TRITICALE ENTERPRISE BUDGETS

The Economic Cost and Return of Growing Winter Triticale in Iowa

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Budget Description

The triticale budget was developed to reflect the full economic cost and estimated returns of growing winter triticale in Iowa. It includes revenues, costs, and returns for grain and straw production. Costs include operating, or cash costs of production, which are direct cash expenditures on inputs such as seed, fuel, fertilizer, etc. The budget also accounts for non-cash costs, such as equipment depreciation and interest cost on investment. Depreciation represents the replacement cost of longer-term assets such as machinery used in production. Interest cost represents what is known as an opportunity cost and is interest charged on owned machinery as well as interest on operating inputs. It represents a return that could be received if the capital was invested in another use. Labor is valued at prevailing rates in the Iowa agriculture sector. A value for land is included at an equivalent cash rent value.

Triticale Types

The budget is presented in Table 1. It reflects the projected costs and return for three different triticale types (forage, intermediate, and grain), each with its own grain and straw yields. The three types are based on their relative allocation of growth to the grain and vegetative parts of the plant. Grain and straw yields for each type were conservatively estimated for three harvest indexes[a] using total biomass produced in Iowa State University research plots on 2002.

Most of the triticale currently grown in the United States is used as forage. Intermediate types have generally been developed for forage, but have relatively high grain yields as well. Varieties with the highest grain yields in recent ISU variety performance tests fall into this category. A few grain type triticales with growth allocation more closely resembling modern wheat have been developed. Currently, there is little supply of these grain types in the U.S. However, they could be made more widely available with increased producer demand.

Revenue

Triticale has feed value similar to corn, so the ten-year average corn price in Iowa for the 1992 to 2001 period of $2.25 per bushel (USDA, National Agricultural Statistics) was used to estimate triticale grain value. We have used a 56 pounds per bushel test weight for triticale to make direct price comparisons to corn (the official U.S. test weight for triticale is 48 lbs/bu). The straw price of $33 per ton represents the value of cornstalks for livestock bedding. This was obtained by ISU researchers through discussions with Iowa hog producers (Larson et al.). There may be a premium above this value for straw used for other purposes, such as landscaping mulch.

Costs

Machinery cost estimates were obtained from Iowa State University Extension publication FM 1712, "Estimated Costs of Crop Production in Iowa – 2002" (Duffy and Smith). Fixed cost covers depreciation, interest, insurance, and housing, while variable cost accounts for items such as fuel, oil, and repairs. Both tractor ownership and tractor operating costs are included for each operation requiring tractor use, such as planting, fertilizer application, etc.

Seed cost was that paid for triticale seed used in Iowa State University plots for the 2002 growing season. This cost is expected to be typical of what an early adopter of triticale would pay for triticale seed in the coming years. This cost could decline if the crop becomes more widely grown.

Fertilizer costs are based on wheat removal rates for grain and straw as reported in ISU Extension Publication PM-1688 (Sawyer et al., 2002). Grain and straw removal rates are shown below in Table 2. Given triticale's similarity to wheat, these rates were deemed appropriate for removal of phosphorus (P) and potassium (K) by triticale production.

[a] Harvest index = proportion of grain mass to entire above ground biomass (grain + straw)

Table 1. Costs and Returns For Triticale Production

	Triticale Type					
	Forage		**Intermediate**		**Grain**	
Yield Levels						
Harvest Index	0.25		0.33		0.40	
Grain (bu per acre @ 56 lbs/bu)	54		71		86	
Straw (tons per acre)	4.5		4.0		3.6	
Revenue						
Grain @ $2.25 per bushel	$ 121.50		$ 159.75		$ 193.50	
Straw @ $33 per ton	$ 148.50		$ 132.00		$ 118.80	
Total Revenue	**$ 270.00**		**$ 291.75**		**$ 312.30**	
Costs	**Fixed**	**Variable**	**Fixed**	**Variable**	**Fixed**	**Variable**
Preharvest Machinery						
Plant (No till drill)	$ 9.28	$ 2.94	$ 9.28	$ 2.94	$ 9.28	$ 2.94
P, K, and Lime Application	$ 0.67	$ 0.22	$ 0.67	$ 0.22	$ 0.67	$ 0.22
Seed						
Triticale, 50lb bags, 100lbs/acre @$8.95/bag		$ 17.90		$ 17.90		$ 17.90
Fertilizer						
Phosphate (P_2O_5 @ $0.224/lb)		$ 10.81		$ 12.49		$ 14.01
Potassium (K_2O @ $0.146/lb)		$ 18.63		$ 17.50		$ 16.66
Lime (yearly cost)		$ 6.00		$ 6.00		$ 6.00
Harvest Machinery						
Combine	$ 12.99	$ 5.73	$ 12.99	$ 5.73	$ 12.99	$ 5.73
Rake	$ 2.42	$ 1.45	$ 2.42	$ 1.45	$ 2.42	$ 1.45
Bale	$ 15.48	$ 17.60	$ 13.76	$ 15.64	$ 12.38	$ 14.08
Haul Grain	$ 1.08	$ 0.54	$ 1.42	$ 0.71	$ 1.72	$ 0.86
Haul Straw	$ 3.92	$ 2.75	$ 3.48	$ 2.44	$ 3.13	$ 2.20
Land (Cash rent equivalent)	$ 123.00		$ 123.00		$ 123.00	
Labor 2 hrs @ $8.00		$ 16.00		$ 16.00		$ 16.00
Miscellaneous		$ 6.00		$ 6.00		$ 6.00
Interest on preharvest variable cost		$ 3.53		$ 3.57		$ 3.61
Subtotal	$ 168.83	$ 110.09	$ 167.02	$ 108.59	$ 165.59	$ 107.65
Total Costs		**$ 278.92**		**$ 275.61**		**$ 273.24**
Net return		**$ (8.92)**		**$ 16.14**		**$ 39.06**

Table 2. The nutrient content of harvested wheat used to calculate nutrient removal and recommended amounts of P_2O_5 and K_2O for triticale.

Nutrient	Grain	Straw
	lbs per bu	lbs per ton
Phosphorus (P_2O_5)	0.6	4
Potassium (K_2O)	0.3	25

The formula utilized to calculate nutrient removal rates for grain was: (nutrient removal rate per bushel)*(56/60[b])*(no. of 56 lb bushels). For example, removal of P_2O_5 by grain harvested from the intermediate type was obtained as: (0.6 lbs.)*(56 lbs/60 lbs)*71 = 39.76 lbs removed per acre. The nutrient removal by straw was: (nutrient removal rate per ton)*(straw yield in tons). For P_2O_5 removal by the intermediate type: (4 lbs)*(4 tons) = 16 lbs removed per acre. Adding grain and straw removal levels provided the total removal for P_2O_5 (55.76 lbs./acre). It is important to recognize that these are not rates that will be applied each time triticale is grown. Rather, these are nutrient amounts that must be replaced at some point to maintain soil nutrient potentials. Even though they may not be applied during the triticale-growing year, they represent replacement costs that are charged against triticale production.

A nitrogen charge is not included in the budget. Enough nitrogen was inherent in the soil for triticale production in Iowa State University triticale test plots in 2002. Applying pre-plant nitrogen caused lodging and was more harmful than beneficial. The second reason is that nitrogen in the soil is subject to loss from leaching (after nitrification) and volatilization (evaporation into the air). Without the triticale crop, nitrogen amounts equal to that captured by the triticale would likely be lost to the environment.

This budget was developed as part of a three-year rotation, including triticale, corn, and soybeans. It assumes that phosphorus, potassium, and lime will be applied once for each rotation cycle. Each crop is charged one-third of application cost. Thus, there is still a charge for fertilizer application costs under preharvest machinery.

[b] Official test weight for wheat is 60 lbs/bu

The cost per pound of phosphorus (P_2O_5) and potassium (K_2O) are those quoted by Treynor Ag Supply, Treynor, IA, during spring 2002. Multiplying cost (per pound) by removal (lbs per acre) yields the charge to triticale for P and K use levels. The lime expense is the yearly cost provided in the corn and soybean budgets in Iowa State's cost estimates for 2002 (Duffy and Smith). The lime expense for triticale should be very similar.

The land charge was calculated using the Iowa State Extension publication "2002 Farmland Cash Rental Rates", FM-1851 (Edwards and Smith). The cash rental rate publication is a survey that gathers responses about cash rents from twelve areas of Iowa. Each respective area is divided into "high quality third", "medium quality third", and "low quality third" for land rating, with average cash rent provided for each land quality. The cost listed in the budget, $123 per acre, resulted from averaging land rents of the three land quality categories for the twelve areas of Iowa.

Estimates for labor time and cost were obtained from the Iowa State Extension budget entitled "Oats and Hay production-seeding year costs" (Duffy and Smith). The operations listed are very similar to those used to produce tritcale. However, the section includes mower-conditioner, rake, bale, and haul costs for alfalfa hay. Assuming this takes one hour per acre, and subtracting that from the total estimate of three hours per acre, yields an estimate of two hours per acre for producing triticale[c]. The labor cost estimate was $8 per hour. This estimate was perhaps on the lower side of present rates paid to agricultural laborers[d]. However, it will be easier

[c] The hours per acre estimate was also calculated using the University of Minnesota Extension machinery estimates, which list estimated work performed for each operation in acres/hr (Lazarus and Selley). Taking the inverse of this number for each operation included in triticale production, and then summing for all operations, gives and estimate of 1.85 hours per acre. This lends support to the two hour per acre estimated explained above.

[d] Labor cost per hour derived from the University of Minnesota machinery cost estimates was $12.16 per hour (Lazarus and Selley).

for Iowa producers to compare triticale to other crops if input costs, such as labor, are equally valued across budgets for all crops. The value used for other Iowa crop budgets for 2002 was $8 per hour (Duffy and Smith).

Interest on preharvest variable cost was established to reflect the interest charge on an operating loan. If an operating loan is not needed, it represents the opportunity cost on the funds invested in winter triticale production. If these funds were not used in crop production, they could be invested elsewhere, such as in an interest-earning certificate of deposit. Interest was calculated for a nine-month period as follows: (sum of preharvest variable cost)*(7.5%)*(3/4 year).

The miscellaneous overhead charge accounts for items such as soil test cost, general farm utilities, farm publications, membership dues, and truck licensing fees. Duffy and Smith estimated this charge at $6.00 per acre.

This budget examines winter triticale as a separate crop produced in isolation from a rotation. There may be benefits from an integrated rotation involving crops such as corn, soybeans, triticale, alfalfa, red clover, etc. A rotation could prove beneficial in lowering production costs and improving yields in corn, soybeans, and triticale, making net profit per acre more attractive. Potential benefits include improved control of weeds, insects, and diseases, and lower fertilizer costs resulting from more efficient use of nutrients. These issues will be addressed in future budgets.

Comparison with Corn and Soybean

It may be useful and instructive to make comparisons between the net returns from triticale and those for corn and soybean production. Using 2002 ISU Extension cost estimates and the 10-year average price, the net return per acre for corn in 2002 was –$40.75. The net return for soybean, using the 10-year average price, was –$12.60. Using the 5-year average price, net return for soybean was -$42.30 per acre. Of course none of these comparisons include farm program payments, which increase the profitability of corn and soybean relative to triticale. Additionally, there is not a value placed on corn stalks for bedding. The triticale budgets show a per acre projected return of -$8.92 for forage triticale types, $16.14 for intermediate types, and $39.06 for grain type triticale when each type is used for grain and straw production.

Cautions

The revenue in these budgets was based on yield from one crop year. Several years of production data are needed to verify them.

Variety tests have demonstrated that grain from some triticale varieties contained excessive ergot levels. Ergot can be a problem when feeding animals and grain with more than 0.1% should not be fed unless it is diluted with ergot-free grain. Ergot levels of winter triticales were significantly below the 0.1% threshold, but most of the spring triticales contained ergot above this level. Ergot can be managed by selecting tolerant varieties, planting triticale in rotation with non-host crops, and planting ergot free seed.

Make sure you secure a market or have a use for triticale before producing it as a grain crop. Currently, there is no established cash market for triticale grain in Iowa. However, research from Florida, Canada, and Australia indicates that triticale makes excellent animal feed. Early adopters of triticale are most likely to feed it to animals on their own farm.

References

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