TITLE: Spring Wheat Variety Performance Evaluation Under Northern Montana Conditions on the Basis of Gross Production Value as Influenced by Yield, Protein and Market.

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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 Dark Northern Spring Wheat at 12, 13, 14, 15 and 16 percent protein for the 10-year period 2002-2011 are graphed in Figure 1. Values along the top axis reflect the average annual $/bu price spread between the minimum and maximum protein levels for which quotes are consistently available. Beginning in 2010, 12 percent protein values were no longer available and were replaced with 16 percent protein values. It should be noted that during 2009 and even more so during 2008, exporters were not issuing bids for certain days (sometimes entire months) and for certain protein levels. Thus, fewer values make up the average annual quotes for those two years. Historical daily bids issued can be accessed via the Montana Wheat and Barley Committee website at:

http://wbc.agr.mt.gov/Producers/pricing_historical_pnw.html

'Gross Dollar Return' comparisons are graphically presented in Figures 2 through 4b reflecting research plot response data for the locations and years below:

Figure No.	Cropping System & Crop	Research Location	No. of Varieties Included	No. of Data Years Included	No. of Calendar Years	Calendar Years Spanned
2	Flw-SW	NARC-Havre	6	10	10	2002-2011
*2a	Flw-SW	NARC-Havre	7	9	9	2003-2011
*2b	Flw-SW	NARC-Havre	10	7	7	2005-2011
*2c	Flw-SW	NARC-Havre	10	3	3	2009-2011
3	Flw-SW	Turner	7	10	10	2002-2011
*3a	Flw-SW	Turner	8	8	8	2004-2011
*3b	Flw-SW	Turner	8	4	4	2008-2011
4	Flw-SW	Loring	6	10	10	2002-2011
*4a	Flw-SW	Loring	8	8	8	2004-2011
*4b	Flw-SW	Loring	8	4	4	2008-2011

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 and plant available water, 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 gross 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 12-16 percent protein spring wheat have varied from as little as $0.04 to as much as $1.16 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 1973-2010 is readily available.

For each research location, a multi-year, average gross market value per acre was determined for selected varieties. 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" (13 percent for spring wheat), or above that termed as "maximum quoted" (16 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 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, however in specific instances; three year analyses have been included to illustrate the potential of promising newly released varieties. For this 2011 report all analyses include a minimum of three years of data.

In 1994, Carlson initiated a new "paired" trial series at Turner whereby 16 to 23 varieties each of spring 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.

FUNDING SUMMARY:

Expenditure information for grant index 4W3635 is to be provided by Montana State University, Office of Sponsored Programs. There is no other grant support for this project.

MWBC FY2012 GRANT SUBMISSION PLANS:

It is planned to submit this project for funding consideration in the next fiscal year.

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 when working 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 the 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 2010 crop. We would not be incorporating the 2011 crop data into the system until summer 2012. 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.

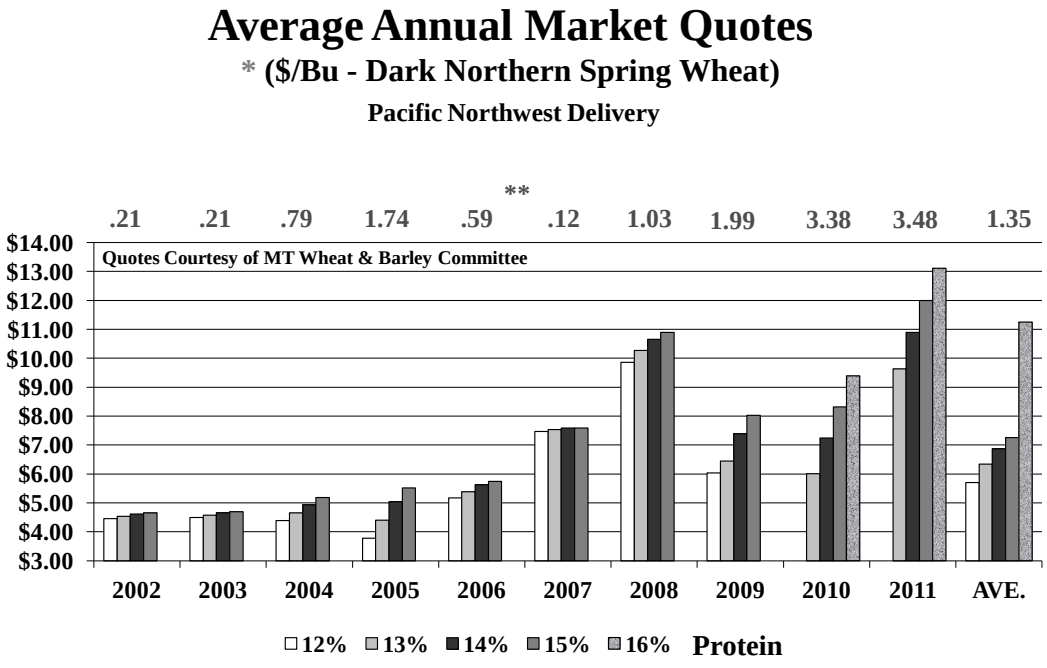
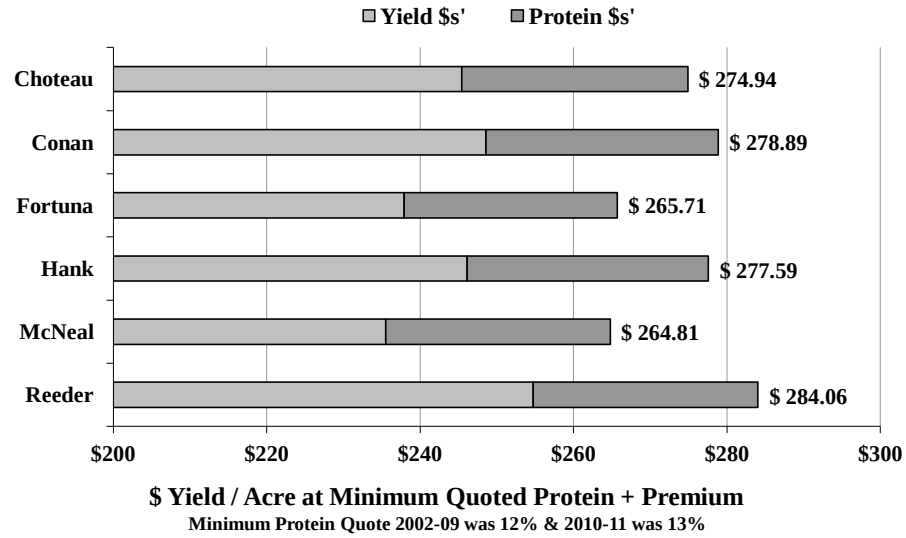


Figure 1.
MSU/AES/NARC

*** Average of All Market Days/Market Year**
**** $/Bu Difference Between 12 & 15% Protein for 2002-09**
**** $/Bu Difference Between 13 & 16% Protein for 2010-11**

Gross Return - Fallow Spring Wheat
Northern Ag Research Center – Havre, Montana
10-Yr Means (2002-2011)

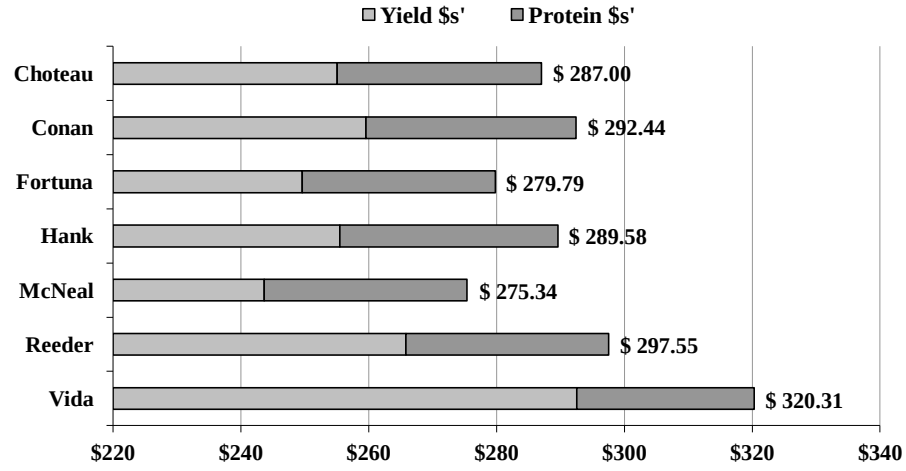


$ Yield / Acre at Minimum Quoted Protein + Premium
Minimum Protein Quote 2002-09 was 12% & 2010-11 was 13%

Figure 2.
MSU/AES/NARC-Havre
Ref=11-3102 P=.0758 CV=5.99%

LSD (P<=.05), Gross Return = $ 14.80 / ac
Prices = PNW Average Annual Market/Year

Gross Return - Fallow Spring Wheat
Northern Ag Research Center – Havre, Montana
9-Yr Means (2003-2011)

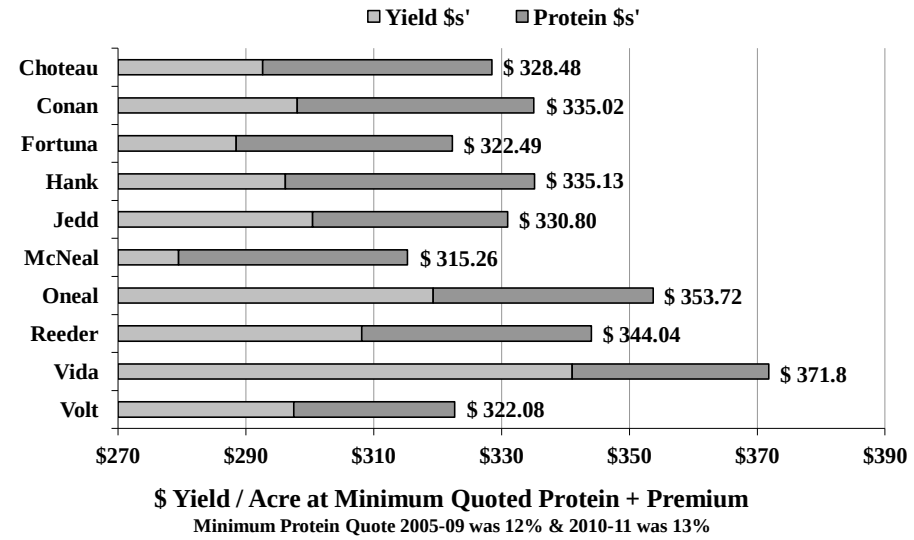


$ Yield / Acre at Minimum Quoted Protein + Premium
Minimum Protein Quote 2003-09 was 12% & 2010-11 was 13%

Figure 2a.
MSU/AES/NARC-Havre
Ref=11-3112 P=.0004 CV=6.62%

LSD (P<=.05), Gross Return = $ 18.30 / ac
Prices = PNW Average Annual Market/Year

Gross Return - Fallow Spring Wheat
Northern Ag Research Center – Havre, Montana
7-Yr Means (2005-2011)



$ Yield / Acre at Minimum Quoted Protein + Premium

Minimum Protein Quote 2005-09 was 12% & 2010-11 was 13%

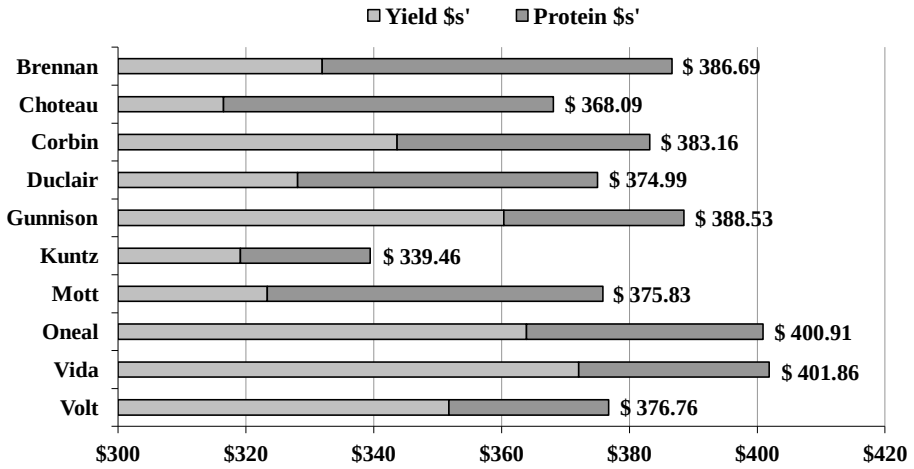
Figure 2b.

MSU/AES/NARC-Havre

Ref=11-3122 P=.0007 CV=6.71%

LSD (P<=.05), Gross Return = $ 24.15 / ac
Prices = PNW Average Annual Market/Year

Gross Return - Fallow Spring Wheat
Northern Ag Research Center – Havre, Montana
3-Yr Means (2009-2011)



$ Yield / Acre at Minimum Quoted Protein + Premium

Minimum Protein Quote 2009 was 12% & 2010-11 was 13%

Figure 2c.

MSU/AES/NARC-Havre

Ref=11-3132 P=.5177 CV=8.42%

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

Gross Return - Fallow Spring Wheat
Leon Cederberg Farm – Turner, Montana
10-Yr Means (2002-2011)

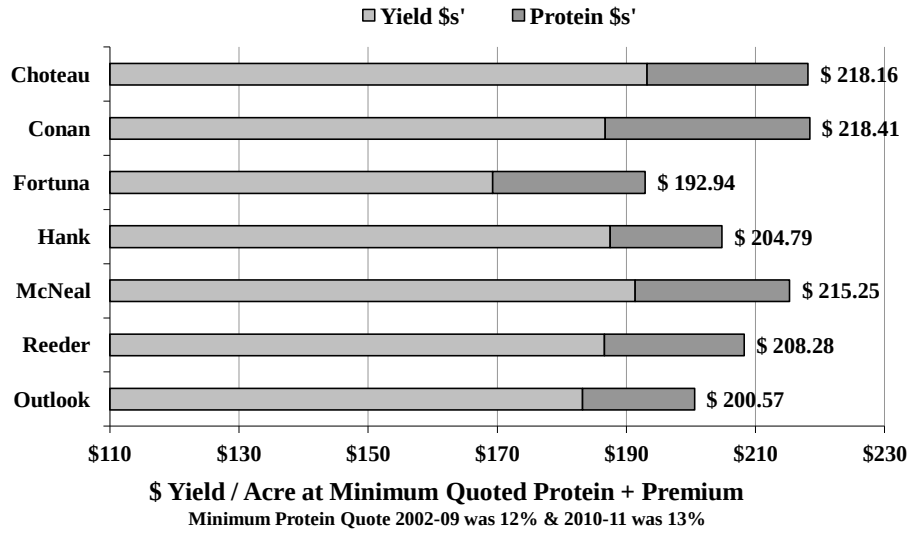


Figure 3.

MSU/AES/NARC-Havre

Ref=11-9901 P=.0422 CV=9.50%

LSD (P<=.05), Gross Return = $ 17.74 / ac
Prices = PNW Average Annual Market/Year

Gross Return - Fallow Spring Wheat
Leon Cederberg Farm – Turner, Montana
8-Yr Means (2004-2011)

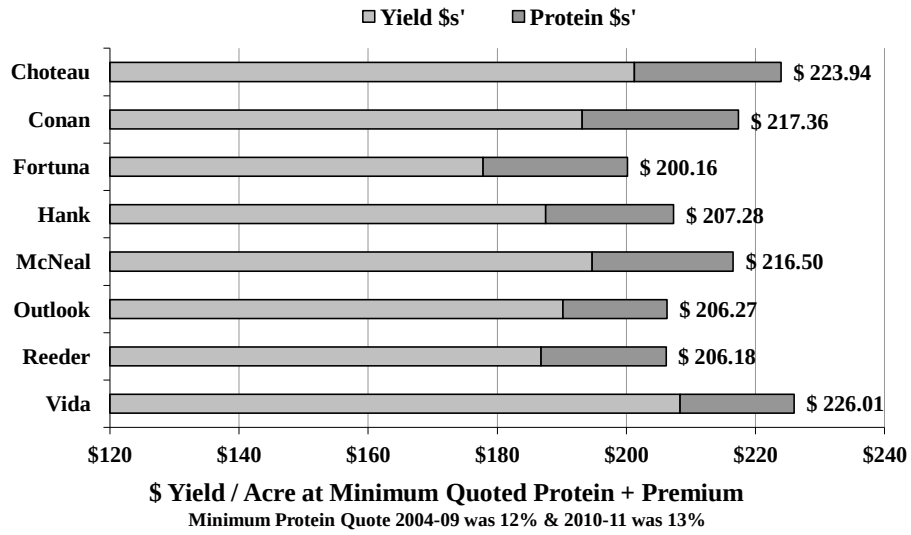


Figure 3a.

MSU/AES/NARC-Havre

Ref=11-9911 P=.1340 CV=9.54%

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

Gross Return - Fallow Spring Wheat
Leon Cederberg Farm – Turner, Montana
4-Yr Means (2008-2011)

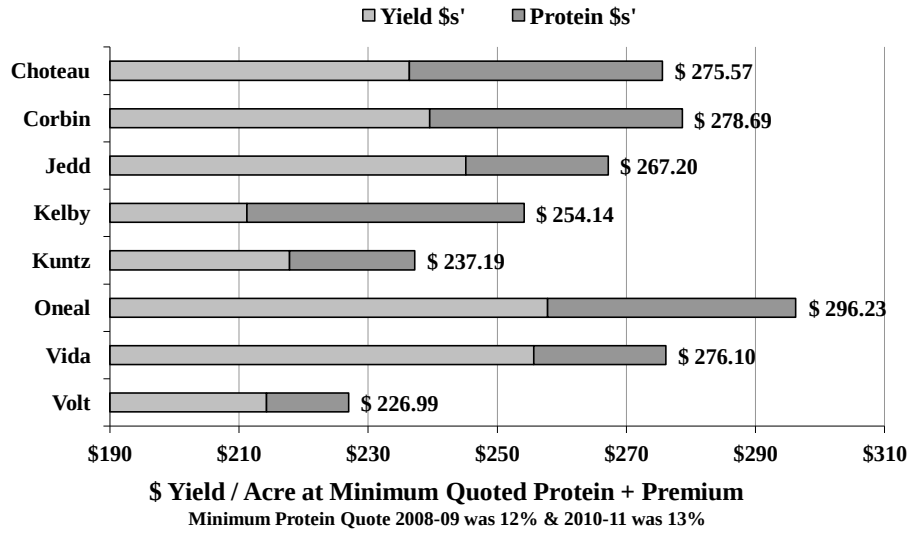


Figure 3b.

MSU/AES/NARC-Havre

Ref=11-9921 P=.0359 CV=10.62%

LSD (P<=.05), Gross Return = $ 41.21 / ac
Prices = PNW Average Annual Market/Year

Gross Return - Fallow Spring Wheat
Flansaas/Lumsden Farm – Loring, Montana
10-Yr Means (2002-2011)

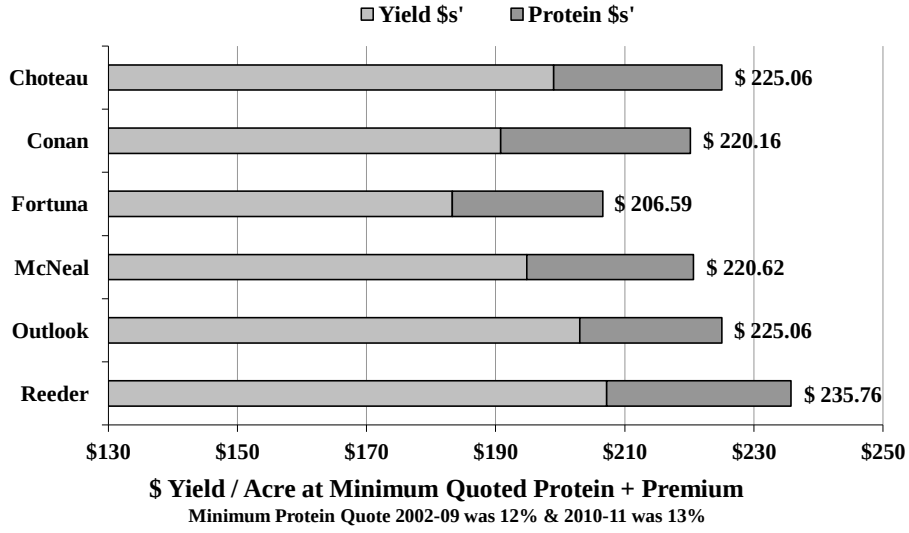


Figure 4.

MSU/AES/NARC-Havre

Ref=11-9905 P=.0126 CV=7.43%

LSD (P<=.05), Gross Return = $ 14.87 / ac
Prices = PNW Average Annual Market/Year

Gross Return - Fallow Spring Wheat
Flansaas/Lumsden Farm – Loring, Montana
8-Yr Means (2004-2011)

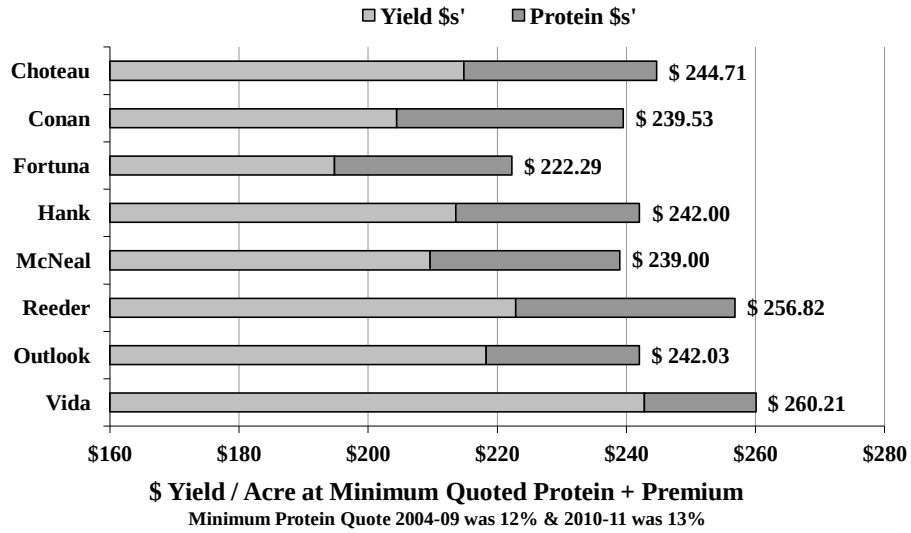


Figure 4a.

MSU/AES/NARC-Havre

Ref=11-9915 P=.0063 CV=7.48%

LSD (P<=.05), Gross Return = $ 18.28 / ac
Prices = PNW Average Annual Market/Year

Gross Return - Fallow Spring Wheat
Flansaas/Lumsden Farm – Loring, Montana
4-Yr Means (2008-2011)

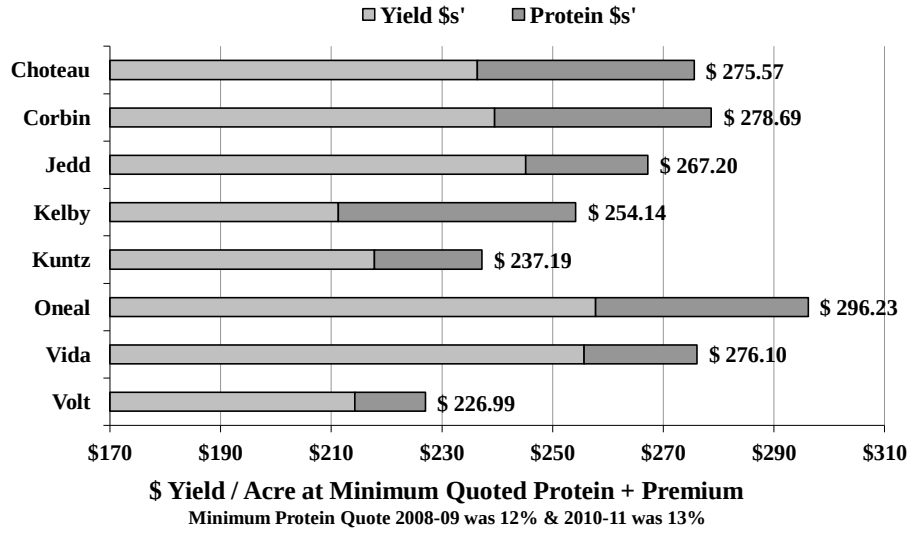


Figure 4b.

MSU/AES/NARC-Havre

Ref=11-9925 P=.0359 CV=10.61%

LSD (P<=.05), Gross Return = $ 41.21 / ac
Prices = PNW Average Annual Market/Year