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Cooperating County Extension Agents
Cooperating Landowners

OBJECTIVES:
It is the objective of this project to bring quality and quantity together to allow the forces of market value to influence evaluation of winter and spring wheat varieties under varying cropping conditions in northern Montana.

RESULTS:
Average annual PNW quotes for Hard Red Winter wheat at 10, 11, 12, and 13 percent protein for the 10-year period 1996-2005 are graphed in Figure 1. The PNW annual market averages for the same period for Dark Northern Spring wheat at 12, 13, 14, and 15 percent protein are graphed in Figure 2. Both graphs include values along the top axis reflecting the average annual $/bu price spread between the minimum and maximum protein levels for which quotes are consistently available.

‘Gross Dollar Return' comparisons are graphically presented in Figures 3. through 7. reflecting research plot response data for the locations and years below:

<table>
<thead>
<tr>
<th>Figure No.</th>
<th>Cropping System &amp; Crop</th>
<th>Research Location</th>
<th>No. of Varieties Included</th>
<th>No. of Data Years Included</th>
<th>No. of Calendar Years Spanned</th>
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Analyses span the maximum number of calendar years, up to 10, for which data exists for a specific location and variety set. Figures marked with an asterisk (*) denote those for which a reduced number of data years were used in the analyses for purposes of including new or otherwise popular variety releases having fewer data years available. In contrast to the 'Comparable Average' method of comparing varietal performance, graphs in this
report reflect only analyses where each variety shown was actually grown at that particular location during all 
years listed. Thus, values included are actual in terms of agronomic yield and associated gross return based on 
protein content and average annual market performance for each year.

It must be kept in mind that in addition to the influence of price variability; crop fertility, plant available water, and 
numerous other factors can dramatically affect gross dollar return. All trials included were fertilized. No attempt 
has been made here to consider fertilizer or other input costs and their subsequent effect on ‘net’ return. Plant 
available water estimates and soil fertility data are available for most of these studies. Climatic and nursery 
management data details for each off-station trial featured here are included with the associated agronomic 
evaluations in a separate report. Most Havre data, collected both on-station and off-station, is represented by a 
minimum ‘applied’ nitrogen rate of 70 lbs actual N/ac. It should be further understood that management plays a 
key role in affecting dollar return - be it associated with enhanced product quality, quantity or shrewd marketing 
skills.

SUMMARY:

Producers are well aware of the impact protein premiums can have on overall market value, but are troubled by 
the fact that the market has generally not been consistent in terms of rewarding growers for producing high quality 
wheat. The potential for discount associated with low quality has likely had more bearing on production 
management than have positive incentives in the form of premiums for quality above average. In the past 
decade, average annual premiums for 10-13 percent protein winter wheat and 12-15 percent protein spring wheat 
have varied from as little as 1.3 cents to as much as 58 cents per point increase in protein per bushel. Producers 
have encouraged researchers to evaluate potential new practices in terms of dollars and cents. Such is never 
easy; and this particular effort toward quantifying wheat variety performance on the basis of total dollar return was 
no exception.

Working with MWBC, the Research Center initiated development of a ‘Gross Dollar Return’ database in 1988 
utilizing a limited approach involving Wednesday markets only. By 1989, daily market spreadsheets were made 
available by MWBC with some file development assistance for previous years provided by NARC. At present, full 
market data for the years 1973-2005 have been made readily available to the Research Center.

For each research location a multi-year, average gross market value per acre was determined for each selected 
variety. Such values were based on gross return for actual yield at the lowest consistently quoted protein level 
plus added gross return for protein premium, if any. The sum of the two values then represents the gross return 
per acre in a given market year. Calculations were made for each year the varieties were under evaluation at a 
particular location. The values were then tested via analysis of variance with data years as replications.

It should be noted that the current procedure affords no mechanism for appropriate adjustment of gross return 
where protein content is either below that termed as "minimum quoted" (10 percent for winter wheat and 12 
percent for spring wheat, or above that termed as "maximum quoted" (13 percent for winter wheat and 15 percent 
for spring wheat). Thus, discounts for protein below the minimum quoted - or added premiums sometimes 
available for protein above normal quote maximums, cannot be reflected in these data. Due to fertilization, 
situations where protein levels were below minimum are extremely rare in these research databases. However, 
situations where protein exceeded the maximum level for which market quotes were available are common in 
these data. Thus, in cases where proteins for ‘average protein performing’ varieties in a particular trial are at the 
maximum level for which a market quote exists; entries with higher protein are not benefited by additional 
premium as they may have been in a commercial marketing situation.

One must also remain aware that the marketing periods chosen for these analyses can have pronounced effects 
on the results due to obvious year differences in overall market price and premium spreads. Not unlike most crop 
evaluation procedures, but perhaps even more important in this case, data reliability increases with additional 
years of observation. At present, it would appear that a minimum of four to five years should be involved for 
meaningful comparison via this system.

In 1994, Carlson initiated a new "paired" trial series at Turner whereby 16 to 23 varieties each of wheat and barley 
were evaluated for five years under both low and optimum nitrogen fertility. Abridged results of that 5-year study
in terms of agronomics and fertilizer economics are posted at Northern Agricultural Research Center’s website in the agronomy research section at http://www.ag.montana.edu/narc.

**FUTURE PLANS:**

The Research Center plans to continue work with MWBC and wheat breeders in further developing and refining the use of these data with agricultural producers. Regression or other means of analysis could be introduced in work with these data. Use of additional data sets representing conditions of lower fertility will also be important to refine the assessment of economic benefits associated with production of high quality varieties.

We have progressed toward evaluation of a revamping of our market matrices to reflect a more logical market year than is represented by the current calendar year approach. Very little “new production year” wheat is marketed in northern Montana until at least mid-August. Thus it may be more logical to associate a years’ agronomic data with 12 months following harvest - perhaps beginning September 1. Such would be a bit frustrating, as agronomic data for a year could not be economically compared until nearly a year later. However, such could be important in more accurately representing real world scenarios. If we took this approach, we would now be able to analyze only up through the 2004 crop. We wouldn’t be incorporating the 2005 crop data into the system until summer 2006. Furthermore, we have developed databases to explore the potential meaningfulness of assigning value weighting to individual months within the annual average on the basis of traditional Montana market volume during those months.

We will continue to explore ways in which to improve the use of actual market data in the comparison of wheat varieties and production practices.
Average Annual Market Quotes
* ($/Bu - Hard Red Winter Wheat)
Pacific Northwest Delivery

Average Annual Market Quotes
* ($/Bu - Dark Northern Spring Wheat)
Pacific Northwest Delivery

Figure 1.
MSU/AES/NARC-Carlson

Figure 2.
MSU/AES/NARC-Carlson
Gross Return - Fallow Winter Wheat
Northern Ag Research Center - Havre, Montana

Figure 3.
MSU/AES/NARC-Havre
Ref=05-3502 P=.0598 CV2=3.44%

LSD (P<=.05), Gross Return = $ 18.84 / ac
Prices = PNW Average Annual Market/Year

Gross Return - Fallow Winter Wheat
Northern Ag Research Center - Havre, Montana
7-Yr Means (1999-2005)

Figure 3a.
MSU/AES/NARC-Havre
Ref=05-3512 P=.0134 CV2=4.28%

LSD (P<=.05), Gross Return = $ 22.14 / ac
Prices = PNW Average Annual Market/Year
Gross Return - Fallow Winter Wheat
Northern Ag Research Center - Havre, Montana
4-Yr Means (2002-2005)

Figure 3b.
MSU/AES/NARC-Havre
Ref=05-3522  P=.6476  CV2=4.17%

Gross Return - Fallow Spring Wheat
Northern Ag Research Center - Havre, Montana

Figure 4.
MSU/AES/NARC-Havre
Ref=05-3102  P=.0001  CV2=2.48%
Gross Return - Fallow Spring Wheat
Northern Ag Research Center - Havre, Montana

Figure 4a.
MSU/AES/NARC-Havre
Ref=05-3112  P=.0004 CV2=3.04%

Gross Return - Fallow Spring Wheat
Northern Ag Research Center - Havre, Montana
7-Yr Means (1999-2005)

Figure 4b.
MSU/AES/NARC-Havre
Ref=05-3122  P=.0002 CV2=3.11%
Gross Return - Fallow Spring Wheat
Leon Cederberg Farm – Turner, Montana

Figure 5.

MSU/AES/NARC-Havre
Ref=05-9901  P=.0001  CV2=2.20%

1Not Planted in 1999 (too wet until too late)

LSD (P<=.05), Gross Return = $ 12.02 / ac
Prices = PNW Average Annual Market/Year

Gross Return - Fallow Spring Wheat
Leon Cederberg Farm – Turner, Montana
5-Yr Means (2001-2005)

Figure 5a.

MSU/AES/NARC-Havre
Ref=05-9911  P=.0035 CV2=3.43%

LSD (P<=.05), Gross Return = $ 18.07 / ac
Prices = PNW Average Annual Market/Year
Gross Return - Fallow Spring Wheat
Flansaas/Lumsden Farm - Loring, Montana

Figure 6.
MSU/AES/NARC-Havre
Ref=05-9905 P=.0004 CV2=2.08%

LSD (P<=.05), Gross Return $9.73 / ac
Prices = PNW Average Annual Market/Year

Gross Return - Fallow Spring Wheat
Flansaas/Lumsden Farm - Loring, Montana
7-Yr Means (1999-2005)

Figure 6a.
MSU/AES/NARC-Havre
Ref=05-9915 P=.0003 CV2=1.75%

LSD (P<=.05), Gross Return $8.74 / ac
Prices = PNW Average Annual Market/Year
Gross Return - Fallow Spring Wheat
Flansaas/Lumsden Farm - Loring, Montana
5-Yr Means (2001-2005)

\[ \text{LSD (P<=.05), Gross Return = $12.53 / ac} \]

\[ \text{Prices = PNW Average Annual Market/Year} \]

\[ \text{($ Yield / Acre at 12\% Protein + Premium)} \]

\[ \text{Choteau} : \$178.68 \]
\[ \text{Conan} : \$174.82 \]
\[ \text{Ernest} : \$173.87 \]
\[ \text{McNeal} : \$171.25 \]
\[ \text{Outlook} : \$181.44 \]
\[ \text{Reeder} : \$181.50 \]
\[ \text{Scholar} : \$158.34 \]

Figure 6b.

Gross Return - Fallow Spring Wheat
McKeever Farm & Seed, Inc. – Loma, Montana

\[ \text{LSD (P<=.05), Gross Return = $7.80 / ac} \]

\[ \text{Prices = PNW Average Annual Market/Year} \]

\[ \text{($ Yield / Acre at 12\% Protein + Premium)} \]

\[ \text{Ernest} : \$122.40 \]
\[ \text{Fortuna} : \$121.05 \]
\[ \text{McNeal} : \$132.38 \]
\[ \text{Scholar} : \$132.31 \]

Figure 7.
Gross Return - Fallow Spring Wheat
McKeever Farm & Seed, Inc. – Loma, Montana

17-Yr Means (1999-2005)

Figure 7a.
MSU/AES/NARC-Havre
Ref=05-9917 P=.0685 CV2=3.14%

Gross Return - Fallow Spring Wheat
McKeever Farm & Seed, Inc. – Loma, Montana


Figure 7b.
MSU/AES/NARC-Havre
Ref=05-9927 P=.3184 CV2=4.40%

1Droughty Conditions – Extreme in 2001
LSD (P<.05), Gross Return ~ $10.98 / ac
Prices = PNW Average Annual Market/Year

($ Yield / Acre at 12% Protein + Premium)