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MARKET OUTLOOK AND THE ECONOMICS OF PRODUCING AND MARKETING MICHIGAN WHEAT

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The Michigan wheat industry faces some major challenges as we review the trends of the past and prospects for the future. Michigan is, by far, the most important white wheat state outside the Pacific Northwest, with about 75 percent of the production as soft white and the balance of 25 percent, soft red. Millers in the state generally prefer white wheat which is used for pies, cakes, cookies, biscuits, donuts, waffles, etc.

Michigan wheat acreage has trended downward since the early 1960's, as can be seen in Figure 1. The area harvested has varied substantially from year-to-year, reflecting changes in farm programs and the flexibility in shifting rotations on Michigan farms.

Yields on wheat moved up to a higher plateau in the 1980's and early 1990's, and have been averaging about 50 bushels per acre in recent years (Figure 2). During this same period, the absolute and percentage variability in yields also increased. The result of declining acres harvested and increased yield is that production of wheat in Michigan has registered no significant trend (Figure 3). As would be expected from the combination of varying acres and yields, production has been very unstable. While not shown in these charts, variability of quality has also been a problem of the industry.

One measure of farmer profits in growing wheat in Michigan is "gross margins over variable costs." For those who do not participate in the government's Wheat Program, this calculation is simply the gross receipts per acre less direct or variable costs of production such as seed, fertilizer, chemicals, fuel, repairs and seasonal hired labor. Gross margins over variable costs still have to cover general farm overhead, taxes and insurance, interest, capital replacement, land and regular hired labor and

Figure 1

Area Harvested for Wheat in Michigan

[Figure 1 omitted]

Figure 2

Wheat Yields in Michigan

[Figure 2 omitted]

Figure 3

Production of Wheat in Michigan

[Figure 3 omitted]

unpaid labor--so it is not a net profit figure. However, it does provide a gauge to how the enterprise has performed over time. For those who have participated in the Wheat Program prior to 1996, the gross margins over variable costs relate to a "base acre" which includes the portion not harvested, as well as the portion which is harvested. Deficiency payments are added to market receipts and nominal costs are included for maintaining cover on a portion of the base acre set-aside.

Figure 4 plots the average gross margins for Michigan farmers from 1975 to 1996. These calculations are based on state average yields, average farm prices and an estimate of variable costs per acre. Note that the Wheat Program has usually provided higher gross margins per acre than received by the non-participant.

Figure 4

Gross Margins Over Variable Costs on Wheat in Michigan for
Participants and Non-participants in the Wheat Program

[Figure 4 omitted]

As shown in Table 1, participants in the Wheat Program averaged around $16 more per acre in 1975-97 than did non-participants. Also, the Wheat Program has provided somewhat more stability in returns than is the case for those who have not participated. This is in terms of percent deviation rather than absolute deviation. More simply put, the standard deviation (a measure of variability) of gross margins for farmers in the Wheat Program ($32) was about the same as for those outside. However, because returns averaged higher for those in the program, the percent deviation was less.

Table 1 also provides some indication of how gross margins from wheat compare with other enterprises. Since, in recent years, about 65-70 percent of Michigan's wheat base has been in compliance (nearly all beginning in 1996), the gross margin for participants is a representative return
in Michigan. However, these are averages and don't necessarily reflect the performance on individual

Table 1

Gross Margins Over Variable Cash Costs for Major Crop Enterprises in Michigan, 1975-97*

Enterprise	Average Gross Margin	Standard Deviation	
		Absolute	Percent
	$/acre	$/acre	%
Wheat			
Participants	89	32	36
Non-participants	73	30	41
Corn			
Participants	117	35	30
Non-participants	96	44	46
Soybeans	122	31	25
Dry Beans	169	56	33
Sugarbeets	343	106	31

* Variable costs were obtained from various issues of "Crops and Livestock Budgets, Estimates for Michigan," Department of Agricultural Economics, Michigan State University. Variable costs exclude family and regular hired labor, and, of course, fixed costs of overhead, taxes, interest on investment, rent, etc.

farms and, of course, do not get to the "bottom line" of what was the profit after accounting for all costs, variable and fixed.

Gross margins for participants in the Wheat Program did nearly equal returns to non-participation on corn in 1975-97 and with much less risk. But since about 80 percent of the corn base in Michigan has been in the Feed Grain Program (almost all beginning in 1996), gross margins from corn in Michigan have averaged above the gross margins from wheat. Gross margins from soybeans, dry beans and sugarbeets have averaged noticeably above those from wheat.

Care must be taken in interpreting this data since the non-variable costs are not specified and rotation considerations are not included. In general, however, it is evident that wheat is being challenged by competing crops.

A case for including wheat in rotations is that the timing of the growing season is such that adverse weather affecting yields of fall harvested crops is usually not serious for wheat. The correlation of wheat yields in Michigan (in terms of ratio to trends) in 1960-96 was only .26 with corn, .26 with soybeans, .17 with dry beans and .23 with sugarbeets. In contrast, deviations from trends in corn and soybean yields were correlated with a coefficient of .73, corn and dry beans at .32 and corn and sugarbeets at .38. The point is that wheat in rotations reduces the weather risk on production.

Similar, but more relevant to income, are the correlations in gross margins among the major cash crops in Michigan. Gross margins, of course, are affected by yields, but also incorporate prices and government payments. These correlations are indicated for 1975-97 in Table 2. The correlations in the lower right section of Table 2 among the fall harvested crops tend to be higher than the correlations between wheat and the fall harvested crops (rows 1 and 2). There are some noticeable exceptions, such as the relatively high correlation between returns to participants in the government program on corn and wheat. We can only conclude that there is some evidence that wheat in the rotation helps stabilize income. However, in absence of a government program providing deficiency payments to farmers (cases of non-participants on wheat and corn), the conclusion is fairly clear that wheat in the rotation reduces income risk as well as production risk.

The Federal Agricultural Improvement and Reform Act (FAIR)

The new Federal Agricultural Improvement and Reform Act (FAIR), passed by Congress and signed by the President in the spring of 1996, represents a major new direction in agricultural legislation which dates back to 1933. The intent of the legislation is to provide a transition from governmental supports and controls to a more market-oriented agriculture and to establish upper bounds to federal expenditures over an extended period of time.

Table 2

How Gross Margins Have Been Correlated Among Major Crop Enterprises in Michigan, 1975-97

Enterprise	Corn		Soybeans	Dry Beans	Sugarbeets
	Participants	Non-participants			
Wheat					
Participants	.58	.25	.22	.21	.35
Non-participants	.39	.44	.24	.43	.04
Corn					
Participants			.62	.46	.42
Non-participants			.63	.62	.15
Soybeans				.60	.20
Dry Beans					.13

The new legislation will provide farmers much more flexibility in how they allocate their plantings of major crops. Essentially, participating farmers will have no restrictions except some limitations apply to planting fruits and vegetables on program acres. Also, conservation plans must be followed. Participants will receive direct payments on feed grain, wheat, cotton, and rice at fixed rates in 1996-2002, regardless of price levels. Under previous programs, the "deficiency payments" declined as prices increased and were eliminated entirely if U.S. market prices exceeded the target prices. In FAIR, there are no target prices (or deficiency payments based on target prices), Acreage Reduction Programs (ARP's) 0-85 programs, set-asides, etc. This the "de-coupling" that has been discussed and proposed, but not enacted, for previous farm bills.

The fixed payments called the "Annual Payment Rates" generally decline over the 1996-2002 period. For individual farmers, the payments will be calculated by multiplying the Annual Payment Rates times the contract acres times the farm program payment yield per acre times 85 percent.

For the 1997-2002 crop years, the annual payment rate on wheat will be between $.45 and $.65 per bushel. In 1998, for example, a wheat farmer with a 100 acre base and a 40 bushel program yield would receive $22.10 per acre as a direct payment ($.65 x 40 bushels x 100 acres x 85%).

One tool of past farm programs retained in FAIR is the non-recourse loan. In the past, the non-recourse loan has put a lower bound on market prices in years of surplus and has also provided income transfer to farmers. In that latter role, problems emerged as prices were held above equilibrium levels, forcing tighter acreage controls in the U.S. while foreign competitors expanded under the U.S. price support umbrella. Also, as the term "non-recourse" implies, the government must accept the commodity under loan as repayment of the loan principal plus interest, if the producer so desires. For most years in the past, this has meant that surpluses accumulated in CCC storage when prices remained below the non-recourse loan rate.

Realizing that the situation was untenable, the government sharply lowered the loan rates in the mid 1980's and shifted the support to agriculture through the target price deficiency payment scheme. Target prices were also lowered, but to a much lesser extent than the drop in loan rates.

The loan program under FAIR will be much the same as has been in effect on crops in recent years. The Omnibus Budget Reconciliation Act of 1990 required that the USDA implement marketing loans for 1993-95 crops of feed grain and wheat if the U.S. had not entered into a GATT agreement by June 30, 1992. Since such an agreement had not been reached, marketing loans were in effect in those crop years. The major difference between a marketing loan and the traditional non-recourse loan is that the government does not take over the grain as a repayment. Instead, if producers elect to pay off the loan when market prices are below the loan rate, they repay the loan at the market price and retain the difference between the loan rate and the market price as a marketing loan gain.

FAIR provides for these same marketing loans, called "non-recourse marketing assistance loans." The formula will be similar to the recent past. The corn and wheat loan rates will be not less than 85 percent of the average farm price for the immediately preceding five crop years, excluding the

year in which the average farm price was the highest and excluding the year in which the average farm price was the lowest. In any case, the loan rate cannot be higher than $2.58 per bushel on wheat.

U.S.-International Wheat Situation

Projections for the U.S. wheat market are sketched out in Table 3. Domestic food use continues to increase. Per capita consumption of flour and cereal products has increased in the U.S. from 156 pounds in 1985 to 192 pounds in 1995. This is a remarkable continuation of a trend to increased consumption of cereal products, particularly those derived from wheat. Wheat consumption per capita in the U.S. held very steady for many years before increasing beginning in the early 1970's. This can be attributed to the increased popularity of fast foods such as hamburgers and pizza, and also increased use of dry pasta products.

This consistent upward trend in per capita consumption of cereal products is not likely to continue at this pace in the future. This prospect, plus the fact that the U.S. population growth rate is proceeding at a pace close to or below 1 percent per year, suggests that the domestic market will approach saturation. The long-term growth potential lies abroad where a strong trend in preferences in the developing world is away from rice and toward wheat.

Feeding of wheat is primarily a function of the relationship between wheat and corn prices. The ratio of wheat to corn prices, particularly high in 1995-96, resulted in a decline in feeding of wheat.

The projections to the year 2005 in Table 3 are generated by an econometric model called "AGMOD" developed in the Department of Agricultural Economics at Michigan State University. Following historically low stocks at the end of the 1995-96 crop year, production is expected to outpace domestic utilization and exports through the 1999-2000 crop year, resulting in increased carryover. The ratio of ending stocks to total utilization is a key factor affecting prices. The projected increase in carryover will tend to keep some pressure on prices for the balance of the decade.

However, the impact of the GATT negotiations in fostering trade liberalization will likely contribute to higher prices after the turn of the century.

Table 3

Projections of Variables Related to U.S. Wheat

Item	Unit	Years										
		1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Production	mil. bu.	2183	2285	2527	2539	2554	2523	2521	2547	2610	2663	2704
Utilization for Food	mil. bu.	883	892	910	925	941	958	974	990	1008	1025	1042
Fed to Livestock	mil. bu.	153	314	325	397	476	461	435	429	439	431	429
Exports	mil. bu.	1241	1001	1075	1018	1038	1109	1141	1191	1146	1198	1240
Ending Stocks	mil. bu.	376	444	650	852	941	927	888	815	821	815	792
Ending Stocks/ Utilization	ratio	0.158	0.192	0.270	0.349	0.367	0.352	0.335	0.300	0.304	0.295	0.281
Loan Rate	$/bu.	2.58	2.58	2.58	2.58	2.58	2.58	2.58	2.58	2.58	2.58	2.58
Target Price	$/bu.	4.00	--	--	--	--	--	--	--	--	--	--
Farm Price	$/bu.	4.55	4.30	3.45	3.34	3.23	3.31	3.43	3.63	3.69	3.81	3.97
Gross Margin Over Variable Cost												
Participants*												
Nominal	$/acre	116	117	96	88	83	83	83	90	77	81	86
1982-84 $	$/acre	76	75	60	53	49	48	47	49	41	42	43
Non-participants*												
Nominal	$/acre	107	99	79	68	64	66	70	76	77	81	86
1982-84 $	$/acre	70	63	49	42	38	38	39	42	41	42	43

*Wheat Program.

These projections are based on the assumption of normal weather and no global political strife in this period. It should be noted, however, that the world is particularly vulnerable at this time to weather shocks in the wheat market.

A feature of the current world wheat market is the projected relatively low carryover in the U.S. and abroad (Figure 5). At the end of the 1995-96 crop year, total carryover in the U.S. and abroad was about 20 percent of annual use. This equaled the total world record lows of recent history in 1965 and 1972.

AGMOD projects that U.S. wheat stocks will reach the 30 percent level after 1997-98, but wheat carryover as a percent of utilization will likely remain low and even decline some in the rest of the world. Situations could develop early in the next century in which production shortfalls will result in periods of high price volatility. This will likely bring public and private resources into efforts to increase productivity in grain production.

While, as indicated in Table 3, non-recourse loans are assumed to continue at $2.58 per bushel through 2005, the direct payments feature of FAIR is projected to end in 2002. For this reason, gross margins for participants and non-participants in the Wheat Program are the same in 2003-2005. The USDA's baseline assumes a continuation of the direct payments after 2002 (see Appendix A).

Price Patterns and Relationships

The U.S. average wheat price is a composite of the various classes--hard red winter, hard red spring, soft red, soft white and durum. This price average is dominated by the bread wheats--hard red winter and hard red spring. These classes comprise about two-thirds of the total production. While soft red and soft white classes are used for other purposes, their prices are strongly correlated with the hard wheats. This can be seen in Figure 6 which is a plot of the average farm price in Michigan in 1975-97 versus the U.S. average farm price, strongly influenced by the hard classes.

Figure 5

Ending Stocks of Wheat in the U.S. and the Rest
of the World as a Ratio to Total Use

[Figure 5 omitted]

Figure 6

Prices Received by Farmers for Wheat in Michigan Compared
with U.S. Average Farm Prices for Wheat

[Figure 6 omitted]

Michigan wheat prices are generally about 5 percent below the national average. About 97 percent of the variation in Michigan wheat prices can be "explained" by the U.S. average wheat price. In years in which supplies of soft red and white are tight, Michigan prices will be strong relative to the national average; when supplies of these classes are large, Michigan wheat prices will be depressed relative to the national average.

Prices on soft red and soft white are generally very close, although unusual supply-demand balances will occasionally cause them to depart. In Tables 4 and 5 are compilations of monthly average cash prices on soft red wheat at Chicago and soft white prices at Toledo beginning in 1960. Prices to farmers in Michigan will run below, but parallel to these price series.

Using the raw values, one could determine how often storage would pay between any two months over some specified period of years. A more comprehensive measure of the seasonal price pattern on wheat prices is the index of seasonality at the bottom of the tables. These are basically averages over the 1960-97 period with a base of 100.

The 95.4 for July on soft white wheat at Toledo indicates that July prices average about 5 percent below the crop year average price (Table 5). The peak of 104.5 in January shows prices average nearly 5 percent above the annual average in that month. The standard deviation (STD DEV) indicates how much confidence can be placed in the index. The 6.3 on white wheat in January states that the January price index can be expected to range between 98.2 and 110.8 (i.e., 104.5 ± 6.3) two-thirds of the time.

The message from these two tables is clear. Year in and year out, it doesn't pay to store soft red or white wheat after December or January. Theoretically, the market should provide enough "carry" to pay those who store from one harvest to the beginning of the next harvest. However, this usually has not been the case with soft wheat. A possible reason is that millers want to assure themselves of adequate supplies of quality wheat early in the storage season and forego the advantage of buying cheaper raw product late in the crop year.

Table 4

Seasonality of Cash Soft Red Wheat Prices at Chicago ($/bu.)

	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN
1960	1.85	1.88	1.93	1.97	2.02	2.08	2.15	2.14	2.07	1.93	1.88	1.89
1961	1.94	1.90	1.98	2.01	2.05	2.09	2.06	2.04	2.08	2.13	2.17	2.17
1962	2.15	2.11	2.07	2.05	2.10	2.13	2.13	2.11	2.11	2.16	2.13	1.96
1963	1.84	1.83	1.97	2.15	2.17	2.20	2.24	2.21	2.03	2.12	2.03	1.53
1964	1.43	1.46	1.49	1.52	1.55	1.52	1.53	1.53	1.51	1.49	1.46	1.44
1965	1.48	1.55	1.58	1.59	1.66	1.69	1.71	1.71	1.63	1.64	1.66	1.79
1966	1.90	1.90	1.86	1.72	1.76	1.80	1.71	1.70	1.80	1.73	1.67	1.58
1967	1.50	1.49	1.51	1.52	1.45	1.46	1.49	1.51	1.50	1.41	1.38	1.30
1968	1.28	1.22	1.20	1.25	1.32	1.33	1.38	1.36	1.32	1.32	1.33	1.28
1969	1.30	1.27	1.31	1.36	1.41	1.48	1.49	1.55	1.53	1.55	1.48	1.41
1970	1.43	1.52	1.67	1.74	1.77	1.74	1.75	1.74	1.70	1.67	1.61	1.64
1971	1.54	1.45	1.45	1.53	1.60	1.71	1.69	1.61	1.62	1.66	1.63	1.46
1972	1.53	1.76	2.02	2.11	2.28	2.60	2.65	2.47	2.37	2.45	2.71	2.82
1973	3.08	4.75	5.11	4.75	5.47	5.84	6.30	6.50	5.59	4.33	3.48	3.91
1974	4.40	4.34	4.41	5.03	4.98	4.60	4.02	3.84	3.62	3.63	3.25	3.03
1975	3.42	3.82	4.06	3.84	3.49	3.32	3.45	3.78	3.66	3.34	3.30	3.47
1976	3.37	3.01	2.89	2.72	2.60	2.66	2.73	2.74	2.63	2.53	2.35	2.29
1977	2.20	2.08	2.20	2.27	2.59	2.65	2.69	2.64	2.82	3.11	3.14	3.19
1978	3.22	3.32	3.42	3.51	3.68	3.68	3.73	3.88	3.79	3.60	3.86	4.36
1979	4.39	4.23	4.28	4.30	4.13	4.26	4.36	4.39	4.18	3.96	4.04	3.96
1980	4.17	4.21	4.38	4.70	4.92	4.54	4.57	4.34	4.15	4.18	3.80	3.60
1981	3.70	3.70	3.87	3.97	4.08	3.86	3.77	3.57	3.59	3.70	3.43	3.31
1982	3.36	3.35	3.18	2.98	3.33	3.23	3.32	3.40	3.36	3.51	3.55	3.53
1983	3.59	3.71	3.62	3.56	3.42	3.55	3.47	3.34	3.57	3.65	3.65	3.51
1984	3.44	3.49	3.47	3.51	3.62	3.49	3.51	3.55	3.55	3.63	3.34	3.27
1985	3.09	2.87	2.83	3.04	3.33	3.46	3.34	3.37	3.40	3.39	3.25	2.52
1986	2.58	2.44	2.36	2.57	2.73	2.76	2.87	2.91	3.11	3.16	3.08	2.63
1987	2.54	2.61	2.77	2.82	2.80	3.00	3.23	3.23	2.94	3.02	3.13	3.56
1988	3.52	3.61	3.84	4.07	4.09	4.25	4.39	4.30	4.31	4.04	4.07	3.87
1989	3.92	3.94	3.93	4.07	4.07	4.03	4.03	3.92	3.61	3.83	3.71	3.26
1990	3.04	2.83	2.62	2.62	2.53	2.52	2.50	2.53	2.76	2.80	2.83	2.86
1991	2.79	2.97	3.24	3.50	3.57	3.79	4.12	4.15	3.71	3.53	3.68	3.60
1992	3.39	3.09	3.24	3.39	3.60	3.59	3.77	3.67	3.58	3.72	3.19	2.82
1993	3.03	3.12	3.22	3.02	3.29	3.53	3.67	3.48	3.28	3.19	3.15	3.20
1994	3.14	3.37	3.75	3.83	3.63	3.76	3.68	3.55	3.39	3.40	3.56	3.91
1995	4.41	4.28	4.53	4.72	4.85	5.04	4.92	5.10	4.99	5.65	5.57	4.88
1996	4.62	4.49	4.33	3.96	3.57	3.54	3.47	3.29	3.49	3.77	3.57	3.38
1997	3.30	3.52	3.49	3.51	3.44	3.34						

INDEX OF SEASONALITY

	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN
INDEX	95.1	96.0	98.3	99.8	101.9	103.3	104.2	103.3	101.1	100.8	98.3	95.0
STD DEV	6.6	6.4	6.4	6.0	5.9	5.6	6.3	6.8	5.8	7.6	8.2	7.4
TREND	0.1	0.0	0.0	0.0	-0.1	-0.1	0.0	-0.1	0.0	0.1	0.1	0.1

Table 5

Seasonality of Cash Soft White Wheat Prices at Toledo ($/bu.)

		JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN
1960	1.77	1.85	1.90	1.98	1.96	1.99	2.03	2.01	1.98	1.82	1.79	1.82	
1961	1.87	1.90	1.91	1.93	2.01	2.04	2.02	1.99	2.02	2.07	2.13	2.11	
1962	2.10	2.06	2.03	2.03	2.08	2.12	2.08	2.09	2.06	2.11	2.07	2.02	
1963	1.78	1.77	1.91	2.08	2.10	2.16	2.20	2.18	2.03	2.13	1.99	1.46	
1964	1.41	1.41	1.43	1.44	1.45	1.46	1.45	1.45	1.47	1.44	1.43	1.41	
1965	1.44	1.53	1.57	1.59	1.65	1.69	1.74	1.73	1.59	1.61	1.63	1.78	
1966	1.85	1.87	1.82	1.68	1.71	1.75	1.65	1.64	1.72	1.64	1.60	1.53	
1967	1.45	1.41	1.40	1.41	1.39	1.44	1.42	1.43	1.42	1.37	1.36	1.27	
1968	1.23	1.13	1.12	1.19	1.29	1.31	1.33	1.31	1.29	1.28	1.30	1.27	
1969	1.25	1.24	1.28	1.31	1.40	1.47	1.48	1.53	1.51	1.56	1.48	1.41	
1970	1.45	1.51	1.64	1.69	1.73	1.72	1.70	1.69	1.59	1.55	1.51	1.57	
1971	1.49	1.44	1.46	1.53	1.58	1.61	1.61	1.54	1.57	1.63	1.68	1.51	
1972	1.49	1.72	1.97	2.07	2.30	2.64	2.65	2.46	2.38	2.44	2.58	2.66	
1973	3.10	4.76	5.14	4.71	5.22	5.50	6.18	6.53	5.60	3.91	3.27	3.75	
1974	4.24	4.22	4.22	4.78	4.63	4.44	3.85	3.67	3.44	3.37	2.95	2.85	
1975	3.21	3.62	3.78	3.60	3.28	3.23	3.32	3.59	3.52	3.22	3.14	3.35	
1976	3.24	2.94	2.89	2.71	2.57	2.64	2.70	2.69	2.54	2.45	2.29	2.21	
1977	2.16	2.04	2.06	2.18	2.52	2.56	2.62	2.56	2.77	3.07	3.03	3.10	
1978	3.26	3.45	3.63	3.69	3.87	3.77	3.72	3.63	3.44	3.35	3.53	4.08	
1979	4.31	4.15	4.17	4.12	4.20	4.18	4.10	4.14	3.90	3.63	3.74	3.71	
1980	4.05	4.15	4.31	4.68	4.88	4.44	4.49	4.21	3.87	3.87	3.62	3.43	
1981	3.62	3.77	3.91	3.99	4.10	3.82	3.68	3.49	3.47	3.61	3.45	3.35	
1982	3.49	3.42	3.22	2.92	3.22	3.29	3.25	3.39	3.43	3.49	3.48	3.42	
1983	3.51	3.71	3.56	3.42	3.36	3.46	3.43	3.25	3.50	3.62	3.49	3.35	
1984	3.37	3.42	3.42	3.41	3.51	3.41	3.50	3.53	3.48	3.48	3.18	3.13	
1985	3.02	2.89	2.89	3.12	3.30	3.41	3.26	3.26	3.31	2.89	2.93	2.50	
1986	2.52	2.48	2.29	2.54	2.69	2.73	2.80	2.84	2.87	2.79	2.89	2.63	
1987	2.57	2.69	2.81	2.88	2.95	3.14	3.28	3.27	2.96	3.02	3.09	3.62	
1988	3.61	3.69	3.87	3.94	3.95	4.11	4.22	4.02	4.06	3.80	3.91	3.81	
1989	3.82	3.83	3.79	3.91	3.93	4.01	3.86	3.74	3.70	3.72	3.44	3.21	
1990	2.96	2.69	2.48	2.39	2.28	2.38	2.37	2.40	2.61	2.67	2.68	2.69	
1991	2.62	2.86	3.09	3.32	3.41	3.73	4.07	4.15	4.09	3.44	3.43	3.37	
1992	3.11	2.86	3.02	3.12	3.30	3.26	3.43	3.34	3.09	3.13	2.95	2.61	
1993	2.83	2.91	2.94	3.10	3.30	3.51	3.67	3.56	3.24	3.16	3.09	3.11	
1994	3.02	3.13	3.42	3.61	3.43	3.67	3.59	3.45	3.24	3.33	3.44	3.77	
1995	4.22	3.96	4.17	4.58	4.62	4.79	4.68	4.80	4.64	5.44	5.44	4.62	
1996	4.44	4.22	3.98	3.40	3.20	3.69	3.58	3.32	3.55	3.81	3.60	3.19	
1997	3.17	3.40	3.37	3.31	3.20	3.14							

INDEX OF SEASONALITY

	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN
INDEX	95.4	96.7	98.3	99.8	102.2	104.3	104.5	103.3	100.9	99.4	97.3	94.9
STD DEV	6.7	6.9	6.7	6.6	6.6	5.1	6.3	7.5	6.7	7.9	8.7	7.4
TREND	0.1	0.0	-0.1	0.0	-0.1	0.0	0.0	0.0	0.0	0.1	0.1	0.1

Forward Pricing Alternatives and Use of "Basis"

The most important tool for marketing decisions on field crops is a comprehensive record of past cash and futures prices. By knowing the past patterns for the level of and relationship between cash and futures prices, farmers, elevator operators and others can increase profits and reduce risk. Attached in Appendix B is a set of tables on: (1) current cash prices on white wheat at the Saginaw, Michigan terminal; (2) forward cash contract prices on white wheat for delivery at harvest at Saginaw; (3) September and December futures prices on the Chicago Board of Trade (CBT); (4) "basis" relative to the difference between current cash prices and December futures from July to December (current cash price minus December futures); and (5) "basis" relative to the difference between the forward cash contract prices for delivery at harvest at Saginaw and September futures.

The tables provide weekly data beginning with the 1982 crop year. The cash and futures prices quoted are mid week, either Wednesday or Thursday. In the most recent period, quotes relate to the closing futures on Wednesdays and the cash prices offered farmers early on Thursday, based on Wednesday's futures close. This provides the means to calculate "basis," the cash price less the relevant futures price. At the end of the market day, elevators use the futures close to establish their paying price to farmers the next morning. Particularly in a volatile market, paying prices to farmers may change during the day, but opening cash prices relative to the closing futures of the previous day provides the best estimate of basis.

The tables on new crop cash contracts and September basis (Tables B1 and B3) begin with January, while September futures (Table B2) begin in October of the preceding year. The harvest contract price from the beginning of the harvest month to the expiration of the relevant nearby futures contract is identical to the current cash price. Each futures contract expires on the third week of the applicable month.

The year designation at the head of each column of the tables on current cash prices, current crop year futures and current crop year bases (Tables B4, B5 and B6) refers to the year of harvest.
These tables begin with the first week of the month of harvest, that is July, on white wheat. Weeks are numbered sequentially and the month label is placed centrally.

The basis tables follow the format for futures. The basis data end with the third week of the delivery month. Basis data provide guidelines on how to interpret forward cash contracts relative to futures at harvest in a historical context. A strengthening basis means that the difference between cash and futures is narrowing. The negative numbers are getting smaller. A weakening basis means that the difference between cash and futures prices is widening and the negative numbers are getting larger.

New Crop Contract Basis

The new crop contract basis is the difference between forward contract prices for harvest delivery and the futures price closest to and following harvest, in this case, September (Table B3). By reviewing what this basis has been in the past, particularly the past five years or so, farmers and grain merchandisers can evaluate the forward contract basis available currently. If the basis is strong (small negative numbers or even positive numbers) and is likely to weaken, forward contracts, or forward contracting in combination with buying calls, should be considered. Guidelines for forward pricing decisions are provided in Figure 7.

Conversely, if basis is weak relative to recent years and is expected to strengthen, appropriate action would be to hedge, enter hedge-to-arrive or minimum price hedge-to-arrive contracts, buy puts or wait to forward price. The appropriate forward pricing alternative depends on which direction futures prices are expected to take and how much price risk the individual is willing and able to handle (Figure 7).

Figure 7

Pricing Decision Chart for Cash Product Sellers

[Figure 7 omitted]

Storage Basis

Interpreting the table on storage basis is a bit more complex (Table B6). Storage costs must be factored in. Given the current basis, a farmer or grain merchandiser has to evaluate how much that basis will strengthen in the future. Will the change be enough to cover storage costs (facility, quality maintenance, foregone interest).

If the current basis relative to the pattern of recent years indicates favorable prospects for profitable storage, then hedging, hedge-to-arrive and minimum price hedge-to-arrive contracts, and buying put options would be appropriate. Risk takers might wait to price or use delayed pricing if they expect futures to increase. Conversely, if basis is not likely to strengthen enough to cover storage costs, farmers should consider cash sales, forward contracts, or minimum price contracts. Risk takers expecting rising futures prices could enter basis contracts, or sell cash and buy futures or calls (Figure 7).

The key to effective hedging is that basis risk is small relative to futures risk. However, since white wheat is not deliverable at the Chicago Board of Trade, basis is more variable on this commodity than on soft red wheat and more care needs to be taken in forward pricing decisions.

Basis does vary from year-to-year. This is due to changing local supply-demand conditions. Each year requires special treatment and assistance from those knowledgeable about the market. Decision makers need to understand the alternative forward pricing tools and the unique market circumstances each year.

Evaluation of Basis Patterns on Wheat in Michigan

By inspection of new crop contract basis at Saginaw in Table B3, the pattern has been fairly consistent in recent years, although some variations are notable. From January to July in 1990-94, new crop basis normally was about -$.25 to -$.35 per bushel at Saginaw relative to September wheat futures at the CBT. In a couple of years (1991 and 1993), basis strengthened noticeably at harvest when the

crop size and quality were better known. Since April of 1995, however, the new crop basis has been much weaker at around -$.45 to -$.50 per bushel. Even so, the basis was fairly consistent at this weaker level.

Storage basis patterns, on the other hand, have lacked consistency. Prior to the 1995 crop year, as shown in Table B6, harvest prices at Saginaw were typically $.25 to $.40 per bushel under December futures. This would be regarded as a relatively strong basis considering that basis near delivery in early December was usually $.15 to $.30 under futures. This reflects the desire of millers and exporters to lock up supplies early in the season. Storage basis was weak at harvest on the 1995 crop and particularly the 1996 crop when quality was a severe problem.

The storage basis for the 1992-97 crop years is plotted in Figure 8. Notice the wide dispersion of storage basis through December. To profit from a storage hedge, a farmer would have to see basis strengthening in this period at a rate which exceeds storage costs. Even to cover foregone interest on the stored crop (say, $4.00 wheat at 8 percent interest), a strengthening of basis by about $.15 per bushel between July and December would be required. The storage basis pattern pictured in Figure 8 would have provided very little opportunity for profit and would have resulted in losses in most years.

On corn and soybeans, storage basis patterns are just the opposite of wheat. Storage basis is quite variable at harvest and then strengthens to a fairly predictable level as delivery time approaches. Possibly a contributor to the dispersed basis pattern on wheat is that storage runs into the peak of corn and soybean harvests when elevators need to allocate space to those crops. Large corn and soybean crops would tend to weaken wheat basis.

Basis patterns do differ within the state. Proximity to millers and to the Chicago and Toledo terminal areas will strengthen basis and provide more consistency. However, even at Toledo, storage basis patterns are not conducive to hedging. This can be seen in Figure 9 which relates monthly average white wheat prices to December futures for the 1992-97 crops.

Figure 8

Basis Patterns on White Wheat Prices at Saginaw, MI,
Relative to December Wheat Futures at the CBT*

[Figure 8 omitted]

Figure 9

Basis Patterns on White Wheat Prices at Toledo, OH,
Relative to December Wheat Futures at the CBT

[Figure 9 omitted]

As mentioned earlier, part of the problem is that white wheat is not deliverable against the CBT wheat contact. Also, the production of white wheat in the Midwest and East is relatively small compared to soft red, and variations in supplies tend to be greater than on soft red. As a result, white wheat prices, while tied to soft red, do exhibit substantial departures. This is evident in Figure 10 which charts the difference between monthly prices on soft white wheat at Toledo relative to soft red. From July 1980 to December 1997, white wheat prices averaged $.08 per bushel below soft red. The discount averaged about $.05 in July to November and $.10 in December to June. At the extremes, white wheat prices ranged from about $.30 per bushel above to $.30-.40 below soft red.

Even though soft red wheat is deliverable at the CBT, storage basis patterns at Toledo present similar problems to those of white wheat. As shown in Figure 11, basis was somewhat erratic from July to December for 1992-97 crops. The dispersion was particularly noticeable in the mid fall at the peak of soybean and corn harvest. Basis did converge as the delivery period approached in December, but still with a range of -$.30 to -$.05 per bushel.

Some Implications to Farmers

Basis patterns relative to forward contracting and hedging for delivery at harvest are reasonably consistent and suitable for forward pricing. However, care must be taken in terms of how futures are used in the storage period. Most farmers should plan to sell wheat at harvest unless basis is abnormally weak, which seldom is the case.

Farmers who believe that futures prices are abnormally low at harvest (while the storage basis is average or strong) and can handle the risk of being wrong, might best sell the cash crop and buy the equivalent in, say, December futures. The opportunities for profit would be greater or risk of loss less in holding futures than holding the cash product.

Of course, if wheat prices are low relative to the government loan rate, storage under a government loan would be warranted. Each year is somewhat unique and must be evaluated separately from the past. Even so, basis records can be quite useful in forward pricing decisions.

Figure 10

Difference Between Prices on White and Red Wheat at Toledo, OH,
by Months, July 1980 to December 1997*

[Figure 10 omitted]

Figure 11

Basis Patterns on Red Wheat Prices at Toledo, OH,
Relative to December Wheat Futures at the CBT

[Figure 11 omitted]

APPENDIX A

Following are excerpts from a report from the World Agricultural Outlook Board of the USDA, Staff Report WAOB-97-1, February 1997.

AGRICULTURAL BASELINE PROJECTIONS TO 2005 REFLECTING THE 1996 FARM ACT

Interagency Agricultural Projections Committee

Introduction

This report provides long-run baseline projections for the agricultural sector through 2005 that incorporate provisions of the Federal Agricultural Improvement and Reform Act of 1996 (1996 Farm Act). The baseline assumes that the new farm legislation remains in effect through 2005. Projections cover agricultural commodities, agricultural trade, and aggregate indicators of the sector, such as farm income and food prices.

The projections are a conditional scenario with no shocks and are based on specific assumptions regarding the macroeconomy, the weather, and international developments. The projections are not intended to be a Departmental forecast of what the future will be, but instead a description of what would be expected to happen under the 1996 Farm Act, with very specific external circumstances. Thus, the baseline provides a point of departure for discussion of alternative farm sector outcomes that could result under different assumptions.

The projections in this report were prepared in October through December 1996, in conjunction with the fiscal 1998 President's budget analysis. Projections reflect a composite of model results and judgmental analysis. Normal weather is assumed. The baseline reflects major agricultural policy decisions made through mid November 1996 and includes short-term projections from the November 1996 *World Agricultural Supply and Demand Estimates* report.

Wheat

For most of the baseline period, demand growth for wheat outstrips yield growth and additional land is brought into production. Beginning in 1998, increasing prices draw more land into wheat. However, the large amount of land enrolled in the CRP from areas that have traditionally been planted to wheat limits the response of planted acreage to rising wheat prices. Nonetheless, wheat plantings rise to 79 million acres by 2005.

Declining prices in 1996-97, combined with the late corn and soybean harvests, result in reduced wheat planted acres in 1997-98. Beginning in 1998-99, strong global import demand and larger U.S. exports result in tightening U.S. supplies and rising prices, pulling in additional U.S. and foreign acreage. Competition from foreign exporters remains keen throughout the baseline.

Wheat prices increase at a faster rate than for other crops, in part because of slower yield growth for wheat than for most other crops. Planting flexibility under the 1996 Farm Act will allow wheat areas to continue to shift to higher yielding feed grains and soybeans in regions where these crops are viable. Initially, increased wheat areas will likely come from regions where there are few alternatives. By 2000, when wheat prices begin to exceed $4.00 per bushel, land that had shifted to other crops will begin to move back to wheat.

Domestic use of wheat grows through the baseline. Increases in food use of 15 million bushels a year imply increasing per capita food use of wheat, but at a slowing rate. Feed and residual use declines after 1997, stays low until 2002 and then declines further as wheat prices rise compared with other feeds.

U.S. wheat exports will rebound from the low 1996-97 level as global imports expand. Also, reduced competition from the EU, which faces limits on the amount of subsidized wheat it can export, increases marketing opportunities for the U.S. through 2000. By 2001, however, global prices are projected to rise high enough that the EU will be able to export wheat without subsidies. This, together with tight supplies and strengthening prices, will lead to slow growth in U.S. exports in the latter years of the baseline.

Production flexibility contract payments decline through the baseline. Producer returns over variable costs will depend increasingly on market prices which will be rising. Despite the drop in contract payments, strong prices, especially after 2000, will result in net returns for program participants rising more than a third between 1997-98 and 2005-06, reaching $124 per acre by 2005.

Wheat Baseline

Item	1994-95	1995-96	1996-97	1997-98	1998-99	1999-2000	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06
Program variables:												
ARP (%)	0	0	--	--	--	--	--	--	--	--	--	--
Participation (%)	87.0	84.8	99	99	99	99	99	99	99	99	99	99
Acreage (mil. acres):												
Idled ARP acres	0.0	0.0	--	--	--	--	--	--	--	--	--	--
0/85-92 acres	5.2	6.1	--	--	--	--	--	--	--	--	--	--
CRP acres:												
Cropping history[1]	--	11.7	11.6	11.5	10.7	12.0	12.7	12.8	12.9	12.9	12.9	12.9
PFC acreage reduction[2]	--	10.3	10.1	10.1	6.9	6.9	6.7	6.7	6.7	6.6	6.6	6.6
Total planted acres	70.3	69.1	75.6	72.0	73.0	73.5	74.5	75.5	76.5	77.0	78.0	79.0
Total harvested acres	61.8	60.9	62.9	62.5	63.5	63.9	64.8	65.7	66.6	67.0	67.9	68.7
Yields (bu./acre):												
Yield/harvested acre	37.6	35.8	36.3	37.5	37.7	37.9	38.1	38.4	38.7	39.0	39.3	39.6
Program yield	34.4	34.4	34.8	34.8	34.8	34.8	34.8	34.8	34.8	34.8	34.8	34.8
Supply and use (mil. bu.)												
Beginning stocks	568	507	376	435	490	469	449	415	394	381	349	337
Production	2,321	2,183	2,282	2,345	2,394	2,422	2,469	2,523	2,577	2,613	2,668	2,721
Imports	92	68	70	85	100	115	120	120	115	115	110	110
Supply	2,981	2,757	2,728	2,865	2,984	3,006	3,038	3,058	3,086	3,109	3,127	3,168
Food	853	884	910	925	940	955	970	985	1,000	1,015	1,030	1,045
Seed	89	104	108	100	100	102	103	104	105	105	105	105
Feed and residual	344	152	325	250	200	200	200	200	200	190	180	175
Domestic	1,287	1,140	1,343	1,275	1,240	1,257	1,273	1,289	1,305	1,310	1,315	1,325
Exports	1,188	1,241	950	1,100	1,275	1,300	1,350	1,375	1,400	1,450	1,475	1,500
Total use	2,475	2,381	2,293	2,375	2,515	2,557	2,623	2,664	2,705	2,760	2,790	2,825
Ending stocks	507	376	435	490	469	449	415	394	381	349	337	343
Stocks/use ratio, percent	20.5	15.8	19.0	20.6	18.6	17.6	15.8	14.8	14.1	12.6	12.1	12.1
Prices (dollars/bu.):												
Target price	4.00	4.00	--	--	--	--	--	--	--	--	--	--
Loan rate	2.58	2.58	2.58	2.58	2.58	2.58	2.58	2.58	2.58	2.58	2.58	2.58
Farm price	3.45	4.55	4.30	3.75	3.85	3.95	4.10	4.30	4.40	4.65	4.80	4.80
Deficiency/PFC payment rate	0.61	0.00	0.87	0.63	0.65	0.62	0.57	0.46	0.45	0.45	0.45	0.45
PFC rate, $/PFC acre	--	--	25.85	18.50	19.14	18.49	16.88	13.60	13.18	13.18	13.18	13.18
Deficiency/PFC payments ($ mil.)	1,146	109	1,947	1,386	1,493	1,442	1,320	1,063	1,032	1,032	1,032	1,032
Variable costs of production (dollars):												
Per acre	59.98	65.34	66.89	67.98	69.46	70.74	71.95	73.24	74.58	75.90	77.31	78.78
Per bushel	1.60	1.83	1.84	1.81	1.84	1.87	1.89	1.91	1.93	1.95	1.97	1.99
Returns over variable costs (dollars/acre):												
Market returns	69.74	97.55	89.20	72.65	75.68	78.96	84.26	91.88	95.70	105.45	111.33	111.30
Participant returns	87.58	97.55	115.05	91.14	94.82	97.45	101.14	105.47	108.88	118.63	124.51	124.48

[1]The cropping history allocation represents crops previously grown on CRP acreage, and is used as a general indicator influencing land available for plantings.
[2]The production flexibility contract acreage reduction allocation of the CRP affects the acreage available for production flexibility contracts and, therefore, is used in the determination of PFC payment rates.