elevation model (DEM) were incorporated into the model to represent slope, aspect and soil wetness. Major soils found were Spodosols, Andisols, and Inceptisols.

Part 5. Economics and Sustainability

Protein Premiums can Motivate Nitrogen Fertilization of HRSW Beyond Maximum Yield

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The price that a producer receives for hard red spring wheat (HRSW), unlike soft white wheat (SWW), is influenced by protein content (%). The producer receives a price premium on HRSW with greater that 14% grain protein and a discount with less that 14% grain protein. Since both yield and protein percentage directly effect profit, producers may desire to apply levels of Nitrogen (N) fertilizer to HRSW that maximize profits considering both yield and protein. This research extends earlier work to determine weather protein premiums may motivate growers to apply N beyond maximum total yield response, which economists refer to as "stage three" of production.

The objective of this research was to determine economically optimal nitrogen fertilization of HRSW for varying protein pricing structures and to discuss factors which motivate profitable fertilization beyond maximum total product or "stage three" of production. Quality based adjustments in competitive output prices are common in agriculture, but their influence on incentives for profitable production into stage three appears not to have been discussed in previous research. For the southeastern Washington HRSW data used in this study, profit was maximized in stage three whenever the premium/discount for protein relative to the 14% protein base price equaled or exceeded $0.04/$0.06 per bushel per 0.25% protein deviations. This premium/discount threshold held for all wheat and nitrogen price combinations examined. At the highest premium/discounts examined, up to 33 lb/ac additional nitrogen beyond maximum yield was applied to capture profitable protein quality premiums. At high premium/discount incentives, the combination of low wheat price and low input price pushed production furthest into stage three, because quality premiums accounted for a greater proportion of total returns. In general, as the proportion of net returns from quality adjustments increases, the incentive to produce into stage three increases.

Economics of No-Till Annual Cropping Systems, Ritzville, WA

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From 1997-2004, William Schillinger conducted a no-till annual spring cropping system experiment in Adams County, near Ritzville, WA. The objective of this study was to determine the long-run economic and agronomic feasibility of no-till cropping systems for low-precipitation areas of the inland Pacific Northwest. The last four years of the study had six rotations involving crops of soft white spring wheat (SWSW), hard white spring wheat (HWSW), spring barley (SB), yellow mustard (YM), and soft white winter wheat (SWWW). The six rotations were: four-year SWWW/SWWW/SWSW/SWSW, four-year SWWW/SB/YM/SWSW, two-year SWSW/SB, two-year HWSW/SB, continuous SWSW, and continuous HWSW. The two-year SWSW/SB rotation and the continuous SWSW rotation were the only two rotations maintained throughout the entire eight-year project period. Conventional tillage soft white winter wheat-summer fallow (SWWW-SF was not included in the experiment. An economic comparison of this traditional system to the experiment's no-till annual cropping rotations was accomplished by conducting a multi-year yield survey among neighboring SWWW-SF farmers. Comparative yield results for SWWW-fallow on neighboring farms are reported in a separate paper in this section.

None of the rotations were able to generate sufficient market returns to cover total costs during the relatively dry 2001-2004 period. Five of the six rotations earned statistically equivalent returns over total costs. The HWSW/SB,