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PROJECT TITLE: Winter and 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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Cooperating County Extension Agents
Individual 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 1987-1996 are graphed in Figure 1. The PNW annual market averages for the same period for Dark Northern Spring wheat at 13, 14, and 15 percent protein (plus values for 12 percent protein first available in 1994), are graphed in Figure 2. Both graphs include values along the top axis reflecting the average annual $/bu price spread between minimum and maximum protein levels for which quotes are consistently given.

`Gross Dollar Return' comparisons are graphically presented in Figures 3. through 10a. reflecting research plot response data for the locations and years below:

Figure No.	Crop & System	Research Location	No.of Varieties Included	No.of Data Years	No.of Calendar Years	Calendar Years Spanned
3	Flw-WW	NARC-Havre	7	10	11	1986-1996
4	Flw-WW	Big Sandy	7	9	10	1987-1996
*4a	Flw-WW	Big Sandy	8	6	7	1990-1996
*5	Flw-WW	North Havre	7	8	9	1988-1996
*5a	Flw-WW	North Havre	8	6	7	1990-1996
*6	Flw-SW	NARC-Havre	7	7	8	1989-1996
7	Flw-SW	Turner	6	10	10	1987-1996
*7a	Flw-SW	Turner	7	9	9	1988-1996

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Figure No.	Crop & System	Research Location	No.of Varieties Included	No.of Data Years	No.of Calendar Years	Calendar Years Spanned
*7b	Flw-SW	Turner	8	7	7	1990-1996
*7c	Flw-SW	Turner	9	5	5	1992-1996
8	Flw-SW	Big Sandy	8	8	9	1988-1996
*8a	Flw-SW	Big Sandy	8	6	7	1990-1996
*8b	Flw-SW	Big Sandy	8	4	4	1993-1996
*9	Flw-SW	North Havre	6	9	10	1987-1996
*9a	Flw-SW	North Havre	8	6	7	1990-1996
*9b	Flw-SW	North Havre	8	4	4	1993-1996
10	Flw-SW	North Joplin	7	8	8	1989-1996
*10a	Flw-SW	North Joplin	8	7	7	1990-1996

Analyses span the maximum number of calendar years, up to 10, for which data exists for a specific location. 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 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 represents 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 cent to as much as 49 cents per point increase 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 1980-1996 have been made 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 simple 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 13 percent for spring wheat, 12 percent for spring wheat beginning with 1994) 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 benefitted 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 20 varieties each of wheat and barley will be evaluated for five years under both low and optimum nitrogen fertility.

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 more sophisticated 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

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economic benefits associated with production of high quality varieties.

We are currently considering an entire revamping of our market matrices to reflect a more logical market year than is represented by the current CY arrangement. 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 would more accurately represent the real world. If we take this approach, we would now be able to analyze only up through the 1995 crop. We wouldn't be incorporating the 1996 crop data into the system until summer 1997. Furthermore, it may be sensible to weight individual months within the annual average on the basis of traditional 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.

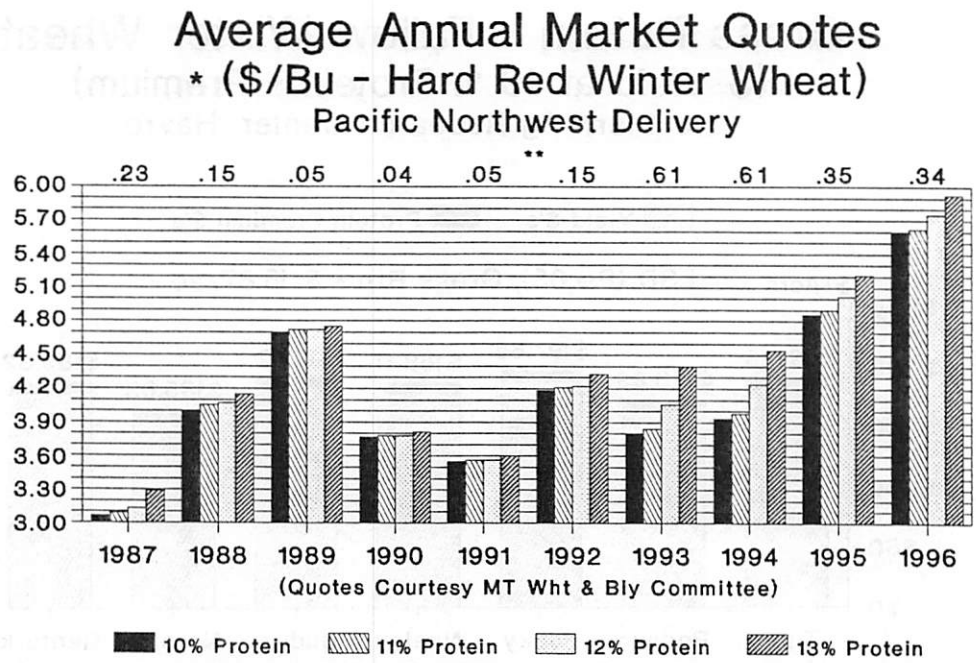

Figure 1.
MSU/AES/NARC-Havre

* Average of All Market Days/Market Year
** $/Bu Difference Between 10 & 13% Prot

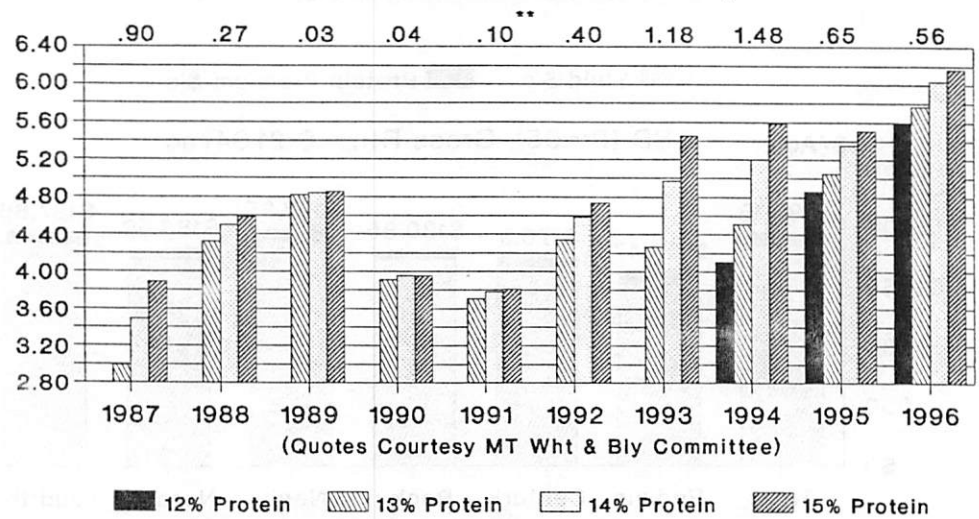

Figure 2.
MSU/AES/NARC-Havre

* Average of All Market Days/Market Year
** $/Bu Diff Between Min & Max Pro Quote

Gross Return - Fallow Winter Wheat
($ Yield at 10 % Protein + Premium)
Northern Ag Research Center, Havre

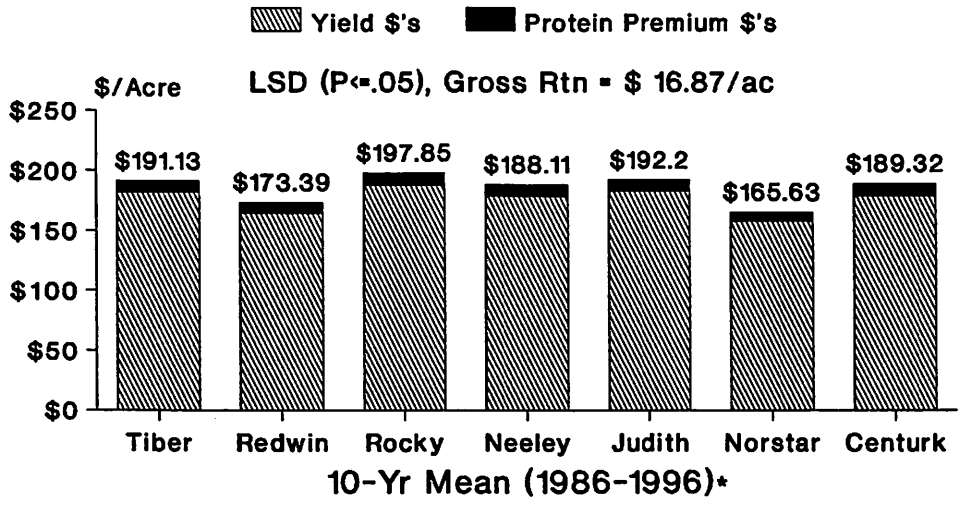

Figure 3.
MSU/AES/NARC-Havre

*1992 Lost to Hail
Basis = PNW Average Annual Market/Year

Gross Return - Fallow Winter Wheat
($ Yield at 10 % Protein + Premium)
Myers Farms Inc., Big Sandy

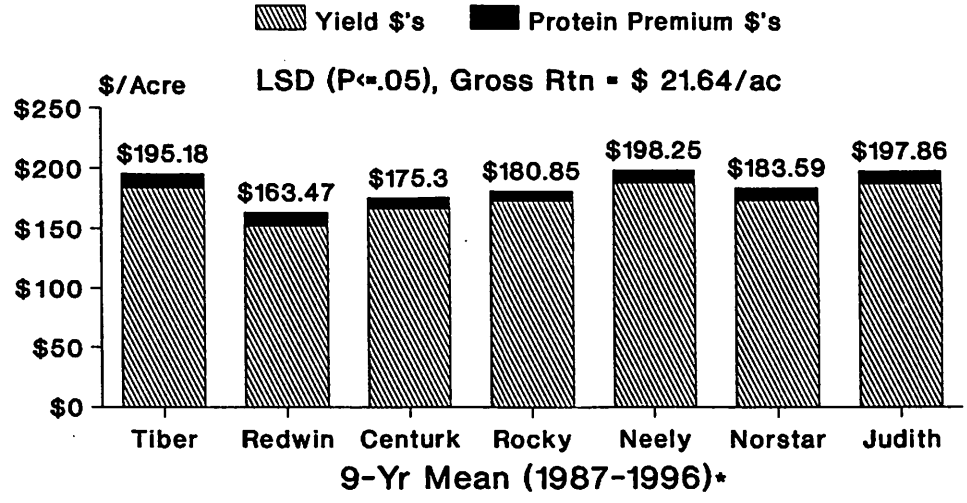

Figure 4.
MSU/AES/NARC-Havre

*1989 Lost to Winterkill
Basis = PNW Average Annual Market/Year

Gross Return - Fallow Winter Wheat
($ Yield at 10 % Protein + Premium)
Myers Farms Inc., Big Sandy

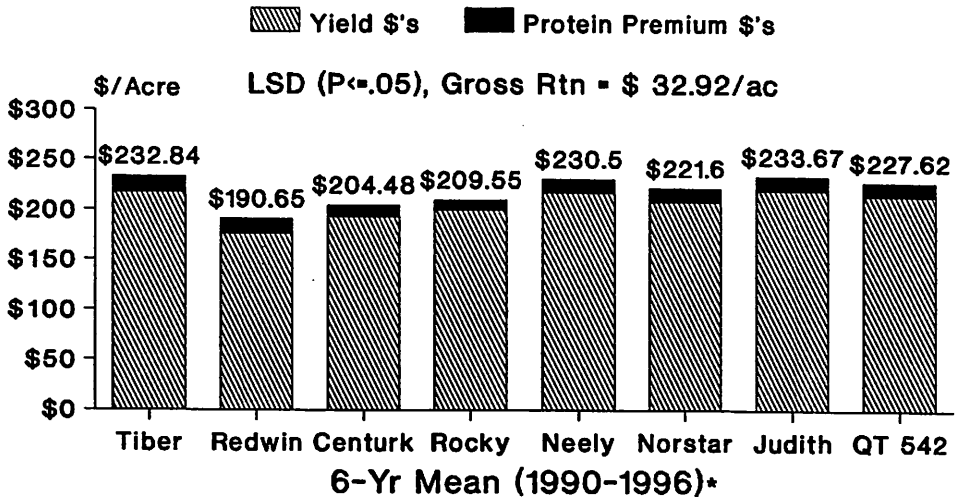

Figure 4a.
MSU/AES/NARC-Havre

*1990 QT 542 not planted
Basis = PNW Average Annual Market/Year

Gross Return - Fallow Winter Wheat
($ Yield at 10 % Protein + Premium)
Mark & Nancy Peterson Farm, North Havre

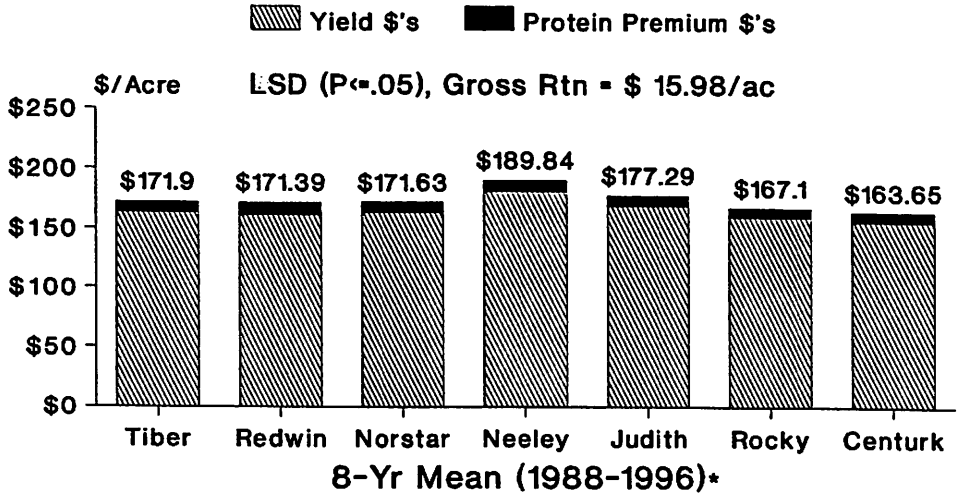

Figure 5.
MSU/AES/NARC-Havre

*1989 Lost to Winter Kill
Basis = PNW Average Annual Market/Year

Gross Return - Fallow Winter Wheat
($ Yield at 10 % Protein + Premium)
Mark & Nancy Peterson Farm, North Havre

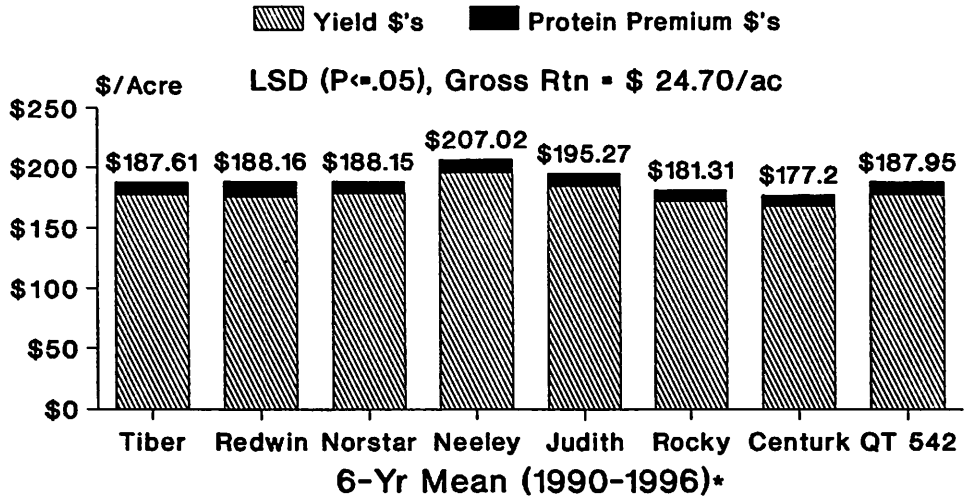

Figure 5a.
MSU/AES/NARC-Havre

*1990 QT 542 not planted
Basis = PNW Average Annual Market/Year

Gross Return - Fallow Spring Wheat
($ Yield at Min.Quote Protein + Premium)
Northern Ag Research Center, Havre

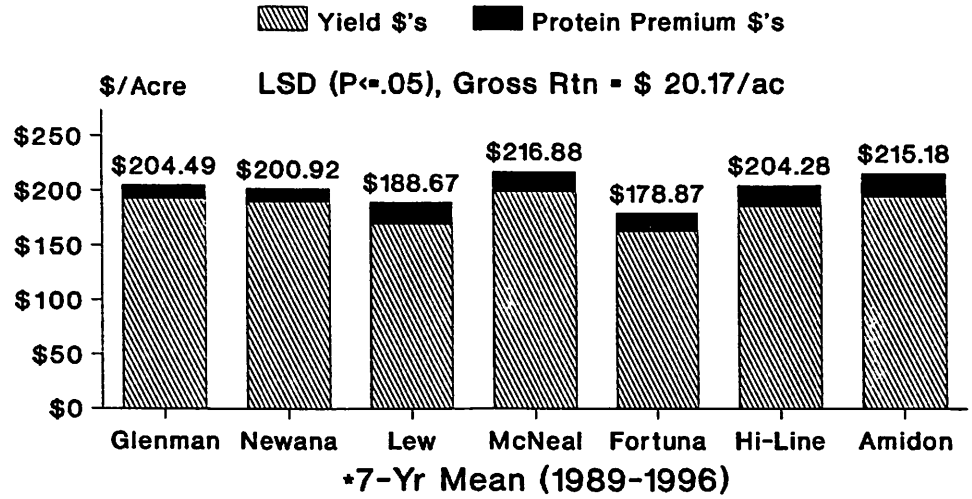

Figure 6.
MSU/AES/NARC-Havre

*1992 nursery lost to hail
Basis = PNW Average Annual Market/Year
Min.Quote@12%Pro.(1994-96),13%(1989-93)

Gross Return - Fallow Spring Wheat
($ Yield at Min.Quote Protein + Premium)
Leon Cederberg Farm, Turner

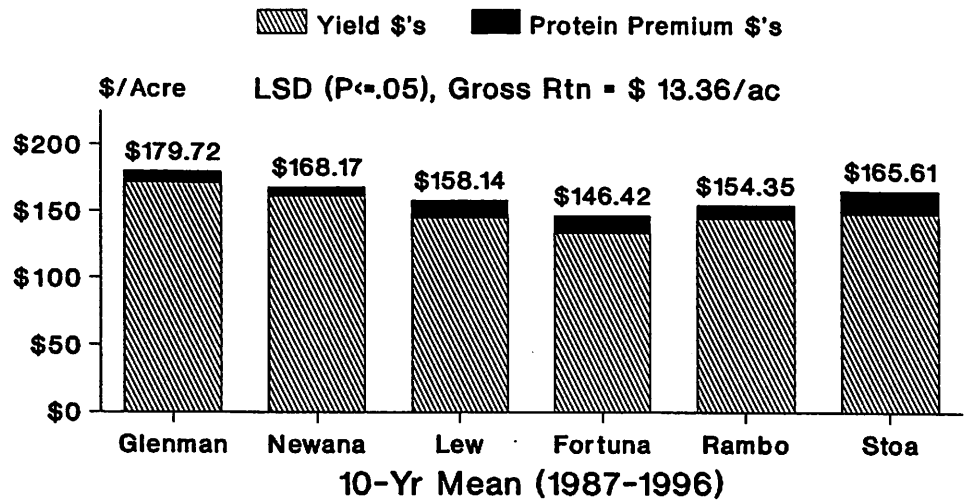

Figure 7.
MSU/AES/NARC-Havre

Basis = PNW Average Annual Market/Year
Min.Quote@12%Pro.(1994-96),13%(1987-93)

Gross Return - Fallow Spring Wheat
($ Yield at Min.Quote Protein + Premium)
Leon Cederberg Farm, Turner

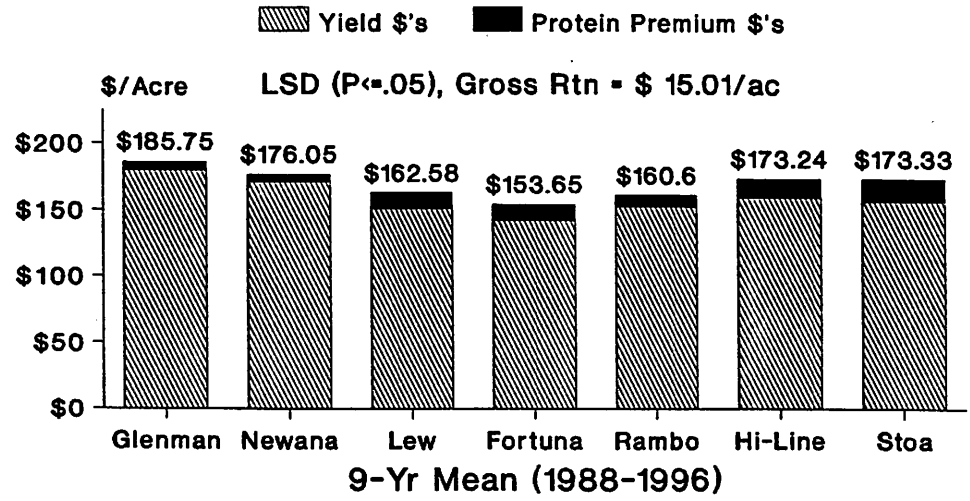

Figure 7a.
MSU/AES/NARC-Havre

Basis = PNW Average Annual Market/Year
Min.Quote@12%Pro.(1994-96),13%(1988-93)

Gross Return - Fallow Spring Wheat
($ Yield at Min.Quote Protein + Premium)
Leon Cederberg Farm, Turner

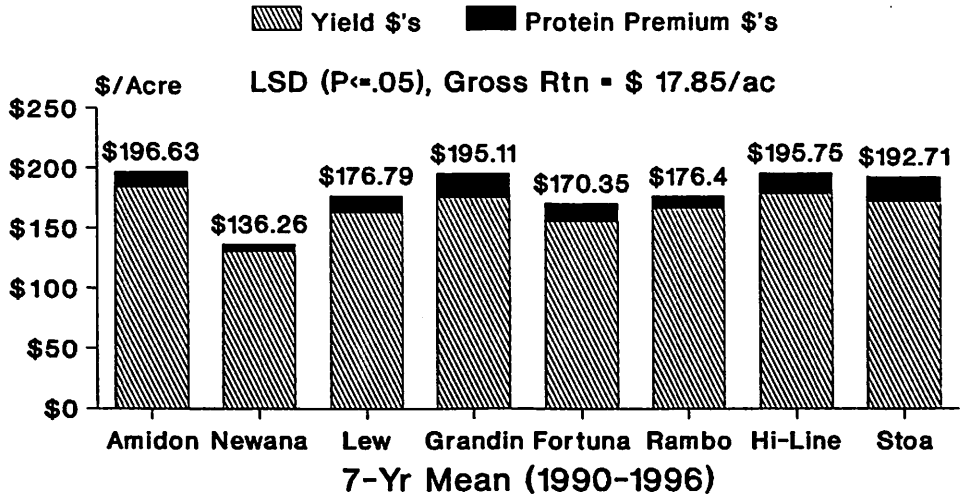

Figure 7b.
MSU/AES/NARC-Havre

Basis = PNW Average Annual Market/Year
Min.Quote@12%Pro.(1994-96),13%(1990-93)

Gross Return - Fallow Spring Wheat
($ Yield at Min.Quote Protein + Premium)
Leon Cederberg Farm, Turner

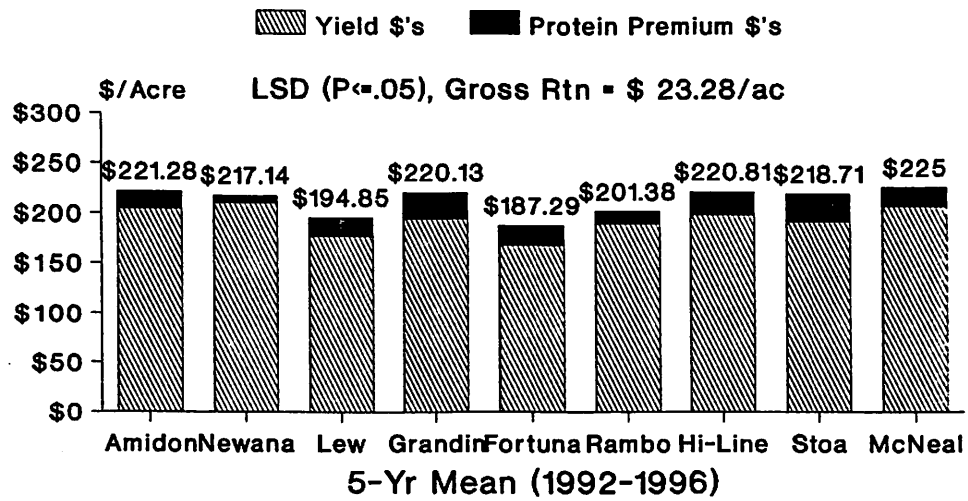

Figure 7c.
MSU/AES/NARC-Havre

Basis = PNW Average Annual Market/Year
Min.Quote@12%Pro.(1994-96),13%(1992-93)

Gross Return - Fallow Spring Wheat
($ Yield at Min.Quote Protein + Premium)
Myers Farms Inc., Big Sandy

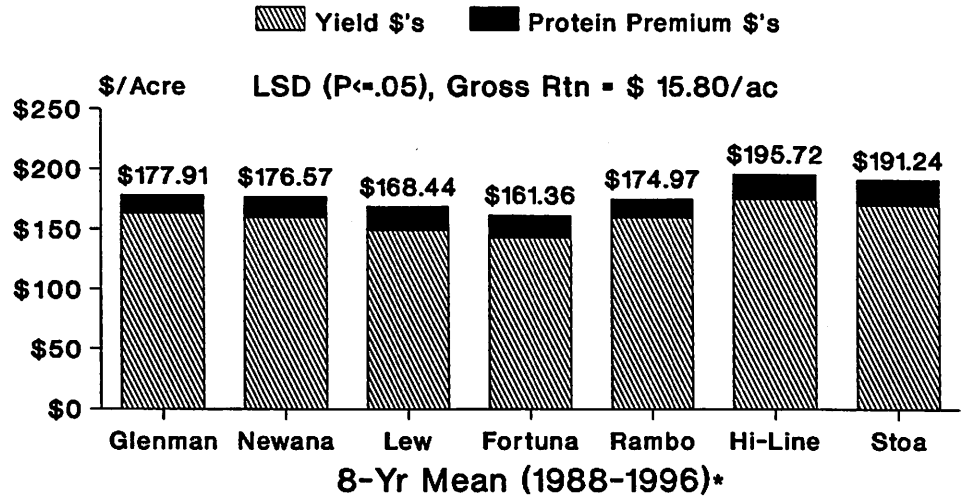

Figure 8.
MSU/AES/NARC-Havre

*1992 Crop Lost to Poor Stand + WSMV
Basis = PNW Average Annual Market/Year
Min.Quote@12%Pro.(1994-96),13%(1988-93)

Gross Return - Fallow Spring Wheat
($ Yield at Min.Quote Protein + Premium)
Myers Farms Inc., Big Sandy

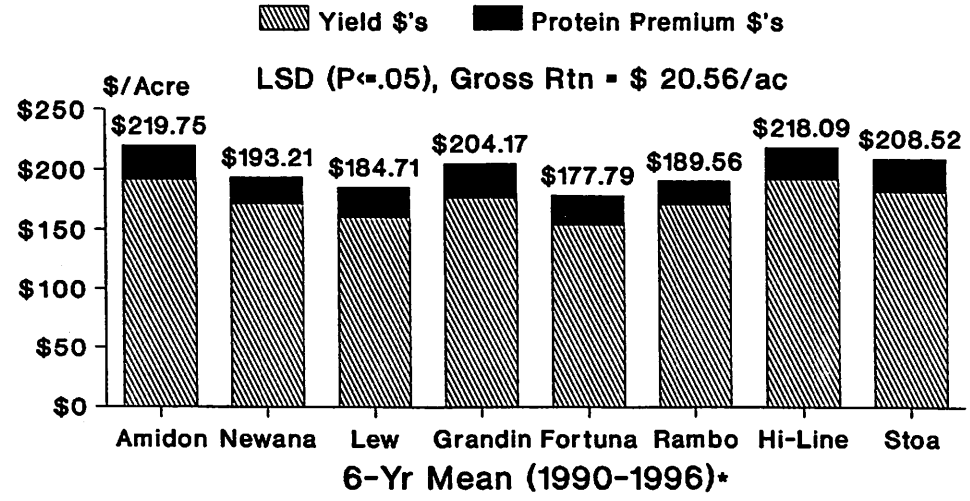

Figure 8a.
MSU/AES/NARC-Havre

*1992 Nursey Lost to Poor Stand + WSMV
Basis = PNW Average Annual Market/Year
Min.Quote@12%Pro.(1994-96),13%(1990-93)

Gross Return - Fallow Spring Wheat
($ Yield at Min.Quote Protein + Premium)
Myers Farms Inc., Big Sandy

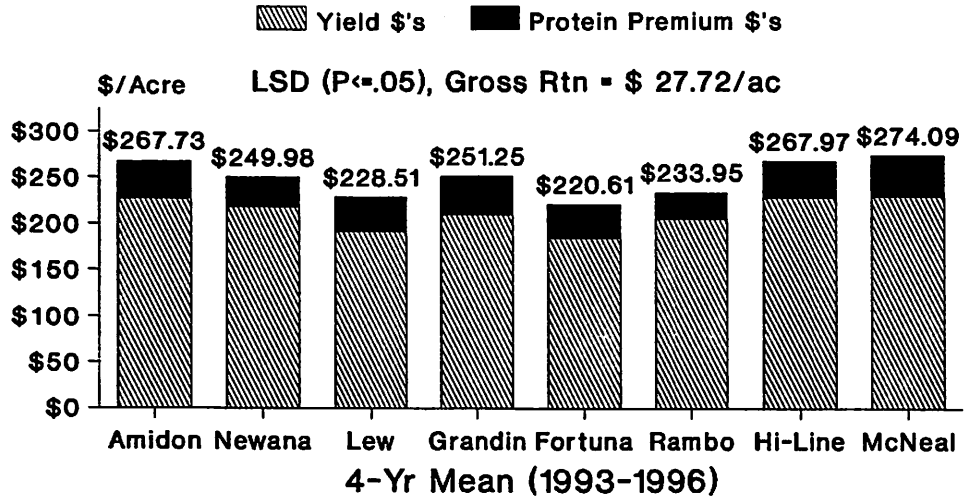

Figure 8b.
MSU/AES/NARC-Havre

Basis = PNW Average Annual Market/Year
Min.Quote@12%Pro.(1994-1996),13%(1993)

Gross Return - Fallow Spring Wheat
($ Yield at Min.Quote Protein + Premium)
Mark & Nancy Peterson Farm, North Havre

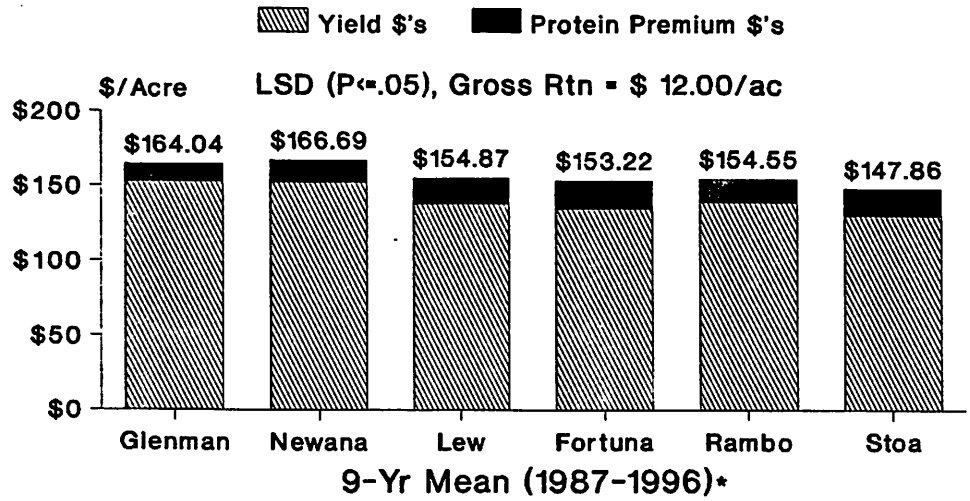

Figure 9.
MSU/AES/NARC-Havre

*1992 Nursey Lost to Hail
Basis = PNW Average Annual Market/Year
Min.Quote@12%Pro.(1994-96),13%(1987-93)

Gross Return - Fallow Spring Wheat
($ Yield at Min.Quote Protein + Premium)
Mark & Nancy Peterson Farm, North Havre

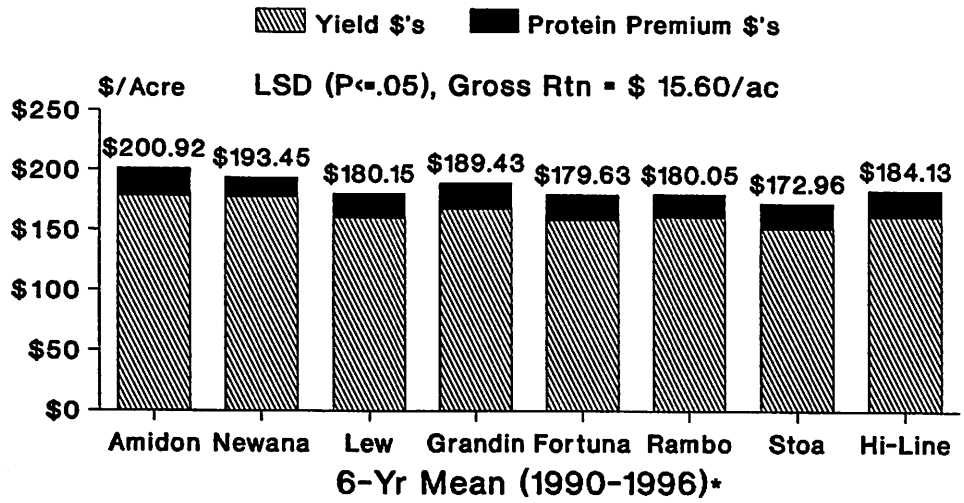

Figure 9a.
MSU/AES/NARC-Havre

*1992 Nursey Lost to Hail
Basis = PNW Average Annual Market/Year
Min.Quote@12%Pro.(1994-96),13%(1990-93)

Gross Return - Fallow Spring Wheat
($ Yield at Min.Quote Protein + Premium)
Mark & Nancy Peterson Farm, North Havre

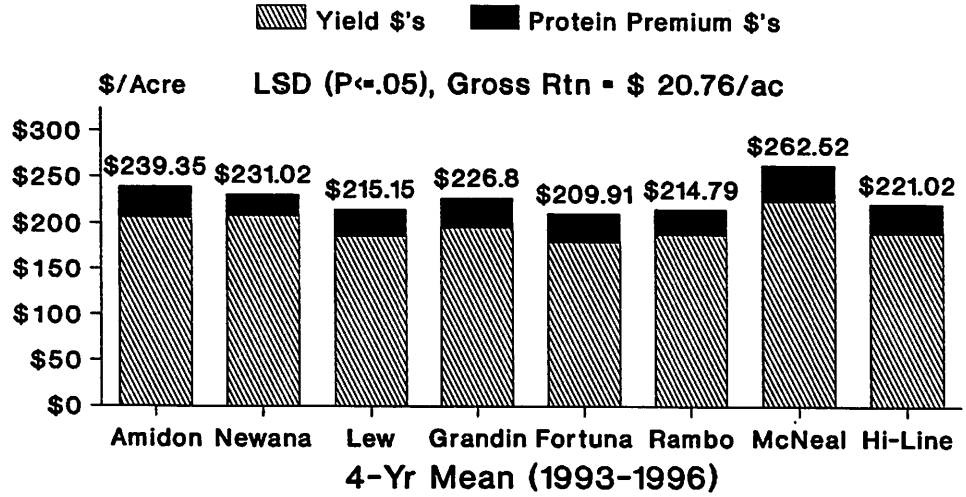

Figure 9b.
MSU/AES/NARC-Havre

Basis = PNW Average Annual Market/Year
Min.Quote@12%Pro.(1994-96),13%(1993)

Gross Return - Fallow Spring Wheat
($ Yield at Min.Quote Protein + Premium)
Graff Farms Inc., No. Joplin

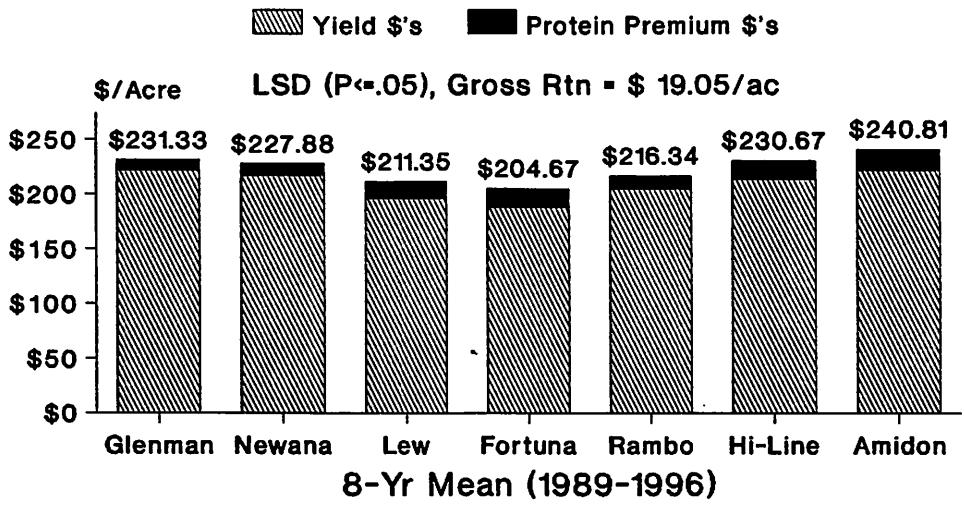

Figure 10.
MSU/AES/NARC-Havre

Basis = PNW Average Annual Market/Year
Min.Quote@12%Pro.(1994-96),13%(1989-93)

Gross Return - Fallow Spring Wheat
($ Yield at Min.Quote Protein + Premium)
Graff Farms Inc., No. Joplin

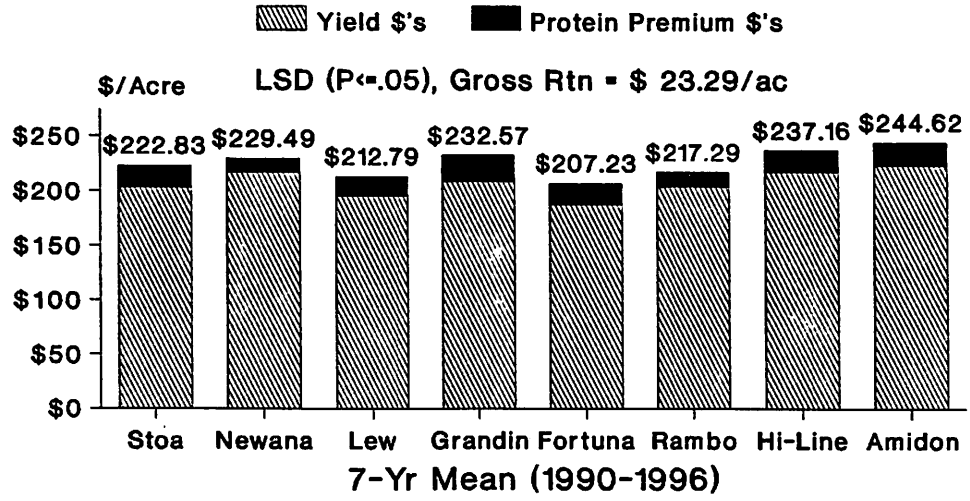

Figure 10a.
MSU/AES/NARC-Havre

Basis = PNW Average Annual Market/Year
Min.Quote@12%Pro.(1994-96),13%(1990-93)