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PROJECT TITLE: Winter and spring wheat variety performance evaluation under northern Montana conditions on the basis of production value as influenced by protein.

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T.L. Allen, Res Spec (NARC) - Havre
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 1984-1993 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 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. Similar market HRW and DNS summaries extended for the 14-year period 1980-1993 are graphed in Figures 1a and 2a, respectively.

`Gross Dollar Return' comparisons are graphically presented in Figures 3. through 11a. reflecting research plot response data for the locations and periods below:

Figure	Crop	Location	No. of Varieties	No. of Years	Years Spanned
3	Flw-WW	Havre	6	9	1983-1993
*4	Flw-WW	Big Sandy	7	6	1987-1993
*5	Flw-WW	North Havre	7	5	1988-1993
6	Flw-SW	Havre	5	10	1983-1993
*6a	Flw-SW	Havre	6	8	1985-1993
*6b	Flw-SW	Havre	8	6	1987-1993

(continued next page)

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Figure	Crop	Location	No. of Varieties	No. of Years	Years Spanned
*6c	Flw-SW	Havre	8	4	1989-1993
7	Flw-SW	Turner	5	10	1984-1993
*7a	Flw-SW	Turner	7	6	1988-1993
8	Flw-SW	Big Sandy	7	5	1988-1993
9	Flw-SW	North Havre	5	10	1983-1993
*9a	Flw-SW	North Havre	6	6	1987-1993
10	Flw-SW	North Joplin	8	5	1989-1993
11	Flw-SW	North Dodson	5	9	1984-1993
*11a	Flw-SW	North Dodson	6	6	1987-1993

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 with 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.

The Research Center would appreciate comments on this approach to wheat variety performance evaluation. 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. 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 (applied N,P, and K for 1982-1985, and soil nutrient analyses plus applied N, P, and K for 1986-1993). All Havre data represents a minimum `applied' nitrogen rate of 70 lbs actual N/ac. It is further obvious 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 13-15 percent protein spring wheat have varied from as little as 1 cent to as much as 59 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.

The Research Center initiated development of a `Gross Dollar Return' database in 1988. Carlson had yield and protein performance data by year back to 1982 for numerous locations throughout northern Montana. A system needed to be developed to marry historic price information to corresponding agronomic performance for overall evaluation. Upon advice sought from Jim Christianson of the Montana Wheat and Barley Committee it was determined that market price values used for evaluating a given actual yield and corresponding protein level for varieties in given data years needed to be based on average annual prices. MWBC had the price information needed, but it was in the form of some 12,000 hand pencil entries for the needed seven years from 1982-1987. A computerized database was needed. As the Committee was already in the initial phases of computerizing the information themselves, the Research Center prepared a temporary, abridged database for pilot use early in 1988 utilizing only Wednesday markets in calculation of annual averages. Pacific Northwest values were used to eliminate confusing variability associated with freight rates at different points of origin. This `Average of Wednesdays' database was used in 1988 to prepare some preliminary graphics featuring 1982-1987 data for MWBC and producer review.

By December 1988, Mark Schutt (then Information Officer for MWBC) had developed a spreadsheet utility affording more efficient computerization of the market data. However, going back to pick up all previous years for which MWBC had pencil data was going to require alot of time. Thus, NARC helped MWBC enter some of the data. At present, full market data for the years 1980-1993 have been made available to the Research Center. Thus, the analyses in this report feature annual market values per year based on daily market quotes for all years reported.

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 adjustment of gross return where protein content is either below that termed as ordinary (10 percent winter, 13 percent spring) - or above 13 percent for winter wheat or 15 percent for spring wheat. Thus, discounts for protein below ordinary or added premiums sometimes available for protein above normal quote maximums cannot be reflected in these data. Situations where protein levels were below ordinary are extremely rare in these research databases, however situations where protein exceeded the maximum level quoted are common. Thus, in cases where proteins for common entries 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 in these data.

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 five years should be involved for meaningful comparison via this system.

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 economic benefits associated with production of high quality varieties.

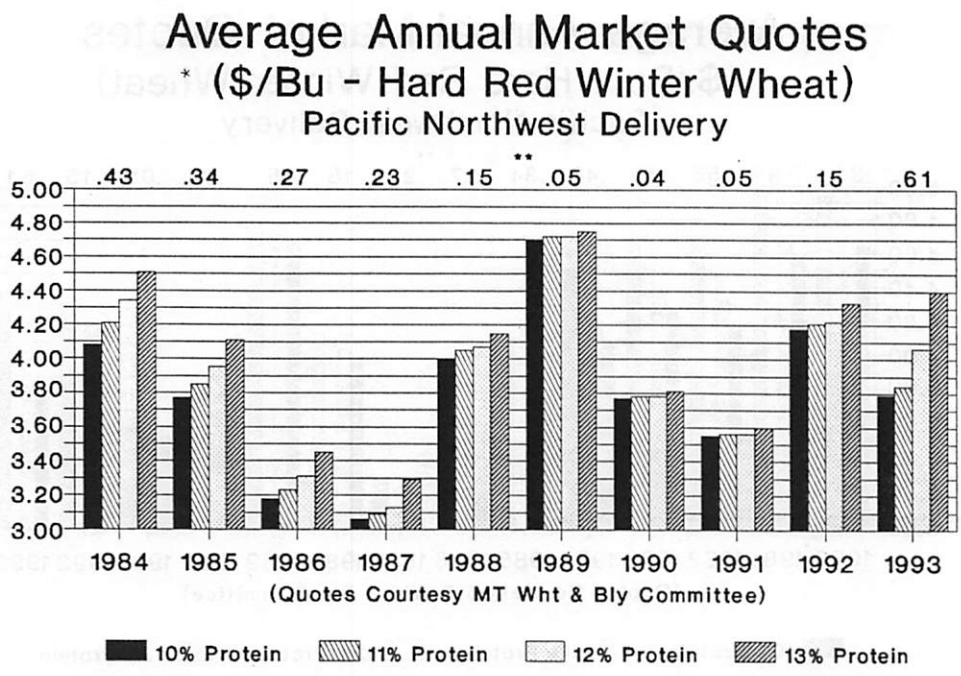

Figure 1.
MSU/AES/NARC-Havre

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

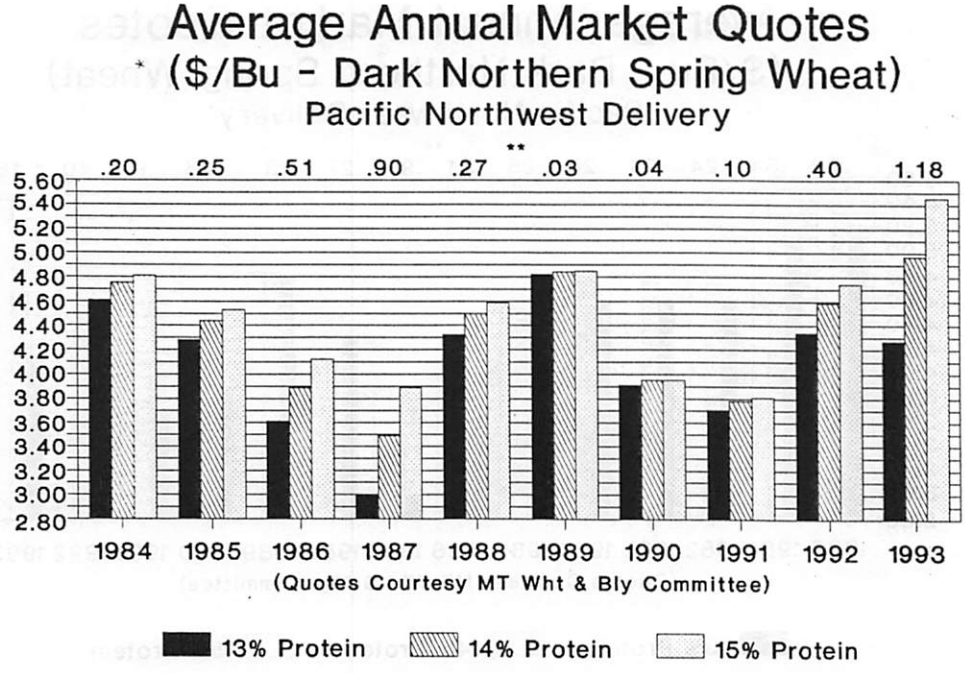

Figure 2.
MSU/AES/NARC-Havre

* Average of All Market Days/Market Year
** $/Bu Difference Between 13 & 15% Prot

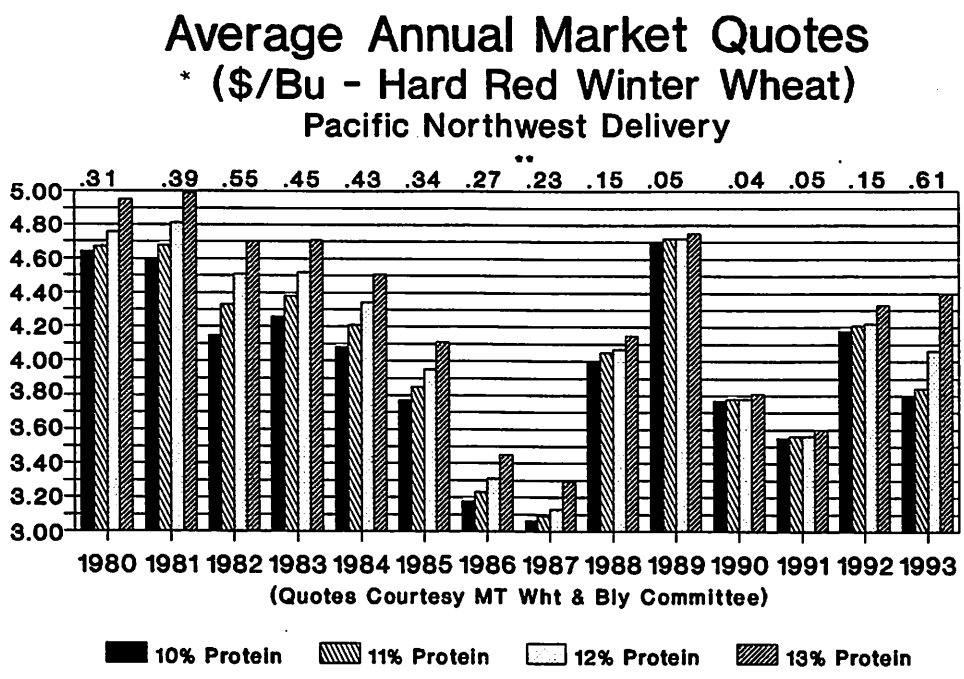

Figure 1a.
MSU/AES/NARC-Havre

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

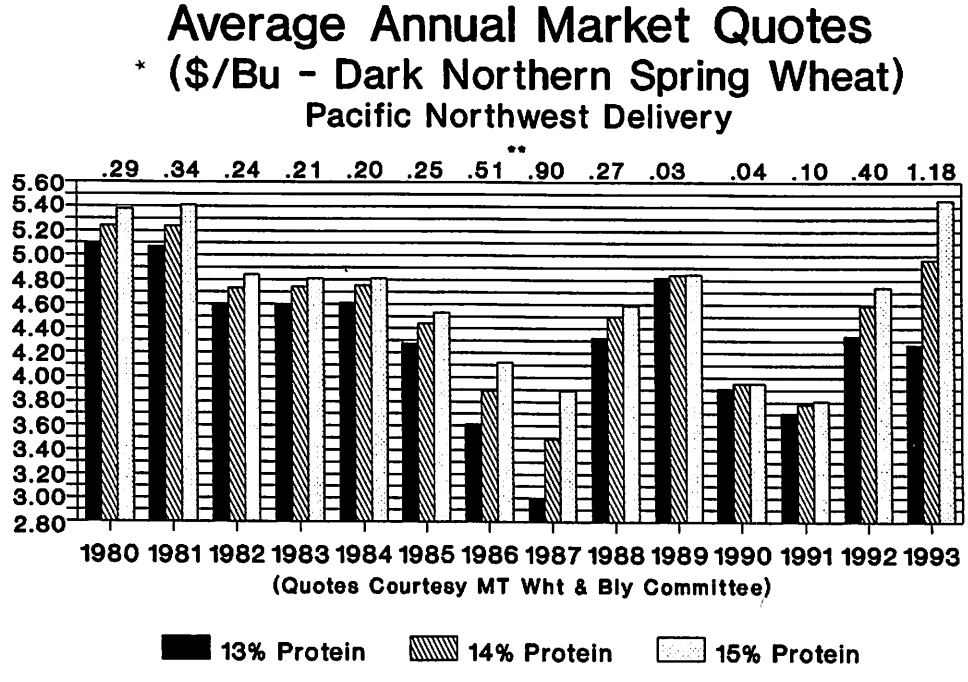

Figure 2a.
MSU/AES/NARC-Havre

* Average of All Market Days/Market Year
** $/Bu Difference Between 13 & 15% Prot

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

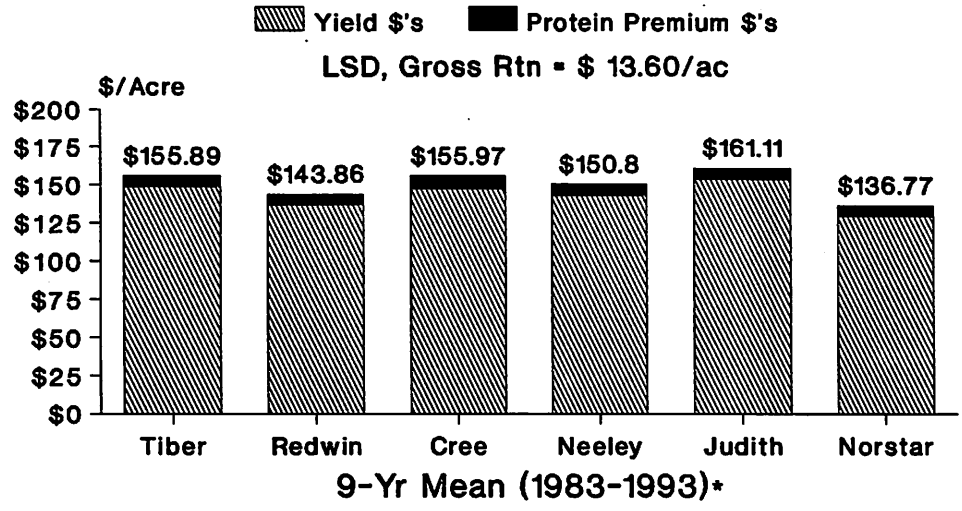

Figure 3.
MSU/AES/NARC-Havre

* 1985 Lost to Drought, & 1992 to Hail
Basis = PNW Average Annual Market/Year

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

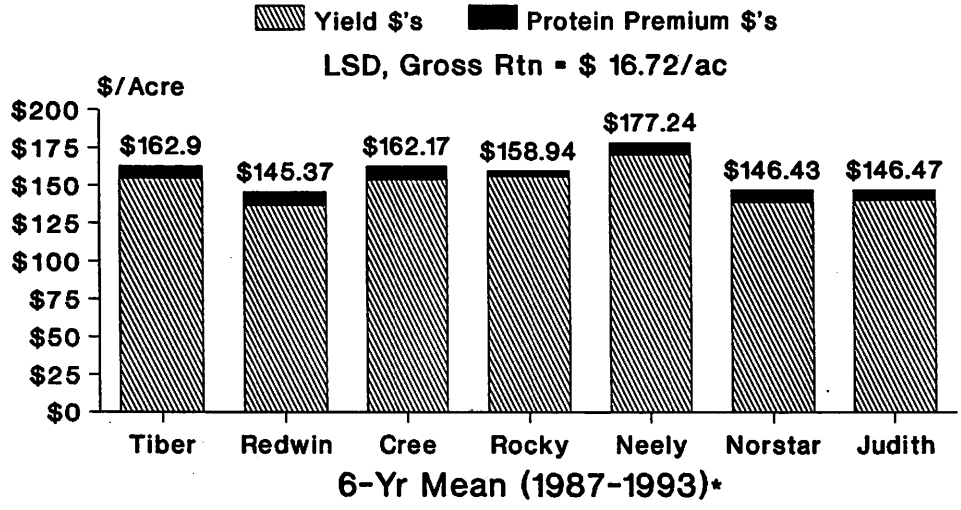

Figure 4.
MSU/AES/NARC-Havre

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

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

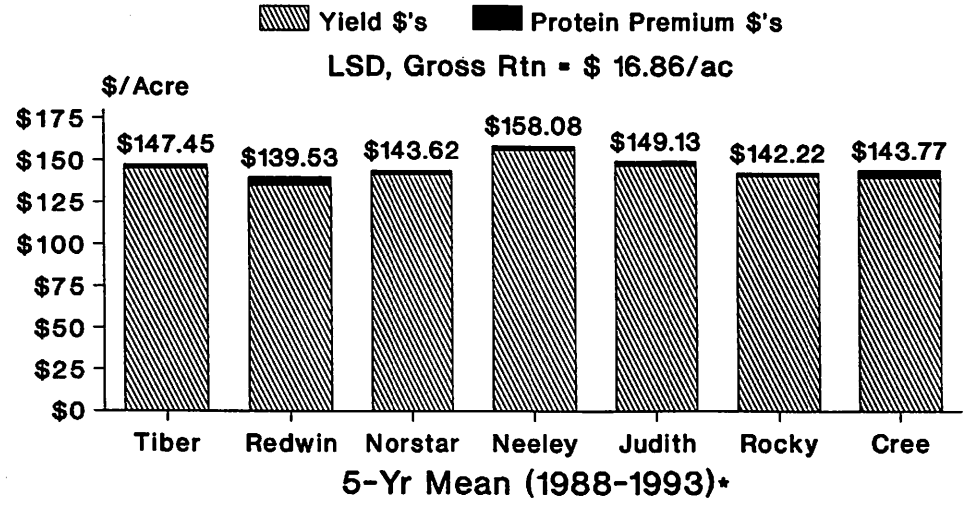

Figure 5.
MSU/AES/NARC-Havre

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

Gross Return - Fallow Spring Wheat
($ Yield at 13 % Protein + Premium)
Northern Ag Research Center, Havre

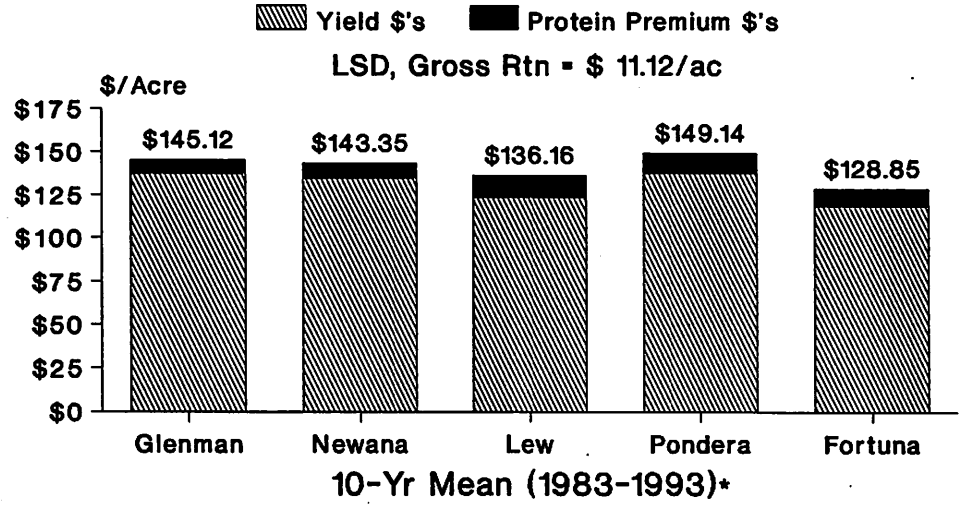

Figure 6.
MSU/AES/NARC-Havre

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

Gross Return - Fallow Spring Wheat
($ Yield at 13 % Protein + Premium)
Northern Ag Research Center, Havre

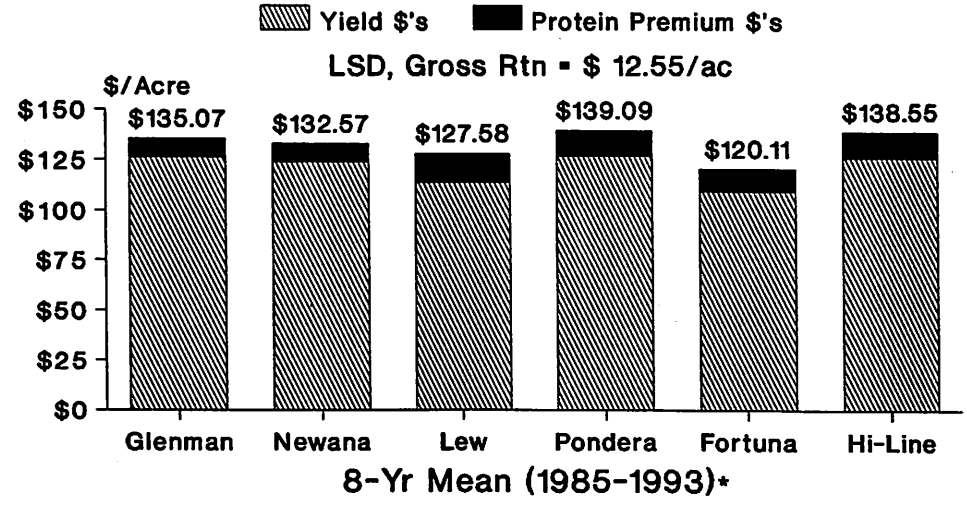

Figure 6a.
MSU/AES/NARC-Havre

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

Gross Return - Fallow Spring Wheat
($ Yield at 13 % Protein + Premium)
Northern Ag Research Center, Havre

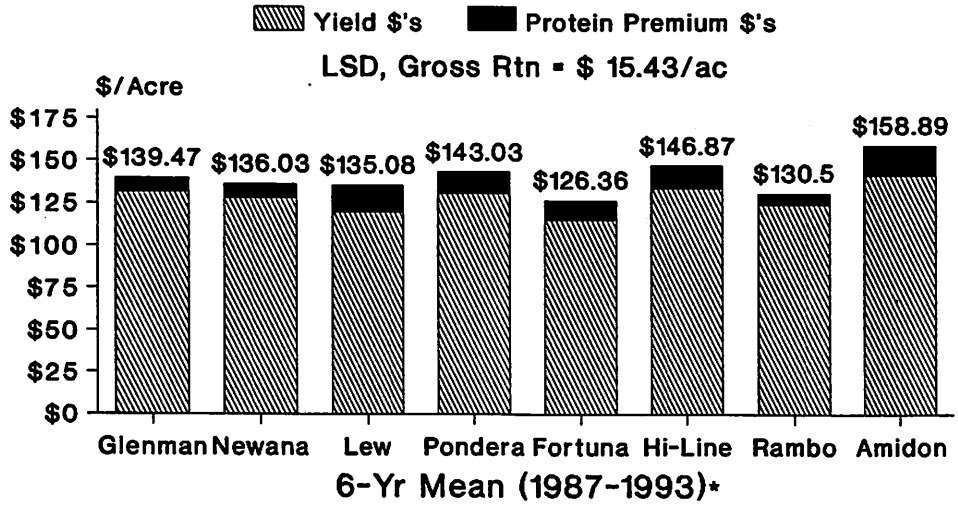

Figure 6b.
MSU/AES/NARC-Havre

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

Gross Return - Fallow Spring Wheat
($ Yield at 13 % Protein + Premium)
Northern Ag Research Center, Havre

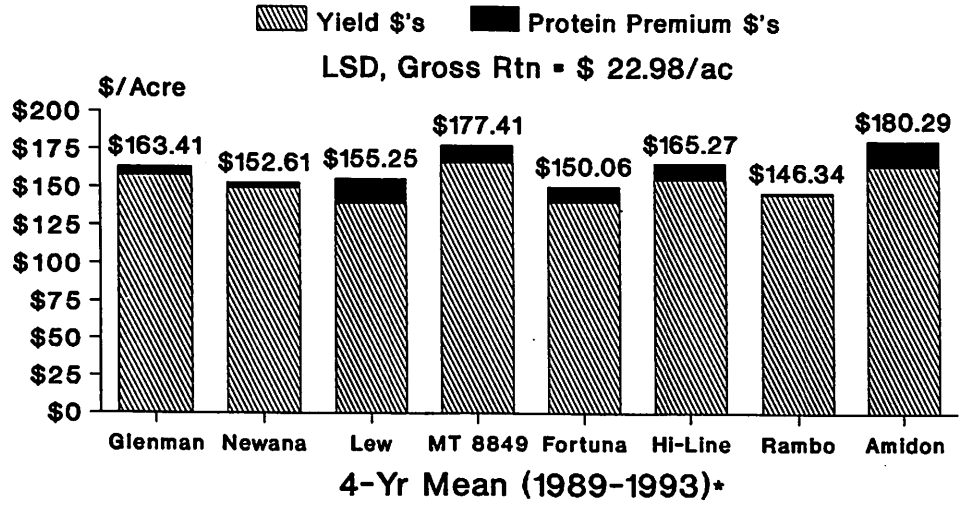

Figure 6c.
MSU/AES/NARC-Havre

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

Gross Return - Fallow Spring Wheat
($ Yield at 13 % Protein + Premium)
Leon Cederberg Farm, Turner

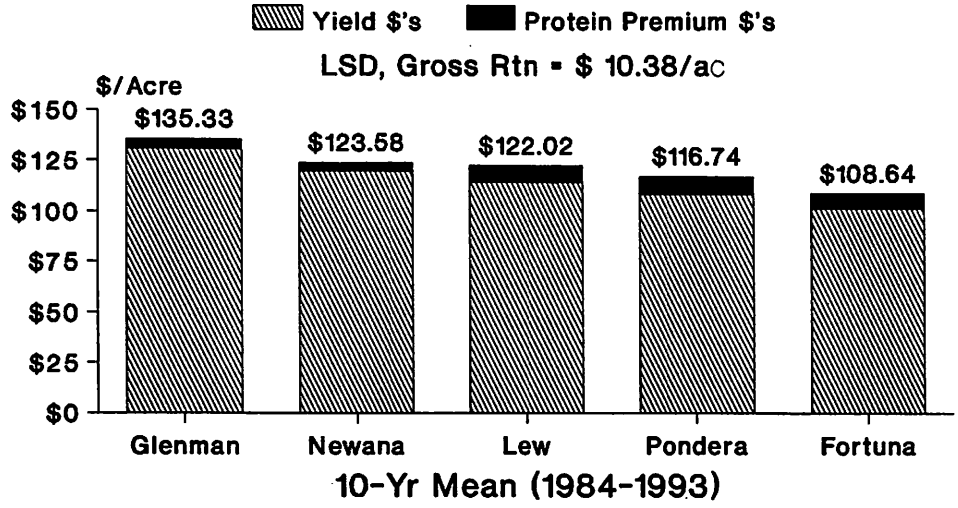

Figure 7.
MSU/AES/NARC-Havre

Basis = PNW Average Annual Market/Year

Gross Return - Fallow Spring Wheat
($ Yield at 13 % Protein + Premium)
Leon Cederberg Farm, Turner

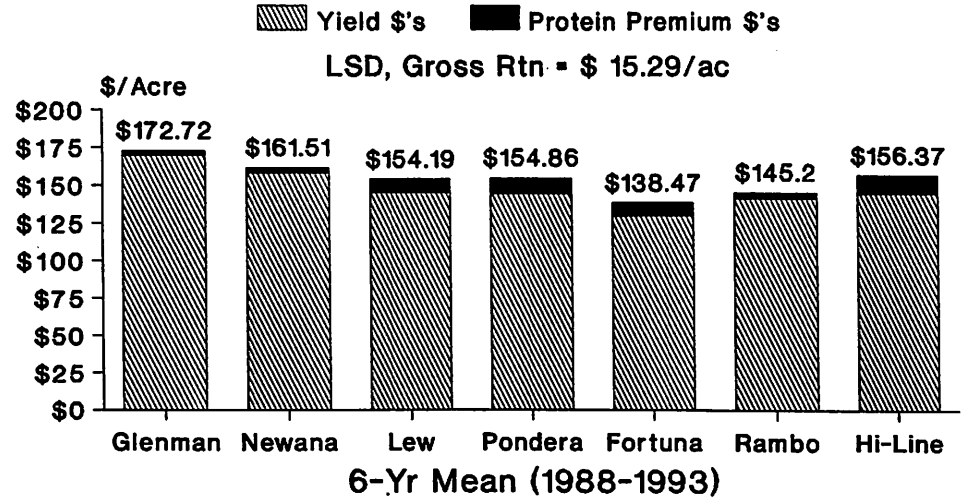

Figure 7a.
MSU/AES/NARC-Havre

Basis = PNW Average Annual Market/Year

Gross Return - Fallow Spring Wheat
($ Yield at 13 % Protein + Premium)
Myers Farms Inc., Big Sandy

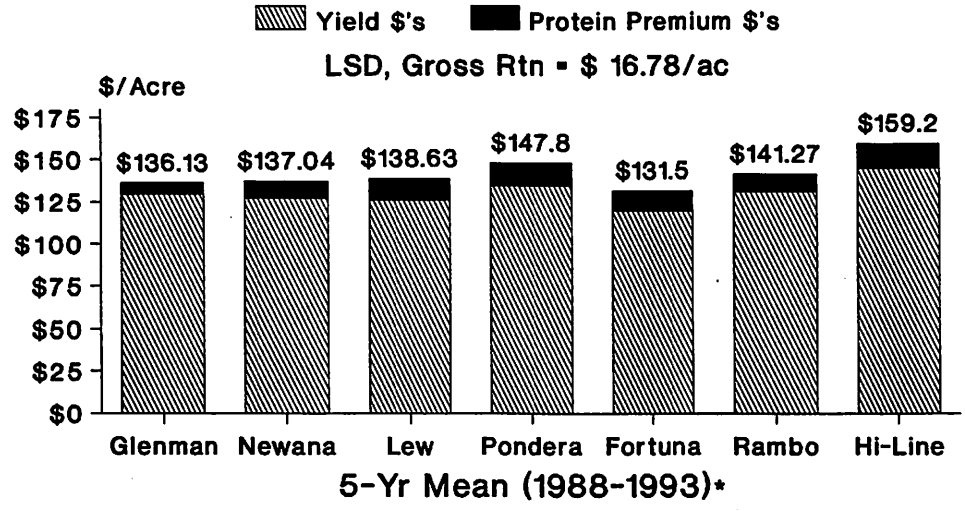

Figure 8.
MSU/AES/NARC-Havre

* 1992 Crop Lost to Poor Stand & WSMV
Basis = PNW Average Annual Market/Year

Gross Return - Fallow Spring Wheat
($ Yield at 13 % Protein + Premium)
Mark & Nancy Peterson Farm, North Havre

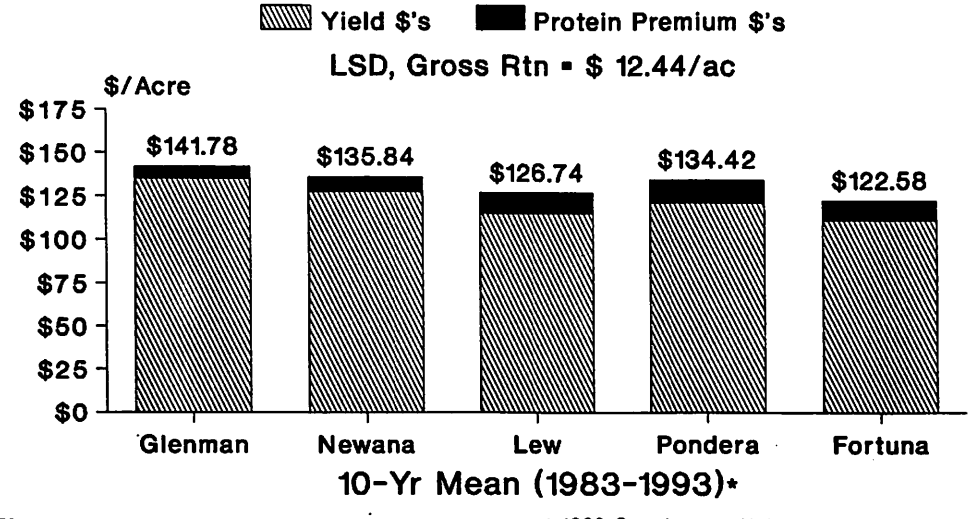

Figure 9.
MSU/AES/NARC-Havre

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

Gross Return - Fallow Spring Wheat
($ Yield at 13 % Protein + Premium)
Mark & Nancy Peterson Farm, North Havre

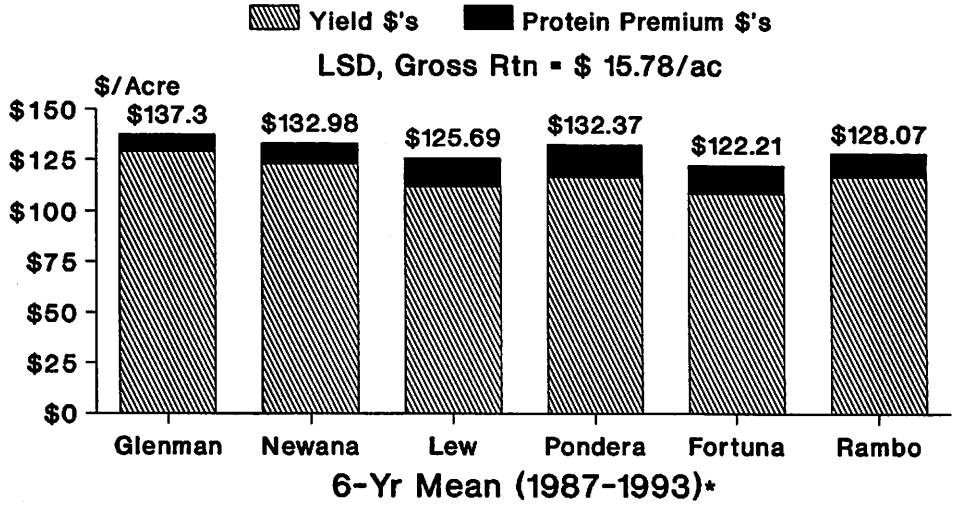

Figure 9a.
MSU/AES/NARC-Havre

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

Gross Return - Fallow Spring Wheat
($ Yield at 13 % Protein + Premium)
Graff Farms Inc., No. Joplin

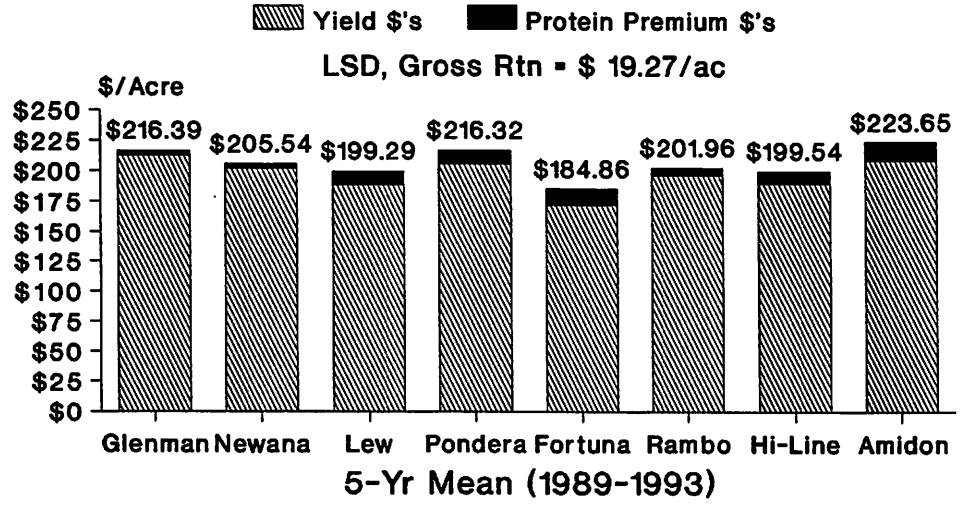

Figure 10.
MSU/AES/NARC-Havre

Basis = PNW Average Annual Market/Year

Gross Return - Fallow Spring Wheat
($ Yield at 13 % Protein + Premium)
Harold Solberg Farm, North Dodson

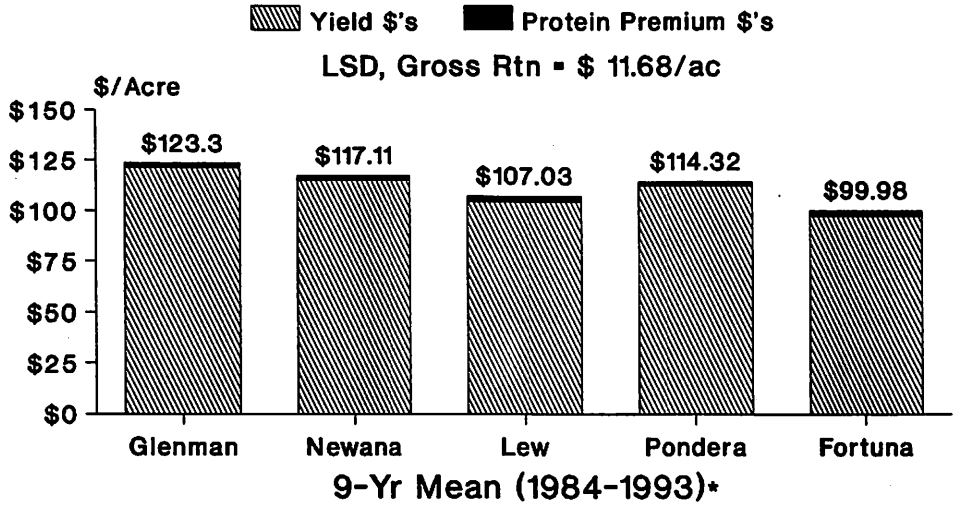

Figure 11.
MSU/AES/NARC-Havre

*1992 Crop Lost to Early Season Drought
Basis = PNW Average Annual Market/Year

Gross Return - Fallow Spring Wheat
($ Yield at 13 % Protein + Premium)
Harold Solberg Farm, North Dodson

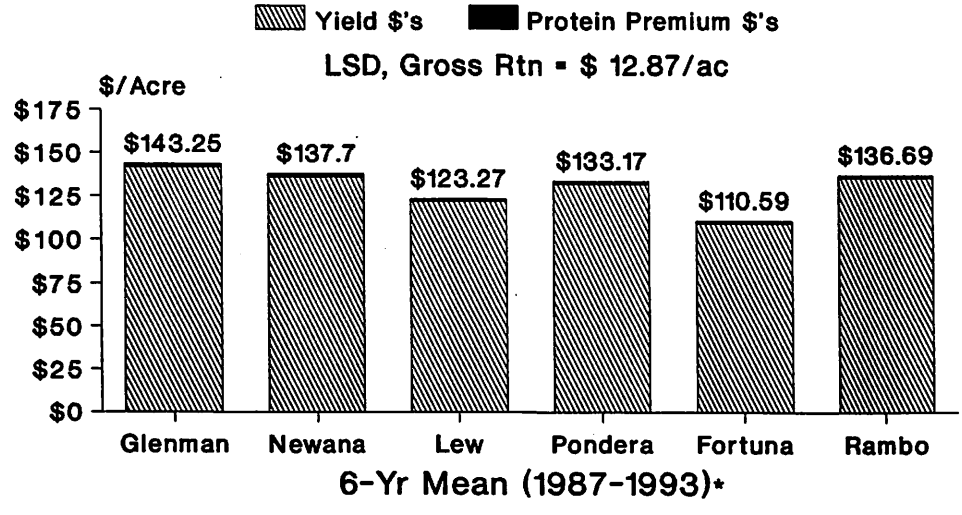

Figure 11a.
MSU/AES/NARC-Havre

*1992 Crop Lost to Early Season Drought
Basis = PNW Average Annual Market/Year