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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.

PERSONNEL:

Principal Investigator: Gregg R. Carlson, Agronomist (NARC) - Havre

Cooperators: Jim Christianson, MWBC - Great Falls
Mark Schutt, MWBC - Great Falls
G.A. Taylor, Breeder (WW) - Bozeman
E.A. Hockett, Breeder (WW) - Bozeman
L.E. Talbert, Geneticist (SW) - Bozeman
T.L. Allen, Technician (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.

SUMMARY:

Producers are well aware of the impact protein premiums can have on overall market value. `Winning with quality' or `losing without it' becomes a game of timing which is often a limited option to the average producer.

Producers have asked researchers to put recommended practices into dollars and cents. Such is never easy; and this 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. The Committee had the price information needed, but it was in the form of some 12,000 individual pencil entries for seven years from 1982-1987. A computerized database was needed to include the some 38,000 values involved when protein premiums by quarter were considered. As the Committee was already in the initial phases of computerizing the database, the Research Center prepared a temporary, computerized 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 producer review.

By December, 1988 Mark Schutt, Information Officer for MWBC had developed a spreadsheet program utility affording more efficient computerization of the market data. At present, data for the years 1980-1990 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 ordinary protein 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.

RESULTS:

Average annual PNW quotes for Hard Red Winter wheat at 10, 11, 12, and 13% protein for the ten-year period 1981-1990 are graphed in Figure 1. The PNW annual market averages for the same period for Dark Northern Spring wheat at 13, 14, and 15% 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.

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

Fig.	Crop	Location	No. of Varieties	No. of Years
3	Flw-WW	Havre	6	8
*3a	Flw-WW	Havre	6	7
4	Flw-WW	Big Sandy	6	7
*4a	Flw-WW	Big Sandy	7	4
5	Flw-WW	North Havre	4	4
6	Flw-SW	Havre	5	9
*6a	Flw-SW	Havre	6	6

(continued next page)

Fig.	Crop	Location	No. of Varieties	No. of Years
7	Flw-SW	Turner	5	8
*7a	Flw-SW	Turner	6	4
8	Flw-SW	Big Sandy	6	3
9	Flw-SW	North Havre	5	8
*9a	Flw-SW	North Havre	6	4
10	Flw-SW	North Dodson	5	7
*10a	Flw-SW	North Dodson	6	4

Figures marked with an asterisk (*) denote those for which a reduced number of data years were included in the analyses for purposes of including new or otherwise popular variety releases with less data 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 annual average market performance for each year. Alternate mechanisms of statistical evaluation need to be explored. With the simple analysis of variance methods utilized, it was felt the use of traditional formulae for estimation of any `missing values' could not be justified.

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 affect on `net' return. Plant available water estimates and soil fertility data are available for these studies (applied N, P, K for 1982-1985, and soil nutrient analysis plus applied N, P, K for 1986-1990). 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.

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 needs to be introduced in work with these data.

Average Annual Market Quotes

* ($/Bu - Hard Red Winter Wheat)

Pacific Northwest Delivery

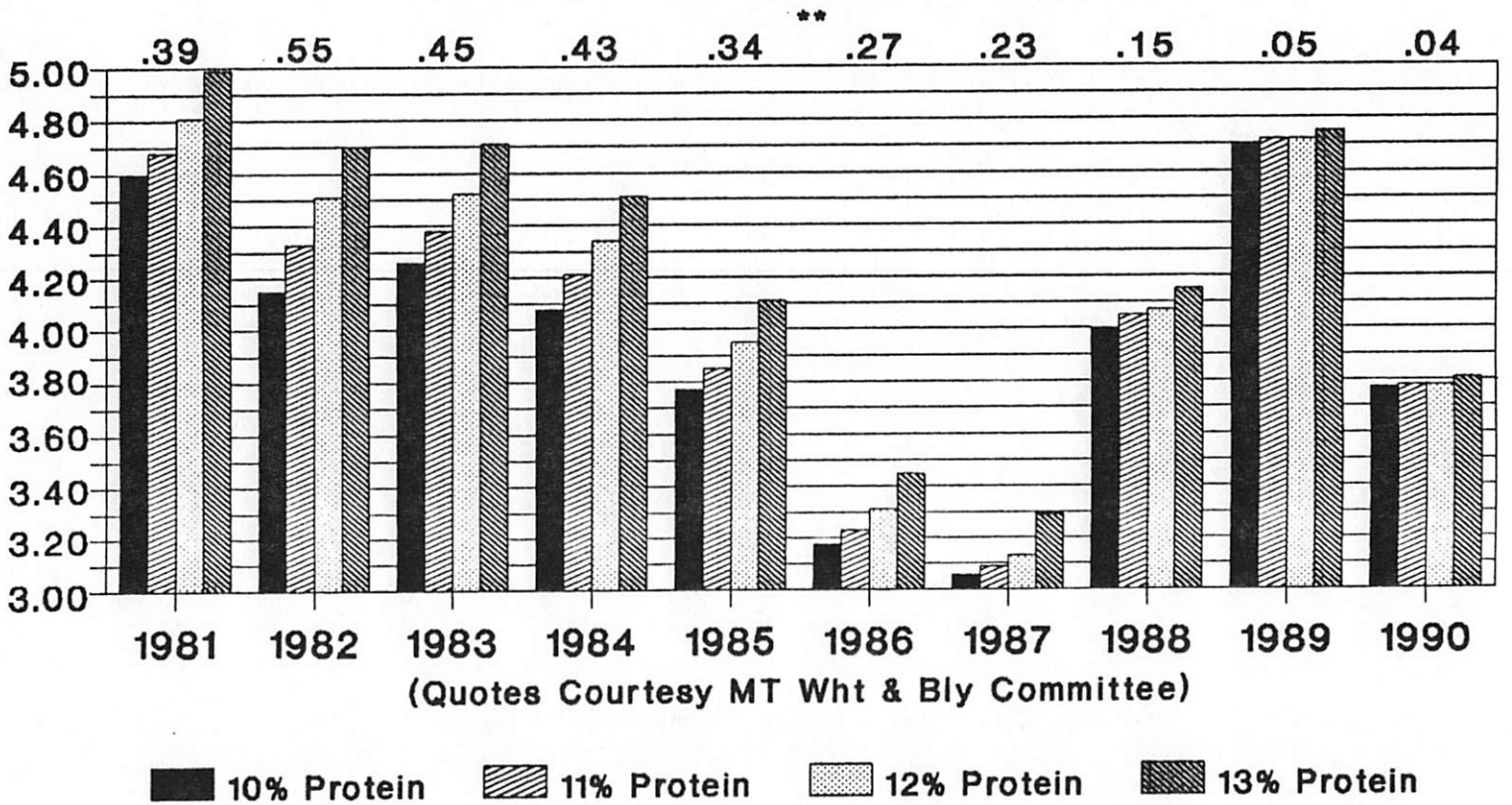

Figure 1.
MSU/AES/NARC-Havre

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

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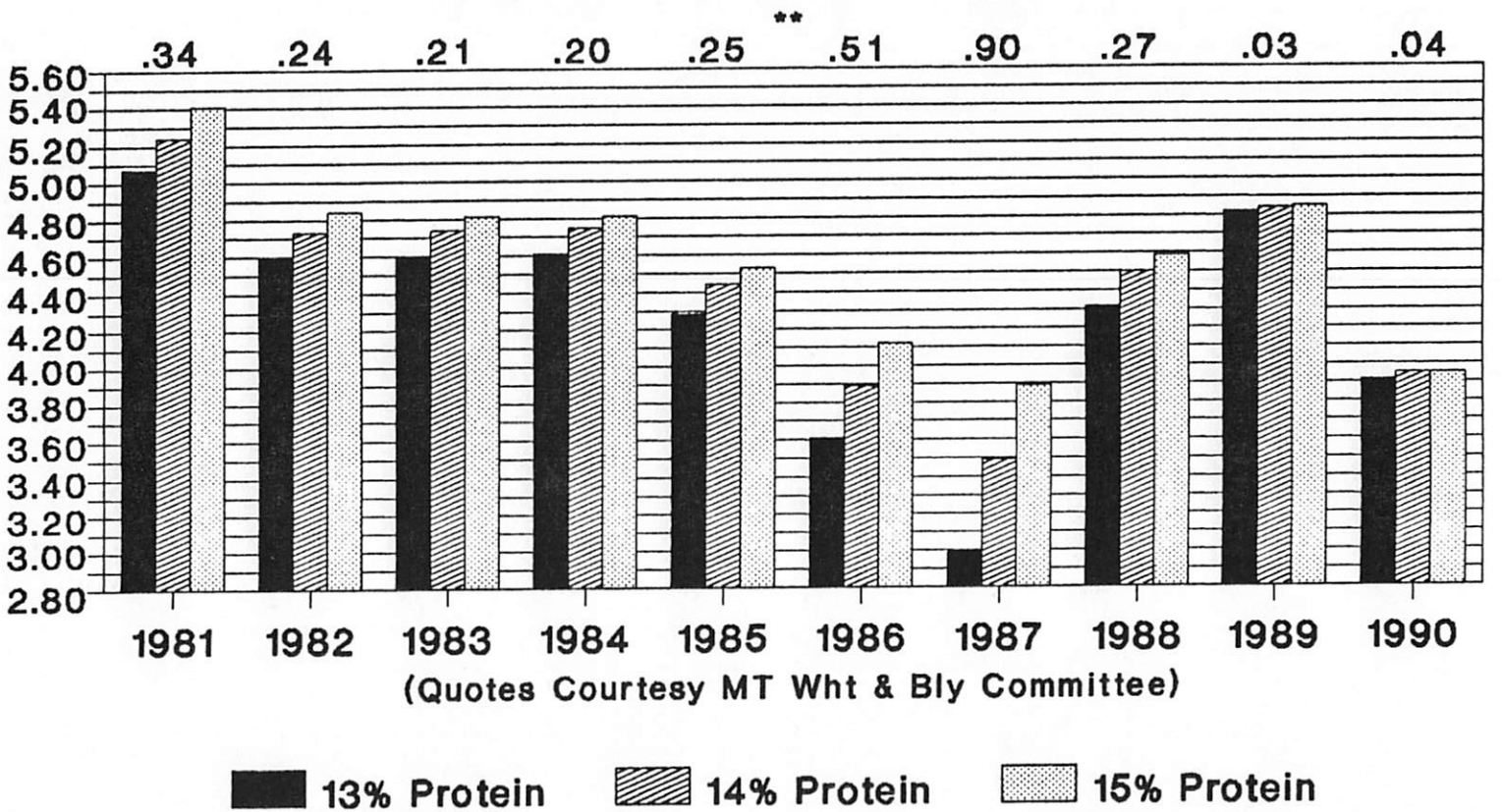
Average Annual Market Quotes

* ($/Bu - Dark Northern Spring Wheat)

Pacific Northwest Delivery



* Average of All Market Days/Market Year

** $/Bu Difference Between 13 & 15% Prot

Figure 2.

MSU/AES/NARC-Havre

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

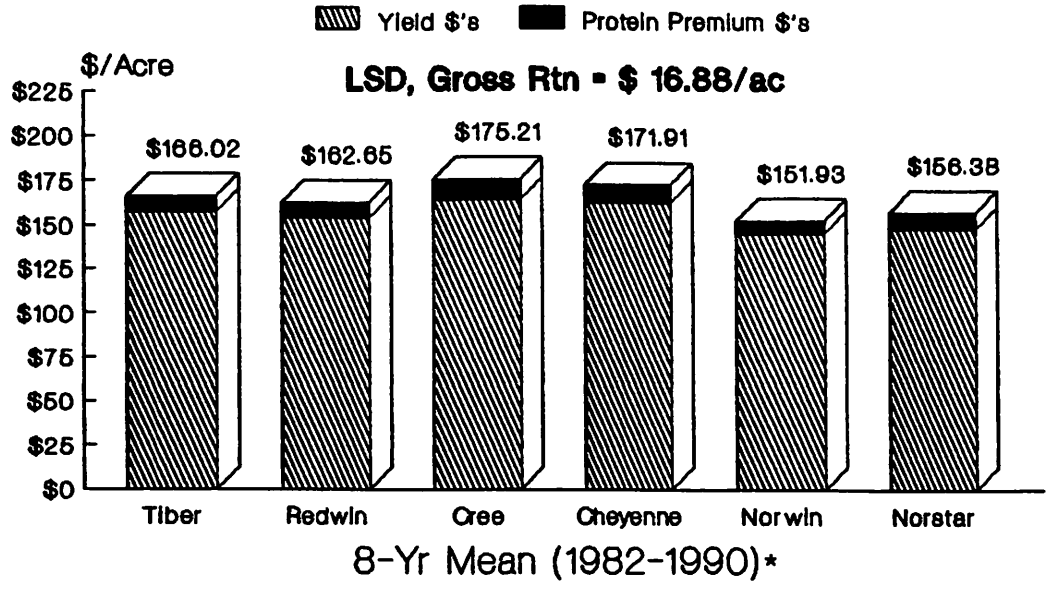

Figure 3.
MSU/AES/NARC-Havre

*1985 Nursery Lost to Drought Conditions
Basis - PNW Average Annual Market/Year

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

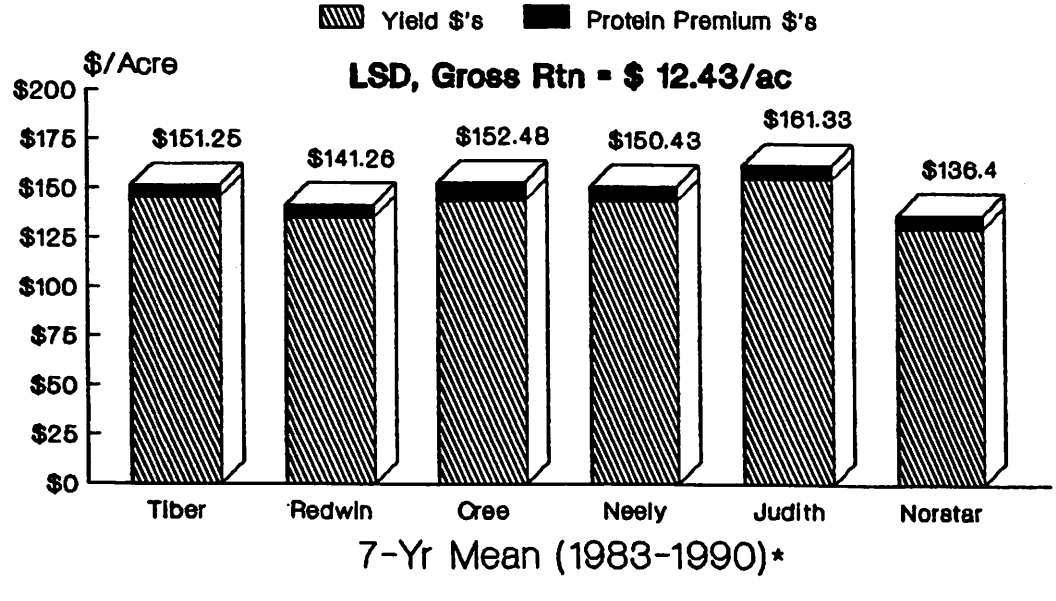

Figure 3a.
MSU/AES/NARC-Havre

*1985 Nursery Lost to Drought Conditions
Basis - PNW Average Annual Market/Year

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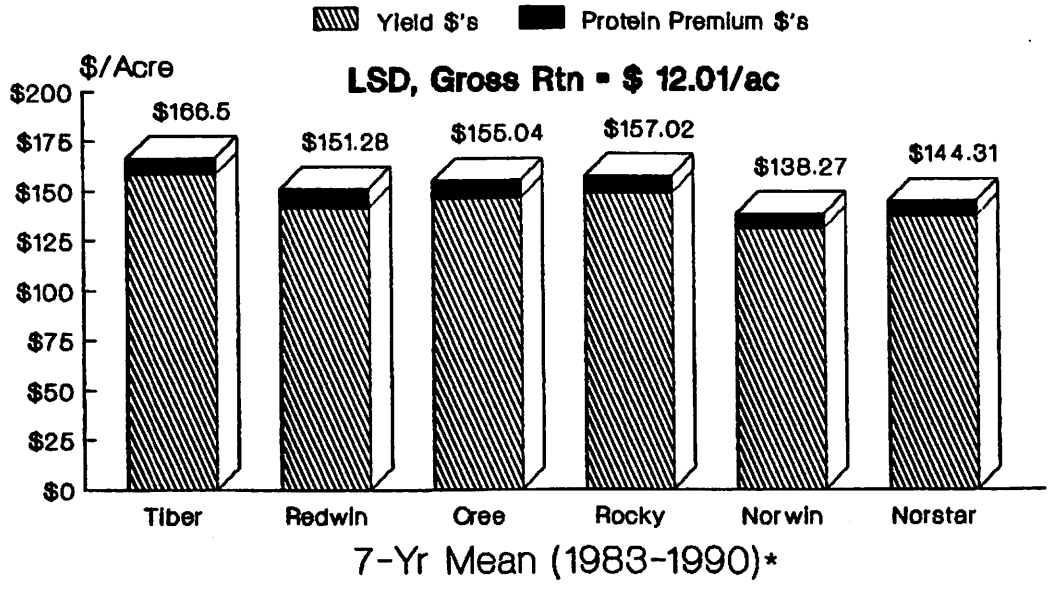
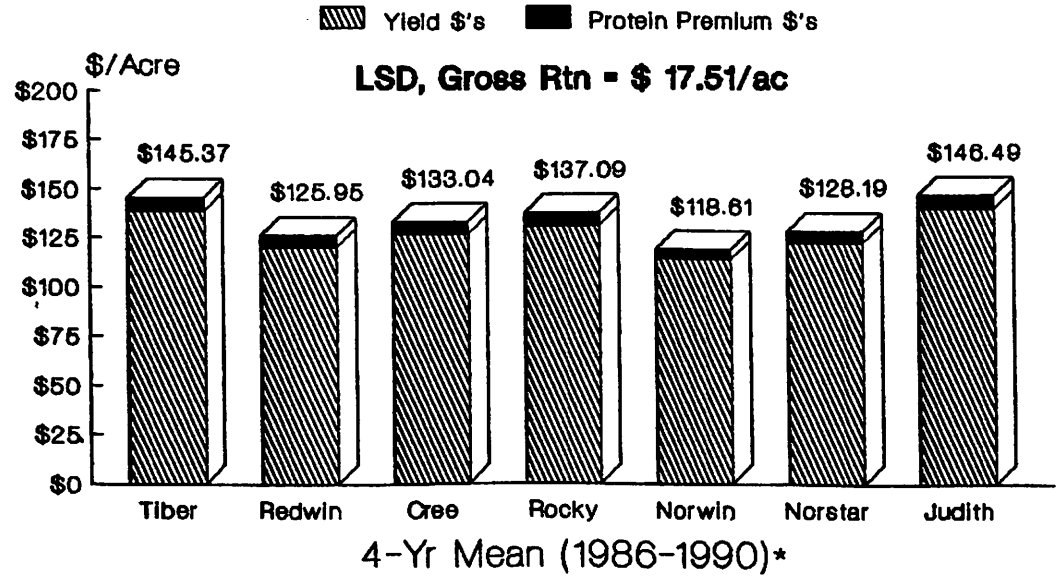
Gross Return - Fallow Winter Wheat
($ Yield at 10 % Protein + Premium)
Myers Farms Inc., Big Sandy



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

Figure 4.
MSU/AES/NARC-Havre

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



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

Figure 4a.
MSU/AES/NARC-Havre

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

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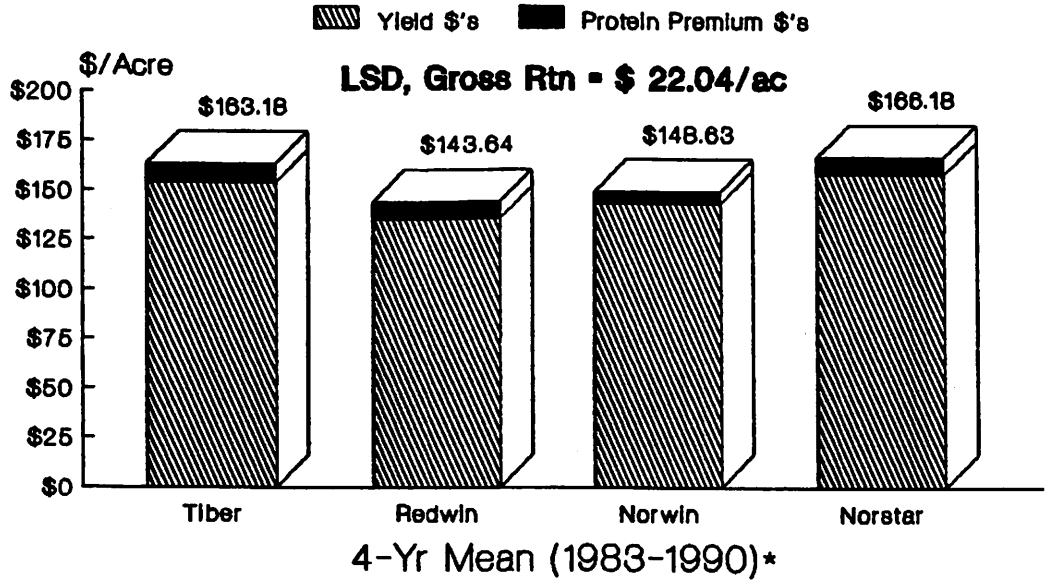

Figure 5.
MSU/AES/NARC-Havre

*1985,86,87,89 Lost to Weather Factors
Basis = PNW Average Annual Market/Year

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

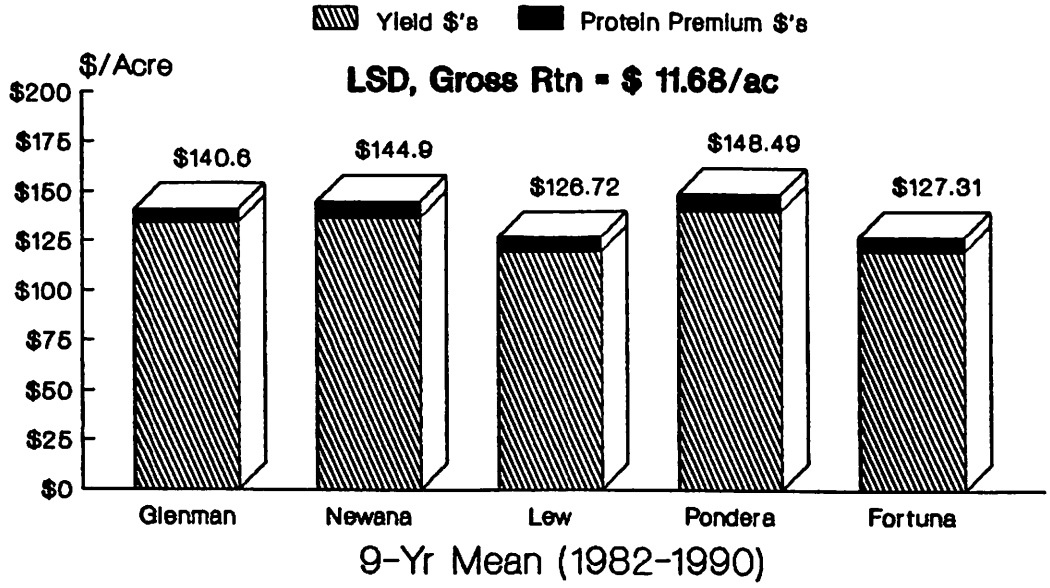

Figure 6.
MSU/AES/NARC-Havre

Basis - PNW Average Annual Market/Year

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

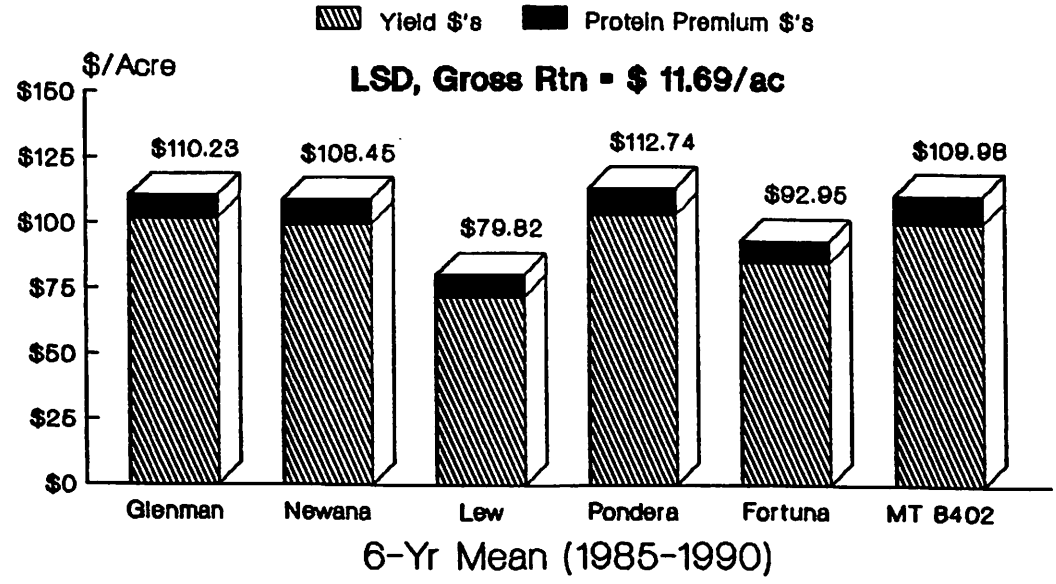

Figure 6a.
MSU/AES/NARC-Havre

Basis - PNW Average Annual Market/Year

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

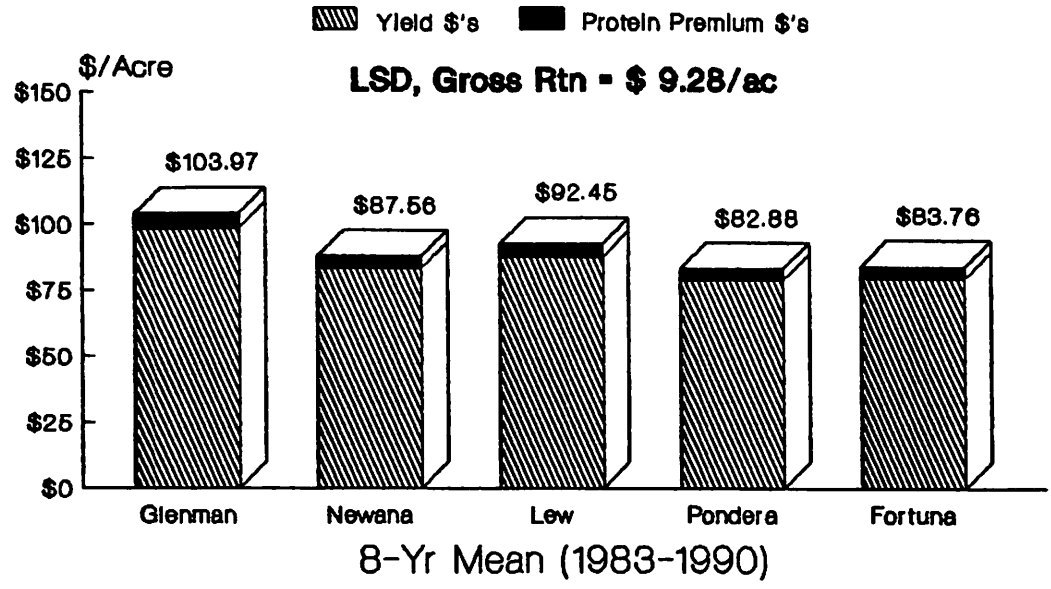

Figure 7.
MSU/AES/NARC-Havre

Basis = PNW Average Annual Market/Year

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

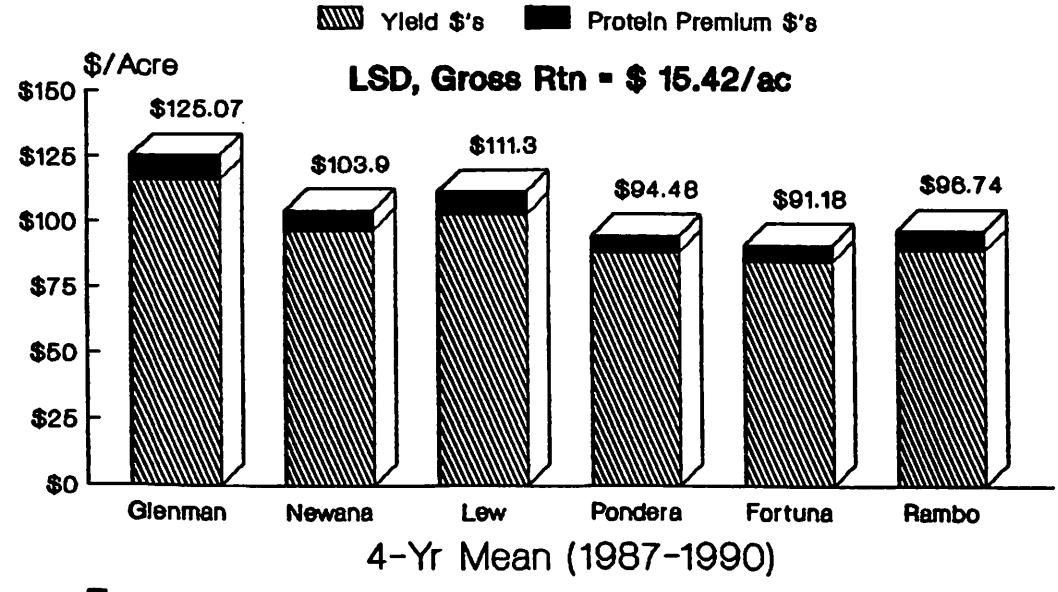

Figure 7a.
MSU/AES/NARC-Havre

Basis = PNW Average Annual Market/Year

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

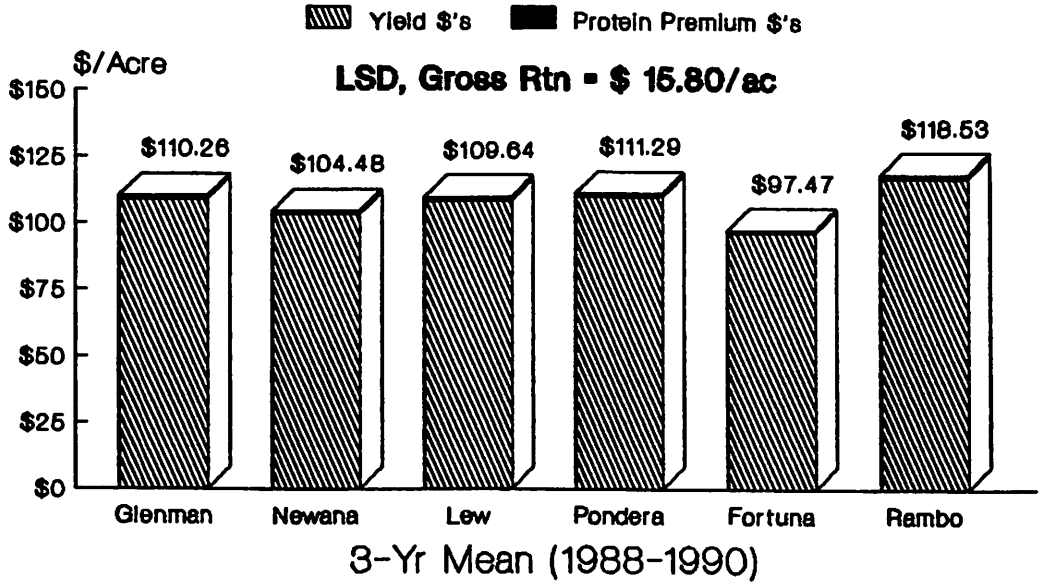

Figure 8.
MSU/AES/NARC-Havre

Basis - PNW Average Annual Market/Year

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

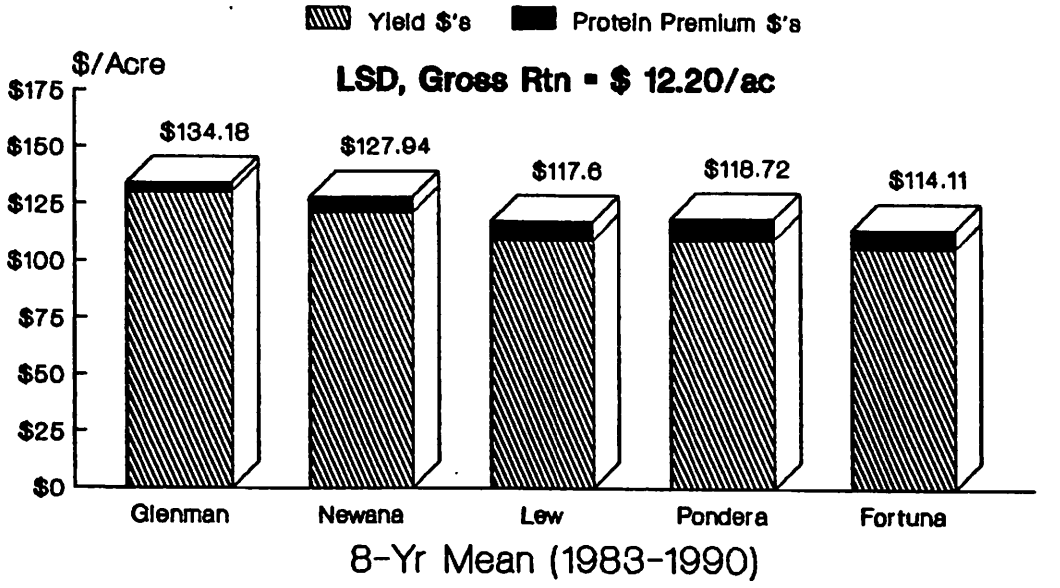

Figure 9.
MSU/AES/NARC-Havre

Basis = PNW Average Annual Market/Year

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

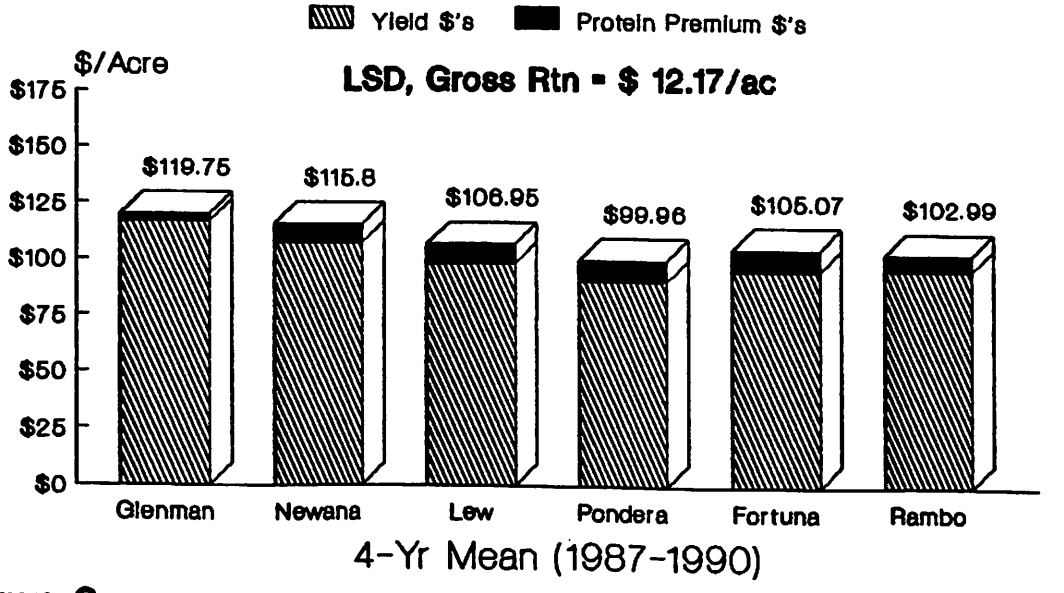

Figure 9a.
MSU/AES/NARC-Havre

Basis = PNW Average Annual Market/Year

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

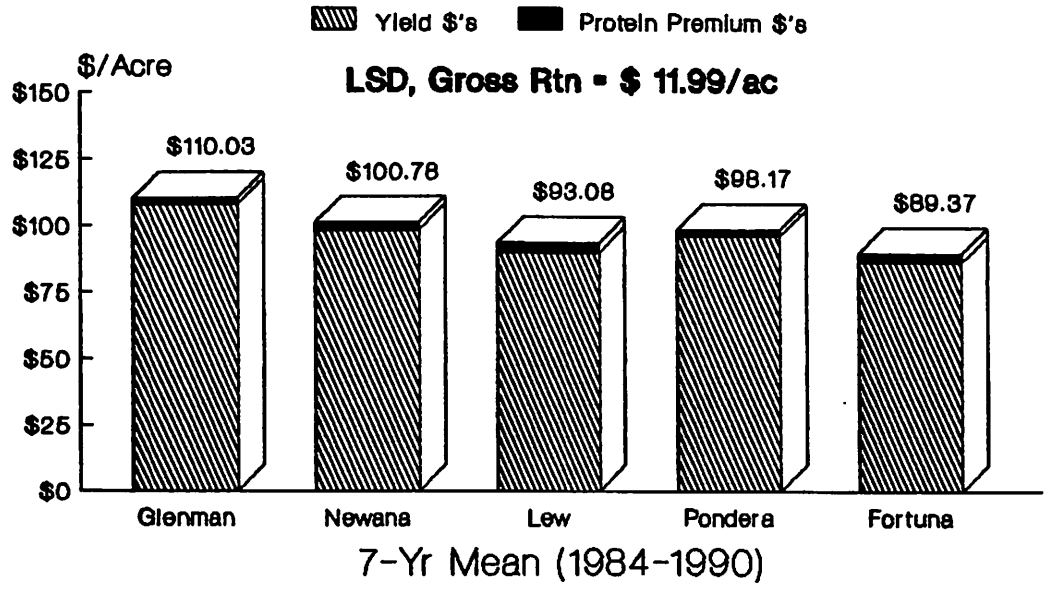

Figure 10.
MSU/AES/NARC-Havre

Basis - PNW Average Annual Market/Year

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

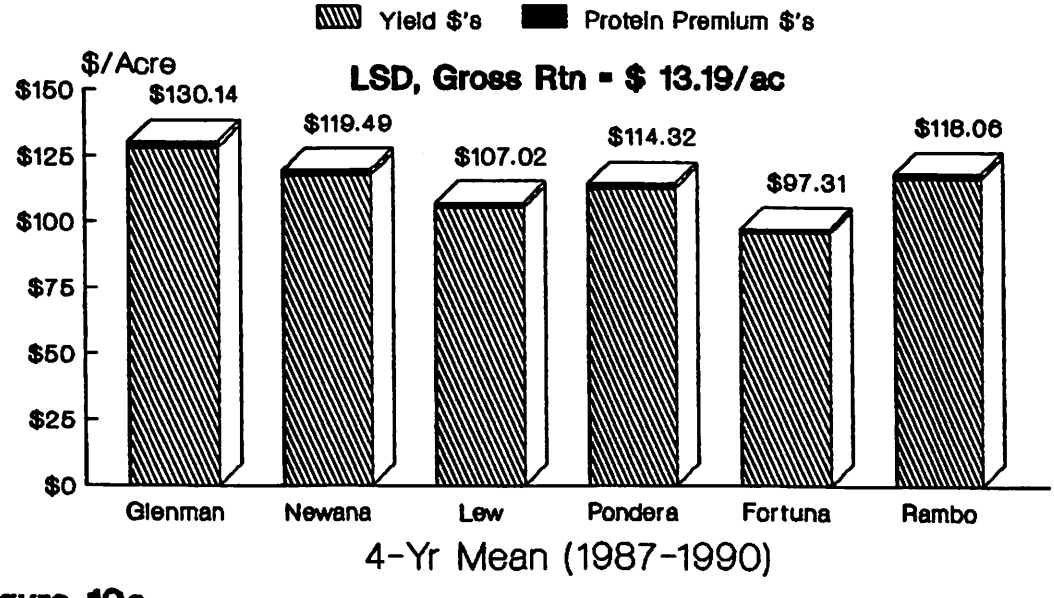

Figure 10a.
MSU/AES/NARC-Havre

Basis - PNW Average Annual Market/Year