4	5.90	52.4	124	77.7	79	35	

Minima	32.1	79.0	65	78.3	1.0	10.6	4.77	45.7	68	52.9	105	23
Maxima	39.1	95.1	82	81.1	3.3	13.1	6.35	56.7	112	80.5	420	47
Means	35.0	89.0	73	79.9	2.5	11.7	5.53	50.1	86	62.6	217	38
Standard Deviations	1.6	4.2	4	0.7	0.7	0.6	0.35	2.7	11	6.5	75	5
Coefficients of Variation	4.5	4.7	6	0.9	26.5	5.1	6.35	5.5	13	10.5	35	13

Malt Check Data are Excluded from Rank Sorting and Statistics

Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics

For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

2001 EXPERIMENTAL LINES (GROUP 12) - ST. PAUL, MN

Table 22

Lab No.	Variety or Selection	Rowed	Kernel	on	Barley	Malt	Barley	Wort	Alpha-	Beta-	Overall					
			Weight	6/64"	Color	Extract	Wort	Protein	Protein	S/T	DP	amylase	glucan	Quality	Score	Rank
2294	ROBUST	6	34.0	83.1	74	79.9	2.0	1	11.7	5.61	49.1	104	55.7	222	39	9
2295	STANDER	6	34.8	92.7	79	79.7	2.6	1	12.1	5.90	51.7	84	76.8	212	35	25
2296	LACEY	6	35.5	90.1	65	79.4	2.9	2	13.1	5.70	45.8	113	59.4	213	38	14
2297	M98-52	6	36.7	90.6	76	79.6	n.d.	3	11.6	5.62	52.7	106	59.8	185	37	17
2298	M98-53	6	37.6	93.3	67	78.6	3.3	2	13.5	5.90	45.7	123	61.5	301	28	36
2299	M98-54	6	37.7	94.5	74	79.5	n.d.	3	12.5	5.92	48.6	76	60.6	212	28	36
2300	M98-67	6	35.0	92.4	66	80.2	3.2	2	12.6	5.73	48.5	108	60.7	326	29	34
2301	M98-68	6	35.9	91.9	69	80.1	2.8	2	12.6	5.80	49.1	115	65.4	209	32	29
2302	M98-69	6	35.0	91.6	73	79.8	2.9	2	11.6	5.50	49.0	99	69.1	143	38	14
2303	M98-77	6	35.7	94.3	72	80.1	n.d.	3	11.7	5.35	48.8	92	62.7	226	36	20
2304	M98-78	6	36.7	94.8	74	80.0	3.1	2	12.3	5.22	45.2	115	60.8	194	46	1
2305	M98-93	6	34.8	90.7	71	80.7	3.1	2	11.3	5.61	51.5	121	*87.3	167	37	17
2306	M98-94	6	34.1	86.2	67	81.5	n.d.	3	11.5	5.30	50.3	107	76.4	144	44	3
2307	M98-95	6	35.5	95.0	73	81.2	n.d.	3	12.1	5.37	48.1	116	77.7	128	40	5
2309	M98-102	6	36.0	88.4	63	79.2	n.d.	3	11.8	4.91	42.8	83	54.9	386	46	1
2310	M98-104	6	36.7	91.5	71	79.5	2.6	2	13.3	5.83	46.4	83	62.4	204	29	34
2311	ROBUST	6	34.7	87.0	72	78.6	2.0	1	12.9	6.04	48.9	122	62.1	225	24	38
2312	STANDER	6	34.0	92.0	75	79.4	2.1	1	12.2	5.57	46.8	108	66.2	112	39	9
2313	LACEY	6	35.2	89.1	77	79.0	2.8	2	12.2	5.80	48.5	88	70.9	252	34	27
2314	MNBRITE	6	34.4	81.6	77	77.5	2.1	1	13.9	6.12	44.6	156	58.1	99	40	5
2315	M96-03	6	33.5	84.5	71	80.5	n.d.	3	9.8	4.70	52.2	57	54.9	263	42	4
2316	M98-20	6	35.7	91.6	59	80.2	n.d.	3	9.8	4.80	50.1	35	60.7	377	32	29
2317	M98-21	6	36.8	93.6	60	80.0	n.d.	3	10.5	4.81	46.0	48	57.8	491	38	14
2318	M98-22	6	36.9	95.8	70	79.7	n.d.	3	9.7	4.61	48.4	34	51.5	611	36	20
2319	M98-23	6	37.0	94.3	61	80.5	n.d.	3	10.5	4.83	48.6	44	54.2	506	39	9
2320	M98-24	6	33.7	88.9	56	80.8	n.d.	3	9.8	4.94	50.7	35	57.3	451	36	20
2321	M98-25	6	35.1	90.1	61	80.5	3.9	2	9.7	4.84	53.0	36	57.4	535	37	17
2322	M98-26	6	34.2	90.1	74	79.3	n.d.	3	11.7	5.34	48.3	86	64.2	273	33	28
2323	M98-27	6	34.2	85.0	51	80.6	n.d.	3	10.0	4.75	50.4	33	59.1	587	36	20
2324	M98-28	6	35.4	93.8	63	81.0	n.d.	3	10.0	5.13	53.6	51	70.5	297	35	25

Table 22

Lab No.	Variety or Selection	Rowed	Kernel	on	Barley	Malt	Barley	Wort	Alpha-	Beta-	Overall					
			Weight (mg)	6/64"	Color (Agtron)	Extract (%)	Wort Color	Wort Clarity	Protein (%)	Protein (%)		S/T (%)	DP (°ASBC)	amylase (20°DU)	glucan (ppm)	Quality Score
2325	M98-29	6	35.2	92.7	65	80.1	n.d.	3	9.7	4.61	47.6	49	50.2	599	39	9
2326	M98-30	6	36.1	93.8	58	80.4	n.d.	3	9.9	4.76	48.7	46	52.6	645	39	9
2327	M98-31	6	35.8	92.6	65	81.1	n.d.	3	10.3	5.19	52.2	53	71.9	356	32	29
2328	M98-33	6	36.6	94.8	68	80.3	n.d.	3	10.4	5.03	49.2	55	61.2	488	32	29
2329	M98-34	6	35.9	92.4	63	81.3	n.d.	3	10.4	4.78	48.1	53	56.5	406	36	20
2330	M98-35	6	32.9	85.3	58	79.6	n.d.	3	11.4	5.38	49.5	63	66.3	367	30	33
2331	M98-36	6	34.5	91.9	65	79.9	n.d.	3	12.2	5.57	47.0	100	53.8	284	40	5
2332	M98-37	6	33.4	83.7	72	80.6	n.d.	3	12.1	5.50	49.4	85	56.1	205	40	5
2308	MOREX MALT CHECK	6	31.5	70.8	77	80.0	2.2	1	11.8	5.98	53.2	132	82.5	45	39	
2333	MOREX MALT CHECK	6	31.0	70.7	74	80.3	2.2	1	12.3	6.04	52.6	109	73.9	102	36	
Minima			32.9	81.6	51	77.5	2.0		9.7	4.61	42.8	33	50.2	99	24	
Maxima			37.7	95.8	79	81.5	3.9		13.9	6.12	53.6	156	77.7	645	46	
Means			35.3	90.7	68	80.0	2.7		11.4	5.32	48.8	81	61.6	313	36	
Standard Deviations			1.2	3.7	7	0.8	0.5		1.2	0.45	2.4	32	7.1	154	5	
Coefficients of Variation			3.4	4.1	10	1.0	19.4		10.7	8.42	4.9	40	11.5	49	14	

Malt Check Data are Excluded from Rank Sorting and Statistics

Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics

For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by K. Smith, University of Minnesota - St. Paul

2001 EXPERIMENTAL LINES (GROUP 13) - CROOKSTON, MN

Table 23

Lab No.	Variety or Selection	Rowed	Kernel	on	Barley	Malt	Barley	Wort	Alpha-	Beta-	Quality	Overall				
			Weight	6/64"	Color	Extract	Wort	Wort	Protein	Protein						
			(mg)	(%)	(Agtron)	(%)	Color	Clarity	(%)	(%)	(°ASBC)	(20°DU)	(ppm)	Score	Rank	
2334	ROBUST	6	34.1	91.7	39	80.7	2.2	1	11.0	5.07	50.7	90	53.6	119	53	1
2335	STANDER	6	35.0	93.1	40	81.2	2.8	1	11.5	5.81	52.4	100	78.1	147	42	3
2336	LACEY	6	34.9	87.2	41	80.1	2.1	1	12.7	5.18	43.1	109	58.8	83	50	2
2337	M98-47	6	35.8	90.7	41	80.0	2.4	1	12.4	5.63	47.4	111	63.9	176	38	10
2338	M98-56	6	35.4	93.3	43	80.9	2.6	1	11.7	5.73	50.6	94	69.7	163	38	10
2339	M98-57	6	32.0	87.1	43	81.2	2.5	1	11.2	5.53	50.6	95	71.0	100	41	8
2340	M98-59	6	33.9	93.9	41	81.1	2.4	1	11.1	5.32	51.6	98	70.5	124	42	3
2341	M98-71	6	34.1	88.5	41	81.7	2.6	1	11.9	5.81	50.1	106	67.4	136	42	3
2342	M98-81	6	35.2	91.2	42	81.0	2.6	1	12.1	5.69	50.2	94	64.8	142	42	3
2343	M98-82	6	34.4	83.1	41	79.5	2.5	1	13.1	6.21	48.2	121	69.7	160	27	24
2344	M98-87	6	31.8	74.4	39	78.6	2.5	1	12.6	5.21	44.7	108	80.9	221	33	18
2345	M98-97	6	35.5	88.3	37	81.0	2.5	1	11.1	5.33	50.8	70	69.1	136	42	3
2346	M98-98	6	35.0	81.2	39	79.4	2.7	1	11.8	5.56	48.4	97	70.0	158	35	14
2347	M98-48	6	38.2	92.1	45	79.7	2.9	2	11.8	5.80	51.6	86	65.5	126	38	10
2348	M98-49	6	38.1	93.0	39	78.4	2.3	2	12.9	5.43	44.5	102	58.0	233	35	14
2349	M98-60	6	32.6	85.2	39	78.4	2.6	1	12.2	5.82	49.3	106	68.2	197	32	19
2350	M98-61	6	35.3	91.6	39	78.6	2.5	1	13.1	5.78	45.7	121	66.5	211	32	19
2351	M98-62	6	34.0	87.4	39	78.9	2.3	1	13.5	5.86	44.5	137	70.6	266	39	9
2352	M98-75	6	30.1	77.9	41	79.8	2.5	1	12.4	5.87	49.6	105	71.8	112	38	10
2354	M98-85	6	34.4	84.6	40	79.6	2.6	1	12.1	5.81	50.1	111	70.8	200	35	14
2355	M98-86	6	34.9	91.2	38	79.5	2.4	1	13.3	6.04	47.7	117	70.1	195	27	24
2356	M98-90	6	34.9	89.5	37	79.5	2.4	1	13.3	5.90	46.3	115	72.1	243	30	22
2357	M98-91	6	31.3	68.5	42	78.8	2.7	2	13.0	5.55	44.5	128	74.1	250	25	27
2358	M98-92	6	33.6	81.5	41	79.1	2.3	1	12.8	5.89	49.8	133	73.1	240	34	17
2359	M98-99	6	32.8	78.0	38	77.9	2.2	1	13.2	5.96	48.3	132	65.2	279	27	24
2360	M98-100	6	33.2	69.3	33	78.9	2.5	1	12.4	5.63	47.7	108	74.6	205	30	22
2361	M98-101	6	34.1	81.2	36	78.3	2.1	1	13.4	5.43	43.3	120	69.0	222	32	19
2333	MOREX MALT CHECK	6	31.0	70.7	74	80.3	2.2	1	12.3	6.04	52.6	109	73.9	102	36	
2353	MOREX MALT CHECK	6	31.5	70.1	76	80.5	2.4	1	12.4	6.21	52.1	116	77.2	63	32	
Minima			30.1	68.5	33	77.9	2.1		11.0	5.07	43.1	70	53.6	83	25	
Maxima			38.2	93.9	45	81.7	2.9		13.5	6.21	52.4	137	80.9	279	53	
Means			34.2	85.7	40	79.7	2.5		12.4	5.66	48.2	108	68.8	179	36	
Standard Deviations			1.8	7.2	2	1.1	0.2		0.8	0.28	2.8	15	5.8	54	7	
Coefficients of Variation			5.3	8.4	6	1.4	7.9		6.3	4.90	5.7	14	8.4	30	19	

Malt Check Data are Excluded from Rank Sorting and Statistics

Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics

For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by K. Smith, University of Minnesota - St. Paul

2001 EXPERIMENTAL LINES (GROUP 14) - CROOKSTON, MN

Table 24

Lab No.	Variety or Selection	Rowed	Kernel	on	Barley	Malt	Barley	Wort	Alpha-	Beta-	Overall					
			Weight	6/64"	Color	Extract	Wort	Wort	Protein	Protein		amylase	glucan	Quality	Score	Rank
2362	ROBUST	6	33.9	91.1	43	79.4	1.8	1	12.4	5.03	43.5	104	52.1	192	51	2
2363	STANDER	6	35.8	95.2	45	80.4	2.8	1	12.4	6.06	52.6	108	77.0	202	35	18
2364	LACEY	6	34.7	89.2	40	79.0	2.4	2	13.0	5.13	40.0	128	59.1	144	46	4
2365	M98-52	6	36.9	91.4	43	79.2	n.d.	3	12.0	5.38	45.9	112	60.8	268	38	10
2366	M98-53	6	37.9	95.7	39	79.5	2.5	2	13.2	5.34	43.2	124	60.1	205	34	20
2367	M98-54	6	39.1	95.0	40	79.3	3.0	2	13.1	6.21	48.9	126	64.3	244	26	36
2368	M98-67	6	35.6	90.7	43	79.7	2.5	1	12.7	5.78	46.9	126	72.2	293	30	27
2369	M98-68	6	34.7	93.1	39	79.2	2.3	1	13.5	5.72	44.6	137	71.7	291	39	9
2370	M98-69	6	34.6	91.5	38	78.4	2.5	1	13.7	6.09	45.3	133	69.4	313	30	27
2371	M98-77	6	34.5	89.4	38	78.2	2.4	1	13.7	5.88	44.0	134	70.5	184	36	14
2372	M98-78	6	36.6	93.7	42	78.0	n.d.	3	13.8	5.07	38.7	131	55.2	201	33	23
2374	M98-93	6	32.4	84.6	41	78.7	2.7	1	13.0	5.76	46.7	125	84.7	310	24	37
2375	M98-94	6	29.4	60.1	38	78.8	2.7	1	12.5	5.61	47.2	136	90.2	157	28	34
2376	M98-95	6	32.9	86.8	40	78.6	2.7	2	13.6	5.74	42.9	127	75.5	405	28	34
2377	M98-102	6	34.3	79.8	37	78.5	2.4	1	13.3	5.50	44.0	104	70.8	325	29	30
2378	M98-104	6	35.1	84.8	40	79.4	2.8	2	12.3	5.93	50.1	104	71.0	222	34	20
2379	ROBUST	6	33.9	92.0	43	80.3	1.8	1	11.6	5.15	44.7	98	54.2	280	54	1
2380	STANDER	6	34.0	93.8	41	81.0	2.6	1	11.0	5.77	54.7	93	79.7	282	38	10
2381	LACEY	6	34.4	90.6	44	80.5	2.1	1	11.7	5.17	44.5	111	67.5	176	47	3
2382	MNBRITE	6	32.7	86.4	44	80.6	*4.0	1	13.0	6.50	54.1	117	76.9	104	34	20
2383	M98-03	6	30.5	67.4	38	81.0	2.9	2	9.3	4.89	54.7	92	76.0	188	30	27
2384	M98-20	6	33.3	77.8	36	80.1	3.3	2	10.3	4.89	48.6	81	73.2	323	33	23
2385	M98-21	6	34.0	84.4	41	80.9	2.6	2	10.5	5.03	51.5	95	71.7	269	36	14
2386	M98-22	6	33.8	85.9	39	81.1	2.5	1	10.1	5.24	54.6	96	76.0	204	37	12
2387	M98-23	6	33.3	81.7	42	82.0	2.7	1	10.0	5.04	56.1	99	76.3	125	41	6
2388	M98-24	6	30.4	69.5	36	80.1	2.6	1	10.8	5.57	53.4	101	81.1	118	36	14
2389	M98-25	6	31.1	65.9	37	80.3	2.8	1	10.7	5.62	52.4	79	71.7	141	36	14
2390	M98-26	6	32.2	82.8	42	80.3	2.1	1	11.1	5.18	48.1	106	68.9	109	46	4
2391	M98-27	6	29.8	63.2	38	80.2	2.6	1	10.2	5.10	50.8	73	72.7	144	33	23
2392	M98-28	6	30.2	68.8	37	79.6	2.8	1	11.4	5.80	53.6	76	79.6	160	29	30

Table 24

Lab No.	Variety or Selection	Rowed	Kernel Weight (mg)	on 6/64"	Barley Color (Agtron)	Malt Extract (%)	Wort Color	Wort Clarity	Barley Protein (%)	Wort Protein (%)	S/T (%)	DP (°ASBC)	Alpha-amylase (20°DU)	Beta-glucan (ppm)	Quality Score	Overall Rank
2393	M98-29	6	31.2	76.2	38	80.4	2.7	1	10.8	5.55	53.5	83	75.0	212	35	18
2395	M98-30	6	30.9	77.0	38	80.2	2.7	1	10.7	5.64	54.4	86	75.5	207	37	12
2396	M98-31	6	31.8	73.6	40	79.2	2.5	2	11.5	5.17	44.9	84	66.6	159	40	7
2397	M98-33	6	32.3	78.1	40	80.5	2.9	2	10.5	5.11	50.3	76	67.7	95	40	7
2398	M98-34	6	31.4	68.4	40	80.0	2.5	1	11.1	5.35	49.5	87	68.2	199	29	30
2399	M98-35	6	30.9	69.0	42	78.9	2.4	1	11.8	5.75	49.3	121	78.3	165	29	30
2400	M98-36	6	30.4	69.8	43	79.3	2.5	1	12.8	5.97	48.2	141	76.0	192	31	26
2401	M98-37	6	27.9	52.7	42	78.9	2.8	1	13.1	6.17	50.6	128	76.7	127	21	38
2373	MOREX MALT CHECK	6	31.9	72.5	75	80.5	2.4	1	12.5	6.29	53.3	119	78.3	65	32	
2394	MOREX MALT CHECK	6	31.4	72.5	76	80.7	2.2	1	12.2	6.10	52.6	118	80.0	50	32	
Minima			27.9	52.7	36	78.0	1.8		9.3	4.89	38.7	73	52.1	95	21	
Maxima			39.1	95.7	45	82.0	3.3		13.8	6.50	56.1	141	90.2	405	54	
Means			33.1	81.2	40	79.7	2.6		11.9	5.52	48.6	107	71.4	209	35	
Standard Deviations			2.5	11.4	2	0.9	0.3		1.3	0.41	4.5	20	8.2	74	7	
Coefficients of Variation			7.5	14.0	6	1.2	11.8		10.6	7.47	9.2	19	11.5	35	20	

Malt Check Data are Excluded from Rank Sorting and Statistics

Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics

For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by K. Smith, University of Minnesota - St. Paul

2001 EXPERIMENTAL LINES (GROUP 15) - CROOKSTON, MN

Table 25

Lab No.	Variety or Selection	Rowed	Kernel	on	Barley	Malt	Barley	Wort	Alpha-	Beta-	Quality	Overall				
			Weight	6/64"	Color	Extract	Wort	Wort	Protein	Protein						
			(mg)	(%)	(Agtron)	(%)	Color	Clarity	(%)	(%)	(°ASBC)	(20°DU)	(ppm)	Score	Rank	
2547	3141	6	35.4	90.3	43	80.2	4.6	2	12.5	6.35	53.2	108	61.0	149	38	9
2548	3142	6	37.6	95.1	41	79.8	4.2	2	12.8	6.38	51.1	98	58.4	178	30	27
2549	3144	6	36.2	93.0	41	80.8	5.1	2	12.5	6.37	53.6	102	56.5	180	33	20
2550	3149	6	37.9	94.0	43	78.9	3.6	2	12.8	5.44	43.8	129	54.0	283	38	9
2551	3151	6	37.4	93.9	43	80.7	5.5	1	13.1	6.72	54.1	95	57.3	99	38	9
2552	3154	6	37.0	94.4	43	80.2	n.d.	3	12.8	6.27	49.9	93	53.3	264	35	16
2553	M95-91 3170	6	36.2	89.4	39	78.8	3.2	2	13.8	6.01	45.2	167	57.9	110	40	5
2554	3183	6	34.3	88.9	43	78.7	4.0	2	13.5	6.40	48.1	100	51.3	225	30	27
2555	3184	6	37.7	93.5	39	78.9	2.5	2	13.7	5.77	43.4	168	58.4	158	39	8
2556	M81 3190	6	35.6	87.0	38	78.0	3.1	2	14.2	5.56	40.9	153	51.5	293	40	5
2557	3191	6	37.1	91.2	41	78.5	3.0	2	13.7	5.59	43.0	136	54.1	150	46	1
2558	3199	6	37.9	96.5	43	79.0	2.8	2	13.4	5.79	45.9	149	60.6	136	45	3
2559	3205	6	35.5	87.9	37	78.0	2.8	2	13.9	5.38	40.5	136	52.8	297	38	9
2560	ROBUST 3210	6	32.2	*76.8	33	76.0	2.0	2	14.3	5.17	37.1	146	47.0	304	30	27
2561	3218	6	35.8	92.0	39	79.0	3.4	2	13.7	6.45	49.7	112	58.4	189	30	27
2562	3227	6	35.7	87.7	39	79.9	n.d.	3	13.3	6.75	51.4	117	58.4	145	33	20
2563	3229	6	37.4	95.7	48	78.5	n.d.	3	14.0	6.51	48.7	91	53.5	255	24	34
2564	LACEY 3230	6	34.1	86.9	44	78.6	2.6	2	12.7	4.95	41.5	119	52.1	111	46	1
2565	3236	6	36.3	90.3	40	78.4	n.d.	3	13.3	5.63	44.7	139	53.5	236	41	4
2566	3242	6	36.3	91.0	40	79.6	n.d.	3	12.6	6.21	50.1	98	51.5	136	36	15
2567	3243	6	36.1	93.9	38	79.4	4.8	2	13.2	6.49	49.7	113	56.0	133	34	18
2569	3251	6	38.3	95.7	43	80.0	n.d.	3	13.3	6.42	50.1	112	52.4	314	29	31
2570	3262	6	37.3	95.6	40	78.1	2.9	2	14.1	5.32	39.9	141	56.0	203	32	22
2571	3285	6	36.4	90.3	39	79.9	n.d.	3	13.5	6.66	52.3	114	57.8	170	29	31
2572	ROBUST 3300	6	34.7	91.1	40	79.2	4.0	1	13.4	6.67	50.7	129	67.2	116	31	25
2573	3302	6	35.9	92.7	39	78.3	3.5	1	14.4	6.59	46.2	141	59.9	124	34	18
2574	3314	6	37.1	94.6	41	78.2	n.d.	3	14.0	6.25	45.0	132	57.4	219	35	16
2575	M108/LACEY 3607	6	34.6	90.5	42	78.0	n.d.	3	13.2	4.86	38.3	125	53.0	162	32	22
2576	3609	6	31.7	80.6	42	77.0	2.2	2	14.3	4.94	36.3	143	55.7	190	31	25
2577	ROBUST 3610	6	34.1	81.2	37	77.1	2.1	1	14.6	5.44	39.2	150	51.4	249	32	22

Table 25

Lab No.	Variety or Selection	Rowed	Kernel	on	Barley	Malt	Barley	Wort	Alpha-	Beta-	Overall					
			Weight	6/64"	Color	Extract	Wort	Protein	Protein	S/T	DP	amylase	glucan	Quality	Score	Rank
2578	M108/LACEY 3634	6	35.3	92.1	38	77.3	2.5	2	13.5	5.11	38.5	143	56.2	201	37	14
2579	3637	6	35.7	92.4	40	78.5	3.6	2	14.4	6.40	45.7	134	62.0	72	27	33
2580	3641	6	33.7	91.0	42	77.2	2.6	2	13.8	4.96	37.9	150	53.8	182	40	5
2581	3647	6	35.0	94.0	44	78.4	2.6	2	13.0	4.92	39.3	134	57.1	182	38	9
2568	MOREX MALT CHECK	6	31.1	71.8	75	79.9	2.3	1	12.5	5.90	50.9	124	75.1	61	32	
Minima			31.7	80.6	33	76.0	2.0		12.5	4.86	36.3	91	47.0	72	24	
Maxima			38.3	96.5	48	80.8	5.5		14.6	6.75	54.1	168	67.2	314	46	
Means			35.9	91.3	41	78.7	3.3		13.5	5.90	45.4	127	55.8	189	35	
Standard Deviations			1.6	3.8	3	1.1	1.0		0.6	0.63	5.4	21	3.9	65	5	
Coefficients of Variation			4.4	4.1	7	1.4	28.7		4.3	10.70	11.8	17	7.0	34	15	

Malt Check Data are Excluded from Rank Sorting and Statistics

Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics

For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by K. Smith, University of Minnesota - St. Paul

2001 EXPERIMENTAL LINES (GROUP 16) - CROOKSTON, MN

Table 26

Lab No.	Variety or Selection	Rowed	Kernel	on	Barley	Malt	Barley	Wort	Alpha-	Beta-	Quality	Overall				
			Weight	6/64"	Color	Extract	Wort	Protein	Protein	S/T	DP	amylase	glucan			
(mg)	(%)	(Agtron)	(%)	Color	Clarity	(%)	(%)	(%)	(%)	(%)	(°ASBC)	(20°DU)	(ppm)	Score	Rank	
2582	3651	6	36.9	96.5	44	78.9	3.4	2	13.2	6.00	45.4	120	57.6	73	38	8
2583	3667	6	34.4	93.6	40	77.9	n.d.	3	13.5	4.94	37.4	120	48.2	144	36	14
2584	3668	6	34.3	85.7	43	78.7	3.9	2	14.1	6.39	47.7	121	59.1	79	22	35
2585	3670	6	33.1	82.1	40	79.4	4.4	2	13.8	6.79	50.9	109	62.4	76	26	33
2586	LACEY 3680	6	32.4	83.1	43	77.9	2.3	2	13.6	5.07	38.1	132	56.3	156	34	18
2587	3685	6	34.3	89.2	41	77.6	2.5	2	13.3	5.07	39.3	129	54.1	192	33	24
2588	ROBUST 3710	6	32.3	76.4	40	76.9	1.9	1	14.5	5.34	38.8	144	50.1	284	30	28
2590	3719	6	36.1	93.0	40	78.1	n.d.	3	15.0	5.70	40.3	125	52.1	321	29	30
2591	LACEY 3730	6	32.2	75.5	37	78.0	2.9	2	14.2	5.90	42.5	136	56.3	271	28	32
2592	3751	6	36.0	89.0	38	77.0	2.5	2	14.5	5.58	39.5	145	52.8	299	31	27
2593	4065	6	34.5	88.3	42	79.8	n.d.	3	10.9	5.13	48.3	94	54.0	332	41	2
2594	4070	6	36.4	89.0	43	78.6	n.d.	3	13.4	5.83	45.3	108	51.0	318	34	18
2595	4090	6	38.0	94.5	39	77.6	n.d.	3	14.0	5.53	41.4	121	51.9	501	25	34
2596	4099	6	35.7	82.2	41	79.0	3.2	2	12.3	5.38	46.4	124	57.3	265	38	8
2597	4101	6	33.9	86.3	42	78.9	n.d.	3	13.9	6.37	47.4	102	52.6	178	29	30
2598	ROBUST 4110	6	35.0	88.0	43	78.0	2.9	1	13.9	5.71	42.8	119	46.7	386	32	25
2599	4114	6	36.8	84.9	42	78.5	3.6	2	12.6	5.48	43.9	117	48.4	493	35	15
2600	4115	6	37.5	92.0	45	78.3	n.d.	3	13.2	5.58	42.6	106	47.9	392	34	18
2601	4116	6	37.4	90.5	41	78.3	3.2	2	13.4	5.33	41.4	116	50.7	485	35	15
2602	LACEY 4130	6	35.2	88.7	42	77.9	2.5	1	13.9	5.42	39.9	129	52.5	295	30	28
2603	4137	6	34.5	86.7	44	79.9	3.1	1	12.3	5.52	47.4	97	53.1	355	39	5
2604	4138	6	34.8	85.1	43	78.6	4.0	2	12.9	5.60	44.3	96	51.3	447	35	15
2605	4143	6	34.9	92.0	47	78.6	3.3	2	12.7	4.81	40.8	92	46.6	557	39	5
2606	4144	6	37.1	94.0	48	78.6	3.6	2	12.6	4.90	41.4	101	46.0	406	39	5
2607	4149	6	36.6	93.6	47	79.4	3.8	2	12.9	5.48	45.9	111	55.8	248	38	8
2608	4151	6	35.0	89.7	44	78.3	n.d.	3	13.2	5.71	45.8	73	46.6	410	34	18
2609	4152	6	37.3	90.9	41	79.5	3.4	2	13.3	5.60	44.1	127	52.3	391	38	8
2611	4157	6	34.3	86.8	46	79.3	n.d.	3	12.4	5.35	45.1	137	55.0	246	49	1
2612	4159	6	35.7	93.0	42	77.1	n.d.	3	13.0	5.28	42.5	98	50.0	451	34	18
2613	4163	6	36.5	91.8	44	80.1	n.d.	3	12.4	5.63	48.0	100	49.5	432	40	3

Table 26

Lab No.	Variety or Selection	Rowed	Kernel	on	Barley	Malt	Barley	Wort	Alpha-	Beta-	Overall					
			Weight	6/64"	Color	Extract	Wort	Protein	Protein	S/T	DP	amylase	glucan	Quality	Score	Rank
2614	4165	6	37.9	89.5	39	79.1	n.d.	3	13.7	5.97	45.9	103	49.7	386	37	13
2615	4186	6	35.5	93.1	43	78.2	3.1	2	12.9	5.37	42.6	118	57.8	317	32	25
2616	4187	6	37.9	94.8	35	78.7	n.d.	3	13.6	5.30	40.3	105	52.6	570	38	8
2617	4189	6	38.1	91.8	42	78.8	n.d.	3	13.0	5.36	41.6	118	50.8	341	34	18
2618	4193	6	37.2	95.6	43	78.1	n.d.	3	12.4	4.85	41.2	83	42.9	654	40	3
2589	MOREX MALT CHECK	6	31.6	71.6	74	79.9	2.4	1	12.2	5.95	51.9	118	76.2	79	32	
2610	MOREX MALT CHECK	6	31.5	69.7	73	80.1	2.5	1	12.8	6.06	50.8	111	70.5	179	24	
Minima			32.2	75.5	35	76.9	1.9		10.9	4.81	37.4	73	42.9	73	22	
Maxima			38.1	96.5	48	80.1	4.4		15.0	6.79	50.9	145	62.4	654	49	
Means			35.6	89.1	42	78.5	3.2		13.3	5.52	43.3	114	52.1	336	34	
Standard Deviations			1.7	5.0	3	0.8	0.6		0.8	0.43	3.3	17	4.2	142	5	
Coefficients of Variation			4.7	5.6	7	1.0	19.5		6.1	7.86	7.6	15	8.0	42	15	

Malt Check Data are Excluded from Rank Sorting and Statistics

Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics

For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by K. Smith, University of Minnesota - St. Paul

2001 EXPERIMENTAL LINES (GROUP 17) - CROOKSTON, MN

Table 27

Lab No.	Variety or Selection	Rowed	Kernel	on	Barley	Malt	Barley	Wort	Alpha-	Beta-	Quality	Overall				
			Weight	6/64"	Color	Extract	Wort	Protein	Protein	S/T	DP	amylase	glucan			
(mg)	(%)	(Agtron)	(%)	Color	Clarity	(%)	(%)	(%)	(%)	(%)	(°ASBC)	(20°DU)	(ppm)	Score	Rank	
2619	4194	6	35.4	89.1	41	79.6	n.d.	3	12.8	5.85	46.1	100	56.2	478	29	27
2620	4195	6	35.7	92.7	39	77.6	n.d.	3	12.8	4.86	38.5	94	46.4	595	29	27
2621	4201	6	34.7	91.3	42	77.7	3.0	2	12.9	4.74	38.3	104	45.7	618	30	24
2622	4205	6	35.1	93.7	44	78.0	n.d.	3	12.1	5.14	42.7	62	39.6	642	36	12
2623	4206	6	37.5	92.5	44	77.5	3.3	2	13.3	4.76	37.0	102	44.6	652	27	31
2624	4209	6	34.4	92.2	42	79.1	3.1	2	12.5	5.28	44.1	107	53.4	353	47	1
2625	ROBUST 4210	6	32.2	85.5	41	77.6	2.1	1	12.6	4.96	41.5	103	46.3	524	36	12
2626		6	37.0	94.1	43	77.7	3.4	2	12.4	5.04	41.8	100	48.5	497	40	8
2627		6	37.0	96.4	45	78.4	2.6	2	12.4	5.21	42.0	137	63.6	211	44	3
2628		6	36.6	95.2	47	78.5	2.4	1	12.6	5.01	42.0	125	55.7	156	40	8
2629	4226	6	34.9	93.4	40	79.6	4.2	2	12.9	6.05	49.0	122	63.5	73	26	32
2630	4229	6	37.0	92.9	44	79.5	3.0	1	11.7	5.59	49.4	104	61.4	183	35	14
2632	4254	6	35.3	88.0	36	79.6	5.7	2	13.9	7.36	54.6	110	57.9	71	30	24
2633	4256	6	37.1	91.0	36	79.3	4.2	1	14.3	7.00	50.7	138	64.9	120	30	24
2634	4258	6	38.4	88.0	34	78.4	3.8	1	14.6	6.74	48.4	144	62.9	219	26	32
2635	4259	6	35.8	90.8	40	78.6	3.0	2	13.3	5.59	43.5	152	59.8	178	42	4
2636	4261	6	36.6	91.3	38	79.6	n.d.	3	13.5	6.52	51.0	112	59.0	99	33	20
2637	M106 4270	6	36.7	90.9	38	78.1	3.3	2	12.8	5.37	43.7	141	55.8	185	42	4
2638		6	34.8	91.3	37	78.9	3.4	2	13.7	5.78	42.6	138	59.9	185	42	4
2639		6	37.4	94.4	35	80.1	n.d.	3	13.9	6.53	49.7	96	54.8	165	35	14
2640	4275	6	36.2	95.4	43	81.5	n.d.	3	12.8	7.49	59.2	77	57.0	55	32	22
2641	4277	6	35.8	95.7	45	79.9	n.d.	3	12.8	5.84	47.2	122	54.0	213	35	14
2642	4284	6	35.7	93.5	42	80.9	n.d.	3	12.4	6.58	53.6	93	60.1	110	37	11
2643	4285	6	34.1	92.6	39	80.0	n.d.	3	13.2	6.74	52.3	95	54.1	168	35	14
2644	4291	6	36.8	92.6	41	79.8	n.d.	3	13.2	6.00	46.6	115	52.8	155	32	22
2645	4295	6	35.7	94.8	42	79.6	n.d.	3	12.8	6.00	48.0	118	58.6	106	33	20
2646	4296	6	34.4	87.8	39	80.1	5.1	2	12.9	6.53	52.9	110	61.9	51	29	27
2647	4301	6	35.1	92.1	42	79.6	4.1	2	13.3	6.10	47.7	124	62.7	72	26	32
2648	4304	6	33.6	89.7	43	79.4	4.2	2	13.1	6.00	47.6	116	62.3	69	29	27
2649	4315	6	38.5	95.9	42	79.1	3.3	2	13.0	5.61	45.2	147	66.6	143	45	2

Table 27

Lab No.	Variety or Selection	Rowed	Kernel	on	Barley	Malt	Barley	Wort	Alpha-	Beta-	Overall						
			Weight	6/64"	Color	Extract	Wort	Protein	S/T	DP	amylase	glucan	Quality	Score	Rank		
2650	4317	6	35.3	93.8	41	80.5	5.0	2	12.4	6.21	51.3	110	61.5	152	34	19	
2651	M95-71	4320	6	37.6	93.8	38	79.7	3.5	1	13.2	6.15	49.1	139	68.8	87	35	14
2653	4332	6	36.7	87.6	40	79.2	3.3	1	13.4	6.23	48.7	144	65.1	105	38	10	
2654	4339	6	35.4	94.3	43	79.5	2.7	2	12.8	5.30	43.0	140	69.3	114	42	4	
2655	4361	6	35.4	92.3	36	79.3	n.d.	3	14.4	6.94	51.1	118	61.2	238	20	35	
2631	MOREX MALT CHECK	6	31.0	71.3	72	80.0	2.5	1	12.7	6.05	51.2	130	80.8	36	24		
2652	MOREX MALT CHECK	6	30.8	70.5	72	79.8	2.4	1	12.1	5.95	50.9	124	81.9	61	32		
Minima			32.2	85.5	34	77.5	2.1		11.7	4.74	37.0	62	39.6	51	20		
Maxima			38.5	96.4	47	81.5	5.7		14.6	7.49	59.2	152	69.3	652	47		
Means			35.9	92.2	41	79.2	3.5		13.0	5.92	46.9	116	57.6	230	34		
Standard Deviations			1.4	2.6	3	1.0	0.9		0.6	0.75	5.0	21	7.1	186	6		
Coefficients of Variation			3.8	2.9	8	1.2	25.0		4.9	12.60	10.7	18	12.4	81	18		

Malt Check Data are Excluded from Rank Sorting and Statistics

Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics

For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by K. Smith, University of Minnesota - St. Paul

2001 EXPERIMENTAL LINES (GROUP 18) - CROOKSTON, MN

Table 28

Lab No.	Variety or Selection	Rowed	Kernel	on	Barley	Malt	Barley	Wort	Alpha-	Beta-	Quality	Overall				
			Weight	6/64"	Color	Extract	Wort	Protein	Protein	S/T	DP	amylase	glucan			
			(mg)	(%)	(Agtron)	(%)	Color	Clarity	(%)	(%)	(°ASBC)	(20°DU)	(ppm)	Score	Rank	
2656	4362	6	36.4	95.2	37	79.7	n.d.	3	13.9	6.86	51.1	124	61.5	106	29	27
2657	4365	6	38.9	93.2	39	79.7	4.1	1	13.8	6.88	52.1	115	63.9	109	31	20
2658	4369	6	39.0	95.4	37	80.0	4.1	1	13.7	6.80	50.8	124	64.4	116	31	20
2659	4375	6	38.2	88.2	33	76.8	2.7	1	12.9	5.84	45.8	151	64.7	107	39	3
2660	4498	6	35.6	96.2	40	78.6	n.d.	3	14.7	6.55	44.6	126	52.9	250	29	27
2661	LACEY 4500	6	35.3	91.9	38	77.5	2.5	1	14.6	5.57	39.7	148	54.9	186	32	17
2662	4502	6	36.3	94.2	35	79.1	n.d.	3	13.8	6.58	48.3	149	53.5	168	39	3
2663	4509	6	38.1	95.3	38	78.9	3.6	2	14.9	7.05	47.7	112	58.7	128	26	34
2664	4519	6	34.9	90.7	38	78.1	3.7	1	15.0	6.66	45.5	125	53.5	168	31	20
2665	4521	6	37.4	94.7	37	79.8	n.d.	3	13.8	6.68	51.3	124	56.0	101	33	11
2666	4522	6	36.3	96.3	38	78.3	4.2	2	14.2	6.55	49.5	119	53.2	168	25	35
2667	4526	6	35.8	94.7	42	78.9	3.7	2	14.1	6.57	47.4	120	55.7	167	25	35
2668	4527	6	36.4	94.8	37	79.1	4.3	2	14.3	6.98	49.4	117	58.6	32	22	37
2669	4530	6	38.1	94.6	37	79.2	n.d.	3	13.2	6.41	48.5	136	58.7	103	37	5
2670	4531	6	36.4	92.8	38	77.5	n.d.	3	14.2	5.45	38.6	115	47.5	126	27	33
2671	4536	6	33.2	88.4	38	78.6	3.8	2	13.2	6.72	52.7	118	55.1	90	31	20
2672	4538	6	34.7	93.9	36	77.9	n.d.	3	13.1	5.39	42.9	120	52.8	189	33	11
2674	4539	6	34.6	90.3	39	79.1	n.d.	3	13.7	6.02	45.1	127	50.5	270	37	5
2675	4547	6	32.8	86.3	41	79.1	n.d.	3	13.1	5.90	48.5	121	45.6	239	35	9
2676	M104 4550	6	33.9	89.1	42	79.3	3.8	2	13.0	6.23	50.5	108	51.2	240	33	11
2677	4554	6	33.3	87.7	40	78.9	n.d.	3	13.6	6.09	45.8	95	45.6	278	34	10
2678	4555	6	36.0	93.3	42	79.1	2.9	1	12.9	6.57	51.9	113	57.0	201	31	20
2679	4556	6	32.0	86.5	38	78.9	3.5	2	13.5	6.54	51.1	124	55.3	187	29	27
2680	4567	6	37.3	95.3	43	78.9	n.d.	3	13.8	6.12	46.0	118	52.1	101	36	7
2681	LACEY 4570	6	34.5	86.1	43	77.1	2.7	2	13.7	5.15	38.2	114	46.6	342	30	26
2682	4575	6	35.2	92.8	40	78.5	n.d.	3	14.3	5.75	41.3	118	50.1	233	32	17
2683	4585	6	35.3	91.5	39	78.7	n.d.	3	15.0	6.72	45.9	137	53.4	223	33	11
2684	4589	6	37.5	95.4	36	78.0	n.d.	3	14.1	5.56	41.1	106	48.2	224	32	17
2685	4591	6	35.8	92.4	37	79.9	n.d.	3	13.5	6.31	47.8	135	56.2	151	33	11
2686	4592	6	38.8	97.5	39	78.6	3.4	2	14.2	5.89	41.5	111	50.6	261	33	11

Table 28

Lab No.	Variety or Selection	Rowed	Kernel	on	Barley	Malt	Barley	Wort	Alpha-	Beta-	Quality	Overall				
			Weight	6/64"	Color	Extract	Wort	Wort	Protein	Protein						
2687	4598	6	35.0	93.9	37	77.1	3.1	2	13.7	5.69	41.9	117	55.4	157	31	20
2688	4600	6	38.5	94.2	42	77.8	3.3	2	13.4	6.12	46.0	135	59.0	95	36	7
2689	4611	6	36.3	94.2	37	78.1	n.d.	3	15.1	6.15	41.5	96	47.7	161	29	27
2690	4617	6	36.6	96.5	42	76.8	n.d.	3	14.0	5.20	38.1	96	39.6	431	22	37
2691	4618	6	36.7	96.0	40	77.9	n.d.	3	14.0	5.04	38.5	90	39.6	472	22	37
2692	ROBUST 4350	6	34.1	86.1	41	77.5	2.0	1	13.7	5.24	41.1	134	48.0	282	43	1
2693	ROBUST 4630	6	33.6	84.3	42	77.2	2.0	1	13.3	5.05	39.1	117	42.0	370	28	32
2695	LACEY 4360	6	33.1	82.1	40	77.2	1.9	1	13.6	5.15	38.1	141	55.2	118	42	2
2696	LACEY 4640	6	33.9	79.3	38	76.8	2.2	1	14.2	5.37	39.4	131	52.9	255	29	27
2673	MOREX MALT CHECK	6	30.9	73.9	72	80.0	2.2	1	11.9	5.97	52.0	118	77.8	68	35	
2694	MOREX MALT CHECK	6	30.5	69.8	71	80.0	2.2	1	12.4	6.00	50.3	121	72.9	91	30	
Minima			32.0	79.3	33	76.8	1.9		12.9	5.04	38.1	90	39.6	32	22	
Maxima			39.0	97.5	43	80.0	4.3		15.1	7.05	52.7	151	64.7	472	43	
Means			35.8	91.8	39	78.4	3.2		13.9	6.09	45.2	121	53.0	195	32	
Standard Deviations			1.8	4.4	2	0.9	0.8		0.6	0.61	4.7	14	6.1	96	5	
Coefficients of Variation			5.2	4.7	6	1.2	24.3		4.2	10.06	10.4	12	11.5	49	16	

Malt Check Data are Excluded from Rank Sorting and Statistics

Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics

For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by K. Smith, University of Minnesota - St. Paul

2001 EXPERIMENTAL LINES (GROUP 19) - CROOKSTON, MN

Table 29

Lab No.	Variety or Selection	Rowed	Kernel	on	Barley	Malt		Barley	Wort			Alpha-	Beta-	Quality	Overall	
			Weight	6/64"	Color	Extract	Wort	Wort	Protein	Protein	S/T	DP	amylase	glucan		
			(mg)	(%)	(Agtron)	(%)	Color	Clarity	(%)	(%)	(°ASBC)	(20°DU)	(ppm)	Score	Rank	
2934	C113-13	6	31.5	72.1	48	73.6	1.9	1	16.8	5.91	36.9	180	58.7	122	23	15
2935	C113-68	6	32.9	78.8	45	76.5	2.1	1	14.6	5.88	42.6	184	60.1	164	23	15
2936	C113-28	6	30.3	70.7	49	75.0	1.9	1	16.8	5.91	37.0	167	60.3	193	19	24
2937	C113-01	6	31.6	71.9	50	75.2	2.0	1	16.3	5.93	36.8	184	62.5	157	15	30
2938	C113-45	6	32.8	80.7	41	76.7	2.1	1	14.1	5.36	38.3	151	61.0	178	25	12
2939	C113-66	6	35.0	90.7	41	77.4	2.2	2	14.1	5.54	39.9	138	61.5	207	21	21
2940	C113-82	6	34.4	87.0	47	74.3	2.2	1	16.6	5.98	36.2	172	58.7	155	22	18
2941	C113-02	6	30.2	72.0	47	75.9	4.1	1	17.0	7.45	46.3	184	69.2	138	16	26
2942	C113-20	6	34.5	88.0	45	77.1	2.3	2	14.3	5.85	42.0	169	58.6	222	30	6
2943	C113-84	6	33.8	80.8	49	76.1	2.1	1	16.2	5.85	36.8	200	63.1	150	22	18
2944	C113-44	6	31.9	78.3	43	76.5	2.9	1	14.9	6.78	46.4	162	74.9	118	22	18
2945	ROBUST	6	34.4	84.0	43	77.0	2.1	1	14.5	5.62	39.5	149	52.8	299	32	4
2946	C113-72	6	31.4	78.7	45	75.9	4.1	2	15.7	7.36	48.2	164	75.2	115	21	21
2947	C113-86	6	36.1	91.5	48	76.1	2.3	1	15.3	5.98	39.7	172	61.2	231	18	25
2948	C113-109	6	32.9	79.0	47	76.4	2.4	2	14.6	5.99	42.5	151	66.9	219	29	10
2949	C113-99	6	33.2	52.4	53	75.7	2.1	2	15.9	5.69	36.8	164	69.8	228	16	26
2950	C113-56	6	35.4	84.7	46	76.8	2.2	1	14.2	5.80	42.1	154	68.1	238	30	6
2951	C113-89	6	32.2	81.6	48	78.0	n.d.	3	14.3	7.02	50.0	155	67.9	92	24	13
2952	STANDER	6	35.6	96.0	45	79.2	3.0	2	13.5	6.35	47.1	131	74.0	278	30	6
2953	C113-12	6	30.6	70.9	51	78.0	n.d.	3	14.6	7.28	50.6	153	71.5	100	21	21
2955	C113-103	6	32.6	79.5	55	76.7	2.5	2	15.0	6.41	43.1	161	69.0	266	23	15
2956	C113-16	6	29.7	70.2	52	75.6	1.7	1	14.7	5.53	38.2	160	58.8	188	24	13
2957	C113-52	6	32.6	83.5	49	77.0	2.0	2	14.0	5.27	39.5	145	57.6	188	32	4
2958	C113-55	6	36.1	93.6	44	78.1	n.d.	3	13.1	5.26	41.8	145	58.3	209	45	1
2959	C113-92	6	32.9	88.2	52	79.8	2.8	2	12.0	5.99	54.5	109	73.9	146	38	3
2960	LACEY	6	34.3	92.8	49	79.2	n.d.	3	12.5	5.17	44.0	114	61.1	187	42	2
2961	C113-10	6	29.8	68.1	51	77.1	n.d.	3	14.5	6.81	48.5	159	68.3	147	16	26
2962	STANDER	6	34.8	93.2	46	79.3	3.3	2	13.2	6.49	51.2	127	79.6	285	26	11
2963	C113-23	6	32.9	79.5	48	76.8	2.8	2	15.3	6.42	44.3	118	67.5	339	16	26
2964	C113-69	6	34.7	94.0	43	79.0	2.7	2	12.9	6.11	48.3	131	68.3	203	30	6

Table 29

Lab No.	Variety	Rowed	Kernel	on	Barley	Malt	Barley	Wort	Alpha-	Beta-	Quality				
			Weight	6/64"	Color	Extract	Wort Color	Wort Clarity	Protein (%)	Protein (%)	S/T (%)	DP (°ASBC)	amylase (20°DU)	glucan (ppm)	
2933	MOREX MALT CHECK	6	30.1	67.8	80	79.0	2.0	1	12.8	5.69	48.1	130	68.0	65	24
2954	MOREX MALT CHECK	6	29.9	68.1	78	78.5	2.0	1	12.5	5.48	45.3	135	68.1	106	37
Minima			29.7	52.4	41	73.6	1.7		12.0	5.17	36.2	109	52.8	92	15
Maxima			36.1	96.0	55	79.8	4.1		17.0	7.45	54.5	200	79.6	339	45
Means			33.0	81.1	47	76.9	2.5		14.7	6.10	43.0	155	65.3	192	25
Standard Deviations			1.9	9.8	3	1.5	0.6		1.3	0.62	5.1	22	6.5	61	8
Coefficients of Variation			5.7	12.1	7	1.9	25.1		8.9	10.23	11.9	14	10.0	32	30

Malt Check Data are Excluded from Rank Sorting and Statistics

Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics

For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by K. Smith, University of Minnesota - St. Paul

2001 EXPERIMENTAL LINES (GROUP 20) - CROOKSTON, MN

Table 30

Lab No.	Variety or Selection	Rowed	Kernel	on	Barley	Malt		Barley	Wort			Alpha-	Beta-	Quality	Overall	
			Weight	6/64"	Color	Extract	Wort	Wort	Protein	Protein	S/T	DP	amylase	glucan		
			(mg)	(%)	(Agtron)	(%)	Color	Clarity	(%)	(%)	(°ASBC)	(20°DU)	(ppm)	Score	Rank	
2965	C113-81	6	32.1	81.0	52	76.3	2.1	2	14.5	5.78	40.8	145	58.4	243	33	6
2966	C113-102	6	30.6	79.4	52	77.2	n.d.	3	14.2	7.25	51.0	111	68.4	256	12	33
2967	C113-57	6	34.3	91.5	48	77.9	n.d.	3	12.6	5.19	42.1	125	54.3	314	34	5
2968	C113-53	6	34.6	88.0	46	78.2	3.0	2	13.9	6.42	47.4	129	67.3	197	23	21
2969	C113-51	6	31.6	83.6	46	78.2	3.0	2	13.6	6.23	47.4	124	66.9	103	26	16
2970	C113-67	6	35.1	86.3	47	78.1	2.2	1	13.9	5.54	40.4	135	67.0	281	36	3
2971	C113-58	6	33.8	85.0	43	77.5	2.1	1	13.8	5.40	40.6	161	58.6	205	36	3
2972	C113-40	6	31.8	77.0	43	78.4	2.7	1	13.9	6.13	47.4	140	65.6	162	30	10
2973	C113-25	6	30.7	76.4	49	76.0	3.0	1	16.6	6.96	42.7	172	67.3	166	17	28
2974	C113-48	6	35.1	85.8	47	78.1	2.2	1	14.6	5.61	39.1	158	64.7	318	26	16
2976	C113-33	6	34.0	89.3	43	76.8	3.0	1	17.1	6.29	41.1	155	69.2	247	27	13
2977	C113-93	6	34.5	97.4	50	76.4	2.8	1	15.1	6.47	42.0	163	71.4	274	24	20
2978	C113-08	6	31.7	72.7	52	74.5	1.9	1	16.6	5.55	34.0	194	60.3	326	12	33
2979	C113-47	6	30.1	72.5	41	77.2	1.9	1	13.3	4.81	36.7	135	56.6	226	32	8
2980	C113-105	6	33.8	80.8	52	77.0	2.7	1	15.6	6.15	40.5	168	62.7	312	21	25
2981	C113-35	6	34.0	82.9	49	76.0	2.3	1	15.7	6.02	39.2	171	65.1	236	15	29
2982	C113-26	6	33.1	80.5	48	74.9	2.5	1	17.1	6.47	38.0	179	66.5	300	15	29
2983	C113-32	6	33.7	74.3	46	75.2	1.9	1	16.3	5.48	34.1	178	61.4	318	13	32
2984	C113-64	6	33.0	76.6	48	78.4	2.4	1	13.4	5.71	42.6	152	67.0	293	37	2
2985	C113-106	6	34.4	83.1	50	77.6	2.1	1	13.7	5.29	39.3	162	62.8	284	31	9
2986	C113-09	6	28.5	62.0	48	77.4	3.5	1	15.5	7.05	46.5	156	74.0	140	18	27
2987	C113-59	6	34.5	86.7	45	78.5	2.6	1	13.8	6.28	48.8	162	73.6	172	28	12
2988	C113-30	6	31.9	73.2	48	75.5	1.8	1	15.9	5.60	35.4	195	59.3	199	19	26
2989	C113-63	6	36.2	87.2	47	78.5	2.6	1	13.8	5.89	44.3	149	69.4	135	43	1
2990	C113-100	6	31.3	68.9	49	75.6	1.9	1	15.3	5.70	37.4	175	62.9	207	12	33
2991	C113-17	6	31.4	70.4	47	76.0	1.7	1	15.4	5.68	37.6	206	59.1	143	23	21
2992	C113-36	6	32.2	68.9	46	76.9	2.0	1	13.6	5.14	39.4	153	57.6	224	33	6
2993	C113-14	6	30.3	64.3	48	75.6	1.6	1	15.5	5.65	37.9	203	61.1	152	12	33
2994	C113-43	6	31.2	70.6	49	74.8	1.7	1	16.4	5.81	36.0	218	61.8	154	15	29
2995	C113-87	6	32.6	80.0	53	75.2	2.0	1	16.2	5.89	37.1	196	58.2	133	26	16

Table 30

Lab No.	Variety or Selection	Rowed	Kernel	on	Barley	Malt		Barley	Wort			Alpha-	Beta-	Overall		
			Weight	6/64"	Color	Extract	Wort Color	Wort Clarity	Protein (%)	Protein (%)	S/T (%)	DP (°ASBC)	amylase (20°DU)	glucan (ppm)		
2997	C113-31	6	30.5	62.7	50	75.3	1.9	1	16.2	6.05	38.4	187	62.9	182	9	37
2998	C113-70	6	30.4	67.6	45	78.1	2.3	1	14.0	6.36	45.4	170	65.2	147	22	23
2999	C113-110	6	31.6	63.2	46	76.7	2.7	1	16.1	6.74	43.0	156	69.7	117	25	19
3000	C113-77	6	33.0	78.6	52	75.7	2.1	1	15.0	6.14	42.3	158	63.3	204	27	13
3001	C113-91	6	31.1	68.1	48	77.1	2.1	1	13.7	5.64	42.7	151	65.6	207	29	11
3002	C113-11	6	30.4	58.7	46	75.1	1.7	1	15.2	5.53	37.6	157	57.0	137	27	13
3003	C113-101	6	32.9	65.6	47	76.7	2.2	1	15.4	6.14	42.8	149	64.5	211	22	23
2975	MOREX MALT CHECK	6	30.2	69.7	76	79.0	2.0	1	11.9	5.47	49.9	132	69.4	124	37	
2996	MOREX MALT CHECK	6	30.6	70.1	76	78.5	1.9	1	12.4	5.45	45.7	151	70.1	68	41	
Minima			28.5	58.7	41	74.5	1.6		12.6	4.81	34.0	111	54.3	103	9	
Maxima			36.2	97.4	53	78.5	3.5		17.1	7.25	51.0	218	74.0	326	43	
Means			32.5	76.8	48	76.7	2.3		14.9	5.95	41.1	162	64.0	214	24	
Standard Deviations			1.8	9.4	3	1.2	0.5		1.2	0.54	4.2	24	4.8	66	9	
Coefficients of Variation			5.4	12.3	6	1.6	20.6		8.1	9.12	10.1	15	7.5	31	35	

Malt Check Data are Excluded from Rank Sorting and Statistics

Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics

For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by K. Smith, University of Minnesota - St. Paul

2001 EXPERIMENTAL LINES (GROUP 21) - CROOKSTON, MN

Table 31

Lab No.	Variety or Selection	Rowed	Kernel	on	Barley	Malt		Barley	Wort			Alpha-	Beta-	Quality	Overall	
			Weight	6/64"	Color	Extract	Wort	Wort	Protein	Protein	S/T	DP	amylase	glucan		
			(mg)	(%)	(Agtron)	(%)	Color	Clarity	(%)	(%)	(°ASBC)	(20°DU)	(ppm)	Score	Rank	
3004	C113-96	6	32.9	71.8	53	77.5	2.0	2	13.5	4.91	37.0	145	54.7	148	42	1
3005	C113-98	6	32.1	75.6	48	78.0	2.2	1	12.5	5.32	43.3	127	59.6	162	35	5
3006	C113-90	6	30.0	62.6	51	77.8	2.0	1	12.1	5.45	46.8	135	57.3	113	34	8
3007	C113-27	6	31.3	62.8	54	76.9	2.5	2	14.5	6.75	47.9	163	69.7	99	16	35
3008	C113-76	6	32.4	77.4	50	78.7	2.4	2	12.9	6.17	49.2	136	68.2	140	31	12
3009	C113-24	6	31.9	70.0	45	74.4	2.0	2	16.2	6.09	39.1	163	68.2	187	15	36
3010	C113-65	6	34.8	84.6	48	76.7	2.5	2	16.3	6.89	43.6	147	70.6	182	26	27
3011	C113-78	6	32.4	71.1	48	75.0	2.0	2	16.5	6.40	40.5	160	61.9	166	21	33
3012	C113-97	6	33.3	83.6	42	77.4	2.2	2	14.4	6.04	44.1	139	61.5	161	23	32
3013	C113-49	6	32.4	78.1	41	77.0	2.1	2	14.5	5.82	41.8	140	58.5	195	30	17
3014	C113-21	6	37.8	89.5	46	76.9	2.2	2	14.3	5.67	39.9	146	55.2	242	28	23
3015	C113-37	6	34.4	87.9	43	78.3	2.5	2	13.7	6.42	48.1	144	68.1	190	30	17
3016	C113-61	6	34.5	85.6	45	79.1	2.6	2	13.6	6.05	45.2	109	65.0	166	31	12
3018	C113-80	6	31.1	72.8	51	75.2	2.9	1	15.8	6.92	44.0	154	62.9	167	24	29
3019	M81	6	35.2	88.8	46	78.1	2.4	1	12.1	5.97	51.7	118	63.2	191	32	10
3020	LACEY	6	33.3	83.9	44	77.4	2.1	2	13.5	5.15	40.9	121	58.5	127	39	3
3021	M69	6	34.4	85.8	47	78.1	2.6	1	12.2	5.95	50.0	113	67.9	211	32	10
3022	C113-41	6	30.9	69.1	47	77.9	2.3	1	13.6	6.00	44.9	156	61.5	103	33	9
3023	C113-104	6	34.6	81.8	47	76.5	2.1	1	14.0	5.35	39.1	149	56.3	189	29	21
3024	C113-05	6	32.1	72.6	49	74.4	1.7	1	15.0	5.43	36.4	148	52.6	158	30	17
3025	C113-85	6	33.1	82.1	47	77.4	2.4	2	13.6	5.48	43.1	135	57.8	174	35	5
3026	C113-19	6	33.1	81.2	45	77.5	2.3	1	13.7	6.21	46.3	147	60.5	180	27	24
3027	C113-88	6	32.0	80.1	52	74.8	1.9	1	15.7	5.47	36.3	161	56.8	140	29	21
3028	C113-04	6	32.1	80.5	48	76.4	*5.5	2	15.5	7.20	48.6	154	67.9	89	25	28
3029	C113-75	6	33.8	87.1	45	76.5	2.3	1	13.7	5.29	39.2	127	55.1	179	31	12
3030	ROBUST	6	33.6	82.2	43	76.0	1.8	1	13.4	4.94	38.4	132	46.1	301	35	5
3031	C113-74	6	37.6	92.8	43	77.0	n.d.	3	14.2	5.16	37.7	138	51.2	253	31	12
3032	C113-71	6	35.8	89.9	47	76.4	n.d.	3	14.6	5.61	39.8	166	51.6	199	27	24
3033	C113-94	6	36.6	92.3	44	76.8	n.d.	3	13.6	5.34	40.9	155	56.2	187	37	4
3034	C113-03	6	33.0	83.1	48	74.3	2.0	2	15.9	5.49	34.6	158	52.6	202	31	12

Table 31

Lab No.	Variety or Selection	Rowed	Kernel	on	Barley	Malt		Barley	Wort			Alpha-	Beta-	Quality	Overall	
			Weight	6/64"	Color	Extract	Wort	Wort	Protein	Protein	S/T	DP	amylase	glucan		
		(mg)	(%)	(Agtron)	(%)	Color	Clarity	(%)	(%)	(°ASBC)	(20°DU)	(ppm)	Score	Rank		
3035	C113-95	6	33.5	84.8	47	75.5	2.5	1	15.7	6.76	43.7	178	65.2	148	24	29
3036	C113-62	6	33.0	89.7	45	77.1	n.d.	3	13.5	5.39	41.2	143	55.9	134	41	2
3037	CHEVRON	6	29.7	*30.5	49	*70.4	n.d.	3	17.3	5.41	32.0	124	47.2	*383	12	37
3039	C113-42	6	33.7	79.5	45	77.7	2.1	1	14.1	5.93	42.8	145	67.7	201	30	17
3040	C113-83	6	31.3	78.9	49	76.5	4.2	1	15.7	7.24	46.2	175	66.4	137	18	34
3041	C113-39	6	33.9	83.0	44	77.5	2.3	1	14.2	5.82	41.7	140	60.4	173	27	24
3042	C113-29	6	32.0	90.9	48	76.6	2.0	1	15.2	5.72	39.2	147	60.9	225	24	29
3017	MOREX MALT CHECK	6	30.1	67.2	77	79.3	2.0	1	12.7	5.81	47.2	124	69.8	70	24	
3038	MOREX MALT CHECK	6	30.5	67.6	75	79.1	1.9	1	12.8	5.53	44.4	128	66.1	85	33	
Minima			29.7	62.6	41	74.3	1.7		12.1	4.91	32.0	109	46.1	89	12	
Maxima			37.8	92.8	54	79.1	4.2		17.3	7.24	51.7	178	70.6	301	42	
Means			33.2	80.9	47	76.8	2.3		14.3	5.87	42.3	144	60.0	173	29	
Standard Deviations			1.8	7.8	3	1.2	0.4		1.3	0.62	4.5	16	6.4	43	7	
Coefficients of Variation			5.6	9.7	6	1.6	19.2		9.0	10.51	10.7	11	10.7	25	24	

Malt Check Data are Excluded from Rank Sorting and Statistics

Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics

For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by K. Smith, University of Minnesota - St. Paul

2001 EXPERIMENTAL LINES (GROUP 22) - CROOKSTON, MN

Table 32

Lab No.	Variety or Selection	Rowed	Kernel	on	Barley	Malt		Barley	Wort			Alpha-	Beta-	Quality	Overall	
			Weight	6/64"	Color	Extract	Wort Color	Wort Clarity	Protein (%)	Protein (%)	S/T (%)	DP (°ASBC)	amylase (20°DU)	glucan (ppm)		
3043	M81	6	35.3	97.0	42	76.9	2.0	1	14.9	5.64	40.5	144	58.7	224	34	5
3044	MNBRITE	6	33.6	85.7	47	77.0	2.9	1	14.8	6.37	44.2	155	66.3	138	31	9
3045	C113-73	6	34.0	87.6	44	77.6	2.1	2	13.3	4.79	36.5	135	53.4	233	37	3
3046	M69	6	34.9	86.6	46	78.4	2.3	1	13.4	5.71	45.0	118	65.6	295	32	8
3047	C113-50	6	35.1	87.1	48	77.5	2.2	1	13.8	4.99	38.7	128	53.8	238	34	5
3048	C113-15	6	33.5	75.7	48	75.6	1.7	1	15.6	5.65	37.5	145	55.8	235	27	12
3049	C113-22	6	35.1	88.0	49	75.4	1.7	1	15.7	5.31	35.0	167	59.8	237	26	13
3050	C113-34	6	32.6	79.4	48	75.4	2.0	1	15.6	5.81	38.5	147	56.5	175	29	11
3051	C113-60	6	33.7	84.7	47	77.4	2.2	2	13.5	5.21	40.2	138	54.3	173	42	1
3052	C113-54	6	33.3	81.8	46	77.8	2.1	2	13.5	5.23	40.8	132	55.0	167	39	2
3053	C113-46	6	33.1	73.3	47	77.1	2.2	2	14.1	5.33	39.4	129	59.6	301	16	18
3054	C113-79	6	34.9	83.9	53	74.9	2.1	2	16.6	5.49	33.8	186	52.9	378	21	16
3055	C113-18	6	30.3	70.7	50	74.3	1.7	1	16.0	5.52	35.5	170	54.8	194	22	15
3056	C113-107	6	32.2	85.6	46	75.8	1.9	1	14.4	5.07	36.7	165	55.2	202	30	10
3057	C113-112	6	33.7	80.3	47	75.2	2.6	1	16.9	6.46	38.3	193	66.1	179	15	19
3058	C113-111	6	30.5	76.4	45	75.0	1.7	1	16.2	6.04	37.5	159	66.2	146	23	14
3060	MNBRITE	6	32.6	80.9	48	76.3	2.6	1	16.1	6.54	41.1	182	70.6	190	20	17
3061	C113-108	6	34.7	88.5	43	77.0	2.4	2	13.4	5.01	37.5	156	51.9	377	37	3
3062	C113-38	6	33.9	87.8	45	77.3	2.3	2	13.1	5.12	39.6	139	57.0	243	34	5
3059	MOREX MALT CHECK	6	30.0	68.5	75	79.2	1.9	1	12.5	5.57	46.4	138	83.9	108	32	
Minima			30.3	70.7	42	74.3	1.7		13.1	4.79	33.8	118	51.9	138	15	
Maxima			35.3	97.0	53	78.4	2.9		16.9	6.54	45.0	193	70.6	378	42	
Means			33.5	83.2	47	76.4	2.1		14.8	5.54	38.7	152	58.6	228	29	
Standard Deviations			1.4	6.3	3	1.2	0.3		1.3	0.51	2.9	21	5.6	69	8	
Coefficients of Variation			4.3	7.6	5	1.5	16.1		8.6	9.26	7.4	14	9.6	30	27	

Malt Check Data are Excluded from Rank Sorting and Statistics

Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics

For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by K. Smith, University of Minnesota - St. Paul

2001 EXPERIMENTAL LINES (GROUP 23) - CROOKSTON, MN

Table 33

Lab No.	Variety or Selection	Rowed	Kernel	on	Barley	Malt	Barley	Wort	Alpha-	Beta-	Overall					
			Weight	6/64"	Color	Extract	Wort	Protein	Protein	S/T	DP	amylase	glucan	Quality	Score	Rank
3063	C113-06	6	29.0	49.7	48	75.7	2.7	1	15.4	6.39	41.6	136	64.9	260	16	1
3064	FB11-119	6	28.6	58.1	42	74.2	2.6	2	14.7	5.49	39.4	127	55.1	416	10	4
3065	FB11-113	6	32.5	77.3	47	75.3	2.1	1	16.5	6.39	39.6	183	66.8	437	12	3
3066	C113-07	6	28.5	40.7	49	74.8	2.8	1	17.0	6.63	40.4	170	64.6	419	9	6
3067	FB11-113	6	33.0	76.2	50	74.7	2.4	1	17.1	6.39	37.6	180	69.2	472	10	4
3068	M92-299	6	28.1	46.5	46	71.4	2.0	1	16.4	5.75	36.7	155	64.8	490	14	2
3059	MOREX MALT CHECK	6	30.0	68.5	75	79.2	1.9	1	12.5	5.57	46.4	138	83.9	108	32	
Minima			28.1	40.7	42	71.4	2.0		14.7	5.49	36.7	127	55.1	260	9	
Maxima			33.0	77.3	50	75.7	2.8		17.1	6.63	41.6	183	69.2	490	16	
Means			30.0	58.1	47	74.4	2.4		16.2	6.18	39.2	159	64.2	416	12	
Standard Deviations			2.2	15.5	3	1.5	0.3		0.9	0.45	1.8	23	4.8	82	3	
Coefficients of Variation			7.3	26.7	6	2.1	13.6		5.8	7.22	4.5	15	7.5	20	23	

Malt Check Data are Excluded from Rank Sorting and Statistics

Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics

For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by K. Smith, University of Minnesota - St. Paul

2001 EXPERIMENT FA41, FARGO PRELIMINARY YIELD TRIAL - FARGO, ND

Table 34

Lab No.	Variety or Selection	Rowed	Kernel	on	Barley	Malt	Barley	Wort	Alpha-	Beta-	Overall					
			Weight	6/64"	Color	Extract	Wort	Wort	Protein	Protein		amylase	glucan	Quality	Score	Rank
754	LACEY	6	36.6	93.2	47	78.4	1.7	1	14.2	5.32	38.2	153	62.3	74	29	16
755	CONLON	2	45.4	97.0	51	78.9	1.6	1	13.7	4.98	38.0	111	66.5	204	33	9
756	DRUMMOND	6	35.7	95.1	*61	78.3	1.7	1	13.4	5.19	39.5	153	62.5	76	38	3
757	ND1646-1	2	43.1	92.0	47	78.2	2.1	2	12.7	4.90	39.2	74	61.4	422	27	20
758	2N19823	2	48.0	96.6	48	77.0	2.2	2	15.3	5.45	36.5	119	53.9	216	28	17
759	2N19831	2	42.2	95.8	49	76.9	n.d.	3	14.9	4.44	31.7	134	40.1	323	28	17
760	2N19832	2	43.3	95.5	48	80.0	1.5	1	13.5	4.62	34.7	104	48.0	124	49	1
762	2N19834	2	46.4	98.5	45	79.5	1.9	1	14.5	5.36	38.8	88	62.1	237	25	24
763	2N19835	2	44.1	94.2	49	79.7	1.7	1	13.7	4.81	35.7	104	56.6	425	30	11
764	2N19836	2	44.0	94.7	50	79.5	1.4	1	11.6	4.08	36.0	85	46.8	196	39	2
765	2N19838	2	40.7	94.1	48	79.3	1.8	2	12.8	4.59	36.6	60	61.3	432	26	22
766	2N19839	2	42.0	95.0	50	78.4	1.6	1	15.1	5.41	37.3	119	57.6	203	28	17
767	2N19840	2	42.4	93.8	48	79.3	1.8	1	13.9	5.52	40.0	149	62.5	168	22	27
768	2N19841	2	45.7	95.4	48	77.0	1.6	1	14.8	5.13	35.3	106	54.1	359	23	26
769	2N19842	2	43.5	94.7	53	76.3	1.9	2	14.5	5.23	36.8	98	59.1	304	18	28
770	2N19843	2	43.6	94.0	51	77.3	1.4	1	13.8	4.42	32.2	108	49.3	360	30	11
771	2N19845	2	40.7	93.2	*58	78.3	1.5	1	14.1	5.18	36.8	115	66.2	465	25	24
772	2N19847	2	45.1	93.1	48	79.6	2.6	1	14.7	6.23	43.7	84	79.1	245	27	20
773	2N19848	2	45.1	96.1	53	80.2	2.5	1	13.7	5.77	44.2	77	80.2	227	30	11
774	2N19849	2	43.8	94.7	51	79.6	1.5	1	12.3	4.34	36.2	77	53.5	288	36	6
775	2N19851	2	44.4	93.9	50	77.1	1.3	1	14.4	4.52	31.7	75	49.3	450	26	22
776	2N19852	2	43.2	92.9	47	80.4	n.d.	3	11.7	4.48	39.1	96	56.5	334	38	3
777	2N19854	2	42.4	94.8	50	80.0	1.9	2	12.7	4.68	38.4	97	64.4	256	37	5
778	2N19855	2	42.8	94.8	47	79.6	1.7	2	12.0	4.28	37.7	89	58.1	249	31	10
779	2N19856	2	42.7	93.5	49	78.1	1.5	1	13.6	4.68	35.0	103	58.9	188	30	11
780	2N19857	2	43.1	96.4	49	80.2	1.8	1	12.9	5.24	41.4	81	68.3	215	35	7
781	2N19858	2	42.5	95.2	48	79.1	1.7	1	13.5	5.04	38.6	103	64.3	108	34	8
782	2N19864	2	44.7	95.5	51	77.7	1.2	1	13.6	4.35	33.6	132	47.3	88	30	11

Table 34

Lab No.	Variety	Rowed	Kernel	on	Barley	Malt	Barley	Wort	Alpha-	Beta-					
			Weight	6/64"	Color	Extract	Wort	Wort	Protein	S/T	DP	amylase	glucan	Quality	
			(mg)	(%)	(Agtron)	(%)	Color	Clarity	(%)	(%)	(°ASBC)	(20°DU)	(ppm)	Score	
761	HARRINGTON MALT CHECK	2	38.8	94.8	79	82.3	1.6	1	11.3	4.88	44.4	101	65.5	119	52
Minima			35.7	92.0	45	76.3	1.2		11.6	4.08	31.7	60	40.1	74	18
Maxima			48.0	98.5	53	80.4	2.6		15.3	6.23	44.2	153	80.2	465	49
Means			43.1	94.8	49	78.7	1.7		13.6	4.94	37.3	103	58.9	258	30
Standard Deviations			2.5	1.4	2	1.2	0.3		1.0	0.51	3.1	25	9.0	116	6
Coefficients of Variation			5.9	1.5	4	1.5	19.0		7.4	10.33	8.3	24	15.4	45	21

Malt Check Data are Excluded from Rank Sorting and Statistics

Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics

For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by J. D. Franckowiak and R. D. Horsley, North Dakota State University - Fargo

2001 EXPERIMENT FA42, FARGO PRELIMINARY YIELD TRIAL - FARGO, ND

Table 35

Lab No.	Variety or Selection	Rowed	Kernel	on	Barley	Malt	Barley	Wort	Alpha-	Beta-	Overall					
			Weight	6/64"	Color	Extract	Wort	Wort	Protein	Protein		amylase	glucan	Quality	Score	Rank
783	LACEY	6	37.4	93.4	50	78.6	1.7	1	14.0	5.35	39.1	165	65.2	82	35	6
784	CONLON	2	43.8	96.2	51	78.6	1.6	1	13.5	4.99	37.1	115	66.0	175	33	10
786	DRUMMOND	6	35.6	93.4	60	77.5	1.7	1	14.2	5.28	37.4	169	63.6	77	26	22
787	ND16461-1	2	43.8	94.0	49	78.0	2.0	1	12.5	4.95	40.4	77	63.5	410	33	10
788	2N19868	2	43.8	97.6	51	79.3	1.7	1	14.9	5.98	40.5	140	69.3	148	35	6
789	2N19869	2	42.5	98.3	49	79.8	1.9	1	13.6	5.90	43.8	112	73.9	108	41	2
790	2N19871	2	44.6	95.3	49	77.3	1.7	1	13.9	4.76	34.5	127	53.6	189	33	10
791	2N19872	2	45.4	97.4	53	78.5	1.6	1	14.5	5.12	36.0	104	65.4	98	30	19
792	2N19873	2	43.6	95.1	47	78.7	1.6	1	12.4	4.79	40.1	85	54.4	250	45	1
793	2N19875	2	42.8	94.0	56	79.8	1.6	1	14.3	5.78	40.9	126	75.5	199	37	3
794	2N19877	2	41.8	92.8	48	78.9	1.5	1	13.7	5.07	38.6	117	80.5	228	32	16
795	2N19878	2	40.3	93.0	53	79.7	1.7	1	13.1	4.75	37.4	89	67.1	251	33	10
796	2N19879	2	43.0	96.3	49	79.0	1.8	1	12.9	5.03	41.1	107	67.7	324	37	3
797	2N19880	2	42.7	94.1	45	79.9	2.1	1	12.8	5.11	40.6	81	64.4	379	32	16
798	2N19882	2	43.3	95.7	46	80.3	1.8	1	13.5	5.07	38.8	88	68.8	366	26	22
799	2N19883	2	42.4	96.2	*19	77.1	2.2	1	13.8	4.33	31.4	115	51.5	282	26	22
800	2N19887	2	41.8	96.4	47	77.4	1.4	1	14.6	4.65	32.7	92	55.6	311	18	26
801	2N19888	2	44.8	95.7	42	81.0	1.4	1	13.3	4.63	35.8	71	63.4	235	37	3
802	2N19890	2	42.0	95.0	51	81.0	1.5	1	14.2	5.05	36.8	94	60.4	97	33	10
803	2N19891	2	44.7	95.1	43	79.1	1.8	1	14.2	5.22	37.8	119	57.2	88	33	10
804	2N19899	2	44.2	97.7	47	80.6	2.1	1	12.7	5.30	43.5	74	74.4	256	35	6
805	2N19902	2	48.0	95.0	53	78.2	2.1	1	15.4	5.76	38.4	157	60.2	165	22	25
806	2N19904	2	46.9	96.0	47	77.2	1.8	2	14.7	5.23	35.8	129	58.8	146	28	20
807	2N19905	2	44.2	95.9	44	79.8	1.9	2	12.4	4.81	39.3	77	74.5	395	35	6
808	2N19906	2	48.5	97.6	52	78.4	2.1	2	13.0	4.90	38.9	76	75.2	362	27	21
810	2N19909	2	42.1	94.1	46	79.9	1.6	1	14.4	5.40	40.0	121	69.1	158	32	16
785	HARRINGTON MALT CHECK	2	40.4	94.0	82	81.7	1.5	1	11.6	4.97	44.8	107	68.8	60	50	
809	HARRINGTON MALT CHECK	2	40.3	94.7	80	82.2	1.6	1	11.5	4.87	45.3	112	79.6	36	50	
Minima			35.6	92.8	42	77.1	1.4		12.4	4.33	31.4	71	51.5	77	18	
Maxima			48.5	98.3	60	81.0	2.2		15.4	5.98	43.8	169	80.5	410	45	
Means			43.2	95.4	49	79.0	1.8		13.7	5.12	38.3	109	65.3	222	32	
Standard Deviations			2.7	1.5	4	1.2	0.2		0.8	0.40	2.9	28	7.6	106	6	
Coefficients of Variation			6.3	1.6	8	1.5	12.8		6.0	7.86	7.6	26	11.6	48	18	

Malt Check Data are Excluded from Rank Sorting and Statistics

Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics

For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by J. D. Franckowiak and R. D. Horsley, North Dakota State University - Fargo

2001 EXPERIMENT FA43, FARGO PRELIMINARY YIELD TRIAL - FARGO, ND

Table 36

Lab No.	Variety or Selection	Rowed	Kernel	on	Barley	Malt	Barley	Wort	Alpha-	Beta-	Overall					
			Weight	6/64"	Color	Extract	Wort Color	Wort Clarity	Protein (%)	Protein (%)		amylase (20°DU)	glucan (ppm)	Quality Score	Rank	
811	LACEY	6	36.9	93.3	49	79.2	1.7	1	14.1	5.27	37.8	*182	70.2	59	29	16
812	CONLON	2	43.6	96.3	52	79.3	1.5	1	13.4	4.81	36.1	119	72.6	160	38	2
813	DRUMMOND	6	35.7	92.9	54	77.8	1.9	1	15.4	5.64	37.5	*205	75.4	44	18	30
814	ND16461-1	2	44.0	94.8	47	79.3	1.7	1	12.8	4.67	38.2	82	71.7	368	28	18
815	2N19910	2	40.2	89.3	51	79.3	1.7	1	14.6	5.48	38.5	120	69.5	104	30	14
816	2N19912	2	41.3	94.1	51	81.1	1.5	1	12.2	4.31	36.2	80	57.7	119	38	2
817	2N19916	2	42.1	97.1	52	78.4	*3.0	1	15.0	6.46	43.3	130	93.7	58	31	12
818	2N19918	2	44.4	96.9	46	76.4	1.8	1	16.0	5.34	34.5	100	71.1	81	26	19
819	2N19919	2	44.6	96.9	55	77.9	1.8	1	14.8	5.02	34.0	88	65.3	192	22	25
820	2N19920	2	45.3	95.0	51	76.2	1.1	1	15.2	4.29	28.3	101	53.6	363	20	27
821	2N19921	2	43.1	91.5	47	75.7	1.0	1	14.7	3.87	26.5	95	48.8	379	19	29
822	2N19922	2	43.6	95.7	45	79.3	1.5	1	13.4	4.91	36.9	100	78.6	211	35	6
823	2N19923	2	40.6	92.0	47	79.2	1.8	1	14.1	5.62	40.9	113	71.9	131	37	5
824	2N19926	2	42.9	96.1	48	79.4	1.8	1	13.4	5.20	39.1	103	71.1	115	38	2
825	2N19928	2	39.3	93.9	52	79.5	1.6	1	13.6	4.68	35.5	105	65.9	220	30	14
826	2N19929	2	43.7	94.4	49	78.9	1.8	1	12.9	4.90	39.3	113	69.3	86	42	1
827	2N19930	2	42.4	95.1	50	79.1	2.0	1	13.9	5.60	40.6	101	62.5	72	31	12
828	2N19931	2	42.6	94.3	54	78.3	2.2	2	14.3	5.06	36.5	96	58.5	143	33	8
829	2N19932	2	46.9	96.9	51	80.4	2.0	1	12.7	5.17	41.2	72	78.3	262	35	6
830	2N19934	2	42.2	95.1	50	79.7	1.7	1	13.7	4.76	35.0	116	60.1	320	33	8
831	2N19935	2	40.3	95.6	51	78.9	1.4	1	14.4	4.78	34.2	155	70.9	187	25	23
832	2N19937	2	41.9	94.5	49	79.2	1.8	2	12.9	4.42	34.4	79	59.0	297	29	16
834	2N19941	2	40.9	93.8	44	78.1	2.6	2	14.7	5.57	39.5	137	66.8	46	24	24
835	2N19944	2	45.5	97.2	45	77.6	2.1	2	13.2	4.17	31.9	80	53.5	388	20	27
836	2N19945	2	42.8	94.6	48	78.4	1.5	1	13.7	4.45	33.0	122	55.6	179	33	8
837	2N19947	2	42.0	96.0	56	77.8	1.6	1	14.0	4.75	34.8	126	66.4	99	32	11
838	2N19948	2	46.1	95.5	51	78.8	1.8	1	13.8	4.99	37.2	93	65.5	271	26	19
839	2N19949	2	43.1	97.8	52	78.4	1.8	1	13.7	4.96	37.9	92	66.0	297	26	19
840	2N19950	2	43.2	97.4	50	77.4	1.8	2	13.9	4.65	34.1	92	63.8	234	21	26
841	2N19953	2	43.0	96.3	47	78.4	1.6	1	14.0	5.12	37.8	94	54.7	261	26	19

Table 36

Lab No.	Variety	Rowed	Kernel	on	Barley	Malt	Barley	Wort	Alpha-	Beta-			
			Weight	6/64"	Color	Extract	Wort	Wort	Protein	Protein	amylase	glucan	Quality
		(mg)	(%)	(Agrtron)	(%)	Color	Clarity	(%)	(%)	(%)	(°ASBC)	(20°DU)	Score
833	HARRINGTON MALT CHECK	2	40.6	94.5	81	82.0	1.8	1	11.6	4.98	46.0	109	78.3
Minima			35.7	89.3	44	75.7	1.0		12.2	3.87	26.5	72	48.8
Maxima			46.9	97.8	56	81.1	2.6		16.0	6.46	43.3	155	93.7
Means			42.5	95.0	50	78.6	1.7		14.0	4.96	36.4	104	66.3
Standard Deviations			2.4	1.9	3	1.2	0.3		0.9	0.53	3.6	19	9.2
Coefficients of Variation			5.7	2.0	6	1.5	17.5		6.2	10.72	9.9	19	13.9
													57
													22

Malt Check Data are Excluded from Rank Sorting and Statistics

Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics

For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by J. D. Franckowiak and R. D. Horsley, North Dakota State University - Fargo

2001 EXPERIMENT FA44, FARGO PRELIMINARY YIELD TRIAL - FARGO, ND

Table 37

Lab No.	Variety or Selection	Rowed	Kernel	on	Barley	Malt		Barley	Wort			Alpha-	Beta-	Quality	Overall	
			Weight	6/64"	Color	Extract	Wort Color	Wort Clarity	Protein (%)	Protein (%)	S/T (%)	DP (°ASBC)	amylase (20°DU)	glucan (ppm)		
842	LACEY	6	37.0	94.7	47	78.6	1.7	1	14.0	5.30	38.5	167	65.1	101	30	4
843	CONLON	2	42.1	94.9	51	78.4	1.5	1	14.1	4.86	36.3	124	75.1	196	33	1
844	DRUMMOND	6	35.3	92.3	53	77.9	1.7	1	14.6	5.18	36.8	194	71.1	78	22	16
845	ND16461-1	2	44.1	92.9	49	78.4	1.8	1	13.6	4.65	36.4	82	64.9	439	23	13
846	2N19955	2	45.2	92.6	50	76.5	1.8	1	14.0	4.57	33.2	128	58.9	165	29	5
847	2N19957	2	42.4	94.9	49	78.8	1.6	1	14.3	4.54	32.8	118	67.2	232	33	1
848	2N19961	2	41.2	93.5	47	78.9	1.8	1	14.7	5.32	36.7	120	74.1	154	28	8
849	2N19963	2	43.0	94.7	45	79.7	1.8	1	14.0	5.13	37.1	108	82.2	236	29	5
850	2N19964	2	42.9	96.5	44	77.4	1.6	1	14.8	5.21	36.2	133	80.5	198	22	16
851	2N19970	2	42.0	96.1	55	79.2	2.9	2	14.4	5.86	40.9	112	91.6	160	33	1
852	2N19972	2	43.3	96.0	57	76.4	1.8	1	14.5	5.00	34.9	107	60.8	379	23	13
853	2N19973	2	35.4	*77.4	51	76.3	1.6	1	14.1	4.67	33.9	109	64.6	312	13	21
854	2N19974	2	41.6	91.8	46	77.0	2.0	1	14.1	5.07	36.3	143	65.6	217	21	20
855	2N19975	2	46.8	98.0	51	76.7	1.7	1	14.3	5.09	37.4	136	65.1	357	23	13
856	2N19978	2	43.7	95.0	50	77.7	2.0	1	15.3	5.16	35.7	115	67.5	474	22	16
858	2N19981	2	42.7	93.4	47	77.2	1.7	1	13.4	4.40	33.0	77	61.0	398	24	12
859	2N19983	2	42.0	92.4	51	75.5	1.3	1	15.1	4.32	30.3	118	48.2	378	25	11
860	2N19985	2	46.1	93.7	42	78.1	2.6	1	13.5	5.24	38.9	103	69.2	279	26	9
861	2N19991	2	42.4	98.1	50	78.6	2.6	1	14.3	5.42	39.6	97	68.5	285	26	9
862	2N19997	2	42.7	96.1	51	77.6	1.8	1	14.2	4.58	33.6	89	65.3	178	22	16
863	2N19999	2	40.1	91.7	49	78.1	1.7	1	14.0	4.67	34.2	96	71.9	175	29	5
857	HARRINGTON MALT CHECK	2	39.8	94.7	78	82.0	1.9	1	11.8	4.96	45.4	111	78.5	48	51	
Minima			35.3	91.7	42	75.5	1.3		13.4	4.32	30.3	77	48.2	78	13	
Maxima			46.8	98.1	57	79.7	2.9		15.3	5.86	40.9	194	91.6	474	33	
Means			42.0	94.5	49	77.8	1.9		14.3	4.96	35.8	118	68.5	257	26	
Standard Deviations			3.0	1.9	4	1.1	0.4		0.5	0.39	2.5	27	9.1	112	5	
Coefficients of Variation			7.2	2.0	7	1.4	20.6		3.4	7.84	7.1	23	13.3	44	19	

Malt Check Data are Excluded from Rank Sorting and Statistics

Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics

For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by J. D. Franckowiak and R. D. Horsley, North Dakota State University - Fargo

2001 EXPERIMENT FA45, FARGO PRELIMINARY YIELD TRIAL - FARGO, ND

Table 38

Lab No.	Variety or Selection	Rowed	Kernel	on	Barley	Malt	Barley	Wort	Alpha-	Beta-	Overall					
			Weight	6/64"	Color	Extract	Wort Color	Wort Clarity	Protein (%)	Protein (%)		amylase (°ASBC)	glucan (ppm)	Quality Score	Rank	
864	LACEY	6	36.8	91.8	51	78.1	1.8	1	14.8	5.18	36.4	176	70.0	73	26	11
865	CONLON	2	44.7	95.7	51	78.2	1.6	1	14.0	4.79	34.8	125	70.8	139	37	3
866	DRUMMOND	6	35.8	93.6	53	77.5	1.7	1	14.4	4.98	36.1	196	68.1	77	22	21
867	ND16461-1	2	44.0	94.6	46	77.7	2.0	2	13.3	4.65	36.0	85	63.2	392	23	20
868	2N20000	2	44.5	93.5	47	79.8	2.1	1	14.1	5.25	37.5	76	69.6	243	25	17
869	2N20002	2	44.0	96.4	51	77.4	1.6	1	14.5	4.99	34.6	110	63.0	405	26	11
870	2N20005	2	42.4	96.2	47	78.1	1.8	1	13.3	4.31	32.4	53	54.3	517	25	17
871	2N20007	2	45.3	94.7	50	77.2	2.0	1	13.8	4.47	33.5	92	63.7	449	19	23
872	2N20009	2	43.6	96.0	55	77.3	1.5	1	14.3	4.47	32.2	85	58.4	381	19	23
873	2N20011	2	40.0	95.1	49	77.9	1.4	1	14.8	5.28	36.8	105	63.8	300	19	23
874	2N20012	2	43.2	93.7	51	77.3	1.3	1	14.5	4.46	32.6	90	48.8	396	26	11
875	2N20013	2	42.6	93.6	47	77.5	1.3	1	14.4	4.70	32.8	101	48.4	410	30	8
876	2N20014	2	42.9	94.6	49	79.1	1.4	1	14.4	4.98	35.8	103	52.0	187	34	5
877	2N20016	2	46.7	96.5	52	79.0	1.5	1	14.8	5.22	36.2	87	47.6	359	26	11
878	2N20020	2	44.8	96.2	49	80.1	1.9	1	11.6	4.82	42.9	61	58.3	214	44	1
879	2N20025	2	42.5	94.0	49	78.1	2.3	1	16.3	6.37	39.6	122	58.5	231	26	11
880	2N20028	2	39.6	*88.2	50	77.6	1.5	1	14.2	4.55	34.4	111	58.4	170	24	19
882	2N20029	2	44.0	95.3	50	77.3	1.5	1	15.6	5.40	35.0	92	56.9	319	15	26
883	2N20031	2	43.7	92.3	55	75.2	1.3	1	15.2	4.58	31.0	79	44.9	374	26	11
884	2N20032	2	48.2	97.1	53	78.2	1.7	1	13.3	4.86	38.9	138	67.1	113	39	2
885	2N20033	2	48.8	97.4	49	78.1	1.7	1	13.5	4.95	38.0	140	64.8	130	34	5
886	2N20034	2	44.2	96.7	49	77.6	1.6	1	13.6	4.48	33.5	83	51.2	91	30	8
887	2N20037	2	40.2	95.3	48	77.7	2.2	1	14.9	5.67	38.6	93	52.3	43	21	22
888	2N20038	2	44.5	96.5	51	80.6	2.4	1	13.2	5.77	45.4	76	66.1	206	35	4
889	2N20040	2	47.7	98.0	49	79.5	2.0	1	13.4	4.97	39.4	69	65.4	221	34	5
890	2N20041	2	46.1	96.8	48	77.5	1.7	1	14.0	4.97	35.9	108	59.7	95	30	8
881	HARRINGTON MALT CHECK	2	39.8	94.5	83	81.7	1.6	1	12.0	5.13	46.0	118	77.9	34	39	
Minima			35.8	91.8	46	75.2	1.3		11.6	4.31	31.0	53	44.9	43	15	
Maxima			48.8	98.0	55	80.6	2.4		16.3	6.37	45.4	196	70.8	517	44	
Means			43.5	95.3	50	78.1	1.7		14.2	4.97	36.2	102	59.4	251	28	
Standard Deviations			3.1	1.6	2	1.1	0.3		0.9	0.47	3.3	33	7.6	137	7	
Coefficients of Variation			7.1	1.7	5	1.4	18.3		6.5	9.51	9.2	32	12.8	54	25	

Malt Check Data are Excluded from Rank Sorting and Statistics

Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics

For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by J. D. Franckowiak and R. D. Horsley, North Dakota State University - Fargo

2001 EXPERIMENT FA46, FARGO PRELIMINARY YIELD TRIAL - FARGO, ND

Table 39

Lab No.	Variety or Selection	Rowed	Kernel	on	Barley	Malt	Barley	Wort	Alpha-	Beta-	Overall					
			Weight (mg)	6/64" (%)	Color (Agtron)	Extract (%)	Wort Color	Wort Clarity	Protein (%)	Protein (%)		DP (°ASBC)	amylase (20°DU)	glucan (ppm)	Quality Score	Rank
891	LACEY	6	35.2	91.7	54	78.4	1.7	1	14.3	5.22	38.5	162	63.6	53	30	10
892	CONLON	2	43.5	97.0	50	78.8	1.7	1	13.5	5.09	39.7	104	69.2	156	30	10
893	DRUMMOND	6	34.9	93.2	58	77.2	1.7	1	14.4	5.31	37.6	168	64.4	87	26	18
894	ND16461-1	2	43.2	93.1	46	77.7	1.9	2	12.9	4.74	38.4	77	58.7	359	23	20
895	2N20046	2	46.3	97.2	44	78.3	1.9	1	15.4	5.57	37.1	88	66.9	196	22	21
896	2N20047	2	46.0	96.4	45	78.7	3.0	1	15.0	6.63	44.6	80	62.6	90	28	13
897	2N20048	2	41.9	94.1	50	79.0	3.0	1	13.7	6.04	45.3	94	66.3	32	20	22
898	2N20049	2	41.6	93.9	40	78.7	1.8	1	13.0	5.03	41.6	113	63.9	217	42	1
899	2N20052	2	43.1	95.4	46	79.6	1.5	1	14.3	5.50	38.9	118	69.8	195	32	7
900	2N20056	2	41.7	95.0	47	76.9	1.4	1	15.0	4.50	31.8	120	51.7	295	32	7
901	2N20060	2	43.9	93.7	53	80.1	2.5	1	14.8	6.41	43.7	99	70.5	103	35	4
902	2N20063	2	43.2	96.9	53	81.2	2.0	1	13.6	5.79	45.0	92	61.5	203	33	6
904	2N20065	2	43.1	95.9	53	81.0	2.2	1	15.1	6.41	43.9	115	77.3	162	37	2
905	2N20071	2	40.2	97.3	62	81.3	2.8	1	13.0	6.03	48.7	63	76.1	207	29	12
906	2N20072	2	41.9	98.2	53	80.5	2.5	1	12.8	5.71	45.7	65	81.7	215	34	5
907	2N20077	2	40.2	94.5	47	79.3	2.7	1	14.5	6.25	43.4	101	83.5	108	31	9
908	2N20082	2	46.3	95.8	49	79.8	2.2	1	13.7	5.61	41.2	81	74.1	304	27	16
909	2N20083	2	42.5	94.9	54	80.5	2.9	1	13.5	6.28	47.3	72	80.9	204	27	16
910	2N20084	2	42.2	97.6	49	78.7	3.1	1	14.4	6.21	43.3	84	71.4	129	28	13
911	2N20085	2	41.6	95.8	48	78.4	1.7	1	13.6	4.87	36.2	88	61.8	245	25	19
912	2N20086	2	38.0	95.0	51	79.7	2.5	1	13.5	5.43	40.6	96	67.6	160	36	3
913	2N20087	2	38.1	93.9	49	79.2	2.2	1	14.0	5.37	41.4	103	66.7	241	28	13
914	2N20088	2	40.8	96.5	56	77.5	1.7	1	15.9	5.65	36.7	104	73.9	318	18	23
903	HARRINGTON MALT CHECK	2	39.8	94.6	81	82.0	1.6	1	11.9	5.02	45.1	104	72.8	32	45	
Minima			34.9	91.7	40	76.9	1.4		12.8	4.50	31.8	63	51.7	32	18	
Maxima			46.3	98.2	62	81.3	3.1		15.9	6.63	48.7	168	83.5	359	42	
Means			41.7	95.3	50	79.2	2.2		14.1	5.64	41.3	99	68.9	186	29	
Standard Deviations			3.0	1.7	5	1.3	0.5		0.9	0.58	4.1	26	7.8	86	6	
Coefficients of Variation			7.2	1.8	10	1.6	24.3		6.1	10.30	9.9	26	11.3	46	19	

Malt Check Data are Excluded from Rank Sorting and Statistics

Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics

For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by J. D. Franckowiak and R. D. Horsley, North Dakota State University - Fargo

2001 EXPERIMENT FA47, FARGO PRELIMINARY YIELD TRIAL - FARGO, ND

Table 40

Lab No.	Variety or Selection	Rowed	Kernel	on	Barley	Malt	Barley	Wort	Alpha-	Beta-	Overall				
			Weight	6/64"	Color	Extract	Wort	Protein	Protein	S/T	DP	amylase	glucan	Quality	Rank
915	LACEY	6	36.0	93.8	49	78.5	1.7	1	15.0	5.48	37.6	148	61.2	125	33 2
916	CONLON	2	34.9	89.6	57	77.9	1.7	1	15.3	5.42	36.0	178	63.6	119	15 27
917	DRUMMOND	6	44.6	95.7	51	79.2	1.6	1	14.1	5.03	35.8	106	65.1	247	29 10
918	ND16461-1	2	43.9	96.1	50	78.9	1.9	1	12.7	4.92	40.6	70	62.9	394	33 2
919	2N20090	2	41.6	91.5	43	77.6	1.7	1	14.7	5.06	35.8	68	58.0	310	18 25
920	2N20091	2	43.5	95.3	46	79.6	3.2	1	14.8	6.23	42.4	75	65.1	151	27 14
921	2N20097	2	41.4	94.6	49	79.4	2.3	1	14.5	5.87	41.0	108	65.3	151	33 2
922	2N20098	2	38.8	92.0	44	78.5	2.5	1	15.0	5.68	38.5	107	62.5	89	27 14
923	2N20105	2	40.4	96.0	48	81.7	2.9	1	14.9	6.17	42.7	67	68.9	205	29 10
925	2N20107	2	41.2	95.0	45	79.5	3.4	1	15.5	6.77	45.1	89	78.0	112	30 5
926	2N20108	2	40.3	96.8	48	78.8	2.0	1	14.3	5.85	41.3	108	75.6	301	27 14
927	2N20109	2	41.7	95.0	47	78.9	2.1	1	14.2	5.78	41.8	85	67.0	291	26 17
928	2N20111	2	40.2	93.0	51	79.0	1.7	1	14.8	5.46	37.8	114	64.6	197	28 13
929	2N20114	2	38.5	95.8	51	79.2	1.7	1	14.4	5.29	37.1	87	66.8	466	16 26
930	2N20117	2	43.1	95.0	50	80.1	1.8	1	13.5	5.49	41.9	85	71.9	214	30 5
931	2N20118	2	45.9	95.5	51	79.8	1.9	1	14.3	5.72	40.9	90	68.7	284	30 5
932	2N20119	2	44.8	98.0	49	79.9	1.4	1	14.3	4.81	34.8	147	69.5	289	29 10
933	2N20120	2	42.8	93.9	51	76.4	1.4	1	15.3	5.92	39.8	123	61.9	358	22 23
934	2N20121	2	44.1	97.7	53	79.8	1.4	1	13.4	5.47	42.2	89	59.5	147	39 1
935	2N20122	2	43.8	95.2	46	78.1	1.4	1	14.3	5.32	39.3	95	53.4	227	30 5
936	2N20125	2	42.9	94.4	47	78.1	1.6	1	15.7	5.96	39.1	130	62.2	377	23 22
937	2N20126	2	45.6	95.8	47	79.8	1.6	1	12.6	5.84	47.3	84	72.8	264	30 5
938	2N20127	2	48.7	97.3	46	79.2	n.d.	3	14.0	5.83	42.7	64	52.2	452	26 17
939	2N20128	2	44.9	95.8	47	75.0	1.4	1	16.4	5.56	34.7	120	51.7	459	26 17
940	2N20131	2	45.9	95.8	48	78.9	1.8	1	14.0	6.09	44.1	85	65.1	205	24 20
941	2N20132	2	42.4	96.7	49	78.6	1.5	1	15.1	6.36	42.7	90	66.2	338	21 24
942	2N20134	2	38.7	*79.1	39	83.5	1.8	2	15.5	5.44	37.4	101	53.2	559	24 20
924	HARRINGTON MALT CHECK	2	39.7	94.1	84	82.4	1.6	1	12.1	5.12	44.7	108	72.5	50	44
Minima			34.9	89.6	39	75.0	1.4		12.6	4.81	34.7	64	51.7	89	15
Maxima			48.7	98.0	57	83.5	3.4		16.4	6.77	47.3	178	78.0	559	39
Means			42.2	95.1	48	79.0	1.9		14.5	5.66	40.0	101	64.2	272	27
Standard Deviations			3.1	1.9	3	1.5	0.5		0.9	0.45	3.3	27	6.7	124	5
Coefficients of Variation			7.4	2.0	7	1.9	28.7		6.0	8.01	8.1	27	10.4	46	20

Malt Check Data are Excluded from Rank Sorting and Statistics

Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics

For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by J. D. Franckowiak and R. D. Horsley, North Dakota State University - Fargo

2001 EXPERIMENT FA48, FARGO PRELIMINARY YIELD TRIAL - FARGO, ND

Table 41

Lab No.	Variety or Selection	Rowed	Kernel	on	Barley	Malt	Barley	Wort	Alpha-	Beta-	Quality	Overall				
			Weight	6/64"	Color	Extract	Wort	Wort	Protein	Protein						
943	LACEY	6	35.5	91.8	51	78.3	2.0	1	14.9	5.85	40.8	146	59.3	133	42	1
944	CONLON	2	44.8	96.3	51	78.9	1.9	1	13.7	5.61	42.0	103	62.8	269	31	4
946	DRUMMOND	6	35.9	94.2	50	78.3	1.9	1	14.9	6.03	42.6	178	64.9	106	28	7
947	ND16461-1	2	42.4	90.8	45	78.5	2.5	2	12.9	5.54	43.7	65	55.6	365	28	7
948	2N20135	2	42.1	93.9	45	78.3	2.3	1	14.5	5.88	40.9	80	61.4	207	27	9
949	2N20137	2	44.1	94.0	50	77.4	1.8	1	14.2	5.50	39.4	92	61.1	316	15	24
950	2N20138	2	41.9	90.8	46	77.2	1.8	1	14.6	5.71	40.8	127	68.1	312	26	12
951	2N20140	2	40.2	92.3	50	77.4	1.5	1	14.0	5.60	39.4	124	69.7	292	24	15
952	2N20142	2	41.1	92.7	48	77.5	n.d.	3	14.4	5.36	39.3	91	55.8	347	12	25
953	2N2146	2	39.0	96.9	47	79.0	2.8	1	15.3	6.81	45.9	66	72.3	128	25	13
954	2N20148	2	44.0	97.3	49	76.4	1.7	1	15.0	5.97	40.7	144	57.0	146	27	9
955	2N20153	2	42.5	90.7	48	76.5	1.8	1	14.8	5.50	37.4	114	64.3	222	25	13
956	2N20154	2	41.8	93.8	52	77.9	2.0	1	13.8	5.91	45.0	90	50.4	334	23	16
957	2N20159	2	43.6	94.5	45	77.4	1.6	1	13.7	4.90	38.6	82	50.0	374	23	16
958	2N20160	2	46.9	96.0	42	77.7	1.9	1	13.5	5.01	38.5	101	58.3	419	23	16
959	2N20163	2	44.7	96.2	52	77.9	2.6	1	15.2	6.09	42.1	70	55.9	361	17	23
960	2N20164	2	40.0	94.2	53	77.7	1.4	1	15.2	5.50	37.4	102	53.4	366	20	21
961	2N20165	2	41.4	94.3	52	78.3	3.0	1	14.6	6.37	43.5	84	57.5	281	23	16
962	2N20166	2	43.2	94.2	41	77.7	2.1	1	13.6	6.00	44.1	106	64.2	208	27	9
963	2N20169	2	44.7	95.7	37	79.0	2.0	1	14.8	5.57	39.2	106	63.2	317	23	16
964	2N20171	2	43.0	93.9	40	78.6	1.8	1	14.9	5.93	40.9	115	68.5	283	34	2
965	2N20172	2	38.4	91.1	43	79.5	1.7	1	14.3	5.63	40.9	111	69.8	384	31	4
966	2N20173	2	42.1	94.2	44	78.1	1.7	1	15.3	5.84	38.8	94	60.6	367	19	22
967	2N20177	2	43.0	92.4	42	80.5	1.5	1	13.9	5.98	44.7	134	65.7	62	34	2
968	2N20179	2	43.6	94.5	40	79.9	1.3	1	13.7	5.36	39.3	103	56.4	213	29	6
945	HARRINGTON MALT CHECK	2	39.6	94.5	81	81.9	1.9	1	11.8	5.57	49.6	110	78.8	52	39	
969	HARRINGTON MALT CHECK	2	40.3	93.5	73	82.4	1.7	1	11.9	5.66	49.6	124	82.4	40	44	

Minima	35.5	90.7	37	76.4	1.3		12.9	4.90	37.4	65	50.0	62	12
Maxima	46.9	97.3	53	80.5	3.0		15.3	6.81	45.9	178	72.3	419	42
Means	42.0	93.9	47	78.2	1.9		14.4	5.74	41.0	105	61.0	273	25
Standard Deviations	2.7	1.9	5	1.0	0.4		0.7	0.40	2.4	27	6.1	99	6
Coefficients of Variation	6.4	2.0	10	1.2	21.9		4.5	6.97	5.9	25	10.0	36	25

Malt Check Data are Excluded from Rank Sorting and Statistics

Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics

For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by J. D. Franckowiak and R. D. Horsley, North Dakota State University - Fargo

2001 EXPERIMENT FA49, FARGO PRELIMINARY YIELD TRIAL - FARGO, ND

Table 42

Lab No.	Variety or Selection	Rowed	Kernel	on	Barley	Malt	Barley	Wort	Alpha-	Beta-	Overall					
			Weight	6/64"	Color	Extract	Wort Color	Wort Clarity	Protein (%)	Protein (%)		amylase (20°DU)	glucan (ppm)	Quality Score	Rank	
970	LACEY	6	36.7	92.1	43	79.7	1.8	1	14.0	5.83	42.7	178	67.6	72	35	3
971	CONLON	2	43.1	95.5	46	80.7	1.6	1	13.3	5.41	42.5	114	71.3	211	42	1
972	DRUMMOND	6	34.9	92.4	53	79.7	1.7	1	14.1	5.89	43.4	182	70.5	68	30	11
973	ND16461-1	2	42.6	93.4	39	79.5	1.9	1	13.1	5.73	44.7	82	69.3	378	32	8
974	2N20180	2	46.4	95.7	38	77.7	1.9	1	13.9	5.85	42.6	108	69.1	295	27	16
975	2N2184	2	45.6	95.9	40	78.3	1.7	2	13.4	4.98	39.6	98	58.9	203	34	5
976	2N20185	2	46.3	96.5	38	77.9	1.6	2	14.4	5.25	38.8	130	40.6	368	28	15
977	2N18318	2	43.4	93.4	44	78.3	1.6	1	14.0	5.44	39.6	139	51.7	246	30	11
978	2N20186	2	48.5	97.3	48	79.4	1.9	1	14.4	6.29	44.0	124	61.5	156	31	9
979	2N20187	2	41.2	91.3	38	79.0	1.8	1	13.6	5.62	42.6	97	65.2	345	27	16
980	2N20188	2	39.5	90.2	47	76.4	1.8	2	16.3	4.97	31.5	128	45.2	437	29	13
981	2N20190	2	45.0	96.7	53	79.4	1.6	1	13.8	5.30	38.4	89	55.1	202	25	20
982	2N20192	2	44.7	97.1	59	80.1	1.5	1	14.0	5.66	41.6	106	62.9	182	34	5
983	2N20193	2	46.5	97.1	45	78.5	1.7	1	15.6	5.94	39.9	118	59.8	234	29	13
984	2N20194	2	46.1	97.9	51	79.6	2.8	1	14.6	7.03	50.7	85	72.7	121	26	18
985	2N20195	2	45.8	94.5	48	77.6	1.9	1	15.3	6.05	40.6	102	65.7	262	24	23
986	2N20200	2	47.5	96.3	49	80.0	1.9	2	13.0	5.11	41.8	70	63.6	405	31	9
987	2N20201	2	46.8	97.0	46	77.1	1.6	1	16.4	5.10	33.0	130	57.5	249	22	27
988	2N20202	2	44.5	97.3	40	76.3	1.9	2	15.8	5.28	33.5	121	56.3	242	24	23
989	2N20203	2	45.6	96.9	48	79.9	2.7	2	14.1	6.53	47.3	65	67.7	101	25	20
990	2N20204	2	41.9	92.9	52	78.6	1.4	1	14.7	5.32	37.9	84	51.7	315	22	27
992	2N20205	2	44.4	96.8	45	80.7	1.9	1	13.2	5.28	42.8	54	56.4	273	35	3
993	2N20206	2	43.3	95.4	43	81.3	1.7	1	12.0	5.18	44.7	65	57.3	342	40	2
994	2N20211	2	44.0	93.5	50	77.9	1.4	1	15.3	5.75	38.5	107	50.1	298	26	18
995	2N20213	2	42.4	92.6	55	80.2	2.2	1	13.7	6.47	50.2	126	80.8	147	33	7
996	2N20215	2	37.0	*79.6	53	77.7	1.8	1	15.2	6.14	42.4	135	56.6	106	18	31
997	2N20216	2	41.4	94.4	44	77.1	1.9	1	15.4	5.92	39.7	111	69.7	209	24	23
998	2N20217	2	44.2	97.5	43	78.1	2.0	1	15.2	6.23	42.6	105	69.1	323	25	20
999	2N20218	2	39.1	94.0	44	80.4	2.4	1	14.0	6.88	51.5	100	80.6	70	23	26
1000	2N20220	2	46.8	94.8	45	77.7	1.9	1	13.5	5.01	37.1	90	59.3	403	19	29

Table 42

Lab No.	Variety or Selection	Rowed	Kernel	on	Barley	Malt	Barley	Wort	Alpha-	Beta-	Overall					
			Weight 6/64"	(%)	Color (Agrton)	Extract (%)	Wort Color	Wort Clarity	Protein (%)	Protein (%)		amylase glucan	Quality Score	Rank		
1001	2N20221	2	48.5	97.0	56	74.2	2.0	1	*18.5	6.97	37.6	121	75.9	431	19	29
969	HARRINGTON MALT CHECK	2	40.3	93.5	73	82.4	1.7	1	11.9	5.66	49.6	124	82.4	40	44	
991	HARRINGTON MALT CHECK	2	40.0	94.6	77	81.9	1.6	1	11.7	5.68	49.1	114	74.7	39	41	
Minima			34.9	90.2	38	74.2	1.4		12.0	4.97	31.5	54	40.6	68	18	
Maxima			48.5	97.9	59	81.3	2.8		16.4	7.03	51.5	182	80.8	437	42	
Means			43.7	95.1	47	78.7	1.9		14.3	5.76	41.4	109	62.6	248	28	
Standard Deviations			3.4	2.1	6	1.6	0.3		1.0	0.59	4.7	29	9.6	111	6	
Coefficients of Variation			7.8	2.2	12	2.0	17.3		7.2	10.34	11.3	27	15.3	45	21	

Malt Check Data are Excluded from Rank Sorting and Statistics

Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics

For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by J. D. Franckowiak and R. D. Horsley, North Dakota State University - Fargo

2001 EXPERIMENT 21, PRELIMINARY YIELD TRIAL - FARGO, ND

Table 43

Lab No.	Variety or Selection	Rowed	Kernel	on	Barley	Malt	Barley	Wort	Alpha-	Beta-	Overall					
			Weight	6/64"	Color	Extract	Wort	Wort	Protein	Protein		amylase	glucan	Quality	Score	Rank
1172	MOREX	6	33.0	*85.5	57	78.5	1.6	1	14.8	5.83	41.1	165	61.4	204	31	17
1173	ROBUST	6	34.8	93.6	55	79.1	1.5	1	14.2	5.98	43.0	159	*52.1	240	44	3
1174	STANDER	6	34.9	91.7	53	79.5	2.0	2	13.9	6.28	45.9	154	65.2	196	38	5
1175	FOSTER	6	35.5	94.0	54	79.1	1.6	1	13.5	5.79	45.1	145	58.3	277	46	1
1176	DRUMMOND	6	34.4	92.9	62	78.9	1.7	1	14.8	6.06	43.7	172	64.6	165	27	22
1177	ND19467	6	35.7	93.7	52	79.1	2.0	1	14.9	6.64	46.6	145	66.2	260	29	20
1178	ND19468	6	38.0	95.1	51	79.7	1.8	1	14.1	6.35	47.0	126	66.6	108	26	24
1179	ND19470	6	35.3	94.3	49	79.1	2.3	1	12.1	5.39	46.5	86	61.8	495	32	14
1180	ND19474	6	35.3	93.3	49	79.1	1.9	1	12.6	5.82	47.8	89	58.8	345	31	17
1181	ND19478	6	34.7	90.9	52	78.9	1.7	1	13.9	5.77	43.3	134	64.1	229	36	8
1182	ND19480	6	34.5	93.5	48	79.4	2.2	1	13.4	5.95	45.8	111	62.6	400	32	14
1183	ND19482	6	36.0	94.6	52	78.8	1.7	1	13.8	5.96	44.4	139	65.5	236	36	8
1184	ND19484	6	33.1	92.4	55	78.7	2.1	1	14.2	6.04	43.9	116	65.8	375	21	28
1185	ND19486	6	36.4	96.4	53	79.4	1.8	1	14.3	5.98	42.6	145	63.3	315	34	12
1186	ND19491	6	34.6	90.9	52	*80.9	2.4	1	11.8	5.23	46.3	99	65.3	403	39	4
1187	ND19493	6	34.8	89.4	48	79.9	2.1	1	11.4	5.18	46.2	102	63.9	387	36	8
1188	ND19495	6	36.1	93.3	43	80.2	1.9	1	11.6	5.33	49.0	72	60.9	327	35	11
1189	ND19498	6	34.9	93.6	56	79.4	2.1	1	14.0	6.40	46.8	128	68.2	169	27	22
1190	ND19500	6	36.4	96.9	57	79.4	2.0	1	14.3	6.49	47.7	149	68.7	157	29	20
1191	ND19524	6	34.9	92.0	59	79.2	1.3	1	14.1	5.64	41.9	165	63.1	218	34	12
1192	ND19525	6	34.7	93.5	58	79.3	1.5	1	14.4	5.97	42.9	163	66.8	127	38	5
1193	ND19527	6	37.4	95.1	55	79.2	2.3	1	13.9	6.32	47.6	117	64.9	315	24	25
1194	ND19538	6	35.4	93.7	57	78.7	1.8	1	15.3	5.93	41.2	196	72.1	85	31	17
1196	ND19542	6	37.9	96.3	56	78.1	2.1	1	15.6	6.81	44.8	177	67.1	304	21	28
1197	ND19551	6	35.9	95.4	62	78.9	1.9	1	14.6	6.01	43.1	167	68.5	121	32	14
1198	ND19552	6	35.0	95.7	62	79.7	2.1	1	13.5	5.75	44.3	159	70.7	108	46	1
1199	ND19556	6	34.9	95.1	60	78.9	n.d.	3	14.5	5.69	39.5	161	61.5	74	24	25
1200	ND19557	6	34.4	94.5	57	79.0	1.9	1	13.6	6.09	47.6	145	65.5	140	38	5
1201	ND19571	6	34.8	96.1	60	78.5	2.1	2	14.6	6.22	45.3	190	67.5	199	23	27

Table 43

Lab No.	Variety	Rowed	Kernel	on	Barley	Malt	Barley	Wort	Alpha-	Beta-	Overall				
			Weight	6/64"	Color	Extract	Wort Color	Wort Clarity	Protein (%)	Protein (%)	S/T	DP	amylase (°ASBC)	glucan (20°DU) (ppm)	Score
1195	MOREX MALT CHECK	6	31.9	73.4	75	80.3	2.1	1	12.8	5.99	50.3	131	77.4	52	34
Minima			33.0	89.4	43	78.1	1.3		11.4	5.18	39.5	72	58.3	74	21
Maxima			38.0	96.9	62	80.2	2.4		15.6	6.81	49.0	196	72.1	495	46
Means			35.3	93.9	55	79.1	1.9		13.9	5.96	44.9	140	65.0	241	32
Standard Deviations			1.2	1.8	5	0.4	0.3		1.1	0.39	2.3	31	3.3	110	7
Coefficients of Variation			3.3	1.9	9	0.6	13.9		7.7	6.60	5.2	22	5.0	46	21

Malt Check Data are Excluded from Rank Sorting and Statistics

Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics

For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by R. D. Horsley and J. D. Franckowiak, North Dakota State University - Fargo

2001 EXPERIMENT 22A, PRELIMINARY YIELD TRIAL - FARGO, ND

Table 44

Lab No.	Variety or Selection	Rowed	Kernel	on	Barley	Malt	Barley	Wort	Alpha-	Beta-	Overall					
			Weight	6/64"	Color	Extract	Wort	Wort	Protein	Protein		amylase	glucan	Quality	Score	Rank
1202	MOREX	6	33.4	88.0	54	78.5	1.8	2	15.1	5.85	41.3	168	64.7	174	30	20
1203	ROBUST	6	36.0	92.5	56	78.7	1.7	1	15.2	6.09	42.5	165	58.1	226	32	17
1204	STANDER	6	35.0	92.4	50	78.9	2.4	1	14.8	6.43	45.4	157	74.5	203	34	13
1205	FOSTER	6	34.4	92.6	59	79.3	2.0	2	12.9	5.59	46.7	132	62.2	203	33	15
1206	DRUMMOND	6	34.8	93.0	59	79.3	1.9	1	14.6	5.94	42.6	175	67.5	147	34	13
1207	ND19580	6	34.4	95.1	58	79.6	2.5	1	14.1	6.73	49.9	149	69.8	96	33	15
1208	ND19583	6	34.7	94.7	58	80.0	2.1	1	13.6	6.05	47.8	160	69.4	90	41	8
1209	ND19584	6	33.9	94.0	54	79.8	2.5	1	14.8	6.54	47.2	173	72.2	136	26	24
1210	ND19585	6	33.1	*83.3	57	77.8	2.7	1	15.6	6.87	44.3	197	61.0	28	17	32
1211	ND19587	6	36.4	95.9	56	79.7	2.5	1	14.5	6.62	48.7	162	73.6	174	26	24
1212	ND19590	6	34.2	93.7	61	80.3	2.0	1	13.3	5.81	46.6	145	71.2	116	44	4
1213	ND19595	6	34.3	94.8	62	79.5	2.0	1	14.3	6.07	45.1	156	64.4	129	38	10
1214	ND19602	6	37.1	94.9	63	79.1	2.7	1	14.6	6.68	47.4	160	64.9	154	29	22
1215	ND19604	6	35.2	91.7	57	79.2	2.2	1	14.9	6.69	47.2	192	68.9	151	22	27
1216	ND19607	6	35.2	94.1	54	78.8	2.4	1	15.7	6.49	44.0	184	72.5	211	24	26
1217	ND19609	6	36.7	93.4	55	80.8	2.1	1	13.6	5.98	45.7	165	70.6	165	42	6
1218	ND19610	6	35.8	95.0	55	80.4	2.3	1	13.5	5.76	45.9	161	70.0	132	46	2
1220	ND19613	6	35.8	94.7	50	78.3	2.5	2	14.8	6.17	44.2	153	67.2	232	30	20
1221	ND19614	6	35.5	93.6	57	78.3	2.2	1	14.6	6.09	43.8	180	68.5	126	28	23
1222	ND19615	6	36.9	96.0	51	78.4	2.5	1	15.0	6.36	44.7	159	65.8	186	31	18
1223	ND19618	6	36.3	89.6	57	78.2	1.9	2	13.3	5.27	40.6	157	65.6	121	46	2
1224	ND19619	6	36.8	92.4	53	78.3	2.1	2	13.6	5.44	42.1	147	62.8	119	42	6
1225	ND19620	6	37.1	94.9	59	79.5	n.d.	3	13.5	5.59	42.9	162	63.9	175	37	11
1226	ND19621	6	34.7	89.8	55	78.4	n.d.	3	13.8	5.18	38.9	154	60.6	108	40	9
1227	ND19626	6	37.1	94.8	50	77.9	2.1	2	16.2	6.25	41.1	188	66.6	238	19	31
1228	ND19627	6	36.3	94.1	42	76.0	1.9	1	15.3	6.01	41.1	194	67.2	173	20	28
1229	ND19631	6	35.8	93.2	51	78.3	2.0	1	14.0	5.80	43.5	181	64.9	83	36	12
1230	ND19632	6	34.6	90.5	58	78.8	2.3	1	14.0	5.74	43.0	157	58.7	102	47	1
1231	ND19633	6	35.5	93.1	49	77.7	2.2	1	15.0	6.02	41.6	191	63.3	153	20	28
1232	ND19634	6	35.2	92.1	48	77.0	2.1	1	15.2	6.07	41.1	171	62.7	176	20	28

Table 44

Lab No.	Variety or Selection	Rowed	Kernel	on	Barley	Malt	Barley	Wort	Alpha-	Beta-	Overall						
			Weight	6/64"	Color	Extract	Wort	Wort	S/T	DP	amylase	glucan	Quality	Score	Rank		
(mg)	(%)	(Agrton)	(%)	Color	Clarity	(%)	(%)	(%)	(%)	(°ASBC)	(20°DU)	(ppm)					
1233	ND19641	6	36.2	92.7	51	78.0	2.0	1	14.8	5.93	41.7	160	62.5	170	31	18	
1234	ND19642	6	35.7	91.6	53	78.2	2.2	1	13.9	5.97	44.2	158	66.9	136	43	5	
1219	MOREX MALT CHECK		31.6	73.3	78	80.2	2.0	1	12.7	5.91	49.8	137	79.5	72	34		
Minima			33.1	88.0	42	76.0	1.7		12.9	5.18	38.9	132	58.1	28	17		
Maxima			37.1	96.0	63	80.8	2.7		16.2	6.87	49.9	197	74.5	238	47		
Means			35.4	93.2	55	78.8	2.2		14.4	6.07	44.2	166	66.3	151	33		
Standard Deviations			1.1	1.9	5	1.0	0.3		0.8	0.42	2.7	16	4.2	47	9		
Coefficients of Variation			3.1	2.0	8	1.3	12.0		5.5	6.97	6.0	9	6.4	31	27		

Malt Check Data are Excluded from Rank Sorting and Statistics

Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics

For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by R. D. Horsley and J. D. Franckowiak, North Dakota State University - Fargo

2001 EXPERIMENT 22B, PRELIMINARY YIELD TRIAL - FARGO, ND

Table 45

Lab No.	Variety or Selection	Rowed	Kernel	on	Barley	Malt	Barley	Wort	Alpha-	Beta-	Quality	Overall				
			Weight	6/64"	Color	Extract	Wort	Wort	Protein	Protein						
1235	MOREX	6	33.6	*86.9	56	78.6	1.7	1	14.8	5.81	40.4	168	61.4	146	35	2
1236	ROBUST	6	35.0	91.3	51	78.7	1.7	1	15.5	6.03	40.3	174	57.8	213	28	14
1237	STANDER	6	35.7	92.3	51	78.9	2.6	1	14.8	6.56	46.8	160	71.2	190	29	10
1238	FOSTER	6	35.7	94.2	57	79.1	2.0	1	13.0	5.59	46.0	136	62.1	174	39	1
1239	DRUMMOND	6	34.7	92.1	59	77.4	1.8	1	15.2	5.90	41.0	173	65.1	112	27	15
1240	ND19646	6	33.4	96.0	50	77.7	2.3	1	14.1	6.18	45.9	96	69.1	244	20	31
1242	ND19647	6	32.6	90.4	54	78.9	2.1	1	13.6	5.67	44.3	125	60.7	199	32	5
1243	ND19648	6	32.0	94.0	53	78.8	2.1	1	14.1	6.04	44.3	123	60.9	197	24	23
1244	ND19649	6	35.8	94.1	43	78.7	2.9	1	13.6	6.29	48.5	94	66.2	240	24	23
1245	ND19650	6	33.9	97.2	50	79.2	3.2	2	13.3	6.36	49.8	94	68.1	253	26	18
1246	ND19651	6	31.5	93.2	47	78.9	2.5	2	14.0	6.37	48.0	117	68.6	206	20	31
1247	ND19653	6	34.4	96.6	51	78.8	2.6	2	14.8	6.86	47.5	127	63.1	256	18	36
1248	ND19655	6	32.5	92.9	51	79.3	2.7	2	12.9	6.00	47.8	91	64.1	318	23	28
1249	ND19656	6	34.1	93.6	46	78.8	2.3	2	13.0	5.75	47.1	94	62.9	297	26	18
1250	ND19657	6	34.1	96.8	47	76.7	3.1	2	14.1	6.42	45.9	97	67.4	238	19	33
1251	ND19658	6	34.8	97.7	46	77.2	2.8	1	14.3	6.49	48.3	89	65.9	280	15	39
1252	ND19659	6	34.2	96.2	47	77.9	2.5	1	13.9	6.03	43.9	109	64.4	329	22	30
1253	ND19661	6	36.2	97.1	55	78.4	2.7	1	14.2	6.70	48.0	118	69.5	262	19	33
1254	ND19662	6	35.6	97.3	51	78.1	2.6	1	14.4	6.65	48.9	123	65.8	227	19	33
1255	ND19663	6	32.8	91.3	53	78.3	2.4	2	13.2	5.77	46.4	110	65.4	176	26	18
1256	ND19665	6	35.0	94.6	60	79.3	2.2	1	13.3	6.04	47.1	112	66.4	212	27	15
1257	ND19666	6	33.3	95.0	53	79.3	2.2	1	13.1	6.38	49.5	113	67.7	268	27	15
1258	ND19668	6	33.2	94.6	50	79.4	2.1	1	13.8	5.75	43.9	112	66.7	272	35	2
1259	ND19669	6	32.7	94.5	53	79.5	1.8	1	12.9	5.60	46.5	107	63.5	258	30	7
1261	ND19670	6	34.4	96.0	53	77.7	2.3	1	15.0	6.41	45.4	119	66.7	377	17	37
1262	ND19671	6	34.5	94.4	57	78.5	1.7	1	13.2	5.56	43.9	106	60.5	380	29	10
1263	ND19672	6	33.8	96.8	48	77.5	2.3	1	14.5	6.20	44.5	95	63.4	367	17	37
1264	ND19673	6	32.1	94.6	51	78.4	2.1	1	13.6	6.11	48.1	98	65.3	259	24	23
1265	ND19678	6	35.8	97.9	62	79.3	1.9	1	13.6	6.16	47.3	128	64.0	349	24	23
1266	ND19680	6	33.9	94.3	51	78.4	2.7	2	14.2	5.91	42.5	154	61.4	317	30	7

Table 45

Lab No.	Variety or Selection	Rowed	Kernel	on	Barley	Malt	Barley	Wort	Alpha-	Beta-	Overall					
			Weight 6/64"	(%)	Color (Agtron)	Extract (%)	Wort Color	Wort Clarity	Protein (%)	Protein (%)		Score	Rank			
1267	ND19681	6	33.6	94.7	49	77.9	2.2	1	15.0	6.35	43.9	151	61.0	349	24	23
1268	ND19682	6	37.4	97.0	55	78.3	n.d.	3	14.7	6.12	43.9	155	61.2	348	26	18
1269	ND19683	6	35.8	94.9	54	78.4	n.d.	3	13.8	6.06	44.4	155	62.8	238	34	4
1270	ND19684	6	33.4	96.5	47	78.3	2.2	1	14.9	6.58	47.2	163	72.3	276	23	28
1271	ND19686	6	35.8	96.1	54	77.6	1.9	1	13.8	5.59	42.8	103	57.7	436	29	10
1272	ND19688	6	33.9	92.0	54	77.9	n.d.	3	13.6	4.91	38.2	111	58.5	395	26	18
1273	ND19689	6	33.6	91.7	50	78.1	n.d.	3	13.4	4.94	38.7	118	56.8	443	30	7
1274	ND19692	6	34.9	95.7	48	78.8	n.d.	3	14.2	6.02	42.8	150	63.2	243	29	10
1275	ND19694	6	33.3	95.0	53	78.9	n.d.	3	14.7	5.56	40.4	153	62.1	250	32	5
1241	MOREX MALT CHECK	6	31.0	72.2	77	80.6	2.0	1	12.5	6.01	50.8	135	76.5	59	31	
1260	MOREX MALT CHECK	6	31.3	79.2	78	80.5	2.0	1	12.4	5.93	51.1	124	75.4	72	37	
Minima			31.5	90.4	43	76.7	1.7		12.9	4.91	38.2	89	56.8	112	15	
Maxima			37.4	97.9	62	79.5	3.2		15.5	6.86	49.8	174	72.3	443	39	
Means			34.2	94.8	52	78.5	2.3		14.0	6.04	45.1	124	64.1	272	26	
Standard Deviations			1.3	2.0	4	0.7	0.4		0.7	0.43	3.0	26	3.7	77	6	
Coefficients of Variation			3.8	2.1	8	0.8	17.2		5.0	7.16	6.6	21	5.7	28	22	

Malt Check Data are Excluded from Rank Sorting and Statistics

Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics

For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by R. D. Horsley and J. D. Franckowiak, North Dakota State University - Fargo

2001 EXPERIMENT 23, PRELIMINARY YIELD TRIAL - FARGO, ND

Table 46

Lab No.	Variety or Selection	Rowed	Kernel	on	Barley	Malt	Barley	Wort	Alpha-	Beta-	Quality	Overall				
			Weight	6/64"	Color	Extract	Wort	Wort	Protein	Protein						
		(mg)	(%)	(Agtron)	(%)	Color	Clarity	(%)	(%)	(°ASBC)	(20°DU)	(ppm)	Score	Rank		
1276	MOREX	6	34.1	85.4	55	79.0	1.7	1	14.4	5.72	42.1	158	64.4	258	37	2
1277	ROBUST	6	35.9	92.9	54	79.0	1.7	1	15.1	6.28	43.0	179	55.3	300	28	22
1278	STANDER	6	34.4	89.4	53	79.1	n.d.	3	14.1	5.55	40.9	157	64.2	242	35	8
1279	FOSTER	6	36.4	94.7	51	79.1	2.2	2	13.8	6.18	46.4	130	67.0	339	23	32
1280	DRUMMOND	6	34.7	92.5	56	79.5	1.8	1	14.7	6.10	44.5	176	65.5	196	27	26
1281	ND19695	6	35.3	93.4	48	79.1	n.d.	3	14.8	5.99	42.3	164	62.8	234	32	12
1282	ND19698	6	33.8	93.9	43	80.6	n.d.	3	11.9	5.50	50.3	*46	58.3	376	37	2
1284	ND19702	6	31.3	89.7	55	79.1	2.1	1	15.5	6.72	44.9	176	73.7	159	26	30
1285	ND19703	6	30.8	88.8	50	80.8	n.d.	3	12.8	5.89	48.1	116	67.1	234	30	18
1286	ND19704	6	33.7	94.8	57	79.3	n.d.	3	14.6	6.36	46.0	149	61.9	206	27	26
1287	ND19708	6	33.6	93.7	53	79.6	n.d.	3	14.5	6.09	43.0	154	63.6	241	32	12
1288	ND19709	6	31.3	*80.3	49	80.3	2.1	1	12.6	5.67	47.0	119	73.2	333	29	21
1289	ND19710	6	33.8	87.3	53	79.7	2.1	2	14.0	6.13	45.8	144	77.8	275	38	1
1290	ND19711	6	32.7	92.7	44	80.1	2.1	1	13.4	6.19	47.5	118	70.6	226	30	18
1291	ND19717	6	33.8	96.1	45	79.7	2.4	2	14.6	6.55	47.3	144	64.9	281	28	22
1292	ND19718	6	34.4	95.0	38	81.3	n.d.	3	11.3	5.34	49.2	*45	58.6	*532	37	2
1293	ND19720	6	35.0	93.1	56	78.8	2.1	1	14.1	5.90	43.2	141	63.2	310	31	15
1294	ND19723	6	34.0	93.2	55	79.5	1.9	1	14.5	5.91	43.8	154	65.1	296	37	2
1295	ND19727	6	34.0	90.3	51	78.7	2.4	2	14.7	6.04	43.6	155	64.6	353	27	26
1296	ND19728	6	33.1	89.6	56	79.6	1.9	1	14.2	6.04	43.3	148	67.8	246	34	9
1297	ND19729	6	31.6	89.0	56	78.9	1.9	1	15.4	6.36	43.6	177	62.5	216	26	30
1298	ND19734	6	34.2	90.1	56	79.9	2.0	1	14.4	6.06	43.7	141	65.6	206	34	9
1299	ND19742	6	35.8	95.3	47	81.2	n.d.	3	12.5	5.64	47.4	96	58.4	415	32	12
1300	ND19743	6	36.4	93.7	43	78.9	1.9	1	12.3	6.42	*53.6	162	61.0	223	36	7
1301	ND19744	6	35.5	94.1	53	80.8	2.8	1	14.9	5.92	41.7	121	62.5	390	30	18
1302	ND19766	6	34.7	90.3	53	78.8	2.1	1	15.6	6.41	41.9	146	65.8	307	28	22
1303	ND19768	6	35.0	92.1	58	79.4	2.0	1	14.9	6.37	44.2	137	65.8	294	31	15
1304	ND19782	6	31.7	85.1	60	79.5	1.9	1	14.2	6.07	45.4	154	68.9	234	33	11
1305	ND19783	6	34.2	88.0	55	79.0	2.0	1	14.9	6.21	44.2	161	69.0	278	31	15
1306	ND19787	6	34.3	88.3	49	79.5	1.8	1	14.0	5.70	43.2	156	70.3	288	37	2

Table 46

Lab No.	Variety or Selection	Rowed	Kernel	on	Barley	Malt	Barley	Wort	Alpha-	Beta-	Quality	Overall				
			Weight	6/64"	Color	Extract	Wort	Wort	Protein	Protein						
		(mg)	(%)	(Agtron)	(%)	Color	Clarity	(%)	(%)	(°ASBC)	(20°DU)	(ppm)	Score	Rank		
1308	ND19814	6	36.1	95.8	53	77.7	1.9	1	15.0	6.07	42.2	144	66.1	268	27	26
1309	ND19816	6	36.1	93.6	55	78.7	2.0	1	14.9	6.49	45.7	153	69.9	305	28	22
1283	MOREX MALT CHECK	6	31.5	71.9	76	81.0	2.1	1	12.4	6.27	53.2	130	79.4	87	36	
1307	MOREX MALT CHECK	6	31.3	73.4	75	81.2	2.0	1	12.2	6.04	52.4	115	74.2	120	36	
Minima			30.8	85.1	38	77.7	1.7		11.3	5.34	40.9	96	55.3	159	23	
Maxima			36.4	96.1	60	81.3	2.8		15.6	6.72	50.3	179	77.8	415	38	
Means			34.1	91.7	52	79.5	2.0		14.1	6.06	44.7	148	65.5	275	31	
Standard Deviations			1.5	3.0	5	0.8	0.3		1.1	0.32	2.3	20	4.8	60	4	
Coefficients of Variation			4.5	3.3	10	1.0	12.4		7.5	5.35	5.2	13	7.3	22	13	

Malt Check Data are Excluded from Rank Sorting and Statistics

Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics

For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by R. D. Horsley and J. D. Franckowiak, North Dakota State University - Fargo

2001 EXPERIMENT 25A, PRELIMINARY YIELD TRIAL - FARGO, ND

Table 47

Lab No.	Variety or Selection	Rowed	Kernel	on	Barley	Malt	Barley	Wort	Alpha-	Beta-	Quality	Overall				
			Weight	6/64"	Color	Extract	Wort	Wort	Protein	Protein						
(mg)	(%)	(Agtron)	(%)	Color	Clarity	(%)	(%)	(%)	(%)	(°ASBC)	(20°DU)	(ppm)	Score	Rank		
1310	MOREX	6	34.6	87.5	52	78.5	1.8	1	14.5	5.79	40.5	159	67.5	244	34	6
1311	ROBUST	6	35.5	92.2	52	78.7	1.8	1	15.0	6.14	42.8	161	57.3	271	32	14
1312	STANDER	6	35.0	91.8	50	80.0	2.2	1	14.2	6.26	45.3	138	74.4	243	34	6
1313	FOSTER	6	35.2	93.0	54	79.3	2.1	1	13.1	6.00	45.1	152	73.9	251	39	2
1314	DRUMLUND	6	35.0	93.3	58	79.0	1.8	1	14.6	6.21	43.2	178	70.5	183	27	24
1315	ND19191	6	32.9	84.9	57	79.5	n.d.	3	14.2	6.20	46.3	125	75.8	114	24	33
1316	ND19194	6	33.9	89.0	56	77.9	2.2	1	14.3	5.32	39.7	101	62.8	292	18	45
1317	ND19198	6	33.8	94.2	51	79.8	2.2	1	13.9	6.51	47.0	189	79.1	118	31	18
1318	ND19200	6	35.6	94.3	54	78.8	2.1	1	14.7	6.31	45.2	163	69.9	309	25	30
1319	ND19201	6	35.2	94.6	54	79.0	2.0	1	15.3	6.32	43.9	187	70.6	222	27	24
1320	ND19203	6	37.1	94.7	50	77.8	1.9	1	13.5	5.87	43.8	148	66.3	320	32	14
1321	ND19205	6	31.4	*70.6	57	77.9	3.0	2	14.5	6.28	45.3	134	73.3	273	20	43
1322	ND19206	6	33.2	83.1	59	78.6	2.9	2	13.3	6.01	45.6	130	71.6	252	32	14
1323	ND19207	6	34.2	93.0	52	78.9	n.d.	3	14.2	5.97	43.6	152	69.7	344	32	14
1324	ND19216	6	33.2	89.6	52	80.6	2.0	1	13.7	6.38	48.1	130	75.0	340	31	18
1325	ND19221	6	36.0	92.6	54	78.6	2.0	1	14.8	6.39	44.9	188	71.0	306	21	42
1326	ND19223	6	33.7	89.6	53	76.8	1.9	1	15.3	5.82	40.1	151	60.2	315	27	24
1327	ND19224	6	31.3	84.1	55	78.7	2.6	2	13.4	5.21	40.0	119	57.8	235	38	3
1328	ND19227	6	34.9	93.2	51	78.9	2.4	1	14.2	6.01	43.4	149	65.9	293	31	18
1329	ND19228	6	34.9	93.6	50	79.3	2.6	2	14.1	5.84	43.8	163	66.0	283	33	11
1330	ND19230	6	31.4	91.0	59	79.6	2.4	2	13.3	5.71	45.1	109	62.3	254	33	11
1332	ND19231	6	34.7	91.8	60	79.1	1.9	1	14.8	6.33	45.9	108	64.9	251	27	24
1333	ND19232	6	33.8	89.4	59	79.2	1.9	1	14.4	6.32	46.4	110	66.1	243	22	41
1334	ND19233	6	34.3	92.6	50	79.4	2.4	1	14.1	6.46	47.9	146	69.7	255	29	23
1335	ND19234	6	33.8	89.5	49	79.5	2.4	1	14.4	6.18	44.5	126	68.9	315	24	33
1336	ND19235	6	34.7	93.9	50	78.6	2.3	1	14.6	5.98	42.2	110	63.3	342	24	33
1337	ND19238	6	32.7	87.5	52	79.8	n.d.	3	13.6	5.75	44.4	119	62.8	227	33	11
1338	ND19239	6	34.4	88.7	54	78.7	2.1	1	14.9	6.32	43.9	132	67.8	360	25	30
1339	ND19240	6	34.6	91.8	53	78.9	2.3	2	14.9	6.33	44.2	124	68.1	298	23	39
1340	ND19242	6	34.0	94.1	60	79.4	2.2	1	14.8	6.40	45.9	142	66.1	254	34	6

Table 47

Lab No.	Variety or Selection	Rowed	Kernel	on	Barley	Malt	Barley	Wort	Alpha-	Beta-	Overall					
			Weight	6/64"	Color	Extract	Wort	Protein	Protein	S/T	DP	amylase	glucan	Quality	Rank	
(mg)	(%)	(Agtron)	(%)	Color	Clarity	(%)	(%)	(%)	(%)	(°ASBC)	(20°DU)	(ppm)	Score			
1341	ND19243	6	34.3	93.6	54	78.6	2.3	1	15.4	6.21	40.7	116	64.0	235	24	33
1342	ND19245	6	33.1	85.6	62	79.6	2.0	1	14.0	5.77	43.6	97	64.3	220	30	22
1343	ND19246	6	33.1	86.5	60	79.2	2.0	2	13.7	5.80	44.2	105	64.9	204	34	6
1344	ND19248	6	31.8	84.8	54	77.9	2.0	2	15.0	5.88	40.1	164	66.5	252	25	30
1345	ND19249	6	33.9	85.1	58	78.7	1.9	2	13.7	5.69	43.5	174	63.7	183	31	18
1346	ND19250	6	32.8	81.0	66	78.9	n.d.	3	13.4	5.46	42.6	141	62.3	169	40	1
1347	ND19251	6	31.5	81.8	54	77.6	1.9	1	15.4	5.85	39.6	182	65.6	243	17	46
1348	ND19252	6	32.8	88.1	53	77.6	2.0	1	14.8	5.82	40.5	206	66.2	226	23	39
1349	ND19253	6	33.0	82.2	56	79.2	2.5	1	14.1	5.97	45.4	125	67.9	145	34	6
1350	ND19255	6	34.0	88.2	60	78.9	2.0	1	14.3	5.89	44.0	119	62.9	211	27	24
1351	ND19258	6	31.7	86.5	56	78.8	2.1	1	13.6	5.61	43.2	151	65.4	184	38	3
1352	ND19261	6	32.3	85.6	52	78.5	2.2	1	14.1	5.61	39.9	162	63.2	282	26	29
1353	ND19262	6	32.7	91.9	57	77.9	1.8	1	14.8	6.41	45.1	190	68.4	217	20	43
1354	ND19265	6	35.7	93.8	51	78.5	2.2	1	14.5	5.99	44.1	107	65.5	387	24	33
1356	ND19266	6	32.2	87.1	51	78.7	2.3	1	13.5	6.19	46.1	106	62.0	247	24	33
1357	ND19267	6	32.6	87.5	53	79.0	1.9	1	13.8	6.18	45.8	139	65.0	221	36	5
1331	MOREX MALT CHECK	6	32.0	74.2	73	80.5	2.0	1	12.3	5.97	51.1	119	75.5	113	39	
1355	MOREX MALT CHECK	6	30.8	72.3	74	80.8	1.8	1	12.4	6.22	54.3	128	71.6	83	36	
Minima			31.3	81.0	49	76.8	1.8		13.1	5.21	39.6	97	57.3	114	17	
Maxima			37.1	94.7	66	80.6	3.0		15.4	6.51	48.1	206	79.1	387	40	
Means			33.7	89.5	55	78.8	2.1		14.3	6.02	43.8	142	66.9	253	29	
Standard Deviations			1.4	3.9	4	0.7	0.3		0.6	0.31	2.2	28	4.6	60	6	
Coefficients of Variation			4.1	4.4	7	0.9	13.3		4.3	5.14	5.1	20	6.9	24	20	

Malt Check Data are Excluded from Rank Sorting and Statistics

Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics

For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by R. D. Horsley and J. D. Franckowiak, North Dakota State University - Fargo

2001 EXPERIMENT 25B, PRELIMINARY YIELD TRIAL - FARGO, ND

Table 48

Lab No.	Variety or Selection	Rowed	Kernel	on	Barley	Malt	Barley	Wort	Alpha-	Beta-	Quality	Overall				
			Weight	6/64"	Color	Extract	Wort	Protein	Protein	S/T	DP	amylase	glucan			
1358	MOREX	6	34.0	85.8	51	78.4	1.4	1	14.7	5.87	41.6	167	59.3	200	35	9
1359	ROBUST	6	35.7	92.4	51	78.8	1.5	1	14.4	6.06	43.6	167	51.5	278	35	9
1360	STANDER	6	35.5	92.4	50	80.1	2.2	1	14.3	6.69	50.3	144	69.7	255	32	15
1361	FOSTER	6	36.2	91.9	54	79.2	1.7	1	12.8	5.62	45.1	143	59.1	272	46	1
1362	DRUMMOND	6	34.7	92.9	56	78.9	1.5	1	15.1	6.01	41.9	188	62.4	171	24	31
1363	ND19272	6	33.0	80.7	49	77.8	2.2	1	14.4	5.73	40.8	148	64.7	250	30	17
1364	ND19273	6	32.1	79.8	55	77.8	2.1	1	14.2	5.78	42.3	170	66.7	259	27	25
1365	ND19274	6	31.6	76.3	53	78.6	2.0	1	13.2	5.58	43.7	103	65.3	201	29	20
1366	ND19275	6	33.8	80.0	59	77.0	2.2	1	14.4	5.03	35.6	104	51.4	352	26	27
1367	ND19276	6	34.8	81.8	53	77.1	2.2	1	14.4	4.96	35.0	108	49.7	325	26	27
1368	ND19278	6	31.4	81.4	50	77.2	2.1	1	14.7	6.01	41.8	164	65.4	133	27	25
1369	ND19279	6	31.8	80.6	54	78.7	2.4	1	13.3	4.86	37.7	103	53.3	184	37	7
1370	ND19280	6	31.7	83.9	56	78.5	2.1	1	13.9	5.16	38.3	122	54.2	194	37	7
1371	ND19282	6	33.4	89.6	57	78.0	2.4	1	14.5	5.15	36.5	109	50.9	253	29	20
1372	ND19283	6	32.8	86.9	55	78.2	2.7	2	14.4	5.52	39.2	114	54.5	256	28	24
1373	ND19284	6	33.1	87.2	55	78.6	2.6	2	13.2	5.22	40.4	106	52.8	229	42	3
1374	ND19285	6	33.0	88.0	53	78.0	2.2	2	15.2	5.71	39.4	115	57.3	218	21	35
1375	ND19286	6	35.1	91.3	55	78.7	2.3	2	13.7	5.46	42.0	98	53.4	289	38	6
1376	ND19287	6	33.1	90.6	57	77.6	2.8	2	14.3	5.15	37.6	108	49.8	310	25	30
1377	ND19289	6	33.5	78.2	53	78.9	1.9	2	13.4	4.92	38.8	87	48.6	336	34	11
1378	ND19290	6	32.9	80.0	55	78.3	2.0	2	13.6	4.94	38.3	153	48.7	293	44	2
1380	ND19291	6	33.9	82.4	55	78.5	2.4	1	13.1	5.74	44.2	150	67.3	243	39	5
1381	ND19292	6	34.0	83.4	57	77.9	2.3	1	13.8	6.04	44.2	167	69.9	264	29	20
1382	ND19297	6	36.8	93.0	46	79.7	3.0	2	12.9	5.70	45.3	117	53.0	291	41	4
1383	ND19300	6	35.0	90.0	52	80.9	2.1	1	13.3	5.87	47.5	118	64.8	65	33	14
1384	ND19301	6	36.8	93.8	54	79.7	2.2	1	13.8	6.76	49.1	112	68.3	340	24	31
1385	ND19302	6	36.7	94.6	51	79.4	2.4	1	14.6	6.84	47.5	121	68.5	322	19	37
1386	ND19303	6	37.6	95.1	52	79.1	2.7	2	14.1	5.84	41.9	88	59.5	485	30	17
1387	ND19304	6	35.9	90.2	52	77.6	2.5	2	15.1	6.43	43.0	129	58.7	521	20	36
1388	ND19306	6	38.1	94.6	53	79.2	2.6	2	13.4	5.70	43.3	107	60.2	285	34	11

Table 48

Lab No.	Variety or Selection	Rowed	Kernel	on	Barley	Malt	Barley	Wort	Alpha-	Beta-	Overall					
			Weight	6/64"	Color	Extract	Wort	Protein	Protein	S/T	DP	amylase	glucan	Quality	Score	Rank
1389	ND19308	6	35.6	87.8	55	80.0	3.1	2	13.2	6.63	51.3	104	64.1	279	26	27
1390	ND19309	6	36.4	92.9	48	79.0	2.8	2	13.8	6.55	48.9	111	63.4	351	23	33
1391	ND19310	6	38.0	95.1	57	80.5	2.7	2	13.3	6.66	50.3	79	73.6	265	29	20
1392	ND19311	6	35.7	93.4	55	79.0	2.7	2	14.9	7.06	49.0	133	66.6	367	22	34
1393	ND19313	6	36.2	94.3	58	78.9	2.6	2	15.0	7.08	48.6	119	66.4	419	18	38
1394	ND19314	6	37.2	96.0	52	78.4	2.8	2	13.7	5.94	42.4	134	57.7	414	31	16
1395	ND19317	6	36.1	96.8	48	79.6	2.3	2	14.7	6.30	45.5	144	68.1	360	30	17
1396	ND19321	6	38.3	92.8	52	81.4	3.0	1	13.9	7.29	53.3	115	79.4	104	34	11
1379	MOREX MALT CHECK	6	31.1	72.9	78	80.8	2.2	1	12.5	6.19	53.0	124	68.7	103	31	
Minima			31.4	76.3	46	77.0	1.4		12.8	4.86	35.0	79	48.6	65	18	
Maxima			38.3	96.8	59	81.4	3.1		15.2	7.29	53.3	188	79.4	521	46	
Means			34.8	88.4	53	78.8	2.3		14.0	5.89	43.3	126	60.5	280	30	
Standard Deviations			2.0	5.9	3	1.0	0.4		0.7	0.67	4.7	26	7.8	94	7	
Coefficients of Variation			5.7	6.7	6	1.3	17.6		4.8	11.29	10.8	21	12.9	34	23	

Malt Check Data are Excluded from Rank Sorting and Statistics

Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics

For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by R. D. Horsley and J. D. Franckowiak, North Dakota State University - Fargo

2001 EXPERIMENT 3, INTERMEDIATE MALTING BARLEY YIELD TRIAL - FARGO, ND

Table 49

Lab No.	Variety or Selection	Rowed	Kernel	on	Barley	Malt	Barley	Wort	Alpha-	Beta-	Overall					
			Weight	6/64"	Color	Extract	Wort	Wort	Protein	Protein		amylase	glucan	Quality	Score	Rank
1397	MOREX	6	33.1	*83.9	55	78.1	1.9	1	15.9	6.44	41.6	175	63.2	234	24	26
1398	ROBUST	6	35.0	91.7	50	79.1	1.8	1	15.2	6.59	43.6	172	55.3	263	31	8
1399	STANDER	6	35.1	92.4	50	79.8	2.4	1	15.0	7.04	49.3	152	70.8	251	29	12
1400	LACEY	6	35.8	91.3	50	79.5	1.9	1	15.3	6.37	44.0	168	61.8	159	31	8
1401	DRUMMOND	6	33.6	90.4	58	79.5	1.9	1	14.7	6.39	45.5	174	62.7	170	27	16
1402	ND18460	6	37.8	94.9	56	79.3	2.2	1	15.3	6.64	43.1	206	61.5	280	27	16
1404	ND18515	6	37.5	96.3	51	79.3	2.1	1	15.8	6.81	45.9	147	67.5	222	34	2
1405	ND18546	6	33.5	90.0	52	79.0	2.3	1	15.2	6.57	44.6	165	65.7	183	31	8
1406	ND18549	6	35.4	92.5	53	79.5	2.5	1	14.9	6.51	45.6	154	68.2	120	38	1
1407	ND18550	6	35.9	93.8	53	78.8	2.2	1	14.4	6.33	44.7	168	62.0	165	28	13
1408	ND18551	6	35.3	94.6	54	78.6	2.2	2	14.9	6.45	44.1	166	66.1	234	27	16
1409	ND18554	6	37.1	95.9	49	78.5	3.0	2	16.3	6.83	42.7	176	63.3	211	23	31
1410	ND18556	6	34.4	93.4	50	79.6	2.9	2	15.1	6.85	47.5	159	59.1	240	32	6
1411	ND18566	6	35.5	94.4	53	79.1	2.3	2	15.0	6.15	42.3	170	58.4	224	34	2
1412	ND18567	6	35.4	95.1	53	79.0	2.1	2	14.6	6.11	44.9	176	61.8	204	26	22
1413	ND18578	6	34.8	95.0	52	78.6	2.3	2	14.9	6.66	46.0	163	56.4	305	28	13
1414	ND18579	6	34.7	93.5	49	78.8	2.7	2	15.9	6.66	44.4	172	59.5	329	24	26
1415	ND18611	6	35.5	95.4	58	78.2	2.2	2	15.3	6.25	41.8	158	58.6	175	34	2
1416	ND18639	6	34.3	94.1	54	78.5	2.9	1	14.3	6.91	50.1	134	58.3	255	27	16
1417	ND18650	6	35.6	94.5	59	79.5	2.5	2	14.4	6.20	43.5	124	59.5	297	30	11
1418	ND18731	6	38.1	95.3	57	78.8	2.1	1	15.0	6.45	45.4	120	59.9	308	25	25
1419	ND18744	6	38.8	95.3	50	77.3	2.3	2	15.9	6.35	41.6	134	60.0	339	24	26
1420	ND18765	6	36.0	93.3	50	79.4	3.4	2	14.8	7.42	50.4	143	60.9	113	32	6
1421	ND18803	6	35.8	93.9	56	78.6	n.d.	3	16.0	6.77	44.9	154	56.6	224	33	5
1422	ND18825	6	34.4	91.5	53	78.3	n.d.	3	15.2	6.96	46.4	145	63.4	256	24	26
1423	ND18826	6	35.2	93.2	55	79.0	n.d.	3	15.0	6.95	46.9	138	64.4	242	24	26
1424	ND18832	6	36.3	95.8	58	78.4	n.d.	3	15.5	6.65	44.3	108	59.4	289	26	22
1425	ND18833	6	37.8	94.6	53	78.6	2.4	2	16.3	6.68	43.0	151	61.3	321	27	16
1426	ND18843	6	35.1	94.1	55	78.2	2.0	2	16.4	6.40	40.3	184	56.0	257	27	16
1428	ND18844	6	35.1	93.1	60	77.9	n.d.	3	15.8	6.38	40.9	168	57.2	283	26	22

Table 49

Lab No.	Variety or Selection	Rowed	Kernel	on	Barley	Malt	Barley	Wort	Alpha-	Beta-	Overall					
			Weight	6/64"	Color	Extract	Wort	Wort	S/T	DP						
		(mg)	(%)	(Agrton)	(%)	Color	Clarity	(%)	(%)	(%)	(°ASBC)	(20°DU)	(ppm)	Score	Rank	
1429	ND18849	6	32.0	87.9	58	79.8	2.1	2	14.1	6.58	48.0	146	68.4	234	28	13
1403	MOREX MALT CHECK	6	31.2	72.2	75	81.4	2.1	1	12.7	6.36	54.2	122	78.5	83	31	
1427	MOREX MALT CHECK	6	31.4	72.5	75	81.4	2.2	1	12.5	6.37	53.5	111	72.4	175	32	
Minima			32.0	87.9	49	77.3	1.8		14.1	6.11	40.3	108	55.3	113	23	
Maxima			38.8	96.3	60	79.8	3.4		16.4	7.42	50.4	206	70.8	339	38	
Means			35.5	93.6	54	78.8	2.3		15.2	6.59	44.8	157	61.5	238	28	
Standard Deviations			1.5	1.9	3	0.6	0.4		0.6	0.29	2.5	20	3.9	58	4	
Coefficients of Variation			4.2	2.1	6	0.8	16.3		4.0	4.41	5.7	13	6.4	24	13	

Malt Check Data are Excluded from Rank Sorting and Statistics

Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics

For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by R. D. Horsley and J. D. Franckowiak, North Dakota State University - Fargo

2001 EXPERIMENT 3, INTERMEDIATE MALTING BARLEY YIELD TRIAL - CARRINGTON, ND

Table 50

Lab No.	Variety or Selection	Rowed	Kernel	on	Barley	Malt	Barley	Wort	Alpha-		Beta-	Quality	Overall			
			Weight 6/64"	(%)	Color (Agtron)	Extract (%)	Wort Color	Wort Clarity	Protein (%)	Protein (%)	S/T (%)	DP (°ASBC)	amylase (20°DU)	glucan (ppm)		
1430	MOREX	6	26.5	46.9	44	77.6	3.0	1	14.5	6.91	50.3	174	76.4	80	9	25
1431	ROBUST	6	28.4	59.0	40	78.4	2.5	1	15.6	6.97	46.6	186	56.6	169	15	15
1432	STANDER	6	28.8	64.4	38	79.1	*4.4	1	14.4	*7.90	55.3	150	84.2	142	25	4
1433	LACEY	6	28.2	60.8	38	78.0	2.8	1	15.1	7.14	47.8	182	70.0	124	15	15
1434	DRUMMOND	6	28.0	54.0	43	78.3	2.9	1	14.2	6.77	49.4	184	71.0	95	13	20
1435	ND18460	6	32.9	84.5	45	79.3	2.4	1	14.4	6.20	45.4	186	65.2	142	31	1
1436	ND18515	6	30.0	72.6	40	78.3	3.1	1	15.0	7.13	49.8	159	75.4	109	25	4
1437	ND18546	6	28.0	60.6	42	78.3	3.3	1	13.9	6.87	50.1	179	72.2	116	20	6
1438	ND18549	6	28.1	52.7	41	77.6	3.3	1	14.6	6.96	50.0	185	75.1	62	7	31
1439	ND18550	6	27.8	49.4	44	77.1	3.3	1	13.9	6.71	48.7	180	69.3	109	14	19
1440	ND18551	6	27.3	51.9	42	77.1	2.9	1	14.1	6.69	49.2	171	70.9	87	9	25
1441	ND18554	6	29.7	63.0	38	77.9	3.1	1	14.3	6.98	50.8	177	71.0	84	11	21
1442	ND18556	6	29.1	65.9	40	78.1	3.5	1	13.7	7.00	54.7	186	74.6	81	20	6
1443	ND18566	6	27.2	51.0	40	77.3	3.4	1	14.3	6.85	48.7	175	71.2	138	9	25
1444	ND18567	6	28.1	62.1	41	77.7	3.1	1	14.0	6.66	49.6	169	69.9	135	15	15
1445	ND18578	6	29.8	80.8	40	78.5	3.4	1	14.9	7.04	50.5	185	67.6	123	20	6
1446	ND18579	6	28.6	63.1	40	78.9	3.0	1	14.3	6.80	49.9	179	66.7	181	11	21
1447	ND18611	6	27.7	61.7	46	76.4	2.9	1	15.3	6.86	46.9	177	71.1	113	9	25
1448	ND18639	6	29.3	64.3	38	77.5	3.4	1	15.3	7.10	48.8	229	76.1	94	11	21
1449	ND18650	6	27.8	55.6	42	77.5	2.9	1	14.5	6.78	47.6	179	74.4	105	9	25
1450	ND18731	6	31.7	66.7	38	77.4	3.4	1	15.0	7.19	49.5	160	70.4	80	20	6
1452	ND18744	6	32.1	72.4	41	78.2	3.5	1	14.9	6.76	46.6	141	69.7	146	28	3
1453	ND18765	6	27.8	55.3	37	78.4	*6.0	1	14.2	*8.47	*61.3	146	82.8	67	16	14
1454	ND18803	6	30.5	65.3	41	79.0	3.3	1	13.8	6.77	52.1	165	64.5	148	29	2
1455	ND18825	6	28.3	58.6	42	78.4	3.3	1	14.0	7.24	54.2	186	75.2	120	15	15
1456	ND18826	6	28.8	59.4	41	78.4	2.9	1	14.5	7.13	52.9	176	74.4	186	11	21
1457	ND18832	6	30.3	80.0	46	78.4	3.1	1	14.1	6.78	51.7	120	71.4	187	18	10
1458	ND18833	6	31.3	66.0	44	78.3	2.7	1	14.5	6.70	48.3	163	70.9	183	17	12
1459	ND18843	6	30.9	66.3	39	78.7	2.9	1	15.3	6.72	45.7	182	62.5	159	18	10
1460	ND18844	6	31.0	69.2	44	78.4	3.7	1	15.9	7.25	48.4	197	63.3	127	17	12

Table 50

Lab No.	Variety or Selection	Rowed	Kernel	on	Barley	Malt	Barley	Wort	Alpha-	Beta-	Overall					
			Weight 6/64"	(mg)	Color (Agtron)	Extract (%)	Wort Color	Wort Clarity	Protein (%)	Protein (%)		DP (20°DU)	amylase (ppm)	glucan	Quality	Rank
1461	ND18849	6	27.3	56.0	43	77.4	3.1	1	14.7	6.88	47.8	168	74.9	197	9	25
1451	MOREX MALT CHECK	6	31.1	72.1	73	80.9	2.2	1	12.3	6.23	54.1	118	75.5	50	32	
Minima			26.5	46.9	37	76.4	2.4		13.7	6.20	45.4	120	56.6	62	7	
Maxima			32.9	84.5	46	79.3	3.7		15.9	7.25	55.3	229	84.2	197	31	
Means			29.1	62.6	41	78.1	3.1		14.5	6.89	49.6	174	71.3	125	16	
Standard Deviations			1.6	9.0	2	0.7	0.3		0.5	0.22	2.5	19	5.6	38	6	
Coefficients of Variation			5.5	14.5	6	0.8	9.6		3.8	3.21	5.0	11	7.8	30	41	

Malt Check Data are Excluded from Rank Sorting and Statistics

Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics

For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by R. D. Horsley and J. D. Franckowiak, North Dakota State University - Fargo

2001 EXPERIMENT 3, INTERMEDIATE MALTING BARLEY YIELD TRIAL - MINOT, ND

Table 51

Lab No.	Variety or Selection	Rowed	Kernel	on	Barley	Malt	Barley	Wort	Alpha-	Beta-	Quality	Overall				
			Weight	6/64"	Color	Extract	Wort	Wort	Protein	Protein						
1462	MOREX	6	28.5	45.9	45	77.1	1.9	1	15.4	6.14	41.5	195	69.3	90	16	29
1463	ROBUST	6	31.7	71.4	45	78.7	1.7	1	15.1	5.96	41.9	189	55.1	181	28	3
1464	STANDER	6	31.2	64.8	48	79.2	2.2	1	14.1	6.47	47.7	155	*79.0	160	23	18
1465	LACEY	6	33.0	77.7	45	79.2	1.8	1	14.3	6.27	46.7	196	64.8	70	22	19
1466	DRUMMOND	6	31.7	75.0	48	78.2	1.6	1	14.8	5.74	40.7	221	62.1	80	24	13
1467	ND18460	6	36.4	87.0	44	78.5	2.2	2	15.5	6.36	42.0	246	65.9	89	27	7
1468	ND18515	6	34.8	82.6	42	78.3	2.0	1	14.9	6.23	44.3	177	71.2	100	28	3
1469	ND18546	6	30.3	69.1	47	78.7	2.1	1	13.8	6.15	46.3	210	65.2	38	15	30
1470	ND18549	6	31.6	71.0	45	78.4	2.0	1	14.3	6.08	45.3	220	65.7	38	18	27
1471	ND18550	6	30.4	62.9	49	77.4	1.8	1	14.0	5.45	40.6	205	62.0	34	19	26
1472	ND18551	6	31.0	67.1	48	78.1	1.8	1	14.3	5.67	42.2	211	63.3	47	21	20
1473	ND18554	6	31.5	72.9	48	78.5	2.1	1	13.7	5.50	41.1	197	61.7	51	29	1
1474	ND18556	6	30.6	69.2	49	78.5	1.9	1	14.1	5.93	44.7	215	65.5	38	18	27
1476	ND18566	6	30.2	64.7	52	78.3	1.7	1	13.9	5.23	38.9	190	59.5	65	29	1
1477	ND18567	6	30.4	59.5	52	78.2	1.7	1	14.0	5.40	40.8	206	61.5	58	26	11
1478	ND18578	6	31.6	70.3	47	78.2	2.0	1	14.6	5.88	41.4	218	61.7	95	28	3
1479	ND18579	6	30.3	70.2	45	78.6	2.1	1	14.1	6.16	45.4	218	64.1	112	25	12
1480	ND18611	6	31.2	74.7	47	76.8	1.7	1	14.8	5.81	40.7	214	64.1	42	20	23
1481	ND18639	6	32.9	82.0	46	78.5	1.9	1	14.7	6.05	43.5	204	67.8	95	28	3
1482	ND18650	6	32.3	80.0	52	77.6	1.8	1	15.1	6.03	42.6	192	62.4	150	24	13
1483	ND18731	6	35.2	81.4	43	77.4	1.8	1	15.1	6.06	41.0	189	64.3	103	24	13
1484	ND18744	6	37.5	89.4	42	78.3	2.0	1	14.8	5.77	41.0	181	67.6	177	27	7
1485	ND18765	6	32.7	74.5	46	79.7	2.4	1	14.1	7.01	52.1	208	*84.1	50	20	23
1486	ND18803	6	33.3	77.1	45	77.6	2.1	2	15.2	6.21	43.5	220	57.6	131	27	7
1487	ND18825	6	31.9	76.4	45	78.5	2.1	1	14.5	6.37	45.1	203	66.5	67	21	20
1488	ND18826	6	32.5	77.8	47	78.4	2.1	1	15.0	6.48	45.9	196	67.5	69	24	13
1489	ND18832	6	33.8	87.0	52	77.9	1.9	1	14.6	6.29	44.0	157	63.2	170	27	7
1490	ND18833	6	34.6	77.4	51	77.9	2.0	1	15.0	6.19	42.3	199	65.5	173	20	23
1491	ND18843	6	32.2	67.5	48	77.7	1.6	1	15.0	5.47	37.1	221	57.3	110	21	20
1492	ND18844	6	32.3	71.1	49	77.6	1.7	1	15.5	5.65	38.7	223	56.4	136	24	13

Table 51

Lab No.	Variety or Selection	Rowed	Kernel	on	Barley	Malt	Barley	Wort	Alpha-	Beta-	Overall Quality					
			Weight	6/64"	Color	Extract	Wort Color	Wort Clarity	Protein (%)	Protein (%)		S/T	DP (°ASBC)	amylase (20°DU)	glucan (ppm)	Score
1493	ND18849	6	28.7	56.8	52	77.3	1.7	1	14.9	5.59	38.2	181	61.2	193	10	31
1475	MOREX MALT CHECK	6	30.8	72.0	76	80.3	2.1	1	12.7	6.13	50.2	135	76.3	60	31	
Minima			28.5	45.9	42	76.8	1.6		13.7	5.23	37.1	155	55.1	34	10	
Maxima			37.5	89.4	52	79.7	2.4		15.5	7.01	52.1	246	71.2	193	29	
Means			32.1	72.7	47	78.2	1.9		14.6	5.99	42.8	202	63.5	97	23	
Standard Deviations			2.0	9.3	3	0.6	0.2		0.5	0.39	3.1	19	3.8	49	5	
Coefficients of Variation			6.3	12.8	6	0.8	10.1		3.6	6.45	7.3	10	6.0	51	20	

Malt Check Data are Excluded from Rank Sorting and Statistics

Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics

For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by R. D. Horsley and J. D. Franckowiak, North Dakota State University - Fargo

2001 EXPERIMENT 2, ADVANCED MALTING BARLEY YIELD TRIAL - FARGO, ND

Table 52

Lab No.	Variety or Selection	Rowed	Kernel	on	Barley	Malt	Barley	Wort	Alpha-	Beta-	Overall					
			Weight	6/64"	Color	Extract	Wort	Wort	Protein	Protein		amylase	glucan	Quality	Score	Rank
1494	MOREX	6	34.2	87.3	52	77.4	2.0	1	15.5	6.26	40.8	174	65.1	192	20	59
1495	ROBUST	6	35.7	93.4	51	77.9	1.8	1	15.6	6.43	41.3	179	53.4	258	27	28
1496	STANDER	6	36.1	94.3	49	79.2	2.5	1	15.0	6.82	48.3	155	70.9	268	29	20
1497	FOSTER	6	35.8	93.1	53	77.7	2.0	1	13.8	6.07	44.8	151	64.6	320	29	20
1498	LACEY	6	35.8	92.9	50	78.6	2.0	2	14.7	6.07	41.4	170	63.7	159	27	28
1500	DRUMMOND	6	35.2	92.4	56	78.1	2.1	1	15.5	6.24	42.8	192	68.6	174	24	39
1501	ND17641	6	34.3	90.0	50	77.1	2.8	2	15.3	7.27	49.1	166	71.7	149	22	48
1502	ND17643	6	36.0	92.6	50	77.7	2.4	1	16.2	7.12	44.4	196	71.9	171	20	59
1503	ND17655	6	35.4	92.6	53	77.9	2.6	2	15.6	7.46	48.9	163	74.7	80	18	70
1504	ND17658	6	33.6	93.9	45	77.5	3.2	1	15.9	7.53	48.5	158	74.7	191	22	48
1505	ND17661	6	34.0	94.5	53	77.6	2.4	1	16.8	7.11	44.0	200	79.8	116	24	39
1506	ND17664	6	32.9	93.8	55	77.8	2.4	1	16.2	7.08	46.2	157	70.6	152	22	48
1507	ND17687	6	34.2	92.4	52	76.7	2.5	1	16.8	7.48	45.7	206	71.8	131	24	39
1508	ND17711	6	32.8	92.8	54	78.8	2.3	1	15.3	6.83	46.0	166	69.0	123	32	12
1509	ND17715	6	34.2	92.6	47	78.5	2.4	1	15.4	7.15	46.4	160	71.0	213	23	45
1510	ND17788	6	33.8	93.4	50	77.2	3.2	2	16.1	7.48	47.0	156	65.4	297	21	55
1511	ND17789	6	33.7	93.5	46	77.2	2.4	1	15.3	6.99	45.6	191	65.4	289	20	59
1512	ND17871	6	33.5	94.0	55	78.5	2.1	1	15.5	7.00	48.0	176	71.2	184	19	64
1513	ND18032	6	35.4	93.4	55	77.4	2.3	1	16.6	7.17	43.6	213	67.1	177	20	59
1514	MOREX	6	25.4	37.8	42	75.3	2.8	1	15.4	6.74	45.0	202	74.0	108	14	75
1515	ROBUST	6	30.6	72.6	42	78.4	2.1	1	14.7	6.10	43.1	175	54.1	230	28	22
1516	STANDER	6	28.1	59.4	43	78.1	*4.2	1	14.5	7.48	54.4	159	82.9	150	22	48
1517	FOSTER	6	28.5	65.2	35	76.7	2.4	1	14.2	6.11	44.4	171	68.4	195	12	78
1518	LACEY	6	27.9	55.7	42	76.7	2.7	1	15.8	6.84	45.7	208	71.2	150	10	83
1519	DRUMMOND	6	28.8	60.8	47	77.6	2.5	1	14.1	6.22	46.3	200	69.1	120	11	80
1520	ND17641	6	29.3	62.6	40	77.6	3.0	1	14.5	6.79	48.0	196	73.1	141	11	80
1521	ND17643	6	28.6	69.2	39	77.4	2.6	1	14.9	6.79	47.6	190	73.6	158	7	88
1522	ND17655	6	30.5	68.2	41	78.5	2.7	1	13.7	6.70	49.6	198	74.7	124	22	48
1524	ND17658	6	28.7	71.7	41	78.0	2.6	1	14.2	6.58	47.3	187	73.2	257	14	75
1525	ND17661	6	27.8	65.0	43	78.0	2.3	1	14.2	6.39	45.9	199	75.3	136	14	75

Table 52

Lab No.	Variety or Selection	Rowed	Kernel Weight (mg)	on 6/64"	Barley Color (Agtron)	Malt Extract (%)	Wort Color	Wort Clarity	Barley Protein (%)	Wort Protein (%)	S/T (%)	DP (°ASBC)	Alpha-amylase (20°DU)	Beta-glucan (ppm)	Quality Score	Overall Rank
1526	ND17664	6	28.3	69.1	43	76.6	2.2	1	15.2	6.29	43.5	185	71.3	119	16	72
1527	ND17687	6	28.7	66.5	42	77.9	2.7	1	14.3	6.52	46.5	188	70.6	189	7	88
1528	ND17711	6	26.8	61.2	41	77.6	2.6	1	14.0	6.62	47.8	170	66.2	137	9	86
1529	ND17715	6	27.8	61.0	40	77.0	2.7	1	15.0	6.78	47.6	186	71.4	213	5	90
1530	ND17788	6	27.9	60.2	36	77.3	2.6	1	14.5	6.90	49.8	186	65.2	173	5	90
1531	ND17789	6	28.9	68.3	35	76.6	2.5	1	15.0	6.59	45.1	203	61.7	*368	9	86
1532	ND17871	6	26.3	57.5	38	76.9	2.5	1	14.8	6.62	45.1	198	73.3	161	10	83
1533	ND18032	6	28.2	56.1	45	77.9	2.5	1	14.3	6.68	49.2	207	69.5	108	11	80
1534	MOREX	6	28.4	46.0	44	77.1	1.8	1	14.6	5.90	41.2	193	68.7	91	19	64
1535	ROBUST	6	31.1	67.0	47	77.9	1.6	1	14.4	5.53	40.3	167	53.7	200	28	22
1536	STANDER	6	30.8	71.8	48	79.4	2.2	1	13.5	6.27	46.6	159	79.7	123	35	5
1537	FOSTER	6	32.6	77.2	42	77.9	1.9	1	13.3	5.60	43.8	172	67.6	189	28	22
1538	LACEY	6	31.4	74.6	52	78.6	1.8	1	13.8	5.71	42.9	172	61.4	143	33	9
1539	DRUMMOND	6	29.8	62.8	48	77.4	1.7	1	14.9	5.52	38.2	203	63.1	195	10	83
1540	ND17641	6	31.1	68.2	45	77.8	2.0	1	14.4	5.89	42.3	176	70.2	96	21	55
1541	ND17643	6	32.3	82.1	47	78.1	2.0	1	14.5	5.74	39.7	169	69.2	173	26	32
1542	ND17655	6	32.9	81.6	47	78.9	2.1	1	14.0	5.90	43.0	162	71.3	133	40	2
1543	ND17658	6	31.1	81.1	42	78.7	2.0	1	13.8	6.06	45.6	177	69.1	184	28	22
1544	ND17661	6	29.7	73.4	46	78.1	1.8	1	14.8	5.66	39.4	184	70.3	112	21	55
1545	ND17664	6	30.2	78.1	48	78.2	2.0	1	14.6	6.16	43.3	168	68.5	57	27	28
1546	ND17687	6	31.5	81.7	42	78.2	1.9	1	14.3	5.84	42.2	184	68.7	161	26	32
1548	ND17711	6	28.9	62.9	44	78.0	1.9	1	14.4	5.95	42.2	182	69.1	72	19	64
1549	ND17715	6	29.2	63.7	50	78.1	1.9	1	14.2	6.17	45.0	201	76.6	74	16	72
1550	ND17788	6	31.7	76.5	48	78.4	1.9	1	14.5	6.10	44.6	183	71.7	115	25	36
1551	ND17789	6	30.1	72.3	46	77.4	1.8	1	14.9	5.80	40.8	232	68.4	132	24	39
1552	ND17871	6	30.3	76.4	48	78.2	1.9	1	14.3	6.04	44.3	199	74.3	92	25	36
1553	ND18032	6	31.2	72.1	49	78.3	1.8	1	14.1	6.00	43.5	210	69.3	72	21	55
1554	MOREX	6	32.8	86.8	58	77.8	1.7	1	15.1	5.95	41.1	178	69.4	151	23	45
1555	ROBUST	6	35.2	92.4	51	78.6	1.7	1	14.9	6.09	41.7	174	57.8	178	28	22
1556	EXCEL	6	35.7	92.2	49	78.8	2.4	1	14.5	6.51	47.4	130	69.5	167	19	64

Table 52

Lab No.	Variety or Selection	Rowed	Kernel Weight (mg)	on 6/64"	Barley Color (Agtron)	Malt Extract (%)	Wort Color	Wort Clarity	Barley Protein (%)	Wort Protein (%)	S/T (%)	DP (°ASBC)	Alpha-amylase (20°DU)	Beta-glucan (ppm)	Quality Score	Overall Rank
1557	STANDER	6	34.9	94.1	50	78.9	2.4	1	14.2	6.39	45.6	147	79.9	166	31	15
1558	LACEY	6	35.4	92.6	51	78.9	1.8	1	14.4	5.93	43.2	160	63.0	100	38	3
1559	FOSTER	6	36.0	93.7	50	77.8	1.9	1	14.1	5.79	42.1	143	63.3	200	30	19
1560	DRUMMOND	6	34.8	93.2	57	78.4	1.7	1	14.6	5.85	41.6	170	66.1	100	35	5
1561	LEGACY	6	33.4	92.8	54	78.5	2.7	1	15.2	6.91	46.6	171	74.7	160	19	64
1562	CONLON	2	*42.1	95.5	52	79.3	1.6	1	13.5	5.18	41.5	*95.3	63.8	*408	33	9
1563	ND16301	6	35.9	94.7	60	79.1	2.1	1	14.0	6.03	45.4	160	70.5	127	43	1
1564	ND16318	6	35.7	94.8	51	78.3	2.4	1	13.9	6.33	47.1	115	63.1	264	24	39
1565	ND16903	6	32.8	91.1	51	*74.8	2.1	1	15.2	5.81	38.6	143	58.5	343	26	32
1566	ND16922	6	35.2	95.0	56	78.2	2.2	1	15.6	6.53	44.7	161	81.9	203	28	22
1567	ND17134	6	35.9	95.5	56	80.0	2.0	1	15.5	6.42	42.4	187	68.8	107	31	15
1568	6B95-2089	6	35.4	95.3	49	78.8	2.2	1	15.0	6.31	42.3	161	64.4	102	32	12
1569	6B95-2482	6	34.6	93.0	57	*74.7	1.7	1	15.2	5.38	37.5	199	65.2	100	22	48
1570	6B96-3733	6	35.7	94.6	53	77.6	2.7	1	14.1	6.58	47.9	154	74.5	195	22	48
1572	MOREX	6	28.3	46.0	43	76.7	1.9	1	15.3	5.82	40.1	195	66.5	59	15	74
1573	ROBUST	6	30.5	67.9	44	78.0	1.7	1	15.1	5.65	38.9	171	51.7	211	19	64
1574	EXCEL	6	30.7	58.7	44	79.4	2.3	1	14.0	6.53	49.3	160	72.6	103	32	12
1575	STANDER	6	30.7	70.2	46	80.0	2.1	1	14.1	6.40	48.3	159	74.7	112	33	9
1576	LACEY	6	32.6	74.2	46	78.8	1.7	1	13.9	5.74	44.0	179	60.3	110	34	7
1577	FOSTER	6	33.1	81.1	44	78.1	1.8	1	13.9	5.59	41.7	164	65.1	191	36	4
1578	DRUMMOND	6	30.5	68.5	51	78.4	1.7	1	14.5	5.64	41.6	205	64.4	105	25	36
1579	LEGACY	6	29.0	58.9	51	77.8	2.0	1	14.7	6.06	43.3	185	78.9	215	12	78
1580	CONLON	2	34.8	76.9	46	78.4	1.7	1	14.3	4.96	36.9	116	67.4	234	23	45
1581	ND16301	6	33.3	81.3	44	79.0	1.9	1	14.3	5.71	42.5	193	68.2	94	34	7
1582	ND16318	6	34.2	87.7	44	79.1	2.0	1	14.1	6.27	46.9	166	64.9	178	26	32
1583	ND16903	6	29.6	67.0	48	*74.6	1.8	1	14.5	5.03	35.7	173	54.7	*354	18	70
1584	ND16922	6	32.7	88.1	46	78.6	1.8	1	14.8	5.89	42.0	171	74.0	236	27	28
1585	ND17134	6	31.7	75.8	43	79.6	1.8	1	14.6	5.76	40.4	203	65.0	96	31	15
1586	6B95-2089	6	31.1	67.1	46	78.1	1.6	1	15.0	5.18	36.9	187	62.0	91	24	39
1587	6B95-2482	6	30.3	66.0	45	77.5	1.6	1	14.6	4.96	35.2	206	60.4	109	20	59

Table 52

Lab No.	Variety or Selection	Rowed	Kernel	on	Barley	Malt	Barley	Wort	Alpha-	Beta-	Overall				
			Weight	6/64"	Color	Extract	Wort Color	Wort Clarity	Protein (%)	Protein (%)		amylase (20°DU)	glucan (ppm)	Quality Score	Rank
1588	6B96-3733	6	34.9	87.7	48	79.6	2.0	1	13.8	6.27	46.6	207	78.7	149	31
1499	MOREX MALT CHECK	6	31.1	72.7	78	80.4	2.1	1	12.4	6.16	53.1	123	72.6	99	36
1523	MOREX MALT CHECK	6	31.3	70.5	76	80.6	2.1	1	12.2	6.12	51.5	136	77.0	77	36
1547	MOREX MALT CHECK	6	31.1	71.8	76	80.7	2.2	1	12.5	5.89	49.6	108	77.9	147	39
1571	MOREX MALT CHECK	6	31.7	71.2	75	80.6	2.1	1	12.6	5.94	50.7	120	74.1	53	30
Minima			25.4	37.8	35	75.3	1.6		13.3	4.96	35.2	115	51.7	57	5
Maxima			36.1	95.5	60	80.0	3.2		16.8	7.53	54.4	232	82.9	343	43
Means			31.9	78.4	47	78.1	2.2		14.7	6.27	44.1	178	68.6	158	23
Standard Deviations			2.8	14.4	5	0.8	0.4		0.7	0.60	3.5	21	6.3	60	8
Coefficients of Variation			8.9	18.4	11	1.1	18.0		5.0	9.58	8.0	12	9.2	38	36

Malt Check Data are Excluded from Rank Sorting and Statistics

Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics

For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy

Samples Submitted by R. D. Horsley and J. D. Franckowiak, North Dakota State University - Fargo

2001 EXPERIMENT FA11, FARGO VARIETY YIELD TRIAL - FARGO, ND

Table 53

Lab No.	Variety or Selection	Rowed	Kernel	on	Barley	Malt	Barley	Wort	S/T	DP	Alpha-	Beta-	Overall			
			Weight (mg)	6/64" (%)	Color (Agtron)	Extract (%)	Wort Color	Wort Clarity	Protein (%)	Protein (%)	(%)	(°ASBC)	amylase (20°DU)	glucan (ppm)		
1982	BARONESSE	2	40.1	89.4	40	77.3	2.6	2	13.4	4.54	35.1	66	48.8	238	30	4
1983	CONLON	2	44.2	96.3	50	79.3	1.5	1	13.4	5.30	40.3	100	64.5	322	33	2
1984	HARRINGTON	2	38.6	82.2	47	78.1	2.0	1	14.8	5.91	40.6	90	64.1	345	16	11
1985	LACEY	6	35.0	91.9	49	78.9	1.8	1	14.9	6.15	43.4	153	63.0	144	38	1
1986	LOGAN	2	43.3	91.9	47	78.6	1.4	1	13.9	5.38	40.1	124	55.1	319	31	3
1987	MOREX	6	32.7	81.3	48	77.2	1.7	1	15.6	5.95	39.3	172	62.1	202	18	10
1988	MERIT	2	39.6	87.6	49	79.9	2.7	1	14.8	6.78	46.0	118	88.7	294	29	5
1989	DRUMMOND	6	33.1	89.4	55	78.4	1.9	1	14.6	6.07	42.1	176	65.8	135	28	6
1990	VALIER	2	36.6	87.6	46	80.4	1.9	1	13.8	5.95	43.4	85	83.8	336	20	9
1991	ND16092-2	2	40.5	91.3	54	79.4	2.4	1	14.8	6.55	45.1	108	77.5	291	27	7
1992	ND16461-11	2	41.7	92.2	48	78.4	2.3	2	12.8	5.20	41.8	59	57.3	606	27	7
1996	HARRINGTON MALT CHECK	2	39.6	94.2	77	81.8	1.7	1	11.7	5.56	50.4	118	68.0	39	39	
Minima			32.7	81.3	40	77.2	1.4		12.8	4.54	35.1	59	48.8	135	16	
Maxima			44.2	96.3	55	80.4	2.7		15.6	6.78	46.0	176	88.7	606	38	
Means			38.7	89.2	48	78.7	2.0		14.3	5.80	41.6	114	66.4	294	27	
Standard Deviations			3.9	4.4	4	1.0	0.4		0.8	0.64	3.0	40	12.2	127	7	
Coefficients of Variation			10.1	5.0	8	1.3	21.4		5.8	11.11	7.2	35	18.3	43	25	

Malt Check Data are Excluded from Rank Sorting and Statistics

Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics

For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by J. D. Franckowiak and R. D. Horsley, North Dakota State University - Fargo

2001 EXPERIMENT FA12, FARGO ADVANCED YIELD TRIAL - FARGO, ND

Table 54

Lab No.	Variety or Selection	Rowed	Kernel	on	Barley	Malt	Barley	Wort	Alpha-	Beta-	Overall					
			Weight (mg)	6/64"	Color (Agtron)	Extract (%)	Wort Color	Wort Clarity	Protein (%)	Protein (%)		amylase (20°DU)	glucan (ppm)	Quality Score	Rank	
1993	LOGAN	2	43.2	93.6	44	78.2	1.6	1	13.7	5.33	39.7	119	57.4	414	26	8
1994	STANDER	6	35.1	93.4	47	78.3	2.5	1	14.6	6.82	48.7	140	76.9	261	26	8
1995	CONLON	2	43.1	96.0	48	79.2	1.6	1	13.5	5.39	40.9	101	71.6	369	33	2
1997	DRUMMOND	6	34.6	91.4	55	77.7	2.0	1	14.6	6.01	41.9	182	66.1	175	20	15
1998	ND16092-2	2	40.0	91.8	55	79.2	2.6	1	14.6	6.59	45.7	115	70.2	203	28	5
1999	ND16461-11	2	43.3	94.6	46	78.7	2.0	1	12.8	5.59	43.7	69	70.0	508	29	3
2000	2ND17274-1	2	39.6	95.6	51	78.7	2.6	1	14.4	6.53	45.5	82	62.9	240	21	14
2001	2N17318	2	43.8	93.3	46	78.0	1.6	1	13.6	5.84	43.0	109	61.3	321	24	12
2002	2N18076	2	44.0	93.8	42	78.0	2.0	1	13.7	5.73	43.0	100	65.0	207	27	6
2003	2N18172	2	43.3	96.4	50	79.6	2.9	1	14.5	7.08	49.5	86	75.3	201	22	13
2004	2N18173	2	42.7	95.9	49	80.0	2.5	1	14.0	6.61	48.6	104	75.1	289	26	8
2005	2N18204	2	43.2	94.0	48	78.1	n.d.	3	13.5	5.60	42.5	111	60.1	334	29	3
2006	2N18234	2	39.8	95.5	51	79.3	1.5	1	13.2	5.08	38.5	88	62.3	521	25	11
2007	2N18337	2	41.4	92.4	48	79.3	1.9	2	13.2	5.77	44.2	90	63.8	327	27	6
2008	2N18380	2	41.6	95.3	49	81.1	1.9	1	12.3	5.43	45.0	95	60.0	662	39	1
1996	HARRINGTON MALT CHECK	2	39.6	94.2	77	81.8	1.7	1	11.7	5.56	50.4	118	68.0	39	39	
Minima			34.6	91.4	42	77.7	1.5		12.3	5.08	38.5	69	57.4	175	20	
Maxima			44.0	96.4	55	81.1	2.9		14.6	7.08	49.5	182	76.9	662	39	
Means			41.2	94.2	49	78.9	2.1		13.7	5.96	44.0	106	66.5	335	27	
Standard Deviations			3.0	1.6	4	0.9	0.5		0.7	0.62	3.2	27	6.2	140	5	
Coefficients of Variation			7.2	1.7	7	1.1	22.2		5.1	10.33	7.3	26	9.4	42	18	

Malt Check Data are Excluded from Rank Sorting and Statistics

Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics

For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by J. D. Franckowiak and R. D. Horsley, North Dakota State University - Fargo

2001 EXPERIMENT FA13, FARGO INTERMEDIATE YIELD TRIAL - FARGO, ND

Table 55

Lab No.	Variety or Selection	Rowed	Kernel	on	Barley	Malt	Barley	Wort	Alpha-	Beta-	Overall					
			Weight	6/64"	Color	Extract	Wort Color	Wort Clarity	Protein (%)	Protein (%)		amylase (20°DU)	glucan (ppm)	Quality Score	Rank	
2009	STANDER	6	34.5	91.0	48	78.2	2.4	1	14.5	6.58	46.2	151	74.7	280	26	5
2010	CONLON	2	44.2	97.6	51	79.9	1.6	1	14.3	5.45	40.2	102	70.6	264	34	2
2011	DRUMMOND	6	34.8	92.3	54	78.1	2.0	1	14.9	6.20	42.5	180	68.2	204	24	9
2012	ND16461	2	42.9	92.9	45	78.4	2.6	2	13.7	5.04	38.8	71	60.1	590	22	13
2013	2N18894	2	44.0	93.1	54	78.2	1.8	1	14.9	5.63	38.1	110	66.3	453	26	5
2014	2N18899	2	42.7	94.0	46	80.5	1.9	1	12.8	5.85	45.8	92	60.4	234	35	1
2015	2N18908	2	39.1	90.9	48	80.0	1.6	1	14.6	5.32	38.4	111	67.7	357	26	5
2016	2N18915	2	40.8	92.8	46	78.1	1.8	1	14.0	5.20	38.6	80	59.8	611	18	17
2018	2N18919	2	40.5	90.8	52	79.3	2.4	1	14.1	6.01	43.9	103	76.6	308	24	9
2019	2N18921	2	40.3	92.4	52	79.9	1.9	1	14.9	5.95	40.5	106	59.7	318	30	3
2020	2N18947	2	39.9	91.8	50	78.4	1.5	1	14.6	5.24	36.5	109	59.7	414	20	15
2021	2N18948	2	41.9	92.2	55	78.6	2.3	1	13.6	5.00	37.2	73	57.9	357	22	13
2022	2N18951	2	41.5	94.0	52	77.8	2.4	2	14.8	4.83	33.8	102	52.7	465	25	8
2023	2N18958	2	46.6	97.5	51	80.7	2.6	1	13.8	6.69	49.7	82	74.4	391	19	16
2024	2N18975	2	41.1	91.1	47	79.8	1.4	1	13.8	5.07	38.4	81	50.8	359	29	4
2025	2N18977	2	46.8	97.1	51	79.4	2.2	1	14.2	5.56	39.9	91	52.8	498	23	12
2026	2N18990	2	43.6	97.6	55	80.5	2.3	1	14.3	6.42	45.9	85	75.0	378	24	9
2017	HARRINGTON MALT CHECK	2	39.8	93.7	79	81.8	1.8	1	11.7	5.42	50.0	107	72.5	153	39	
Minima			34.5	90.8	45	77.8	1.4		12.8	4.83	33.8	71	50.8	204	18	
Maxima			46.8	97.6	55	80.7	2.6		14.9	6.69	49.7	180	76.6	611	35	
Means			41.5	93.5	50	79.2	2.0		14.2	5.65	40.8	102	64.0	381	25	
Standard Deviations			3.4	2.5	3	1.0	0.4		0.6	0.58	4.2	28	8.4	115	5	
Coefficients of Variation			8.1	2.6	6	1.2	19.3		4.0	10.31	10.3	27	13.1	30	19	

Malt Check Data are Excluded from Rank Sorting and Statistics

Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics

For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by J. D. Franckowiak and R. D. Horsley, North Dakota State University - Fargo

2001 EXPERIMENT FA14, FARGO INTERMEDIATE YIELD TRIAL - FARGO, ND

Table 56

Lab No.	Variety or Selection	Rowed	Kernel	on	Barley	Malt	Barley	Wort	Alpha-	Beta-	Overall					
			Weight (mg)	6/64" (%)	Color (Agrton)	Extract (%)	Wort Color	Wort Clarity	Protein (%)	Protein (%)		amylase (ppm)	glucan	Quality Score	Rank	
2027	STANDER	6	35.0	92.7	46	78.5	2.5	1	14.7	6.38	44.7	143	69.6	289	31	5
2028	CONLON	2	44.0	97.3	52	79.4	1.8	1	13.3	4.99	38.3	97	63.4	442	35	1
2029	DRUMMOND	6	34.7	92.9	54	78.4	1.9	1	15.0	6.07	42.1	176	65.5	183	24	10
2030	ND16461	2	43.1	94.5	47	79.0	2.1	1	13.0	5.42	42.3	73	68.1	458	29	6
2031	2N18998	2	43.2	97.1	48	80.4	2.1	1	13.0	6.03	47.2	53	75.4	798	24	10
2032	2N19012	2	43.9	94.9	45	80.5	2.3	1	12.4	6.02	49.1	77	80.0	318	29	6
2033	2N19023	2	43.6	94.9	47	77.2	2.1	1	13.7	5.28	39.2	90	61.5	310	15	17
2034	2N19029	2	40.7	95.0	52	78.8	1.6	1	15.0	5.66	38.6	103	66.4	406	22	13
2035	2N19032	2	41.4	91.2	48	78.0	1.6	1	15.0	5.16	34.5	127	61.3	466	21	15
2037	2N19033	2	43.8	95.0	48	78.9	1.8	1	14.4	5.76	42.4	108	58.6	343	28	9
2038	2N19040	2	37.6	93.9	49	81.7	2.5	1	13.4	6.76	50.7	64	65.9	428	22	13
2039	2N19052	2	45.7	96.9	51	79.8	2.0	1	13.5	6.22	46.0	86	68.0	522	19	16
2040	2N19053	2	45.6	95.9	46	79.8	2.1	1	13.5	6.23	46.4	73	65.1	480	24	10
2041	2N19054	2	46.8	96.0	48	79.9	2.0	1	13.4	6.01	45.0	82	67.2	540	29	6
2042	2N19088	2	38.9	91.8	47	80.3	2.3	1	12.1	5.35	45.7	56	66.2	344	34	2
2043	2N19098	2	45.8	92.4	53	79.5	1.9	1	13.4	5.25	40.6	64	60.2	367	32	3
2044	2N19099	2	46.5	95.3	48	80.0	1.8	1	13.4	5.31	40.1	66	62.2	360	32	3
2036	HARRINGTON MALT CHECK	2	39.3	93.3	79	81.9	1.7	1	11.7	5.41	48.5	109	74.5	57	39	
Minima			34.7	91.2	45	77.2	1.6		12.1	4.99	34.5	53	58.6	183	15	
Maxima			46.8	97.3	54	81.7	2.5		15.0	6.76	50.7	176	80.0	798	35	
Means			42.4	94.6	49	79.4	2.0		13.7	5.76	43.1	90	66.2	415	26	
Standard Deviations			3.8	1.8	3	1.1	0.3		0.9	0.50	4.3	33	5.4	134	6	
Coefficients of Variation			9.0	2.0	5	1.4	13.9		6.4	8.73	9.9	37	8.1	32	21	

Malt Check Data are Excluded from Rank Sorting and Statistics

Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics

For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by J. D. Franckowiak and R. D. Horsley, North Dakota State University - Fargo

2001 EXPERIMENT FA15, FARGO INTERMEDIATE YIELD TRIAL - FARGO, ND

Table 57

Lab No.	Variety or Selection	Rowed	Kernel	on	Barley	Malt		Barley	Wort	S/T	DP	Alpha-	Beta-	Overall		
			Weight	6/64"	Color	Extract	Wort	Wort	Protein	Protein	(%)	(°ASBC)	(20°DU)	amylase	glucan	Quality
2045	STANDER	6	35.5	92.3	48	78.4	2.6	1	14.4	6.72	46.9	139	74.3	227	23	14
2046	CONLON	2	43.4	94.9	51	79.3	1.8	1	13.5	5.56	41.5	96	70.8	346	33	3
2047	DRUMMOND	6	34.3	91.0	54	78.2	1.8	1	14.9	5.99	41.0	177	66.3	149	31	6
2048	ND16461	2	42.8	94.6	48	79.0	2.0	1	12.9	5.32	42.4	68	65.6	446	29	7
2049	2N19101	2	46.5	94.4	48	80.1	2.0	1	13.3	5.30	41.0	62	54.7	474	36	2
2050	2N19110	2	43.8	94.0	51	78.7	1.5	1	14.7	5.55	39.2	103	68.2	456	23	14
2051	2N19119	2	50.8	94.4	55	80.2	2.7	1	13.3	6.35	49.9	68	71.4	200	27	10
2052	2N19121	2	40.6	92.3	50	79.7	1.6	1	13.7	5.56	41.1	88	65.8	547	26	11
2053	2N19123	2	42.1	93.3	49	79.2	1.8	1	14.2	5.56	40.2	100	64.6	329	28	8
2054	2N19130	2	43.5	93.7	48	79.3	1.7	1	12.3	4.78	41.0	78	53.0	495	42	1
2055	2N19133	2	41.5	94.6	50	79.7	1.3	1	14.0	4.81	36.5	87	62.4	262	28	8
2056	2N19138	2	38.5	93.0	50	80.1	1.4	1	13.6	5.46	40.5	85	65.5	384	24	12
2058	2N19152	2	46.4	97.3	53	79.2	2.1	1	13.3	5.84	44.6	66	65.2	300	32	4
2059	2N19156	2	46.4	94.0	47	76.8	2.2	1	15.9	6.63	42.4	122	75.2	306	24	12
2060	2N19164	2	42.4	93.1	47	79.5	2.1	1	13.0	5.46	42.8	60	65.7	540	32	4
2061	2N19184	2	40.0	*69	*36	*84.9	n.d.	3	14.1	4.59	34.3	68	60.7	696	19	16
2057	HARRINGTON MALT CHECK	2	39.5	94.0	78	81.9	1.7	1	12.0	5.39	48.6	96	71.3	169	39	
Minima			34.3	91.0	47	76.8	1.3		12.3	4.59	34.3	60	53.0	149	19	
Maxima			50.8	97.3	55	80.2	2.7		15.9	6.72	49.9	177	75.2	696	42	
Means			42.4	93.8	50	79.2	1.9		13.8	5.59	41.6	92	65.6	385	29	
Standard Deviations			4.2	1.4	2	0.9	0.4		0.9	0.61	3.6	32	6.0	147	6	
Coefficients of Variation			9.8	1.5	5	1.1	20.8		6.5	10.93	8.8	35	9.2	38	20	

Malt Check Data are Excluded from Rank Sorting and Statistics

Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics

For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by J. D. Franckowiak and R. D. Horsley, North Dakota State University - Fargo

2001 EXPERIMENT MI11, MINOT VARIETY YIELD TRIAL - MINOT, ND

Table 58

Lab No.	Variety or Selection	Rowed	Kernel	on	Barley	Malt		Barley	Wort			Alpha-	Beta-	Overall		
			Weight	6/64"	Color	Extract	Wort Color	Wort Clarity	Protein (%)	Protein (%)	S/T (%)	DP (°ASBC)	amylase (20°DU)	glucan (ppm)		
2062	BARONESSE	2	36.2	78.0	42	75.3	1.9	2	14.9	4.40	30.3	82	53.0	391	12	10
2063	CONLON	2	37.8	85.8	43	79.1	1.6	1	13.8	4.91	37.6	112	67.5	299	26	1
2064	HARRINGTON	2	33.1	68.0	39	77.8	1.8	1	14.4	5.28	37.6	93	62.0	309	5	11
2065	LACEY	6	33.0	75.0	43	78.6	1.7	1	14.5	5.70	39.9	187	62.3	82	24	3
2066	LOGAN	2	39.4	79.4	44	78.6	1.4	1	13.6	4.96	36.7	146	58.2	186	18	8
2067	MOREX	6	29.6	50.1	44	77.0	1.9	1	14.9	5.68	38.6	187	66.5	91	14	9
2068	MERIT	2	36.5	79.9	43	79.0	2.2	1	14.9	5.88	40.9	134	85.5	283	21	5
2069	DRUMMOND	6	31.0	68.2	49	77.8	1.8	1	14.5	5.74	41.8	197	65.6	93	21	5
2070	VALIER	2	35.4	74.1	47	78.6	1.7	1	15.2	5.78	38.5	122	74.1	238	19	7
2071	ND16092-2	2	38.8	83.4	45	80.9	1.9	2	14.4	6.00	42.9	120	80.1	266	25	2
2072	ND16461-11	2	39.8	85.7	41	79.1	1.8	1	13.4	5.43	40.7	92	63.1	320	24	3
2078	HARRINGTON MALT CHECK	2	39.7	93.0	80	81.7	1.7	1	12.0	5.59	50.6	112	74.5	30	39	
			Minima	29.6	50.1	39	75.3	1.4	13.4	4.40	30.3	82	53.0	82	5	
			Maxima	39.8	85.8	49	80.9	2.2	15.2	6.00	42.9	197	85.5	391	26	
			Means	35.5	75.2	44	78.4	1.8	14.4	5.43	38.7	134	67.1	233	19	
			Standard Deviations	3.4	10.3	3	1.4	0.2	0.6	0.50	3.4	41	9.5	105	6	
			Coefficients of Variation	9.7	13.7	6	1.8	11.1	4.1	9.12	8.7	31	14.2	45	34	

Malt Check Data are Excluded from Rank Sorting and Statistics

Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics

For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by J. D. Franckowiak and R. D. Horsley, North Dakota State University - Fargo

2001 EXPERIMENT MI12, MINOT ADVANCED YIELD TRIAL - MINOT, ND

Table 59

Lab No.	Variety or Selection	Rowed	Kernel	on	Barley	Malt	Barley	Wort	Alpha-	Beta-	Overall					
			Weight (mg)	6/64" (%)	Color (Agrton)	Extract (%)	Wort Color	Wort Clarity	Protein (%)	Protein (%)		DP (20°DU)	amylase (ppm)	glucan	Quality Score	Rank
2073	LOGAN	2	40.4	83.0	44	78.4	1.4	1	14.0	5.23	37.5	145	54.0	182	20	14
2074	STANDER	6	32.4	75.7	45	79.1	2.2	1	14.3	6.27	45.2	175	76.1	118	29	4
2075	CONLON	2	38.1	89.7	42	79.2	1.7	1	13.5	5.10	38.9	122	68.6	156	24	8
2076	DRUMMOND	6	31.8	79.0	45	78.0	1.9	1	14.7	5.82	40.6	204	66.1	100	26	6
2077	ND16092-2	2	39.4	85.0	44	80.2	2.2	1	14.6	6.20	42.9	123	82.3	230	29	4
2079	ND16461-11	2	39.9	86.2	40	78.4	1.9	2	13.2	5.30	41.1	92	68.1	329	23	10
2080	2ND17274-1	2	38.1	89.6	45	78.8	2.0	1	14.5	6.09	42.3	107	76.9	273	23	10
2081	2N17318	2	40.8	89.8	40	77.3	1.5	1	14.8	5.60	38.1	137	57.7	207	19	15
2082	2N18076	2	42.4	87.1	40	77.1	1.8	1	14.7	5.39	37.7	136	56.4	107	24	8
2083	2N18172	2	42.2	93.0	43	79.9	2.1	1	14.5	6.24	44.2	156	72.9	116	31	1
2084	2N18173	2	38.9	90.1	43	80.5	2.0	1	13.7	5.93	45.5	138	69.5	247	31	1
2085	2N18204	2	40.2	85.1	39	77.6	2.3	2	13.7	4.81	36.2	136	55.0	274	26	6
2086	2N18234	2	36.9	86.0	42	79.6	1.7	1	13.9	4.93	36.8	102	58.6	358	23	10
2087	2N18337	2	37.9	84.8	43	78.5	2.0	1	14.2	5.58	40.1	104	61.3	263	21	13
2088	2N18380	2	39.8	91.7	43	80.6	1.6	1	13.4	5.14	39.5	112	55.8	429	31	1
2078	HARRINGTON MALT CHECK	2	39.7	93.0	80	81.7	1.7	1	12.0	5.59	50.6	112	74.5	30	39	
Minima			31.8	75.7	39	77.1	1.4		13.2	4.81	36.2	92	54.0	100	19	
Maxima			42.4	93.0	45	80.6	2.3		14.8	6.27	45.5	204	82.3	429	31	
Means			38.6	86.4	43	78.9	1.9		14.1	5.58	40.5	133	65.3	226	25	
Standard Deviations			3.1	4.7	2	1.1	0.3		0.5	0.49	3.0	30	9.1	99	4	
Coefficients of Variation			7.9	5.4	5	1.4	13.9		3.8	8.86	7.5	23	13.9	44	16	

Malt Check Data are Excluded from Rank Sorting and Statistics

Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics

For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by J. D. Franckowiak and R. D. Horsley, North Dakota State University - Fargo

2001 EXPERIMENT MI13, MINOT INTERMEDIATE YIELD TRIAL - MINOT, ND

Table 60

Lab No.	Variety or Selection	Rowed	Kernel	on	Barley	Malt	Barley	Wort	Alpha-	Beta-	Overall				
			Weight	6/64"	Color	Extract	Wort Color	Wort Clarity	Protein (%)	Protein (%)		amylase (20°DU)	glucan (ppm)	Quality Score	Rank
2089	STANDER	6	32.3	80.4	42	79.4	2.1	1	14.4	6.28	45.6	156	77.3	139	38 1
2090	CONLON	2	38.1	89.5	40	79.0	1.6	1	13.7	4.80	36.6	106	67.6	224	25 10
2091	DRUMMOND	6	32.6	80.4	47	78.1	1.8	1	14.8	5.64	38.9	83	61.3	110	26 7
2092	ND16461	2	39.3	87.1	40	78.0	1.9	1	13.5	5.12	39.0	184	62.6	334	10 17
2093	2N18894	2	42.8	88.6	43	77.5	1.5	1	14.5	4.96	35.2	126	53.6	296	31 4
2094	2N18899	2	39.7	89.0	46	79.4	1.7	1	14.2	5.78	41.9	105	65.2	146	33 3
2095	2N18908	2	35.5	75.0	45	78.9	1.5	1	14.9	5.49	37.1	117	68.5	240	19 14
2096	2N18915	2	38.2	89.6	38	78.6	2.0	2	14.3	5.51	40.0	102	60.7	361	17 15
2097	2N18919	2	37.4	82.3	46	79.0	2.0	1	14.1	5.90	42.9	118	77.8	179	24 11
2098	2N18921	2	39.0	88.6	48	79.3	1.7	1	14.6	6.00	41.7	121	59.3	283	26 7
2100	2N18947	2	36.1	73.4	43	78.1	1.5	1	14.9	5.00	35.0	119	55.8	257	23 12
2101	2N18948	2	37.7	88.1	45	78.4	2.0	2	13.9	4.96	36.8	85	55.5	313	15 16
2102	2N18951	2	38.3	88.4	42	77.8	1.9	2	14.5	4.84	34.4	122	50.9	238	27 6
2103	2N18958	2	42.5	94.5	44	80.0	2.6	1	13.7	6.65	50.0	107	70.7	114	30 5
2104	2N18975	2	39.7	82.2	46	78.4	1.5	1	14.7	4.99	35.8	100	52.0	280	26 7
2105	2N18977	2	43.7	92.7	47	79.5	1.8	1	14.5	5.29	37.6	119	50.6	228	36 2
2106	2N18990	2	40.4	92.8	46	79.7	2.0	1	15.5	6.16	40.0	103	58.8	359	22 13
2099	HARRINGTON MALT CHECK	2	39.7	93.5	78	81.4	1.7	1	11.5	5.46	48.3	104	71.2	43	39
Minima			32.3	73.4	38	77.5	1.5		13.5	4.80	34.4	83	50.6	110	10
Maxima			43.7	94.5	48	80.0	2.6		15.5	6.65	50.0	184	77.8	361	38
Means			38.4	86.0	44	78.8	1.8		14.4	5.49	39.3	116	61.7	241	25
Standard Deviations			3.2	6.1	3	0.7	0.3		0.5	0.56	4.1	24	8.5	81	7
Coefficients of Variation			8.2	7.1	6	0.9	16.7		3.5	10.26	10.5	21	13.8	34	29

Malt Check Data are Excluded from Rank Sorting and Statistics

Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics

For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by J. D. Franckowiak and R. D. Horsley, North Dakota State University - Fargo

2001 EXPERIMENT MI14, MINOT INTERMEDIATE YIELD TRIAL - MINOT, ND

Table 61

Lab No.	Variety or Selection	Rowed	Kernel	on	Barley	Malt	Barley	Wort	Alpha-	Beta-	Overall					
			Weight (mg)	6/64"	Color (Agtron)	Extract (%)	Wort Color	Wort Clarity	Protein (%)	Protein (%)		amylase (20°DU)	glucan (ppm)	Quality Score	Rank	
2107	STANDER	6	33.3	84.3	42	79.5	2.2	1	13.4	5.90	47.2	137	68.4	77	34	7
2108	CONLON	2	37.6	87.2	44	79.0	1.8	1	13.8	5.25	38.7	112	64.2	201	22	12
2109	DRUMMOND	6	33.0	83.9	47	77.7	1.9	1	14.2	5.89	42.4	*194	63.8	102	27	9
2110	ND16461	2	40.4	88.8	42	78.0	1.9	2	13.1	4.86	39.1	86	55.1	420	20	14
2111	2N18998	2	39.2	89.9	43	79.5	2.2	2	13.7	6.05	46.0	76	71.2	455	13	17
2112	2N19012	2	40.8	86.6	40	79.6	2.0	1	13.0	5.67	45.0	116	80.3	219	39	1
2113	2N19023	2	40.2	89.3	39	77.3	2.3	3	13.9	4.75	35.2	86	54.5	425	18	16
2114	2N19029	2	37.0	87.9	40	79.2	1.8	1	14.4	5.63	39.8	116	66.8	292	22	12
2115	2N19032	2	37.6	84.4	44	78.7	1.4	1	13.9	4.93	36.9	125	56.3	370	20	14
2116	2N19033	2	40.2	90.4	44	79.7	1.6	1	13.8	4.97	38.7	112	54.1	342	36	3
2117	2N19040	2	36.1	88.2	43	80.1	2.0	1	13.8	5.94	44.1	96	52.9	342	28	8
2118	2N19052	2	43.5	92.5	43	80.6	2.1	2	13.4	5.85	45.2	105	62.5	414	35	4
2119	2N19053	2	43.0	94.9	42	81.2	2.1	2	13.2	5.64	43.8	103	64.3	405	38	2
2121	2N19054	2	44.8	92.2	43	80.3	2.6	2	13.5	5.60	44.4	103	62.1	429	35	4
2122	2N19088	2	36.6	90.1	45	80.1	2.0	1	12.5	5.12	43.9	88	64.3	292	35	4
2123	2N19098	2	41.5	86.7	43	78.7	1.7	1	13.4	4.81	38.5	81	55.5	332	25	11
2124	2N19099	2	43.3	90.6	42	79.9	1.8	1	13.4	5.16	39.3	86	60.1	331	27	9
2120	HARRINGTON MALT CHECK	2	39.4	93.7	77	81.7	1.8	1	12.3	5.58	47.8	111	70.5	108	46	
Minima			33.0	83.9	39	77.3	1.4		12.5	4.75	35.2	76	52.9	77	13	
Maxima			44.8	94.9	47	81.2	2.6		14.4	6.05	47.2	137	80.3	455	39	
Means			39.3	88.7	43	79.4	2.0		13.5	5.41	41.7	102	62.1	320	28	
Standard Deviations			3.4	3.0	2	1.0	0.3		0.5	0.45	3.6	17	7.2	113	8	
Coefficients of Variation			8.8	3.4	5	1.3	14.1		3.5	8.34	8.6	17	11.6	35	28	

Malt Check Data are Excluded from Rank Sorting and Statistics

Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics

For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by J. D. Franckowiak and R. D. Horsley, North Dakota State University - Fargo

2001 EXPERIMENT MI15, MINOT INTERMEDIATE YIELD TRIAL - MINOT, ND

Table 62

Lab No.	Variety or Selection	Rowed	Kernel	on	Barley	Malt	Barley	Wort	Alpha-	Beta-	Overall					
			Weight (mg)	6/64" (%)	Color (Agrton)	Extract (%)	Wort Color	Wort Clarity	Protein (%)	Protein (%)		amylase (ppm)	glucan	Quality Score	Rank	
2125	STANDER	6	33.2	81.4	42	79.6	2.1	1	13.9	6.08	47.2	147	68.9	101	38	1
2126	CONLON	2	38.8	89.4	43	78.9	1.7	1	14.0	5.06	37.2	111	63.9	294	28	7
2127	DRUMMOND	6	32.6	80.8	50	77.9	1.8	1	15.0	5.72	40.4	190	60.0	89	31	5
2128	ND16461	2	40.1	87.1	39	78.6	1.9	1	13.1	5.09	39.3	82	58.6	432	25	10
2129	2N19101	2	41.1	87.5	42	79.4	1.5	1	13.5	4.70	36.3	72	46.5	398	32	4
2130	2N19110	2	41.1	89.1	41	78.3	1.5	1	14.8	5.01	34.7	104	53.5	318	28	7
2131	2N19119	2	46.2	95.0	46	80.2	2.2	1	12.7	5.80	49.3	83	58.3	199	30	6
2132	2N19121	2	37.7	86.7	43	79.0	1.6	1	13.6	5.14	39.0	95	57.4	394	12	15
2133	2N19123	2	40.6	90.6	45	79.1	1.8	1	14.7	5.17	36.1	100	54.9	407	26	9
2134	2N19130	2	41.7	90.5	41	79.0	1.7	1	13.3	4.45	35.7	87	48.3	405	34	3
2135	2N19133	2	38.9	90.3	46	79.7	1.4	1	14.0	4.62	33.9	90	56.5	321	23	11
2136	2N19138	2	36.2	80.0	44	80.0	1.4	1	13.7	5.07	38.7	99	61.3	185	23	11
2137	2N19152	2	44.7	95.8	45	79.7	2.1	1	13.3	5.29	41.6	80	58.7	286	35	2
2138	2N19156	2	45.1	93.0	45	77.7	2.0	1	15.4	5.50	36.7	124	62.4	405	22	13
2139	2N19164	2	37.8	79.9	45	78.0	2.0	1	13.7	5.16	38.1	67	57.5	458	9	16
2140	2N19184	2	36.6	*44.1	*30	*85.1	2.1	2	14.6	4.93	35.8	94	64.4	449	18	14
2141	HARRINGTON MALT CHECK	2	39.8	93.7	79	81.6	1.7	1	11.9	5.28	48.0	94	74.1	167	35	
Minima			32.6	79.9	39	77.7	1.4		12.7	4.45	33.9	67	46.5	89	9	
Maxima			46.2	95.8	50	80.2	2.2		15.4	6.08	49.3	190	68.9	458	38	
Means			39.5	87.8	44	79.0	1.8		14.0	5.17	38.7	101	58.2	322	26	
Standard Deviations			3.9	5.2	3	0.8	0.3		0.8	0.43	4.2	31	5.7	120	8	
Coefficients of Variation			9.9	6.0	6	1.0	14.9		5.4	8.37	11.0	30	9.8	37	31	

Malt Check Data are Excluded from Rank Sorting and Statistics

Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics

For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by J. D. Franckowiak and R. D. Horsley, North Dakota State University - Fargo

Appendix A: **METHODS**

Cleaning All samples were cleaned on a Carter Dockage Tester and any material not retained on a 5/64" screen was discarded.

Barley Mill Ground barley was prepared with a Labconco Burr mill that was adjusted so that only 35% of the grist remained on a 525 µm sieve after 3 min of shaking and tapping.

Kernel Weight The number of kernels in a 20 g aliquot of each sample was counted electronically and the '1000 kernel weight' was calculated.

Plumpness Samples were sized on a Eureka-Niagra Barley Grader and the percentage of the seeds retained on a 6/64" screen was determined.

Barley Color The brightness of the grains was measured using an Agtron M45-D analyzer.

Barley Moisture Content Five g of ground sample was dried for 3 h at 106°C. The percentage of weight loss that occurred during this drying was calculated.

Barley Protein Content Total nitrogen values were obtained using an automated Dumas combustion procedure with a LECO FP-528 analyzer. Nitrogen values were converted to protein percentages by multiplication by 6.25.

Malting Conditions 170 g (db) barley samples were steeped at 16°C for 32-48 h, to 45% moisture, by alternating 4 h of wet steep with 4 h of air rest. The steeped samples were placed in a chamber for 5 d at 17°C and near 100% R.H., in cans that were rotated for 3.0 min every 30 min. The germinated grain (green malt) was kilned for 24 h as follows: 0.5 h from 25°C to 49°C, 9.5 h at 49°C, 0.5 h from 49°C to 54°C, 4.0 h at 54°C, 0.5 h from 54°C to 60°C, 3.0 h at 60°C, 0.5 h from 60°C to 68°C, 2.0 h at 68°C, 0.5h from 68°C to 85°C, and 3.0 h at 85°C.

Malt Mill Fine-grind malts were prepared with a Miag laboratory cone mill that was adjusted so that 10% of the grist remained on a 525 µm sieve after 3 min of shaking, with tapping. Coarse-grind malts were prepared with a corrugated roll mill that was adjusted so that 75% of the grist remained on a 525 µm sieve. Ground malts for moisture, protein and amyloytic activity analyses were ground in a Labconco Burr mill (see Barley Mill).

Malt Moisture Content See Barley Moisture Content.

Malt Protein Content See Barley Protein Content.

Malt Extract The finely ground samples were extracted using the Malt-4 procedure (Methods of Analysis of the ASBC, 8th ed, 1992), except that all weights and volumes specified for the method were halved. The specific gravity of the filtrate was measured with an Anton/Parr DMA5000 density meter. The density data were used to calculate the amount of soluble material present in the filtrate, and thus the percentage that was extracted from the malt.

Wort Color was determined on a Skalar SAN plus analyzer by subtracting the absorbance at 700 nm from that at 430nm and dividing by a factor that was determined by comparison with values obtained in a collaborative test.

Wort Clarity was assessed by visual inspection.

β-Glucan Levels were determined on a Skalar SAN plus analyzer by using the Wort-18 fluorescence flow injection analysis method with calcofluor as the fluorescent agent (Methods of Analysis of the ASBC, 8th ed, 1992).

Soluble (Wort) Protein Levels were determined on a Skalar SAN plus analyzer using the Wort-17 UV-spectrophotometric method (Methods of Analysis of the ASBC, 8th ed, 1992).

S/T Ratio was calculated as Soluble Protein / Total Malt Protein

Diastatic Power Values were determined on a Skalar SAN plus analyzer by the automated ferricyanide procedure Malt-6A (Methods of Analysis of the ASBC, 8th ed, 1992).

α-Amylase activities were measured on a Skalar SAN plus analyzer by heating the extract to 73°C to inactivate any β-amylase present. The remaining (α-amylase) activity was measured as described for Diastatic Power Values.

Quality Scores were calculated by using a modification of the method of Clancy and Ullrich (Cereal Chem. 65:428-430, 1988). The criteria used to quantify individual quality factors are listed in Table A1.

Overall Rank Values were ordered from low to high based on their Quality Scores. A rank of '1' was assigned to the sample with the best quality score.

Appendix B

2001 Crop Year

Quality Score Parameters for 2- and 6-rowed barleys

Quality parameter	2-rowed		6-rowed	
	condition	score	condition	score
Kernel Weight (mg)	> 42.0	5	> 32.0	5
	40.1–42.0	4	30.1–32.0	4
	38.1–40.0	2	28.1–30.0	2
	≤ 38.0	0	≤ 28.0	0
on 6/64 "	≥ 90.0	5	≥ 77.0	5
	85.0–89.9	3	70.0–76.9	3
	< 85.0	0	< 70.0	0
Malt Extract (% db)	≥ 81.0	10	≥ 80.0	10
	79.5–80.9	7	79.0–79.9	7
	78.0–79.4	4	78.0–78.9	4
	< 78.0	0	< 78.0	0
Wort Clarity 3=hazy 2=slightly hazy 1=clear	= 3	0	= 3	0
	= 2	1	= 2	1
	= 1	2	= 1	2
	1=clear			
Barley Protein (% db)	≥ 13.5	0	≥ 14.0	0
	12.6–13.4	5	12.6–13.9	5
	10.1–12.5	10	10.6–12.5	10
	≤ 10.0	5	≤ 10.5	5
Wort Protein (% db)	> 6.0	0	> 6.0	0
	5.1–6.0	3	5.3–6.0	3
	4.4–5.0	7	4.6–5.2	7
	< 4.4	0	< 4.6	0
S/T (Soluble/Total Protein, % db)	> 46.0	0	> 46.0	0
	40.0–46.0	5	40.0–46.0	5
	< 40.0	0	< 40.0	0
DP (Diastatic Power, ° ASBC)	> 140.0	0	> 170.0	0
	130.1–140.0	4	160.1–170.0	4
	110.0–130.0	7	140.0–160.0	7
	95.0–109.9	4	130.0–139.9	4
	< 95.0	0	< 130.0	0
Alpha-amylase (20° DU)	> 55.0	0	> 60.0	0
	50.1–55.0	4	55.1–60.0	4
	40.0–50.0	7	45.0–55.0	7
	35.0–39.9	4	40.0–44.9	4
	< 35.0	0	< 40.0	0
Beta-glucan (ppm)	< 40	0	< 40	0
	40–80	3	40–80	3
	80 – 150	7	80 – 150	7
	150 – 300	3	150 – 300	3
	> 300	0	> 300	0