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An Economic Analysis of the Potential Returns from an Enhanced Wheat Checkoff Program



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**Report to the National
Wheat Foundation**

AN ECONOMIC ANALYSIS OF THE POTENTIAL RETURNS FROM AN ENHANCED WHEAT CHECKOFF PROGRAM

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AN ECONOMIC ANALYSIS OF THE POTENTIAL RETURNS FROM AN ENHANCED WHEAT CHECKOFF PROGRAM

Executive Summary

Two main questions are addressed in this study: (1) What are the strengths, weaknesses, opportunities, and threats facing the U.S. wheat industry and how might the implementation of an enhanced wheat checkoff program prove helpful in combatting any negative market effects? (2) Would the implementation of an enhanced wheat checkoff program likely benefit wheat producers?

Regarding the first question, the study finds reasons to be optimistic about the future of the U.S. wheat industry. However, the study highlights a number of key negative forces likely to have growing impacts on the future viability and profitability of the industry. The key negative forces identified include:

- low relative growth of wheat productivity;
- low relative returns to wheat production;
- increased market price volatility;
- the complexity of crop insurance as opposed to traditional farm policy tools;
- disruptions of or inaccessibility to transportation systems for wheat producers;
- wheat quality concerns;
- the uninformed consumer regarding GMO, gluten, and other wheat consumption issues;
- growing wheat export competition; and
- uncertain future domestic demand for wheat and the impact of noneconomic demand drivers like health and diet.

Some examples of activities identified that might be funded by an enhanced checkoff program to combat these negative forces include the following:

- research to boost yields, lower the cost of production, develop new wheat varieties that are drought tolerant and disease and pest resistant that meet end-user specifications;
- support for the development of producer decision aids and other producer information and tools to support efficient farm production decisions;
- the organization of a Wheat Transportation Coalition to focus on key issues in wheat transportation;
- research on the safety and nutritional aspects of U.S. wheat and wheat products;
- mass media campaigns directed to consumers, health providers, government agencies, and others based on sound scientific evidence to combat growing gluten- and GMO-related concerns;

- trade servicing in the U.S. and wheat importing countries to demonstrate U.S. productive capacity and reliability as a supplier, advertising in trade periodicals; promotional material for food buyers; and similar activities;
- technical assistance to food manufacturers to expand the type, quality, and number of uses of wheat and wheat products; and
- consumer promotion including media campaigns to promote consumption of wheat-based products; consumer education seminars; baking/cooking seminars for institutional nutritionists, cooks, and food buyers, etc.

The answer to the second question regarding the potential returns to producers from an enhanced wheat checkoff program is approached in a two-step analysis. In the first step, the estimated impacts of an enhanced wheat checkoff program on U.S. wheat sales (domestic, export, and total) over 2012/13 to 2019/20 over five alternative additional checkoff program funding levels are first estimated based on the sales impacts of promotion (promotion elasticities) reported by the most recent studies of 23 checkoff programs. In the second step, we calculate the benefit-cost ratios (BCRs) corresponding to the estimated revenue increases and alternative funding levels. Three sets of BCRs are calculated assuming first that the additional funds are used only to promote domestic sales, then assuming that the funds are used only to promote export sales, and finally assuming that the additional funds are used to simultaneously promote both domestic and export sales. Because two checkoff revenue forecasts were generated (based on FAPRI and USDA forecasts for 2012/13 through 2019/20) for three demand variables (domestic demand, exports, and total demand) with three alternative estimates of checkoff promotion impact (“high,” “low,” and “mean” checkoff program effectiveness) over five alternative levels of additional checkoff expenditures, 90 alternative BCRs are calculated to represent the potential range of BCRs that the wheat industry might realistically expect from the implementation of an enhanced wheat checkoff program.

The estimated domestic demand promotion BCRs based on the FAPRI and USDA forecasts are in the range of \$1.38 - \$36.12 and \$1.41 - \$30.72, respectively. For export demand promotion, the BCR estimates based on those two forecasts are in the range of \$0.36 - \$43.88 and \$0.35 - \$36.66, respectively. For total demand, the BCRs are in the range of \$0.92 - \$39.64 and \$0.93 - \$33.30, respectively. One interpretation of these results is that the range of possible BCRs is too wide to be useful for determining whether or not to move forward with an enhanced wheat checkoff program. Perhaps a better interpretation of these BCR results, however, is that despite the wide disparity in assumed demand promotion effectiveness, potential funding levels, and wheat market forecasts, the BCRs across nearly all assumptions are positive and greater than one. A BCR greater than 1 is taken as an indication that the returns to producers exceed the costs. That is, an enhanced wheat checkoff program is likely to be effective in generating a positive return to producers under most assumptions. The few BCRs estimated to be less than one all result from assuming a “low” level of program effectiveness. Under the assumption of an average or high level of program effectiveness, the estimated BCRs are all much in excess of 1.

Additional conclusions of the analysis include the following:

- The levels of the returns to an enhanced wheat program and of the associated BCRs depend critically on the effectiveness with which the additional funds are invested to enhance demand, the level of the funding increase, and future wheat prices and quantities.
- BCRs and funding levels tend to be inversely related at the same level of promotion effectiveness. That is, as funding grows, revenues grow as well but at a decreasing rate so that BCRs decline as funding increases. That is the principle of diminishing returns.
- A high BCR generally implies that a checkoff program is underfunded. As funding increases, the checkoff investments capture some of the revenues that are unrealized at lower funding levels. In the process, however, the BCR tends to drop.
- The same level of BCR can be generated by many different levels of additional funding depending on the level of program effectiveness at those funding levels. By the same token, different BCRs can be generated for the same level of additional funding depending on the level of program effectiveness at that level of additional funding. At a given level of program effectiveness, however, higher levels of funding generate higher levels of revenues for producers and result in lower BCRs. An increase in program funding along with an increase in program effectiveness can result in higher BCRs.

The study results and conclusions provide the basis for drawing some implications for the establishment, operation, and potential returns of an enhanced wheat checkoff program. The primary implication is that increasing the funds available for wheat checkoff promotion activities is likely to work in the sense that producer returns are likely to be substantially greater than the costs of the program. Other related implications of this study include the following:

- The BCR of additional funds spent under an enhanced wheat checkoff program would likely be high in the early years of the program and then drop over time if the additional funding level increases. However, learning, increased experience, and greater efficiency in investing the additional funds available to promote demand under an enhanced checkoff program of a given size over the early years would likely generate some scale effects that enhance the BCR of the additional funds invested over time even without an increase in the level of the additional funding.
- What the additional checkoff funds are spent on will make a difference for the returns to wheat producers. For example, a large increase in checkoff funds that is squandered or invested in ineffective promotional efforts will likely return less to producers than a smaller increase in funding that is invested in highly effective promotional activities.
- Given the critical nature of how any increase in wheat checkoff funds is allocated among potential promotional activities under an enhanced wheat checkoff program, those charged with managing the allocation of the increased funds would be well-advised to conduct a study of best practices across commodity checkoff groups to determine not only the most impactful type of activities in which to invest but also the most effective mechanisms for managing and investing the additional checkoff funds.

- Setting the initial level of the additional wheat checkoff assessment is important and should probably begin at a modest level. This study demonstrates that the BCR would likely be high for an initial modest increase in wheat checkoff funds which would communicate well to stakeholders and provide the basis for seeking an additional increase in the funding level over time. Also, attempting to manage too many funds early in the life of an enhanced wheat checkoff program could result in waste and inefficiency until those charged with managing the increased funds gain sufficient experience with administering and investing the funds.
- To demonstrate the effectiveness of checkoff promotion activities to stakeholders and to provide guidance for program management, those charged with managing any additional funds generated through an enhanced wheat checkoff program should plan for periodic external evaluations of the program's effectiveness.
- To facilitate such evaluations, an early consideration in the process of implementing an enhanced wheat checkoff program should be the development of a system or process to collect and maintain all data and other information regarding checkoff program activities and expenditures by type of activity, product, and market segment. Failure to develop such a system at the outset could severely limit the ability of researchers to provide useful evaluations of the impact of the increased checkoff funding.
- Care must be taken in communicating the results of this benefit-cost analysis (or any future benefit-cost analyses of an enhanced wheat checkoff program) to stakeholders. Producers can easily identify the line on their balance sheets for the cost to them of the checkoff assessments they pay. But there is no line on their balance sheets for what their contributions to the checkoff program return to them in additional revenues. They often fail to understand that the "returns" to their checkoff contributions are actually included in the revenue line on their balance sheets. This study concludes that, if an enhanced wheat checkoff program is implemented, the revenue line on wheat producers' balance sheets will be supplemented by additional revenues much in excess of the additional contributions of checkoff dollars they make. If such a program is actually implemented, a competent ROI evaluation of the program would be designed specifically to identify that part of the industry revenue stream that has been generated by the additional checkoff dollars rather than by any other market event or force. Then, when compared to the actual costs of the program, the "returns" that producers realize often becomes more apparent. For example, the most recent study of the soybean checkoff program (Williams, Capps, and Lee, 2104) concludes that about 5% of soybean farm cash receipts are generated by the checkoff program.
- Finally, a common mistake made by checkoff groups is to represent a checkoff program to stakeholders as the panacea to their financial problems in an effort to gain support for the establishment or enhancement of such a program. In fact, checkoff programs are only one of many forces that affect markets, including relative price changes, weather, agricultural policies, changes in incomes, population growth, competition for consumer sales from competing suppliers and products, consumer health concerns, demographic trends, and so on. When producers fail to see the large impact on their returns that they have been led to expect, they tend to become disenchanted with the program and how it is being managed. Consequently, beginning in the early stages of discussion of an enhanced wheat checkoff

program, the actual potential of the program should be emphasized to avoid unrealistic expectations if the program becomes reality. Studies like this one should be useful in that process. Also helpful would be to consistently characterize an enhanced wheat checkoff program (before and after implementation) as an effective tool for producers to work collectively to help reduce downside pressure on prices and profits in bad years and contribute to higher prices and profits in good years rather than as a panacea to all the financial problems they face. A subsequent ROI study after some period of program implementation that shows positive returns would serve to reinforce support for the program.

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AN ECONOMIC ANALYSIS OF THE POTENTIAL RETURNS FROM AN ENHANCED WHEAT CHECKOFF PROGRAM

Primarily cooperative efforts by groups of suppliers of generic agricultural products intended to enhance their individual and collective profitability, commodity checkoff programs have been around since at least the mid-1950s. The earliest check-off programs were voluntary, cooperative state-level efforts among farmers and/or processors to finance the promotion of generic agricultural commodities. Among the oldest of the still existing agricultural check-off programs are those for dairy, Florida citrus, and soybeans. Operating primarily under state authority and lacking legislative authority to compel producers to participate, these programs were plagued by the problem of free riders which motivated the supporters of many such groups to pressure state and later federal legislators to provide them with legislative authority for mandatory check-offs.

Today virtually every agricultural commodity has one or more state and/or federally authorized organizations dedicated to promoting the economic welfare of its producers funded through some form of checkoff assessment on sales by producers and often others in the marketing chain. The term “checkoff” refers to the collection of a fee and comes from the concept of checking off the appropriate box on a form, like a tax return, to authorize a contribution for a specific purpose, such as the public financing of election campaigns, or, as in this case, the financing of programs to enhance producer welfare.

The number of federal checkoff programs has increased substantially over the last two decades and now operate for 22 commodities, including beef, blueberries, Christmas trees, cotton, dairy products, eggs, fluid milk, Hass avocados, honey, lamb, mangos, mushrooms, paper and paper based packaging, peanuts, popcorn, pork, potatoes, processed raspberries, softwood lumber, sorghum, soybeans, and watermelons. In addition, state and federal marketing orders for a wide variety of commodities, primarily fruits, vegetables, and nuts, are authorized to conduct promotion and research programs. Other checkoff organizations operate under state authority. Also, a few organizations of commodity producers and/or processors, like the Sugar Association, operate generic promotion programs independent of any state or federal authority.

The funds collected by checkoff groups are used primarily to expand demand (both domestic and foreign) through generic advertising efforts, the development of new uses of the associated commodities, and other promotional activities. Although some checkoff programs also fund research intended to reduce production costs and/or enhance yields, the share of their total budgets spent on research is generally much smaller than the share spent on demand promotion activities.

The primary motivations for collective action by producers to promote their commodities include the high cost of advertising and the loss of program benefits to free riders. Advertising is a costly enterprise and the level of expenditures on advertising needed to move consumer demand for a given product is well out of the reach of individual producers. Also, given that the commodities produced by any one producer of a generic commodity are virtually identical to those of any other producer, the additional market demand generated by the advertising of a generic commodity by any specific producer could be filled by any other producer who has not shared in the cost of the advertising. Such producers get a “free-ride” in terms of increased sales from the promotional efforts by other individuals or small groups of producers. This is the classic “free-rider problem” in which everyone shares in the benefits but only some pay the costs (Ward 2006). Commodity checkoff programs were designed to deal with these two problems – minimizing the effect of free-riders and creating sufficient resources to pay for expensive advertising. Removing potential free-riders and creating a pool of funds earmarked for generic advertising messages is precisely the intent behind the national legislation for supporting commodity checkoff programs and is an important objective of many federal and state marketing orders. Commodity checkoff authority granted through the federal enabling legislation provides the vehicle for compelling all producers to pay the checkoff assessment as a means of funding generic advertising programs and the authority to limit or deny refunds.

Obviously, without generic advertising programs, some amount of the respective commodities would still be sold. So, for example, even if the Cotton Board stopped informing us that cotton is the “fabric of life”, a good deal of cotton textile products would still be bought and sold on the market. What, then, motivates the establishment of checkoff programs? Primarily, the pressure to establish a checkoff program is the result of a perception among producers that market forces alone are not maximizing the demand and sales potential of their industry. Producers may perceive downward pressure on the industry that needs to be counteracted, structural problems in the industry such as growing concentration of processing, growing imports, or international competition from foreign producers. If the perception of the need to supplement industry profits beyond what the market has done is strong enough, producers of generic products may see value in collectively promoting their products through checkoff programs. The success of the few early programs in terms of measured returns on investment has spurred growing interest over the years in checkoff programs as an alternative means of bolstering the profitability of generic commodity industries.

Like those of the soybean industry prior to the establishment of the federally mandated soybean checkoff program in 1992, wheat checkoff programs currently operate at the state-level under state legislative authority. Many have recently increased their assessment rates. Also like the early state-level soybean checkoff programs, the state-level wheat checkoff programs face challenges of free-riders and potential overlap of activities.

The objective of this study is to provide an economic assessment of the need for and potential returns from an enhanced wheat checkoff program. First, the major forces affecting the U.S.

wheat industry are examined. The analysis highlights the potential advantages and disadvantages of implementing an enhanced wheat checkoff program. Then, the potential returns from such a program are examined. The analysis considers the potential returns to an enhanced wheat checkoff program over two alternative nine year forecast periods of 2012/13-2019/20 based on the most recent FAPRI and the USDA wheat market forecasts. The study concludes with a summary of the major conclusions and implications for an enhanced wheat checkoff program.

Analysis of the Major Forces Affecting the U.S. Wheat Industry

This section identifies major trends in U.S. and world wheat production and consumption. The major forces underlying these trends are analyzed to identify strengths, weaknesses, opportunities, and threats facing U.S. wheat producers and the U.S. wheat industry. Overall, supplies of wheat are adequate and demand is strong (Figure 1). U.S. hard red winter wheat yields were disappointing in 2014 but increased production elsewhere contributed to another world record wheat crop (Figure 2). Demand for wheat continues to grow. Even in the face of a record corn crop, feed use is up and total consumption is at a new record high. World wheat ending stocks, as measured by days on hand at the end of the marketing year, are estimated at a 98-day supply of wheat, up from the 10-year average of a 95-day supply but still below the 20-year average of 105 days (Figure 3).

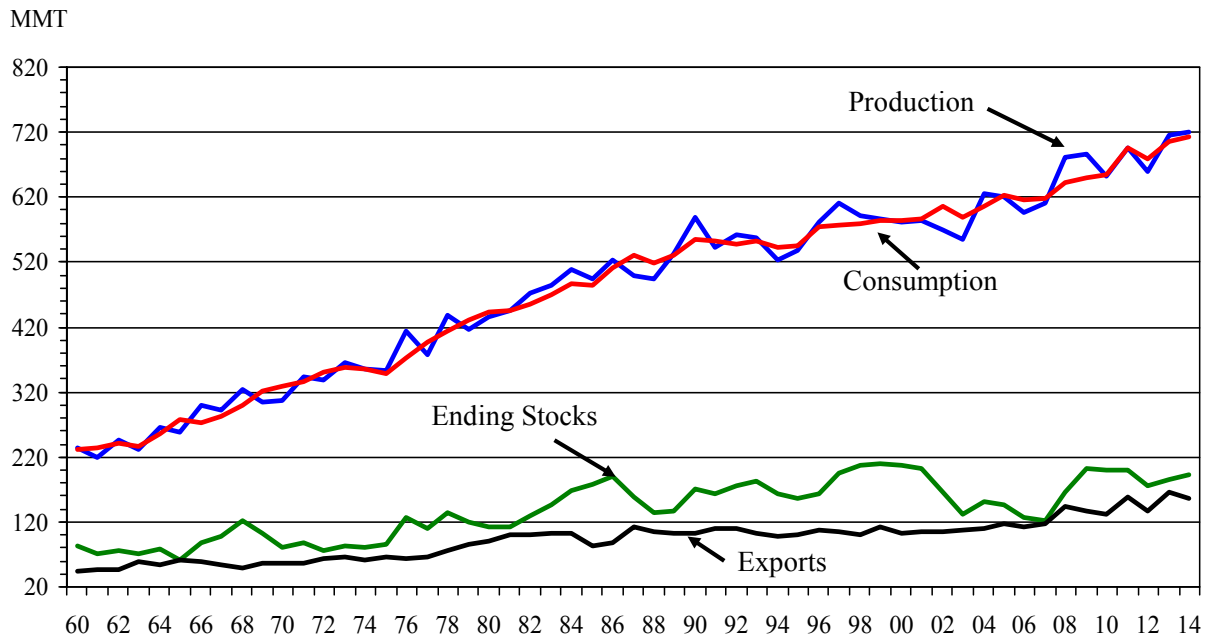
In the U.S., wheat struggles to be competitive with corn and soybeans, crops with stronger growth patterns in yields and higher net returns in the biofuel era (2007 and forward) (Figures 4 and 5). Studies show that the cost of wheat production is higher in the U.S. than for our major export competitors, supporting an emphasis on quality characteristics for competitive advantage.

U.S. farm policy has been revised but remains an important safety net for wheat producers. Transportation has become a major issue in the grain trade with competition for trucks and rail space from the oil industry. Exchange rate risk can have an important impact on the price competitiveness of wheat as the global wheat trade surges to record levels. Consumer and producer attitudes towards genetically modified wheat and concerns related to wheat gluten impact both production prospects and demand.

U.S. Wheat Industry Strengths

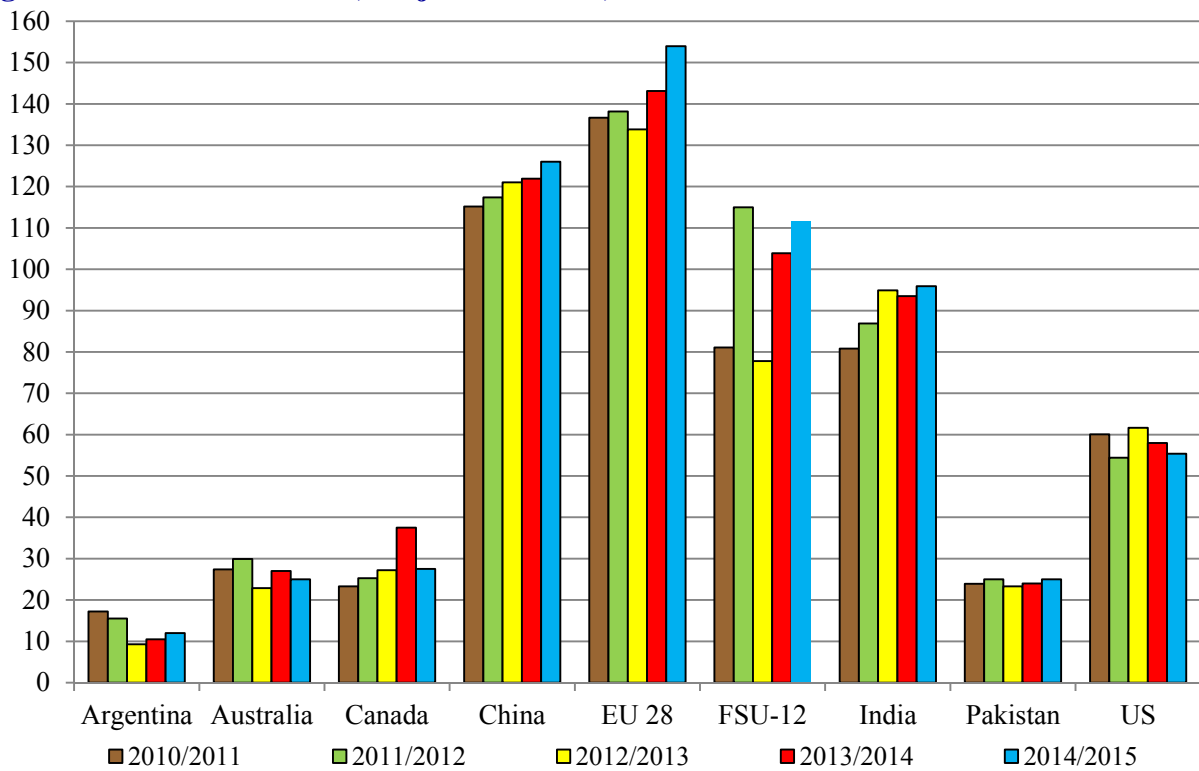
The primary strengths of the U.S. wheat industry as it interfaces with the world wheat market include a positive demand outlook, improvements in U.S. wheat quality, the reliability of the U.S. wheat industry as a supplier of wheat to world markets, a relatively high price of wheat received by producers, a relatively stable cost of wheat as an input to the production of flour and other wheat products, and the U.S. farm policy safety net under the current farm bill (Table 1).

Figure 1: World Wheat Production, Exports, Consumption, and Ending Stocks, 1960-2014



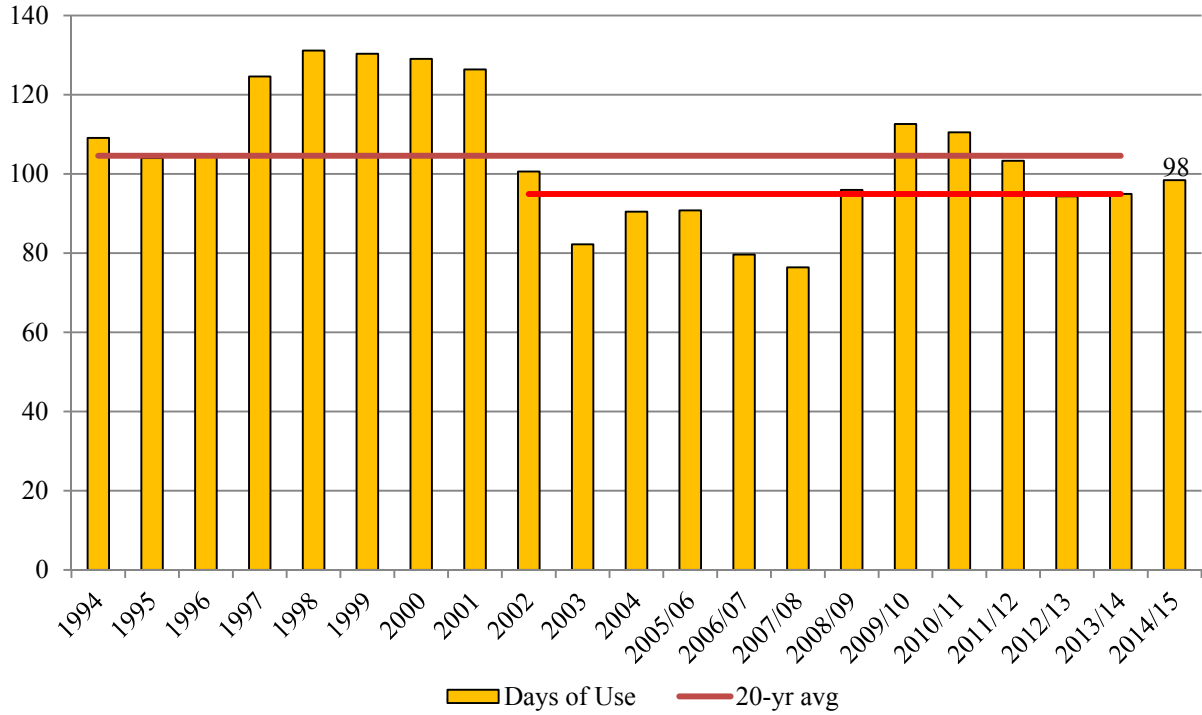
Source: USDA, World Agricultural Supply and Demand Estimates, 10/10/2014

Figure 2: Wheat Production, Major Countries, 2010/11-2014/15



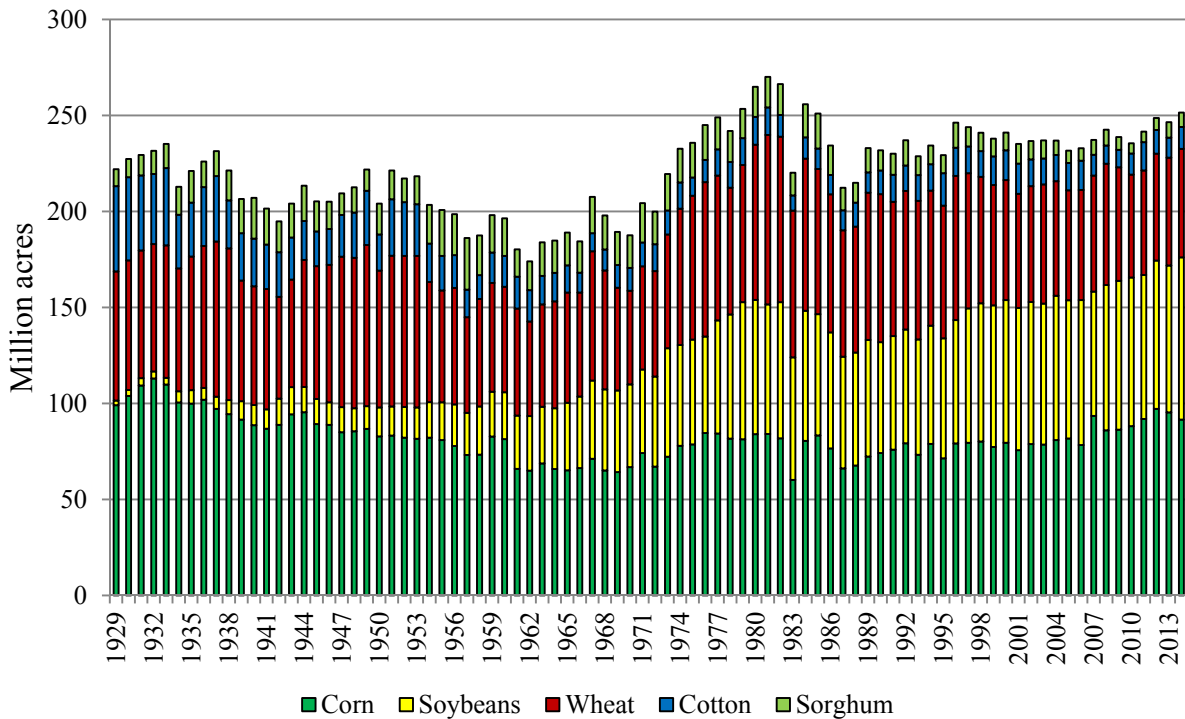
Source: USDA, Foreign Agricultural Service, 10/10/2014

Figure 3: World Wheat: Days of Use on Hand, 1994-2014/15



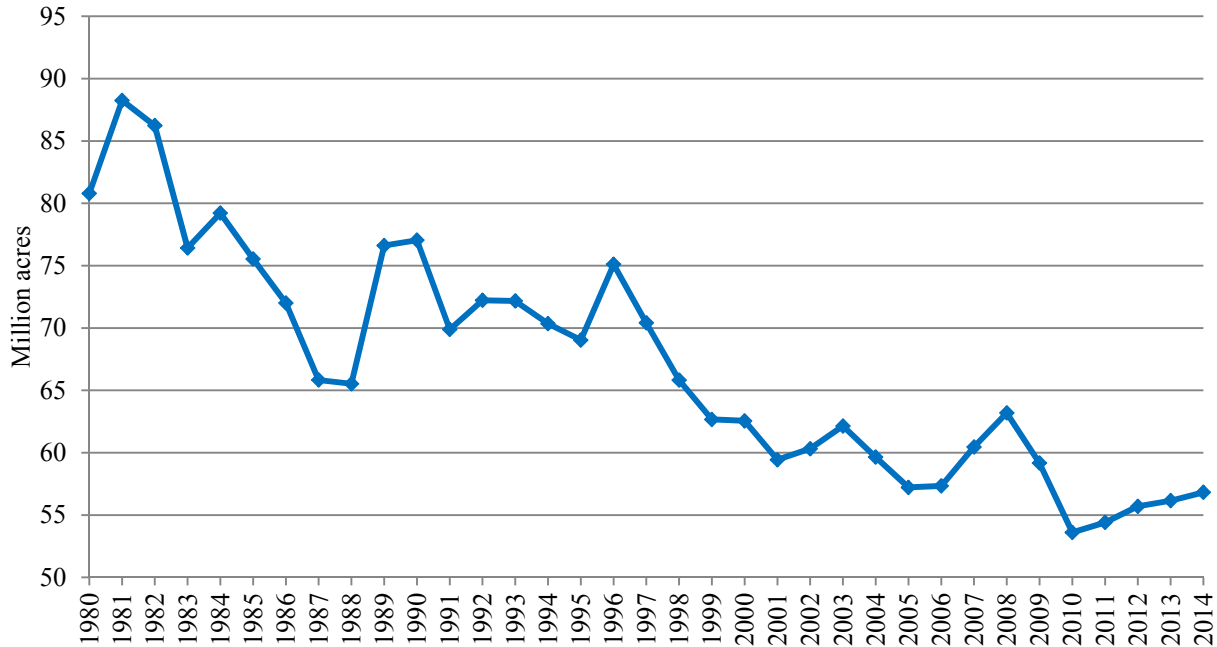
Source: USDA, World Agricultural Supply and Demand Estimates, 10/10/2014

Figure 4: U.S. Planted Acres, Selected Crops, 1929-2014



Source: USDA, 6/30/2014

Figure 5: U.S. Wheat Planted Acres, 1980-2014



Source: USDA, National Agricultural Statistics Service

Table 1: Potential Strengths, Weaknesses, Opportunities, and Threats Facing the U.S. Wheat Industry

STRENGTHS		WEAKNESSES	
<ul style="list-style-type: none"> • Positive Wheat Demand Outlook • Improvements in U.S. Wheat Quality • The Reliability of the U.S. as a Wheat Supplier • Relatively High U.S. Farm Price of Wheat • Relatively Stable Cost of Wheat as an Input • The U.S. Farm Policy Safety Net 	<ul style="list-style-type: none"> • Cost of Production Disadvantage • Slow Relative Growth of Wheat Yields • Low Relative Returns to Wheat • Wheat Transportation Issues 		
OPPORTUNITIES		THREATS	
<ul style="list-style-type: none"> • The Sustainability Movement • The Advent of Trait-Specific Varieties • The Potential of Biotech Wheat • The Opportunity of Managed Market Volatility 	<ul style="list-style-type: none"> • Growing Export Competition • Growing Strength of the U.S. Dollar • The Prediction of Climate Change • Opposition to Genetically Modified organisms (GMOs) • The Anti-Gluten Movement 		

Positive Wheat Demand Outlook

The current growth in world population continues to put pressure on world agricultural productivity in the face of limited arable land and water resources. The world population surpassed 7 billion in 2013 and is increasing by over 70 million annually, +1.1% per year (USDA ERSa, 2014) (Figure 6). UNICEF estimates that by the end of this century, the population of Africa will grow from about 1.2 billion today to 4 billion (UNICEF, 2014). Over that period of time, Nigeria, one of the most important customers for U.S. wheat, will increase from the present 178 million inhabitants to over 1 billion inhabitants.

In addition to the demand driven from an increasing population base, the world is consuming more grain per person. Since 2003, world per capita grain use (barley, corn, millet, mixed grains, oats, rice, rye, sorghum, soybeans, and wheat) has increased from 333 kg per person per year (734 pounds) to 378 kg (832 pounds), an increase of 13% or 1.13% per year over the last 11 years (USDA FAS, 2014) (Figure 7). The trendline of growth experienced a downturn with the drought in the U.S. in 2012 and record high corn and soybean prices but has since resumed its previous path. Although the fastest growth in per capita grain consumption has come from corn and soybeans, wheat and rice, the primary food grains, have experienced increases of 5% and 6%, respectively, over the last 10 years (Figure 8).

The surge in world per capita grain consumption coincides with global economic growth patterns since 2003 (IMF, 2014) (Figure 9). Since that time, increasing economic growth has been driven by developing nations such as Brazil, China, India, Indonesia, and Russia. Growth in these countries, whose people strive for better living conditions and better diets, and which account for over 40% of the world population, is double the annual growth rate in the advanced economies such as Australia, France, Germany, Japan, the United Kingdom, and the United States. To feed a global population expected to reach 9 billion people in 2050, crop production will roughly have to double from present levels (Foley, 2014).

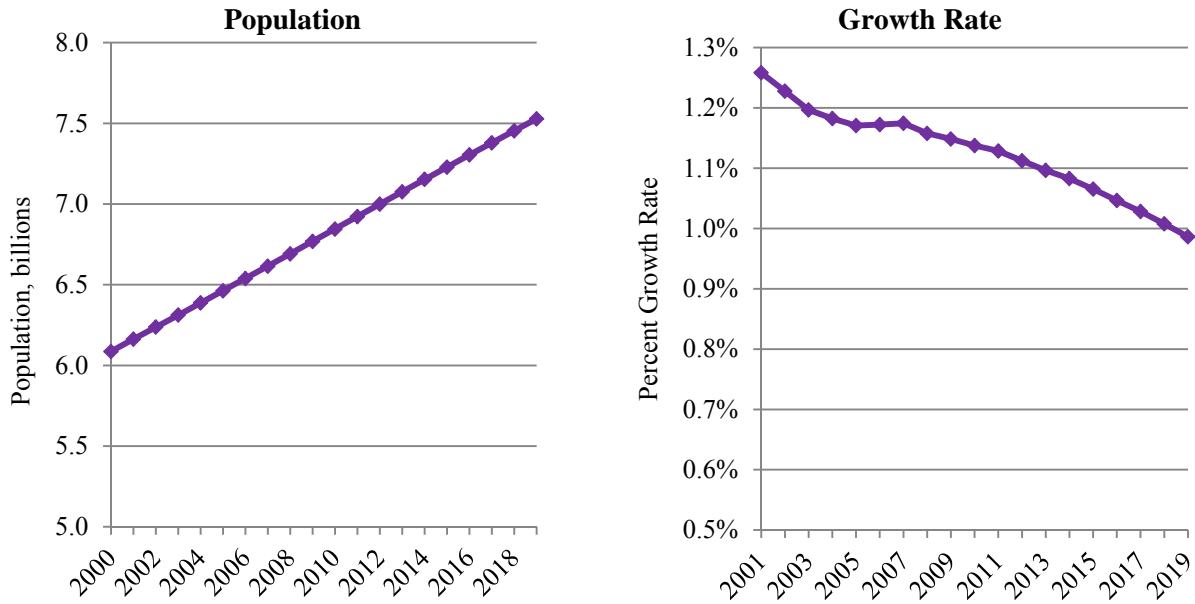
Improvements in Wheat Quality

The competitive environment for grain exports continues to grow. As noted in a special Congressional report in 1989, *Enhancing the Quality of U.S. Grain for International Trade*:

In the 1970s, one-third of the world supplied grain to two-thirds of the world's people. Today, the reverse is true: two-thirds of the world supplies grain to the other third. This competitive environment has made foreign buyers increasingly sensitive about the quality of grain they receive (U.S. Congress, p. 3).

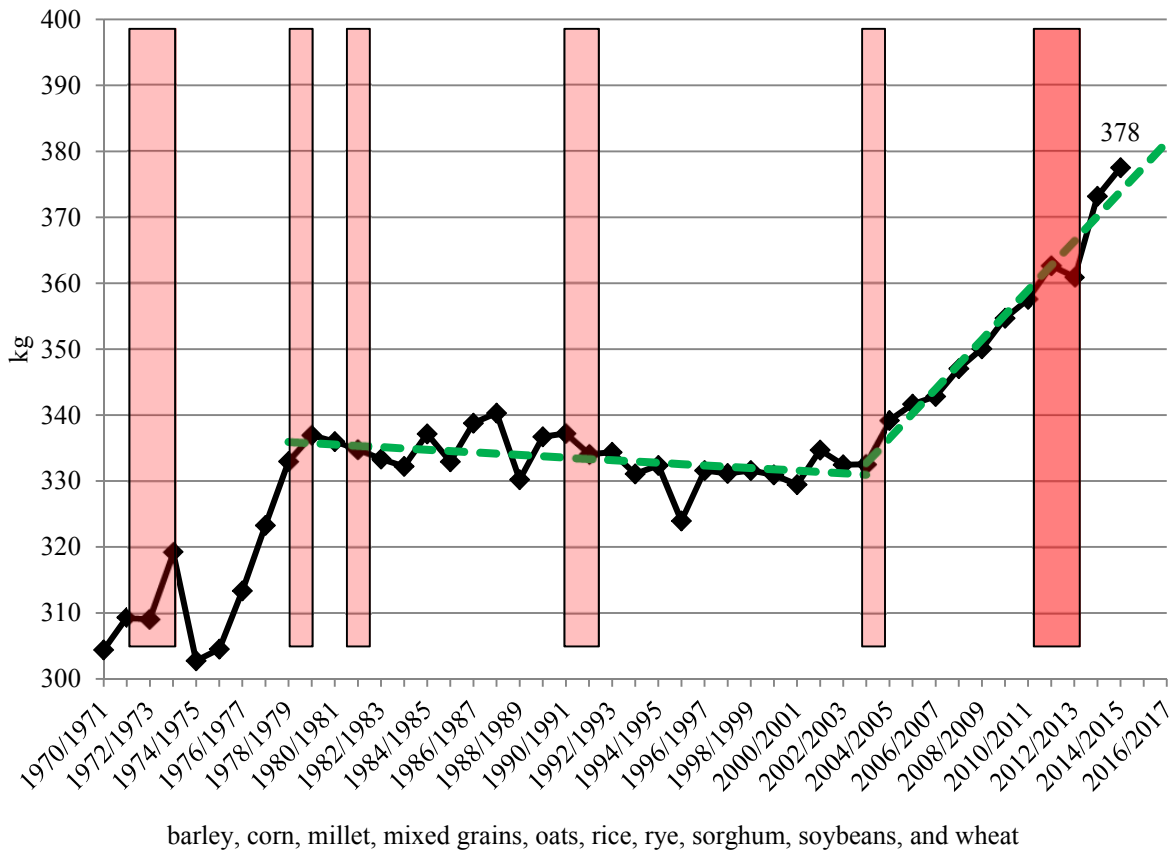
In the last 20 years, global wheat trade has increased from 100 million metric tons (mmt) to over 160 mmt, a 50% increase (USDA FAS, October 2014) (Figure 10). To compete in this

Figure 6: World Population Trends, 2000-2019



Source: USDA, Economic Research Service Macroeconomic Data Set

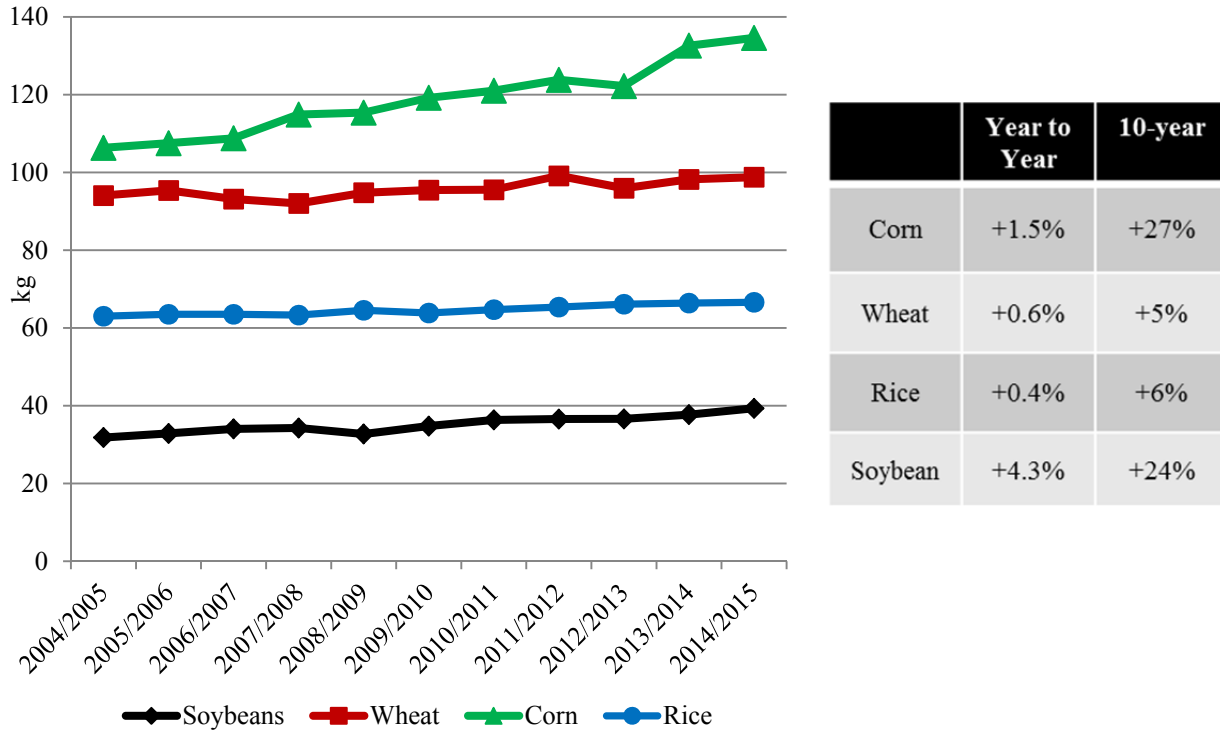
Figure 7: World Per Capita Grain Use, 1970/71-2016/17



barley, corn, millet, mixed grains, oats, rice, rye, sorghum, soybeans, and wheat

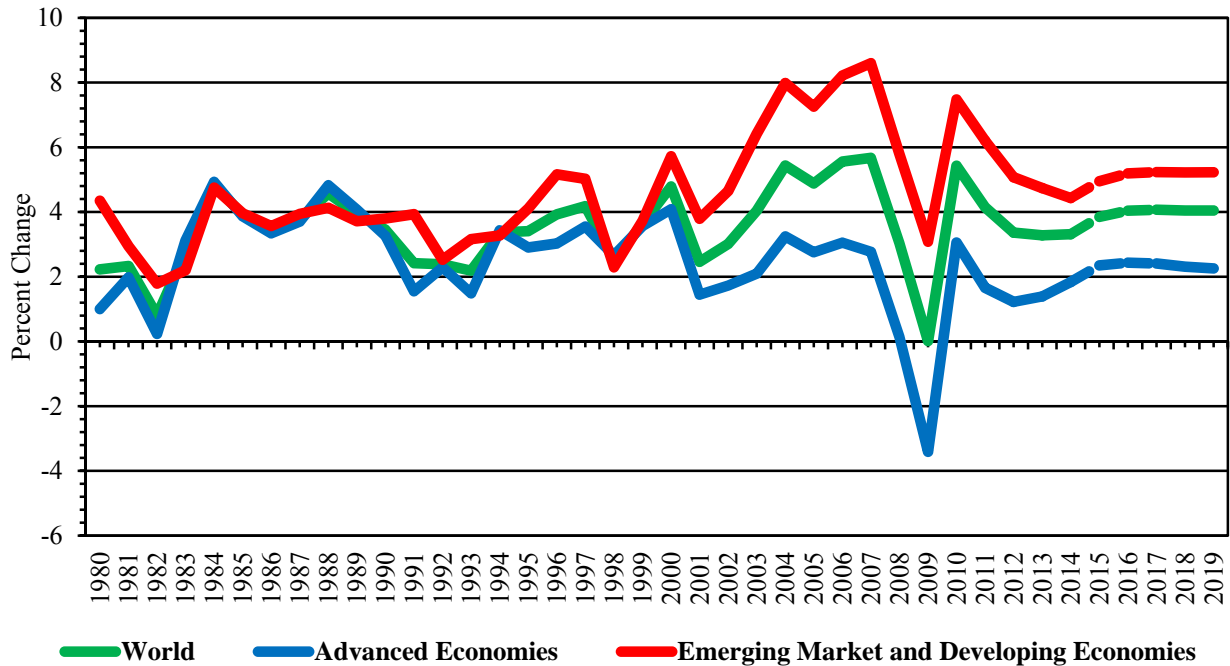
Source: USDA, Production, Supply, and Distribution (PSD) Online Database, 10/13/2014

Figure 8: World Per Capita Consumption, 2004/05-2014/15



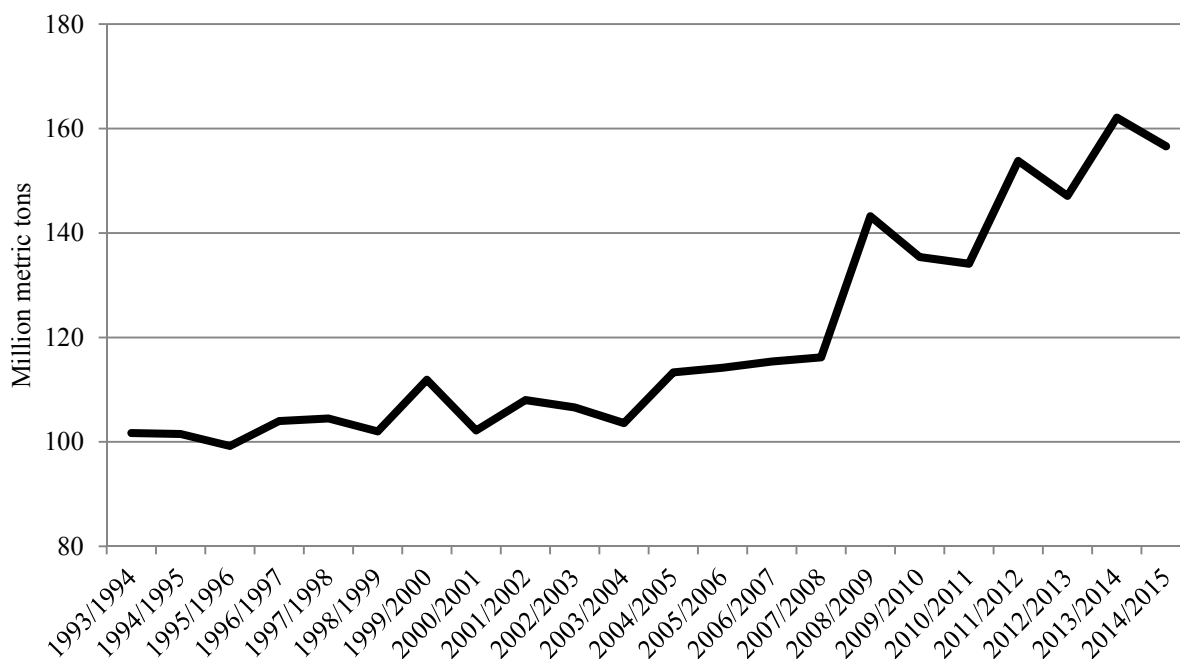
Source: USDA, World Agricultural Supply and Demand Estimates, Updated 10/10/2014

Figure 9: Global Economic Growth, 1980-2019



Source: World Economic Outlook, 10/2014: <http://www.imf.org>

Figure 10: World Wheat Exports, 1993/94-2014/15



Source: USDA, Foreign Agricultural Service, 10/10/2014

environment, the U.S. must, as noted in the 1989 report, “become more quality-conscious and develop a reputation as a high-quality supplier”. That has been the case. According to the export wheat quality survey, total defects and dockage of Hard Red Spring Wheat have fallen from 3.7% to 2.4% since 1986 (USDA, FGIS, 1986 and GIPSA, 2013). The same quality measurements for Hard Red Winter Wheat show a decline from 4.25% to 3.1% (Figure 11).

The Reliability of the U.S. as a Wheat Supplier

U.S. wheat production has changed relatively little over the last 50 years, increasing from 1.4 billion bushels in 1960 to 2.0 billion bushels in 2014 (in the range of a low of 1.1 billion bushels in 1961 to a high of 2.8 billion bushels in 1981) (USDA FAS, 2014). Meanwhile foreign wheat production tripled from 7.2 billion bushels to 24.2 billion bushels. Over that same time period, the U.S. share of world wheat production fell from 16% to 8% (Figure 12).

Relative to other major competitors in the world wheat export trade, however, the U.S. is considered a more reliable supplier of wheat. Since 1960, average wheat yields in the European Union and the nations of the former Soviet Union (FSU-12) have dipped 10% or more below trendline yields 9 times and 13 times, respectively, (USDA FAS, 2014) (Figure 13). In contrast, average wheat yields in the U.S. have been 10% below trend only 3 times since 1960 (1974, 1989, and 2002).

Figure 11: Export Wheat Quality, 1985-86, 2004-06, 2011-13

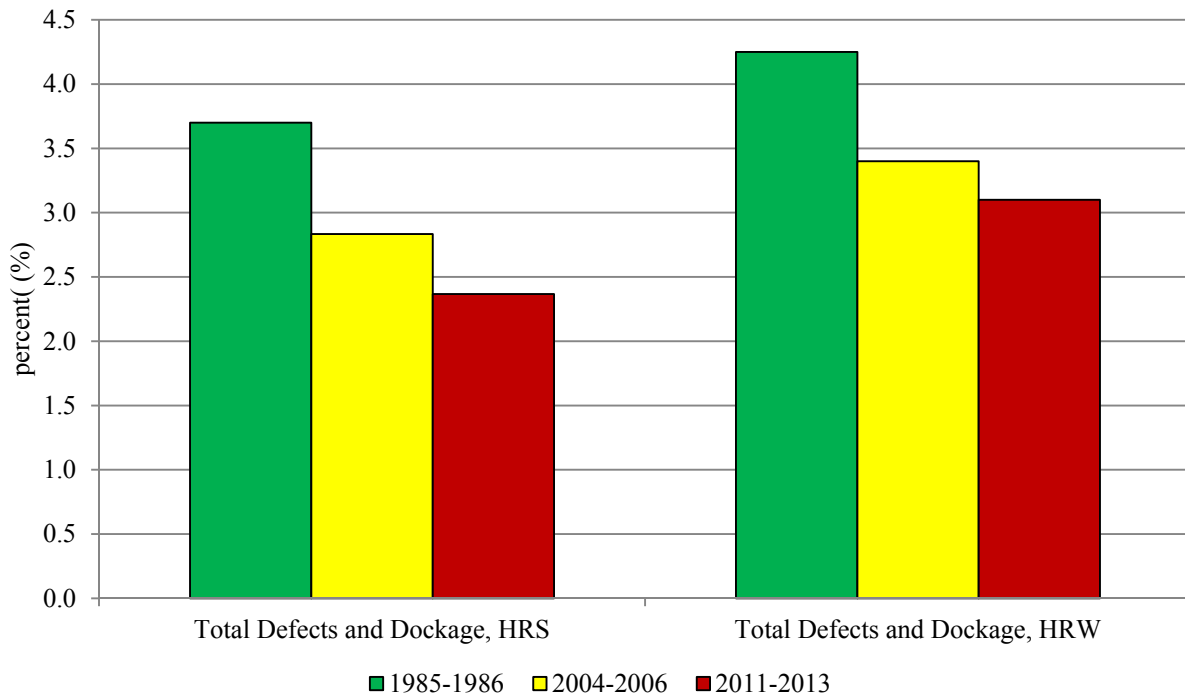
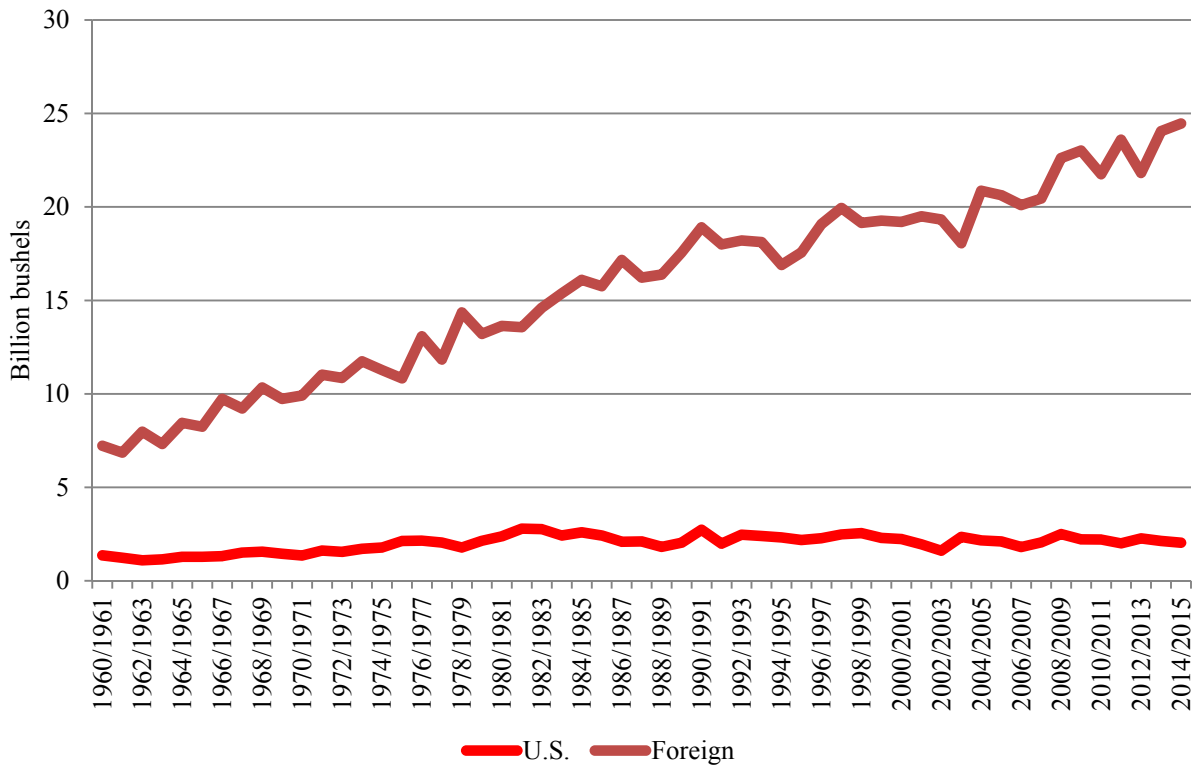
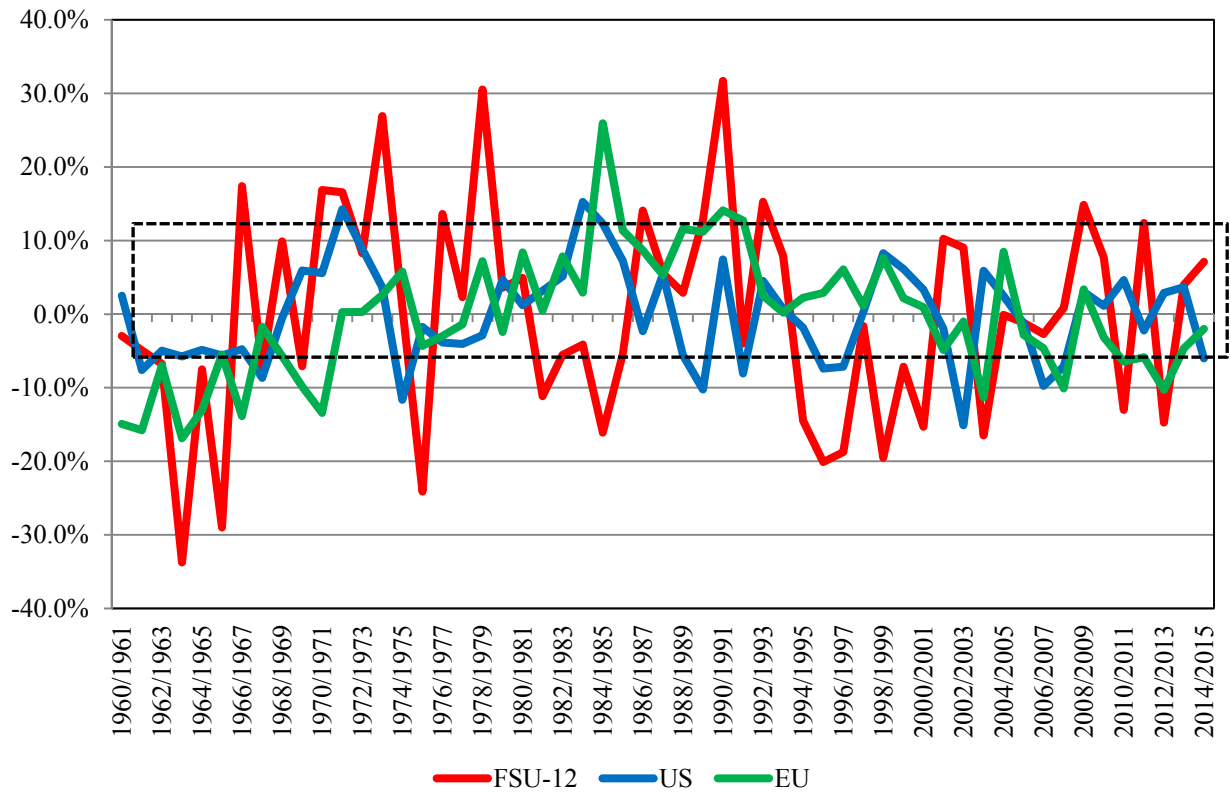


Figure 12: World Wheat Production, 1960/61-2014/15



Source: USDA, World Agricultural Supply and Demand Estimates, 10/10/2014

Figure 13: US, FSU-12, and EU Wheat Yield Deviations from Trendline, 1960/61-2014/15



Number of times below -10%: 13 3 9
 Source: USDA, Production, Supply, and Distribution (PSD) Online Database, 10/14/2014

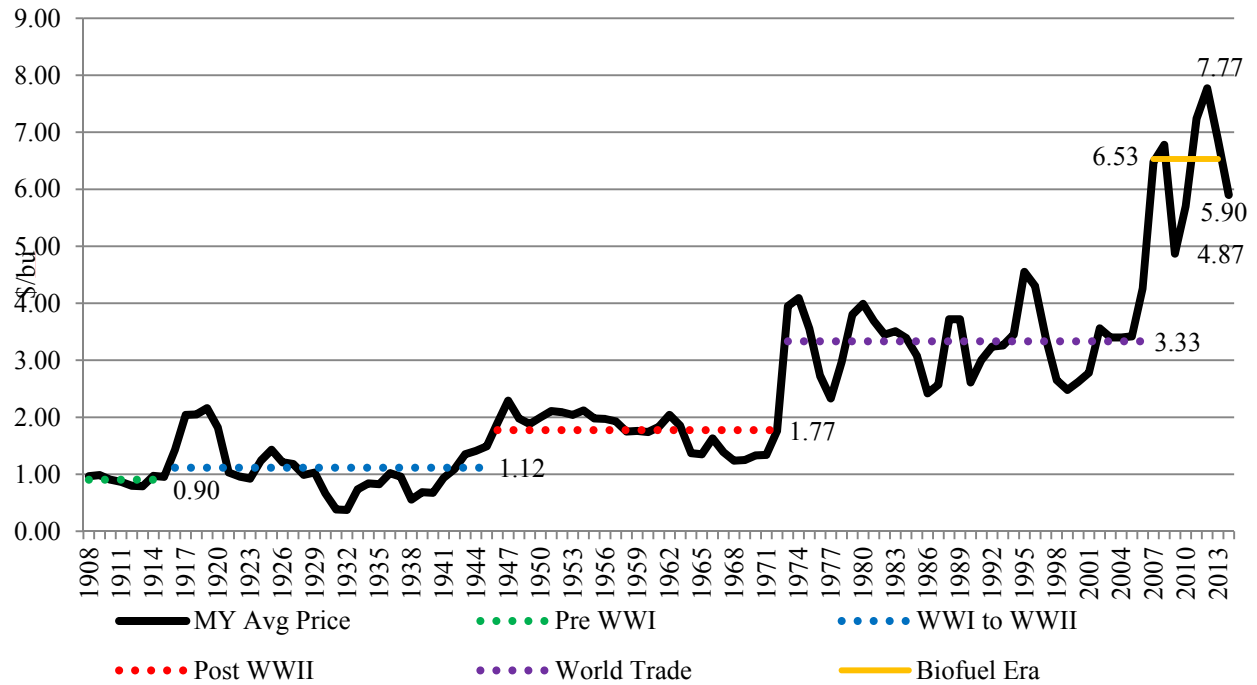
Relatively High U.S. Farm Price of Wheat

Even though wheat prices in 2014 are below that of the last two years, the overall price level in the biofuel era (2007 to present) is much improved relative to recent history (Figure 14). The average cash price paid to farmers in the U.S. (the season average farm price) was \$3.33 per bushel from 1973 to 2006 (USDA OCE, 2014). Since 2007, the average cash price received is \$6.53, almost double the previous average. Even with the recent decline in prices, the estimated season average farm price for the 2014/15 marketing year is \$5.90 per bushel, 77% higher than the previous average.

Relatively Stable Cost of Wheat as a Wheat Product Input

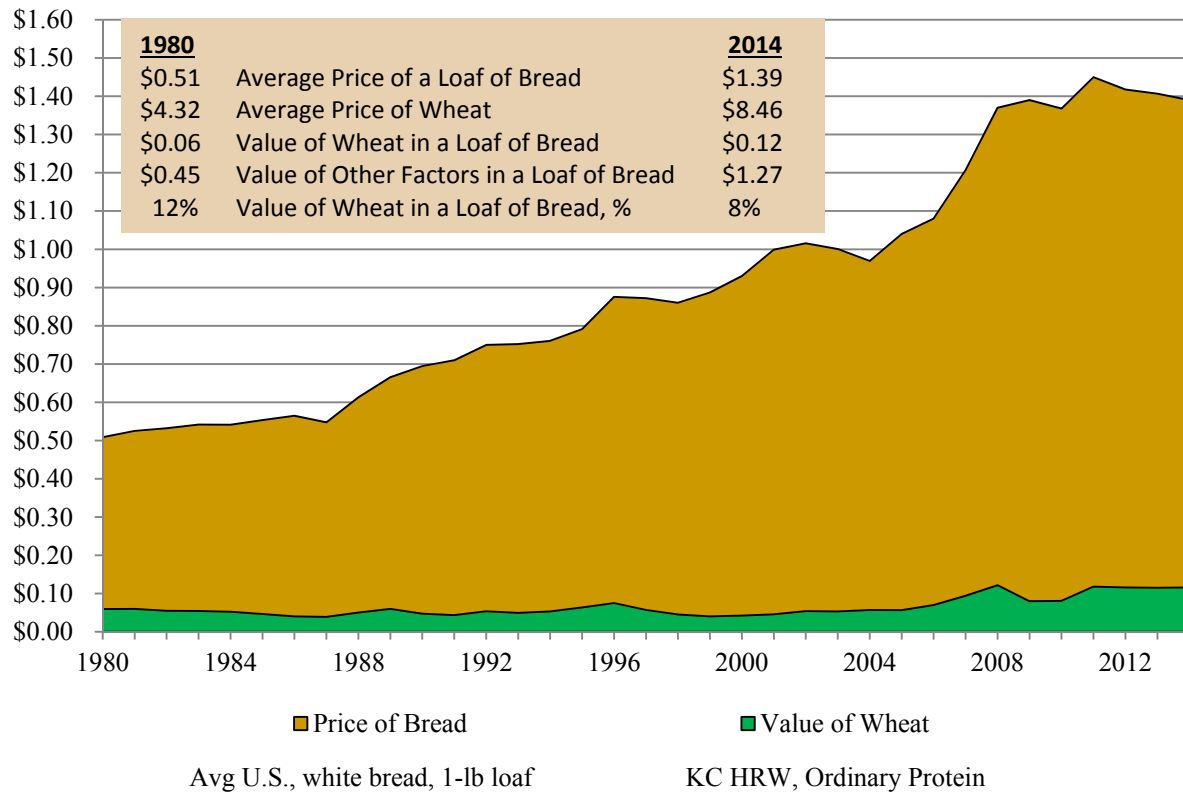
Even in an era of record high and volatile commodity prices, the value of wheat in a loaf of bread has been relatively stable (Figure 15). In 1980, the average price of a one pound loaf of white bread in the U.S. was \$0.51 (Economagic, 2014). With the price of wheat at \$4.32 per bushel, the value of wheat in a loaf of bread was \$0.0592 or about 12% of the value of the loaf of bread

Figure 14: Marketing Year Average Wheat Prices, 1908-2014



Source: USDA, World Agricultural Supply and Demand Estimates, 10/10/2014

Figure 15: Value of Wheat in a Loaf of Bread, 1980-2014



(USDA ERSd, 2014). In 2008, the price of bread had increased to \$1.39 and the average price of wheat to an all-time high at \$8.89. The value of wheat in that loaf of bread was \$0.1217, 9% of the value of bread. Relative to the value of the loaf, the contribution of wheat went down, not up. In 2014, with the price of bread at \$1.39 and wheat at \$8.30, the value of wheat is \$0.1138 or only 8% of the value of the loaf of bread.

The U.S. Farm Policy Safety Net

The Agricultural Act of 2014 (the new Farm Bill) eliminates the familiar commodity support programs of the 2008 bill including direct payments, counter-cyclical payments, and ACRE. In their place, producers must choose between two new commodity programs, Price Loss Coverage (PLC) or Agricultural Risk Coverage (ARC).

PLC is similar to the counter-cyclical payment program that pays on base acres if the national marketing year average price falls below the target price. In the language of the new farm bill, the old target price is called the reference price. The reference price for wheat in the 2014 farm bill is \$5.50 per bushel.

ARC is more similar to the ACRE program. It pays on base acres if actual revenue falls below a guaranteed level of revenue. This benchmark is based on a five-year Olympic average (high and low values excluded) of county yields and national marketing year average prices. During the debate on the current farm bill, ARC was referred to as a program protecting against shallow losses and PLC as a program to protect against deep losses (Outlaw, 2014).

Another factor which will impact the PLC versus ARC decision is that only PLC participants will be able to add the Supplemental Coverage Option (SCO) to their crop insurance coverage. SCO is a new crop insurance product that provides county level coverage for insured losses (yield or revenue depending on the underlying insurance product purchased) from 86% down to the coverage level of the underlying policy.

Producer expectations with regard to both yield and price over the next 5 years will be important considerations in farmer choice of program as will the relative importance of the Supplemental Coverage Option, available only under PLC. While details of these programs are still being finalized and sign-up is not yet underway, preliminary analysis suggests that the SCO program will be of significant benefit to crop producers in high risk production areas, a condition facing many U.S. wheat producers. SCO will make affordable levels of insurance coverage for high risk wheat producers similar to those enjoyed by relatively low risk corn and soybean producers.

U.S. Wheat Industry Weaknesses

The major weaknesses for the U.S. wheat industry include a cost of production disadvantage, slow relative growth of wheat yields, low relative returns to wheat production, and wheat transportation issues.

Cost of Production Disadvantage

Many U.S. wheat producers have a cost of production disadvantage relative to producers in export competing countries (Figure 16). A recent study shows that in 2011 wheat farmers in Kansas had a higher per acre cost of production than farmers in Europe, FSU-12, Australia, Argentina, or Canada (Zimmer, 2012). In periods of high prices (high demand or low supply), production is still sustainable in a region with a high cost structure. In the long run, where value is more determined by the cost of production, however, producers with a lower cost structure have a definite advantage.

Slow Relative Growth of Wheat Yields

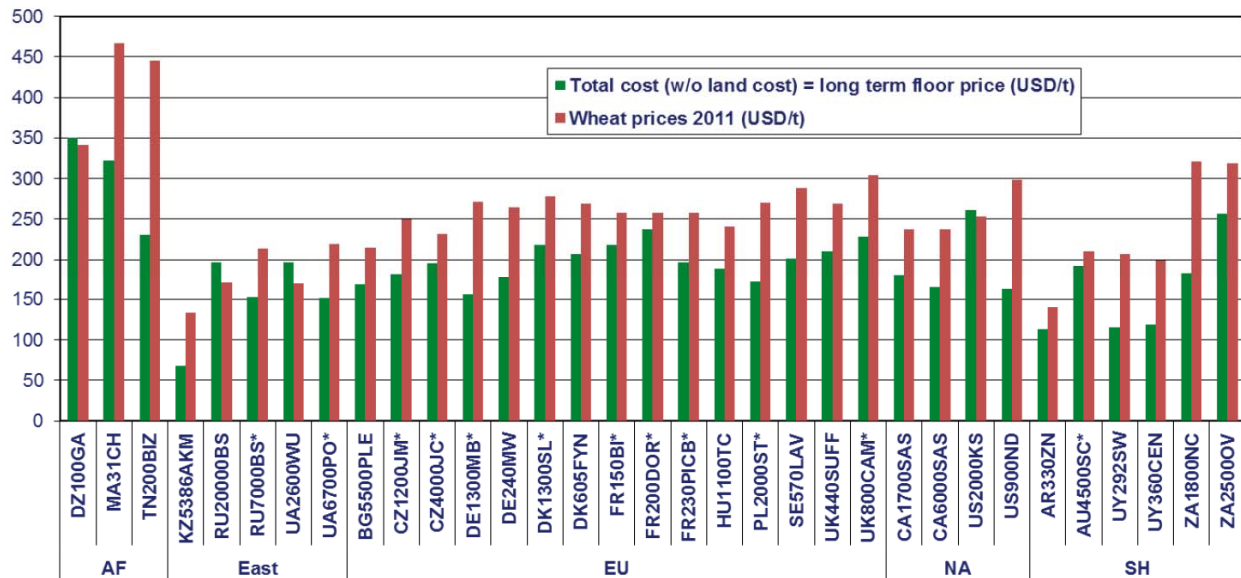
Average U.S. wheat yields have increased over the last 50 years from 26 bushels per acre to over 40 bushels per acre (USDA FAS, 2014). The wheat yield improvement in recent years, however, has not kept pace with those of other crops (Figure 17). Using average yields from 1980-1985 as a base, corn yields were 38% higher in 2003 and are projected to be 69% higher in 2014. Soybean yields were 15% higher than the base in 2003 and estimated at 60% higher in 2014. Cotton yields were 34% higher in 2003 and 45% higher in 2014. In contrast, wheat yields were 21% above the base period in 2003 but only expected to be 20% higher in 2014, no change in the last 10 years. Grain sorghum was at 94% of its base yield in 2003 but is estimated to be up 16% in 2014, just below the yield gains in wheat.

Low Relative Returns to Wheat Production

Commodity prices for crops competing for acreage in the U.S. have been higher across the board in the biofuel era. With less growth in per acre productivity, wheat returns have fallen well below those of corn and soybeans (Figure 18). Since 2007, corn returns over operating (variable) costs have averaged \$367 per acre, soybeans \$339 per acre, wheat \$141 per acre, cotton \$129 per acre, and grain sorghum \$101 per acre (USDA ERSb,2014). While not every wheat farmer has the option to grow corn or soybeans, increasingly corn and soybean acres in the U.S. are shifting north and west. In 2010 and 2011, more acres were planted to corn and soybeans than to wheat in Kansas. North Dakota has had more corn and soybean acres than wheat since 2012 (USDA NASS, 2014).

Figure 16: Wheat Cost of Product Comparison

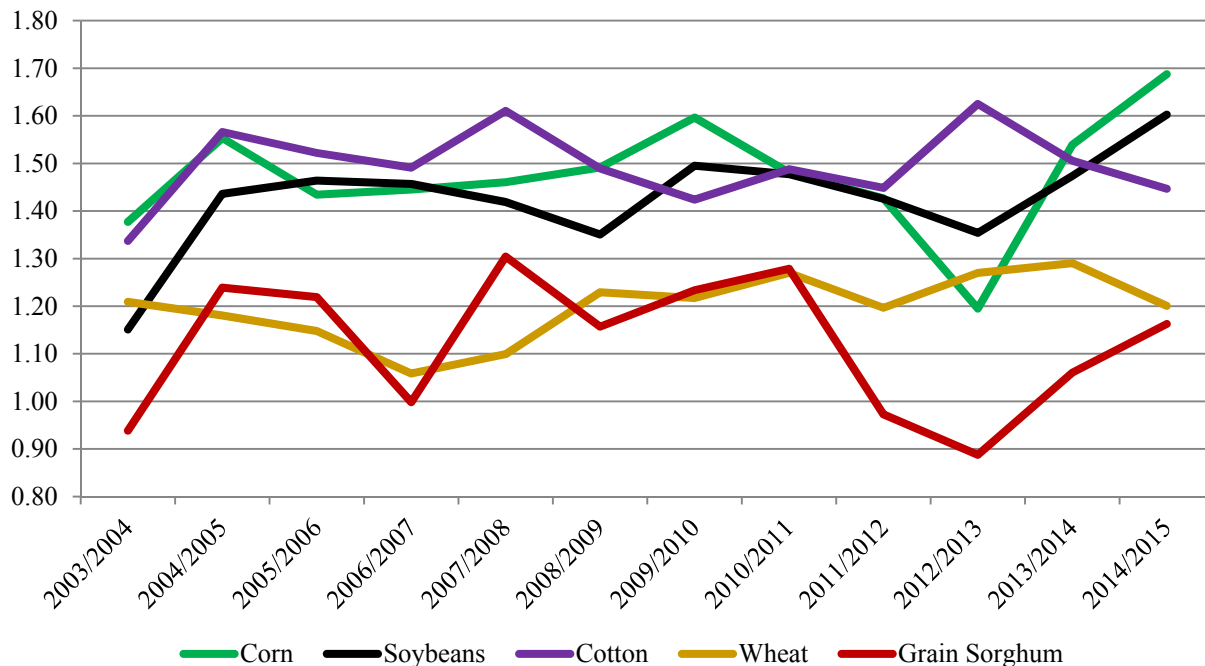
Long Term Price Floor Wheat vs. 2011 Wheat Prices



- Except for a few farms total cost significantly lower than 2011 wheat prices.
- 2011 EU farm gate wheat prices in the range of 250 to 275 USD/t.

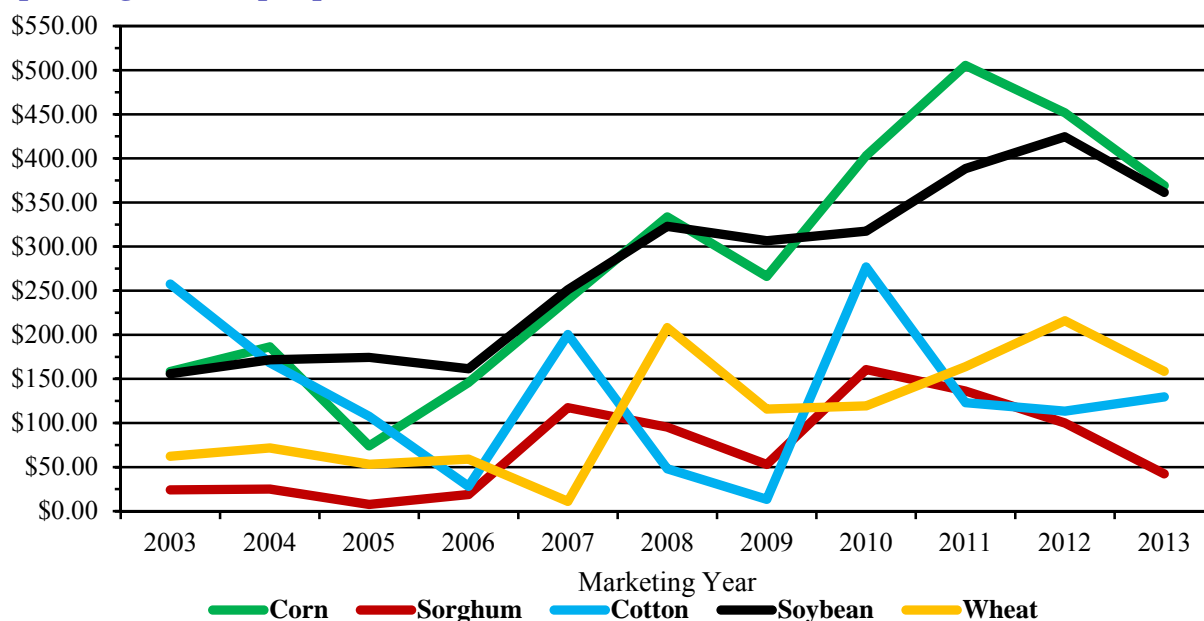
Source: Zimmer, 6/27/2012

Figure 17: Yield as a Proportion of Base Average, 2003/04-2014/15



Source: USDA, Production, Supply, and Distribution (PSD) Online Database, 10/13/2014

Figure 18: U.S. Corn, Sorghum, Cotton, Soybean, and Wheat Value of Production Less Operating Costs, \$/per planted acre, 2003-2013



Source: USDA, ERS, <http://www.ers.usda.gov/data-products/commodity-costs-and-returns>

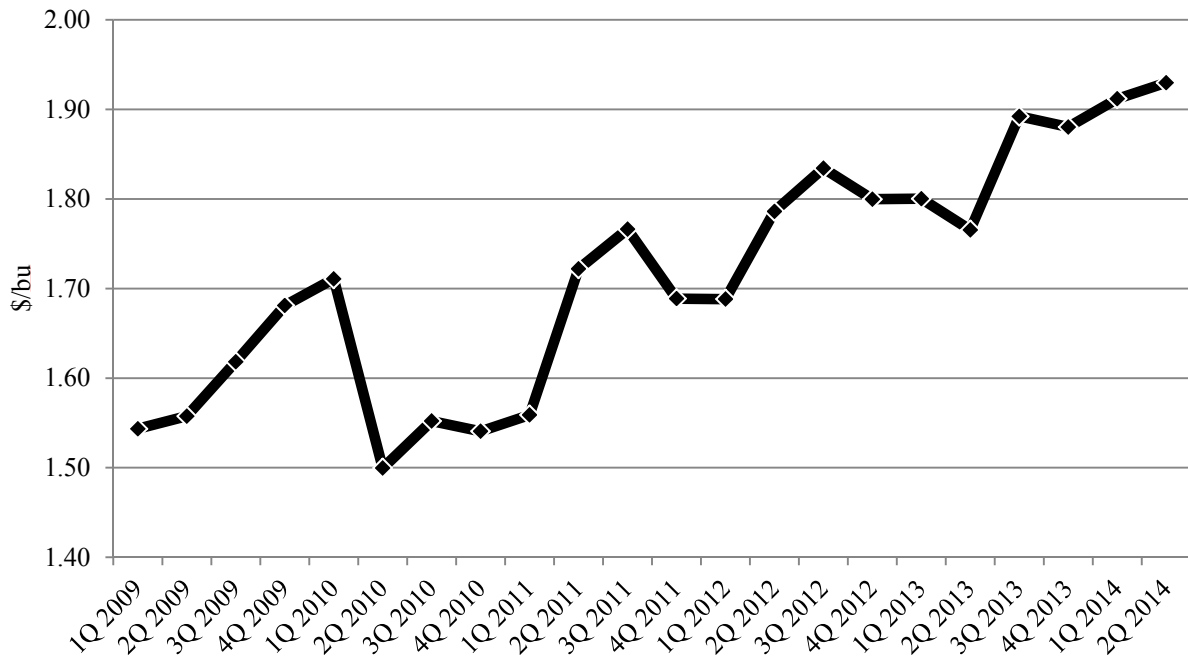
Wheat Transportation Issues

A recent USDA report concluded that “[a]n affordable and reliable transportation network is necessary to maintain the strength and competitiveness of American agriculture and our rural communities” (USDA Grain Transportation Report, 2012, p.2). Rail service is particularly important for those areas located far from inland waterways and the cost of hauling grain is prohibitive. Railroads transport 95% of the grains and oilseed production in Montana and 86% in North Dakota (ibid).

Rail service to grain shippers has been limited and more expensive since the fall of 2013 (GTR, August 7, 2014). A study by North Dakota State University based on basis values finds that North Dakota farmers have lost nearly \$67 million so far this year due to rail shipment delays in corn, wheat, and soybeans (USDA Grain Transportation Report, May 22, 2014). They could lose an additional \$95 million if delays persist. The reasons for the delays and increased costs cited in the report include high demand for grain shipments, an extremely cold winter, and increased oil transportation.

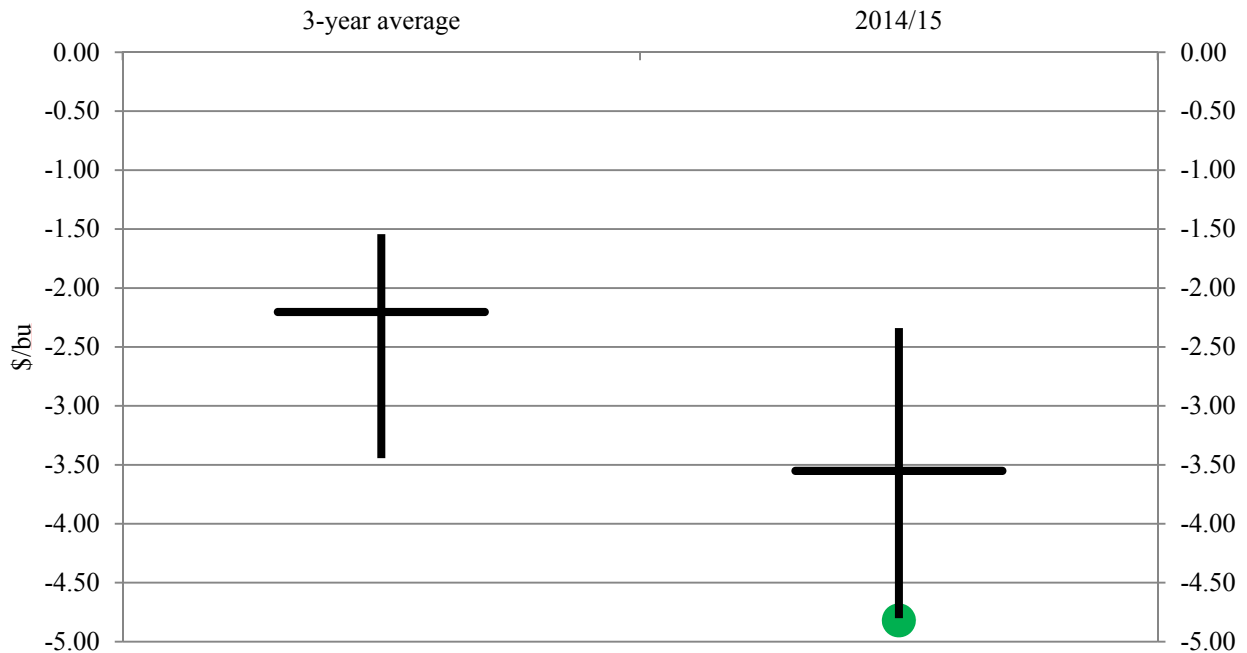
Truck and rail transportation costs from North Dakota to Japan through the Pacific Northwest have increased over 40 cents per bushel (+25%) since the second quarter of 2010 (USDA Grain Transportation Report) (Figure 19). The three-year average hard spring wheat price spread between North Dakota and Portland over the last three years has been a minimum of -\$1.50/bushel and a maximum of -\$3.50/bushel with an overall average of -\$2.20 (Figure 20). So

Figure 19: Truck and Rail Transportation Costs, ND Wheat to Japan through PNW, 2009-2014



Source: USDA Grain Transportation Report

Figure 20: HRS North Dakota—Portland Price Spread (High, Low, and Average)



Source: USDA Grain Transportation Report

far in the 2014/15 wheat marketing year, the minimum spread has been -\$2.34/bushel, the maximum -\$4.82, the most recent quote, and the average -\$3.55.

U.S. Wheat Industry Opportunities

The key opportunities for the U.S. wheat opportunity include the current sustainability movement, the advent of trait specific wheat varieties, the potential of biotech wheat (GMOs), and the opportunity of managed market volatility.

The Sustainability Movement

The concept of sustainable agriculture encompasses a way of farming that is environmentally sound, productive, economically viable, and socially desirable (Schaller, 1993). Increasingly, major retailers and food product suppliers are adopting and prescribing practices that meet and are accountable to their sustainability goals. Many suppliers have issued sustainability goals to address issues of commodity optimization and efficiency, strengthening local economies, providing access to affordable and healthy food, and benefitting the planet (Walmart, 2014). Some examples include the following:

- Cargill will launch the next generation of its precision agriculture platform to enhance agronomic decision-making to increase productivity with minimal environmental impact.
- General Mills will increase acreage in its sustainable agriculture initiative and provide incentives for farmers who demonstrate a reduction in greenhouse gas emissions in fertilizer management.
- Monsanto will support farmers to improve nitrogen efficiency and greenhouse gas emissions through advanced breeding and biotechnology, new plant varieties and hybrids, and precision and data management tools.
- Kellogg Company has committed to increase the rate of adoption of Climate Smart Agriculture practices¹.
- PepsiCo has committed to increase the utilization of sustainable farming practices and will deploy its Sustainable Farming Initiative to 500,000 acres of farmland used by North American suppliers by the end of 2016².

The concept of sustainable agriculture is appealing for what it is not, a prescription for a particular farming practice such as ‘organic’ or ‘alternative agriculture’ applicable to every location and circumstance. Rather, as Schaller (1993) notes, it is “general enough to appeal not only to people interested in environmentally beneficial and healthful farming but also to those concerned with its economic and social dimensions” (p.91).

¹ Climate-smart agriculture (CSA) is program of the Food and Agriculture Organization of the United Nations designed to enhance food security, mitigate climate change, and preserve natural resources.

² The Sustainable Farm Initiative (SFI) provides environmental, social, and economic sustainability indicators with detailed criteria and global standards.

The Advent of Trait- Specific Wheat Varieties

Researchers at the University of Illinois concluded that “[c]hanging consumer preferences and technological advances have altered the production of commodity grains” (Bard et al., 2002). Wheat varieties have been developed with specific quality characteristics for tortillas and pizza dough (Texaswheat.org, 2011). New marketing opportunities are possible from bringing wheat with differentiated quality characteristics to market in balance with consumers’ willingness to pay for the attribute and an identity preserved production and marketing system.

The Potential of Biotech Wheat—GMOs

With limited water and land resources, efforts to meet increasing world food demand will need to come more from increasing yields than from increasing cultivated area. The development and adoption of genetically modified organisms (GMOs) have the ability to increase productivity and promote more environmentally friendly agricultural practices such as no-tillage systems and reduced applications of pesticides (Raven, 2013).

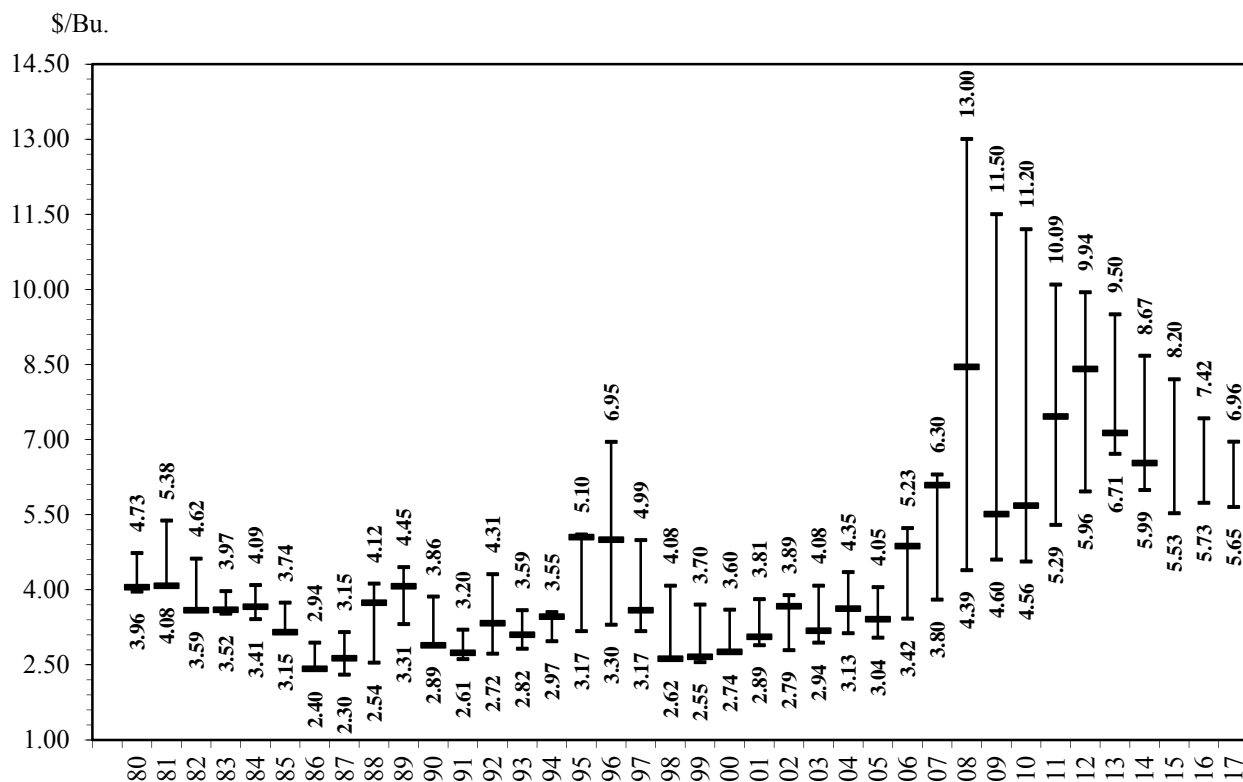
A recent study measuring the impact of GM crops shows that if crop biotechnology had not been available to the 15.4 million farmers planting GM seeds in 2010, maintaining global production at the 2010 level would have required an additional 13 million acres of soybeans, 14 million additional acres of corn, and 7 million additional acres of cotton (Brookes and Barfoot, 2012). Combined, this area represents 9% of the arable land in the U.S., 23% of the arable land in Brazil, or 25% of the grain production area of the EU.

While no GMO wheat is approved for planting in the U.S., a survey by the National Association of Wheat Growers (NAWG) found that 76% of respondents supported the commercialization of biotechnology in wheat (NAWG, 2009). In studies of the effect of GM crops on human health, the National Academy of Sciences, the American Medical Association, the World Health Organization, Britain’s Royal Society, the European Commission, and the American Association for the Advancement of Science have all surveyed the research and found no evidence that GM foods are unsafe to eat (Bennett, 2014).

The Opportunity of Managed Price Volatility

Grains, and many other commodity markets, have experienced increased volatility over the last several years. With electronic trading, increased volume, and expanded trading limits, grain futures markets can move more in one day than over the entire life of contract highs and lows in the 1980s (Figure 21). Although volatility increases risks and costs on the part of market participants, it also creates opportunity. Agricultural commodity producers and users equipped with a diversity of price risk management tools can manage pricing opportunities and, in many cases, lock in profitable prices even in markets that are trending lower.

Figure 21: July KCBT Wheat Prices (High, Low and Close), 1980-2017



U.S. Wheat Industry Threats

Major threats facing the U.S. wheat industry include growing export competition, growing strength of the U.S. dollar, the prediction of climate change, opposition to genetically modified organisms (GMOs), and the anti-gluten movement.

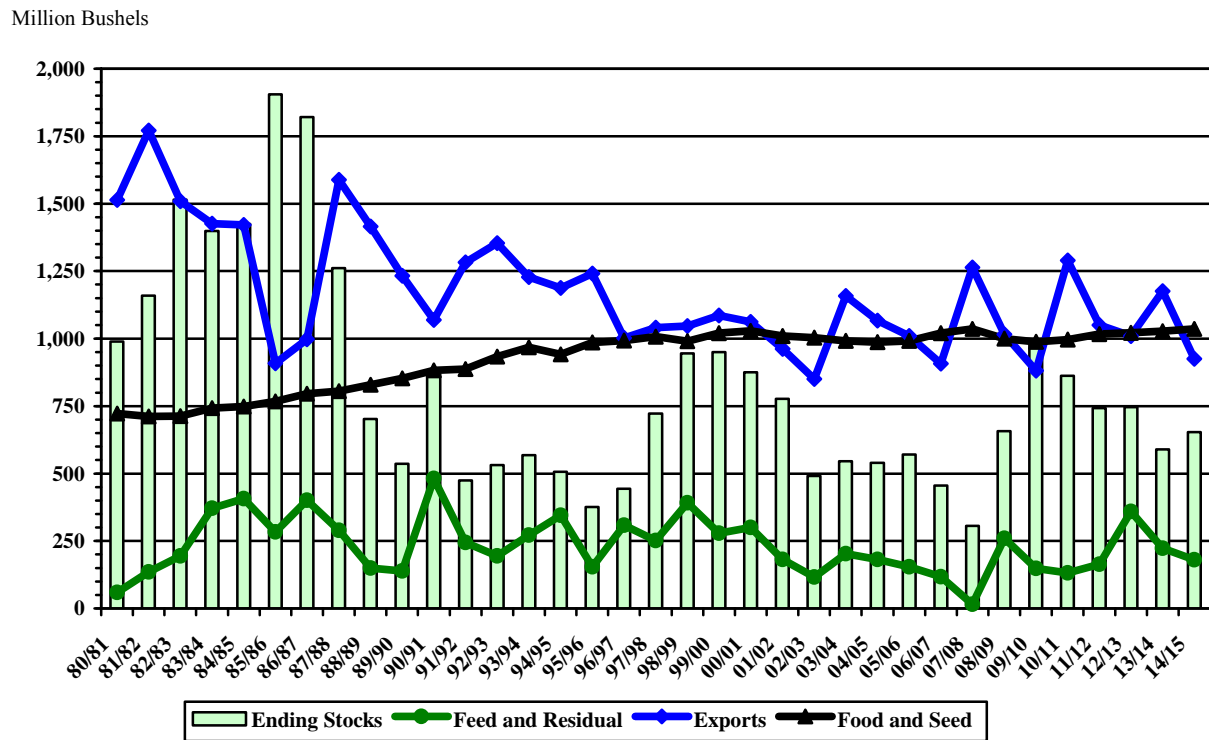
Growing Export Competition

Exports are often the largest and most variable of U.S. wheat use categories (Figure 22). There is strong, positive correlation between the level of U.S. exports and the price of wheat. In the early 1980s, the United States accounted for about half of the world wheat trade (USDA FAS, 2014). However, that share has fallen to less than 20% in recent years (Figure 23). Major competitors include the FSU-12, EU, Canada, and Australia.

Growing Strength of the U.S. Dollar

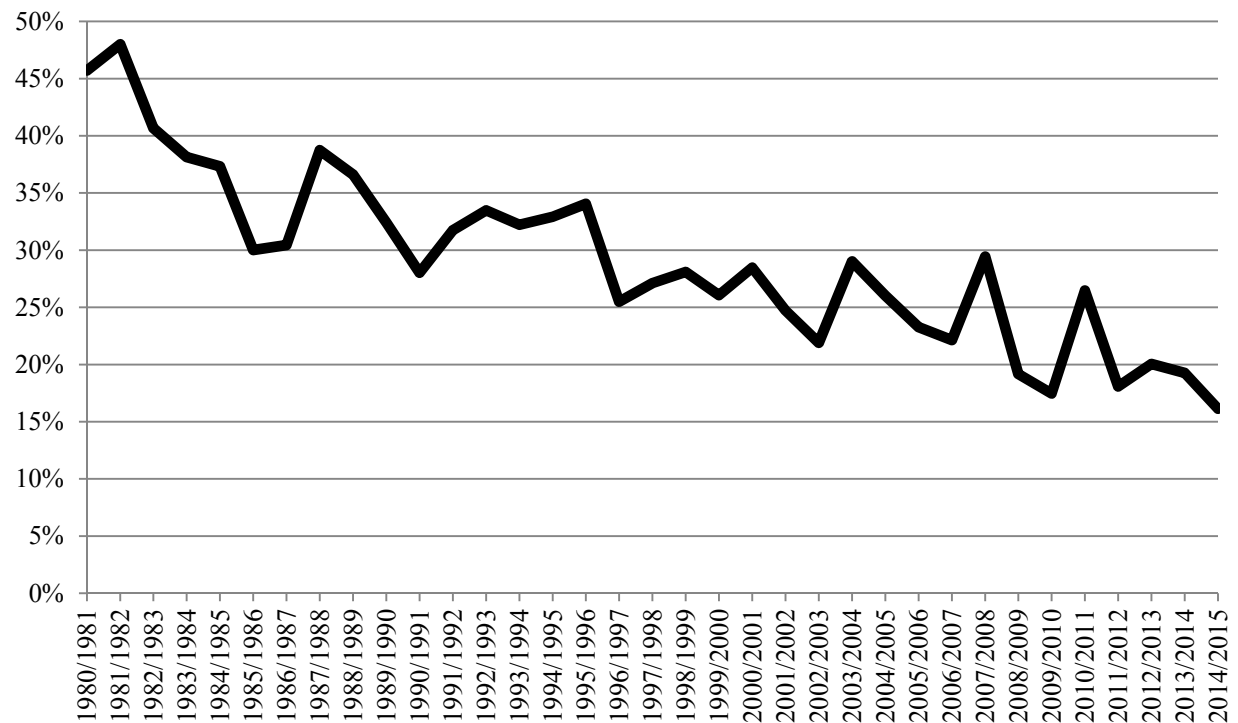
The effect of exchange rate valuation on agricultural exports has been an important question since the U.S. adopted a flexible exchange rate system in 1973. Schuh's seminal work on the agricultural sector effects of changes in the exchange rate argues that the agricultural export boom of the 1970s was linked directly to the depreciation of the dollar during that period (1974).

Figure 22: U.S. Wheat Use, 1980/81-2014/15



Source: USDA, World Agricultural Supply and Demand Estimates, 10/10/2014

Figure 23: U.S. Wheat Export Share, 1980/81-2014/15



Source: USDA, Production, Supply, and Distribution (PSD) Online Database, 10/13/2014

By the same token, appreciation in the value of the dollar can have major negative effects on exports of bulk commodities such as wheat, especially to low income countries (Shane, Roe, and Somwaru, 2008).

For example, the price of U.S. wheat rose sharply from January 2003 to April 2008 (USDA, ERSd, 2014). With a stable exchange rate of about 10.9 Mexican pesos per dollar over this time period, changes in wheat prices in both countries were roughly equivalent (USDA ERSa, 2014). When the value of the dollar began to strengthen relative to the peso in late 2008 (rising from 11 to 13 pesos to the dollar), the price of wheat in pesos became relatively more expensive than wheat priced in dollars (Figure 24). As of late 2014, the price disadvantage of buying U.S. wheat with an undervalued foreign currency such as the peso is over 20% (X-rates.com, 2014).

As measured by the U.S. Dollar Index, the value of the dollar relative to a basket of the world's major currencies has increased from around 80 in the spring of 2014 to over 86 in late September (Figure 25). The implication is that rather than the export boom due to a dollar devaluation in the 1970s, the current outlook is for growing downward pressure on U.S. wheat exports as the purchasing power of the foreign currencies against the U.S. dollar continues to deteriorate.

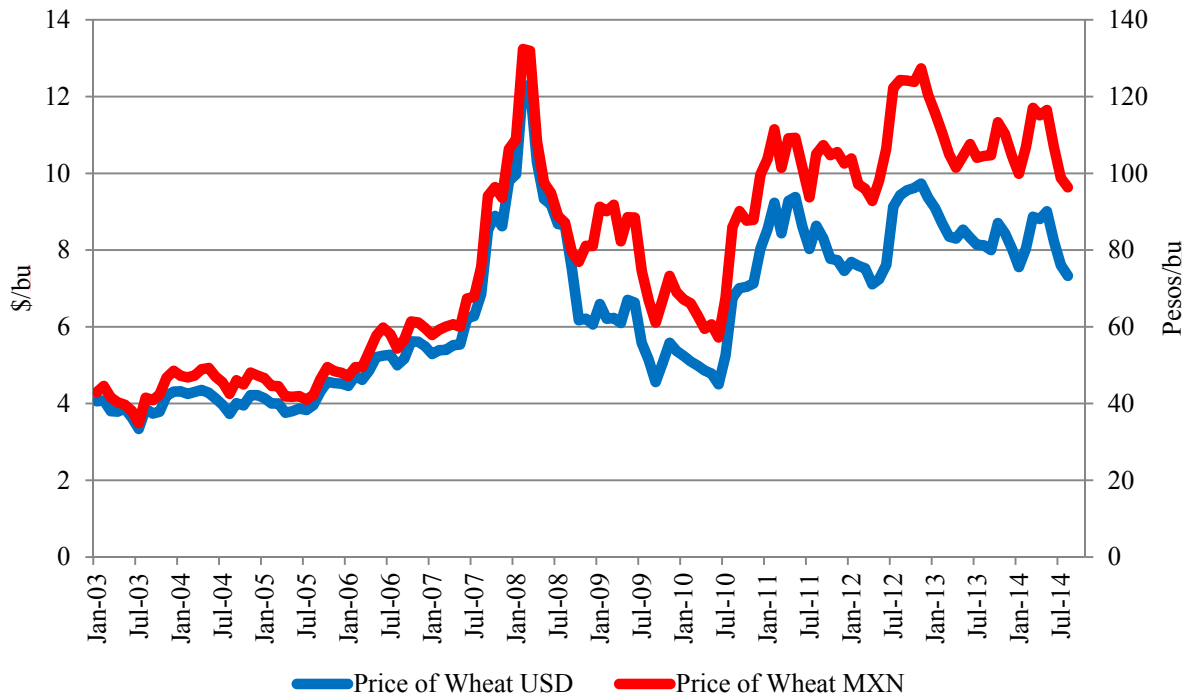
The Prediction of Climate Change

Warnings of severe future agricultural risk from global climate change resulting in a hotter climate, altered precipitation amounts, altered precipitation intensity, and higher sea levels are mounting (see, for example, McCarl, 2008). This predicted risk, however, varies regionally as overall climate change would likely be beneficial to crop production in some areas but cause declines in others.

A recent study highlights the regional differences in agricultural production risk posed by the predicted climate change in its analysis of the positive and negative impacts of that change for dryland winter wheat grown south of the 40th parallel (the Kansas/Nebraska border) with annual precipitation from 11 to 18 inches (CIMMYT, 2014). According to that study, winter wheat production would be positively impacted by warmer winters, reducing the severity of winter kill and elevated CO₂ levels increasing water use efficiency. The study finds that negative impacts come from increased frequency of years with severe drought and increased insect problems.

Climate-agriculture-environment interactions are complex and more study is needed to assess the environmental effects of climate change and develop recommended agricultural practices. As Reilly et al. (2003) concluded: "While climate prediction is highly uncertain, it seems likely that in some regions agriculture may well become non-viable even if many areas benefit." Such is the threat of climate change for traditional U.S. wheat producing regions. Countries currently producing wheat in northern climes such as Canada, the FSU-12, and Russia will gain in their comparative advantage in the production and export of wheat compared to countries currently producing wheat further south, like the United States.

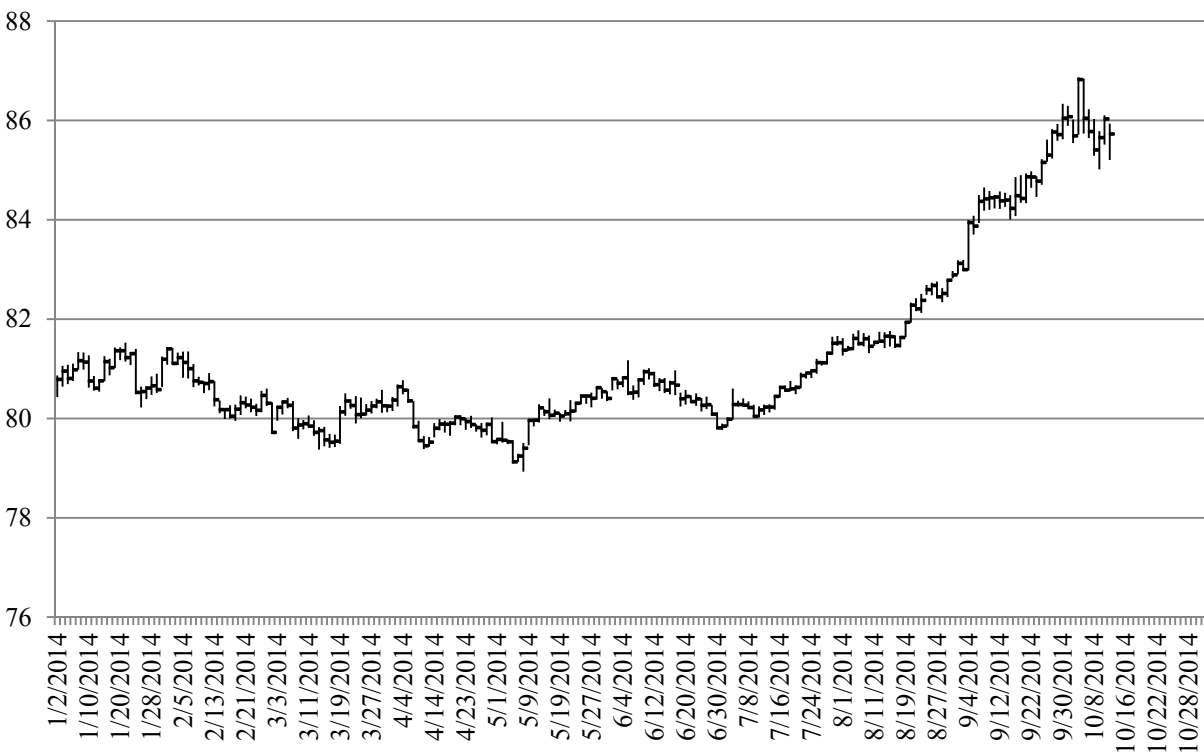
Figure 24: Wheat in Dollars and Pesos, January 2003-July 2014



Price of No. 1 HRW, ordinary protein, Kansas City, MO

Source: USDA Wheat Data, USDA Agricultural Exchange Rate Data Set, X-rates.com

Figure 25: U.S. Dollar Index, Nearby Daily, 2014



Opposition to Genetically Modified Organisms (GMOs)

Opposition to genetically modified foods is driven by many factors, including a perceived lack of consumer benefits, uncertainty about possible negative health and environmental effects, and the perception that a few large corporations will be the primary beneficiaries of biotechnology in agriculture (Pinstrup-Andersen, Pandya-Lorch, and Rosegrant, 1999). Sensitivity to this issue in the wheat industry was demonstrated in the spring of 2013 when Roundup Ready wheat was found growing on a farm in Oregon. Monsanto had field tested Roundup Ready wheat in 16 states, including Oregon, between 1998 and 2005 (USDA APHIS, 2013). Monsanto never sought nor gained approval to commercialize genetically modified (GM) wheat and no country in the world has approved its use. A study of the wheat market effects of the discovery of GM wheat growing on the Oregon farm found that even though no GM wheat spread to fields harvested for food, the average price of wheat prices for all classes fell 1.17% (Capps, 2014). If 75% of the 2013 wheat crop had not been priced as of the official notice of this discovery on May 29, 2013, lost revenue to U.S. wheat farmers would have amounted to about \$229 million³.

The Anti-Gluten Movement

Celiac disease is an auto-immune disorder caused by gluten-containing foods (wheat and other grains) in genetically susceptible patients. About 1% of the U.S. population suffers from this disease (Kagnoff, 2006 and Bizzaro et al., 2012). At present there is no cure. Treatment consists of adherence to a lifelong gluten-free diet. Despite the low incidence of celiac disease, public confusion about the health consequences of gluten has prompted an anti-gluten movement. Gluten has been referred to as “the new diet villain” (Springen, 2008). Almost a third of adults in the U.S. (29%) say they want to cut down on the gluten they eat or to consume a gluten-free diet (Hellmich, 2013).

A Reuters news story suggested that 18 million Americans are gluten-sensitive in addition to the 3 million that have celiac disease (Baertlein, 2011). Growing consumer interest in non-celiac gluten sensitivity has prompted internet forums, patients or patient groups, manufacturers, and physicians to advocate the adoption of gluten-free diets with no scientific evidence to support their concerns (Di Sabatino and Corazza, 2012). While non-celiac gluten sensitivity may exist in patients in cases where celiac disease has been properly ruled out, DiSabatino and Corazza (2012) conclude that “nonceliac gluten sensitivity should be the subject of more in-depth clinical research, and that ‘sense’ should prevail over ‘sensitivity’ to prevent a gluten preoccupation from evolving into the conviction that gluten is toxic for most of the population.” Some have suggested that the increase in gluten-sensitivity is related to wheat breeding practices that

³ This estimate of price impact accounts for a 25% level of pre-harvest sales. In its calculations of the season average farm price for wheat, USDA estimates that about 13% of the wheat crop in a given marketing year is priced by June (USDA, ERS).

enhance the gluten content of wheat grown today. Kasarda (2013), however, finds no clear evidence supporting the link between the wheat content of gluten and breeding practices.

Implications for an Enhanced Wheat Checkoff Program

This review of the issues facing the U.S. wheat industry finds reasons to be optimistic about the industry's future. The review also highlights a number of issues that will likely have growing negative impacts on the future viability and profitability of the industry. These forces are likely to have impacts on both the supply of and demand for U.S. wheat. An expanded wheat checkoff program, strategically designed to target the key negative forces in the industry, could be an effective industry tool to counteract those forces. The following summarizes the key negative forces facing the industry on both the supply and demand sides of the market and some examples of the way in which a checkoff program could prove helpful in combatting their market effects.

Supply-Side Negative Forces

Low Growth of Wheat Productivity

U.S. wheat yields have not kept pace with gains in corn and soybeans and, as a consequence, have lost planted area to those competing crops. Yield is a primary factor in farm profitability and accessibility to land. The high costs of land and equipment provide incentives for farmers to adapt technologies to spread these costs over more and more units of production. Farmers who grow high yielding, high productivity crops can pay more for land or offer more in rent than farmers who grow lower yielding crops. In today's competitive environment, crops that fail to keep pace productively are at competitive disadvantage to higher yielding alternatives.

Some examples of how an enhanced wheat checkoff program could assist in this regard include research to:

- boost yields to keep up with increasing demand given land area constraints, make wheat production competitive with alternative crops, and lower the cost of production relative to that of foreign competition.
- develop new wheat varieties with characteristics such as drought tolerance and disease and pest resistance in the face of climate change. Biotech or genetically modified wheat strains will play a role in this effort. Successful product introduction, however, will need to include both research and promotion programs to achieve consumer acceptance.
- achieve productivity gains and enhance the reputation of the U.S. as a reliable supplier of high quality wheat.

Low Relative Returns to Wheat

The net returns from wheat production have not kept pace with corn and soybeans. Though the input costs are higher, the higher yields for corn and soybeans have resulted in higher profit

margins than for wheat over time and have contributed to the acreage shift away from wheat. With lower returns per acre, wheat farmers are less competitive when it comes to bidding for land to rent or buy and they are less able to afford and adapt high production, high efficiency technologies. The net return disadvantage could be offset by higher yielding wheat or the ability to produce wheat that earns a higher price. Wheat produced with high value characteristics in response to specific user specifications that earns a higher price could reduce the current profit margin disadvantage for wheat.

An enhanced wheat checkoff promotion program to expand industrial and consumer demand for wheat in both U.S. and foreign markets would help support the price of wheat, boost the competitiveness of wheat for land area, and reduce the wheat profit margin disadvantage. Examples of additional targeted production research that could be funded through an expanded wheat checkoff program to help reduce the current profit margin disadvantage for wheat include:

- the development of wheat with high value characteristics in response to specific user specifications and
- projects that focus on reducing U.S. wheat production costs.

Increased Market Price Volatility

Market volatility makes marketing more difficult and more costly. Two primary impediments for making a marketing decision by farmers is uncertainty related to production and making a marketing decision too soon and missing out on higher prices. The financial consequences can be severe for a producer who must buy out a contract at sharply higher prices due to a shortfall of production. Farmers who lock in a price only to see prices surge higher miss out on what too often times are rare profit opportunities. Conversely, missed market opportunities and sharply lower markets have significant consequences as well. Even if farmers and elevators are comfortable with the level of prices hedged, margin requirements in volatile markets add to the cost of maintaining the hedge and in extreme cases, have forced hedgers out of their positions altogether. However, volatile markets also offer pricing opportunities for those producers with a marketing plan and who are proficient in using price risk management strategies. This is especially important when profitable prices may be available only for brief periods of time and occur when producers may be more focused on some aspect of production rather than marketing.

An enhanced wheat checkoff program could help wheat producers in this regard through funding various activities such as the development and operation of educational programs and tools to train and assist wheat farmers in price risk management strategies in collaboration with agricultural economists and wheat researchers at land grant universities.

Crop Insurance

U.S. farm policy has moved away from traditional farm price support programs to one more built on crop insurance products. With this move have come a complexity of individual decisions and

the opportunity for producers to craft a safety net that fits their production system and risk preferences. Even after the initial PLC/ARC determination is made, farmers will face annual choices related to crop mix, insurance options, and levels of coverage.

Although checkoff programs traditionally are prohibited from engaging in any efforts to influence farm policy, an enhanced wheat checkoff program could assist wheat farmers in dealing with the crop production issues through such efforts as:

- supporting research on issues such as the relationship between the federal cost sharing of crop insurance premiums and the affordability of crop insurance policies and the impact of crop insurance on the viability of production particularly in high risk production areas.
- funding the development of producer decision aids and other producer information and tools to support efficient farm production decisions.

Transportation Issues

Disruptions of or inaccessibility to transportation systems can severely impact both the producers and users of grain. Farmers are penalized by lower cash bids as transportation costs widen the basis. Grain users lose access to the commodities they need for processing and export commitments. The most recent example of this is in the northern plains where farmers in North Dakota, heavily dependent on rail transportation, have been severely impacted by the combination of large crops, severe weather, and competition for rail space. A highly developed infrastructure of grain transportation resources is a vital component of U.S. competitiveness in foreign markets. These must be maintained and improved to enhance the reliability and affordability of wheat transportation given the great distances between major production areas and ports.

With respect to transportation issues, among other activities, an enhanced wheat checkoff program could:

- take the lead from the United Soybean Board and bring together interested industry, university, and public groups in a Wheat Transportation Coalition funded by the checkoff similar to the Soy Transportation Coalition funded by the soybean checkoff program.
- fund investigations of key transportation problems in wheat similar to the soybean transportation infrastructure study and similar studies sponsored by the Soy Transportation Coalition (see Vadali et al., 2010 for example).

Demand-Side Negative Forces

Wheat Quality Concerns

Many participants in the global wheat market have a lower cost of production than U.S. producers. If wheat is viewed only as a generic commodity in the world market place, the lower

cost structure of U.S. competitors can be a source of competitive advantage. If U.S. wheat can be successfully distinguished on verifiable quality characteristics from wheat produced in other countries, and become more reliably and consistently supplied, the resulting product and delivery differentiation can be a source of sustainable competitive advantage for the U.S. wheat industry. Given the higher cost of production in the U.S. relative to most foreign competitors, our global competitive advantage comes from quality characteristics. Value may be seen as a function of both price and product attributes with superior value and competitive advantage stemming "...from offering lower prices than competitors for equivalent benefits or providing unique benefits that more than offset a higher price" (Porter, 1985, p. 3).

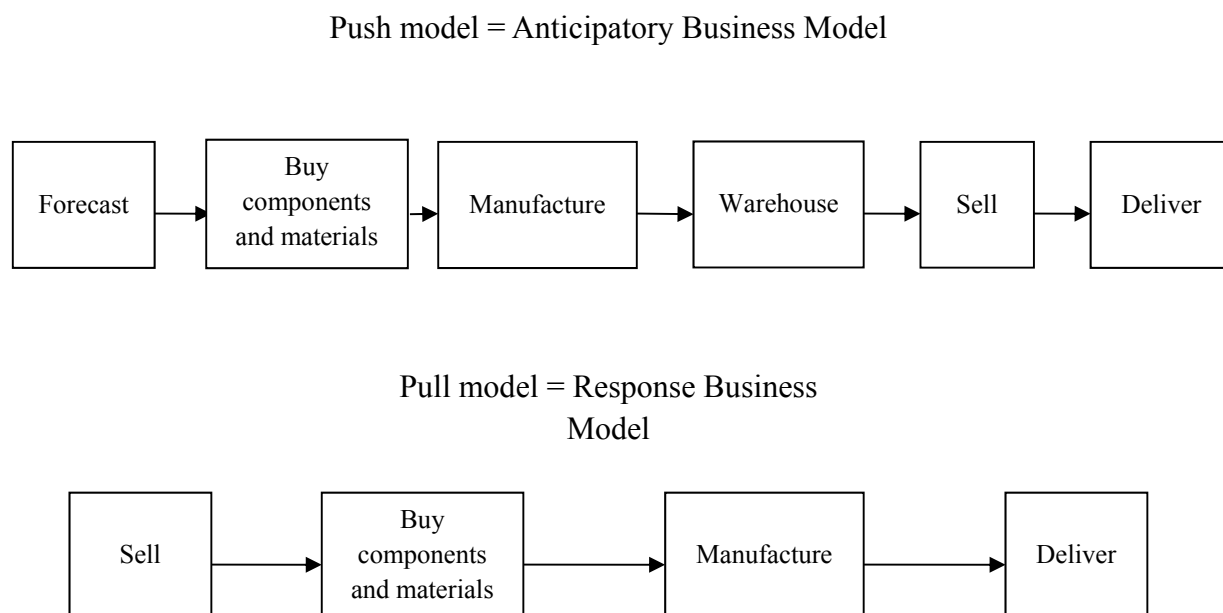
An enhanced wheat checkoff program could focus on resolving wheat quality concerns through numerous activities such as:

- boosting the demand for U.S. wheat through supporting wheat quality enhancement research.
- funding research to develop trait-specific varieties and identity preservation practices in response to specific requirements of wheat users as a means of shifting wheat from a commodity orientation to a product orientation. Rather than offering products in the marketplace based on demand forecasts or government price guarantees, marketing is end-user driven. That is, products are normally produced and sold in deference to the product traits and characteristics consumers or buyers require (Figure 26). The product is pulled into the market by the customer rather than pushed into the market by the producer (Welch and Lyford, 2010).
- developing an industry-led plan to adopt sustainability practices that would further efforts to move the wheat industry from a commodity orientation to engendering quality and valued characteristics. Such efforts can be critical for an industry as occurred with Sapiro's (1922) "California Plan" that revolutionized agriculture in that state:
Grade it upwards, and make sure the thing you're selling can have a brand name put on it, and it is always the highest quality of that product that is brought on any market. We spend hundreds of thousands of dollars in inspecting everything that is delivered to cooperative associations. We go behind that, we go to the farmer and try to get him to begin to produce high class things. (p. 28)
- working with wheat buyers and processors to promote the high quality of U.S. wheat in U.S. and foreign markets as well as the reliability, trustworthiness, and efficiency of the U.S. grain grading system.

The Need for Consumer Education on Wheat

The production of genetically modified crops has contributed to yield growth, lower costs, increased farm income, and improved food security. Plants and products from GMO sources have been found to be safe both in regards to human health and the environment. As with the

Figure 26: Push Versus Pull Models of Consumer Demand



increasing interest in wheat gluten, much consumer concern seems to be based more on suspicion than science.

In this regard, examples of what an enhanced wheat checkoff program could do include:

- funding scientific research related to the safety and nutritional aspects of U.S. wheat and wheat products.
- enhance the demand for U.S. wheat through a national mass media campaign direct to wheat product consumers, health providers, government agencies, and others based on sound scientific evidence to combat growing gluten- and GMO-related concerns.

Growing Export Competition

The U.S. share of world wheat exports has fallen from around 50% in the early 1980s to less than 20% over the last several years. Lessening the impact of this trend is that while the U.S. share of the world export pie is shrinking, the pie itself is getting larger. Total world wheat exports over the last 20 years have increased 60%, from 100 mmt to 160 mmt. The key to holding and growing U.S. market share is a focus on quality, reliability, and consistency of supply. Global issues impacting U.S. wheat exports are economic growth, especially in developing or emerging economies, the value of U.S. dollar relative to foreign currencies, and open, unrestricted trade.

An enhanced wheat checkoff program, perhaps in cooperation with U.S. Wheat Associates, could fund targeted promotion of U.S. wheat and products in specific foreign markets to help

gain back lost foreign market share. Examples of foreign market promotion activities that could be funded include:

- trade servicing through foreign study teams to demonstrate U.S. productive capacity and reliability as a supplier; trade press announcements and conferences; advertising in foreign periodicals; promotional material for foreign food buyers; and other similar activities.
- technical assistance to expand the type, quality, and number of uses of wheat and wheat products in foreign markets such as technical assistance to foreign flour mills to improve efficiency and the production, handling, and marketing of wheat products; wheat product development research; and wheat processing technology short courses aimed at foreign food processors.
- consumer promotion including generic or identified promotion activities to promote the use of wheat and wheat-based commodities. Generic promotion fosters manufacturer and consumer use of these commodities without specifically identifying them as wheat-based and may consist of wheat product sales campaigns and consumer education seminars or promotion campaigns in cooperation with U.S. wheat and wheat product exporters. Identified promotion would enhance foreign demand by differentiating U.S. wheat products from their competitors and might include baking/cooking seminars for institutional nutritionists, cooks, and food buyers; the distribution of booklets featuring U.S. wheat products and institutional recipes; and sharing the costs of marketing of wheat-based products with third party contributors in the program countries.

Domestic Wheat Demand Growth

Health issues are a major driver of U.S. grain consumption. Concerns over cholesterol and heart disease have motivated a move of consumers away from animal products towards wheat and other grains. At the same time, however, a growing interest in lowering carbohydrate consumption has pushed consumers away from wheat and grain-based products (USDA, ERSe, 2013). Today, a growing number of people suspect that wheat gluten may be having a negative impact on their health. In the face of changing consumer preferences and attitudes, wheat has an important role to play in contributing to a healthy, diversified diet.

An expanded wheat checkoff program could generate the funds necessary to mount what could be expensive national campaigns to combat these issues and build consumer confidence in and demand for U.S. wheat and wheat products. Examples of domestic promotion activities that could be supported by an enhanced wheat checkoff program to build U.S. domestic demand for wheat and wheat products include activities such as:

- wheat promotion programs ranging from new use and product development projects focused on wheat composition and quality to trade and consumer communication projects and a wide variety of wheat chemistry, genetics, processing, and utilization projects.

- wheat product promotion projects focusing on financing partnerships with wheat product marketing organizations, seminars and research on the nutritional and health aspects of wheat and wheat products as well as projects related to new uses of wheat and wheat products.
- technical assistance to wheat millers, wheat product manufacturers, and other food industry groups to help improve efficiency in the production, handling, and marketing of wheat and wheat products; projects to enhance the preference of food manufacturers for wheat as an ingredient; conferences, seminars, and short courses with wheat and food manufacturing industries; advertising in trade magazines; promotional materials for food buyers; and other similar activities directed specifically at the wheat and food processing and manufacturing industries.
- direct-to-consumer promotions including generic or identified promotion activities to promote the use of wheat and wheat-based commodities including media campaigns to promote consumption of wheat-based products and to combat misinformation about wheat; consumer education seminars; partnerships with retailers to promote wheat-based products such as the dairy industry partnerships with Domino's Pizza to promote increased use of cheese and with McDonald's to promote increased use of dairy products with specialty coffee sales; baking/cooking seminars for institutional nutritionists, cooks, and food buyers; the distribution of booklets featuring U.S. wheat products and institutional recipes; and sharing the costs of marketing of wheat-based products with third party industry partners.

Potential Returns from an Enhanced Wheat Checkoff Program

The previous section clearly lays out the issues facing the U.S. wheat industry and provides examples of how an enhanced wheat checkoff program could potentially help counter the negative market effects of those issues. The question remains, however, as to whether an enhanced checkoff program would indeed be beneficial to U.S. wheat producers and the U.S. wheat industry if implemented in coming years. The objective of this portion of the report is to analyze the future potential returns to producers from an enhanced checkoff program.

Obviously, since no enhanced wheat checkoff program has been implemented, there has been no research or promotion activities financed with such funds and, hence, no data to use for measuring the effectiveness of an enhanced wheat checkoff program. That does not mean, however, that wheat producers have not paid checkoff assessments to fund research and promotion activities. Currently 22 of the 42 wheat producing states operate a wheat checkoff program under state legislative authority. Wheat producers in those states are assessed a checkoff fee ranging from one cent to five cents per bushel or from 0.25% to 0.75% of the value of a wheat bushel to their respective state commissions. The state checkoff funds are used primarily to finance production research projects within each respective state to boost wheat yields and/or reduce costs of production. However, each state commission contributes about one quarter of a

penny per bushel (\$0.0028) to the U.S. Wheat Associates (USW) to finance wheat export market development. USW is the USDA Foreign Agriculture Service (FAS) wheat export cooperator. FAS matches the wheat checkoff dollars invested in wheat export promotion, thus enhancing the impact of the checkoff dollars contributed to USW by the states.

Unfortunately, neither state data on wheat checkoff activities and associated expenditures nor USW data on export market promotion activities and expenditures were made available for this analysis. Two studies in 2010 concluded that the returns to wheat producer checkoff contributions for export market promotion have been highly effective, generating high benefit-cost ratios (BCRs) (IHS Global Insight, 2010 and Kaiser, 2010). The Kaiser study was particularly well done and provides a reasonable approximation of what might be expected from an expanded wheat export promotion program financed by an enhanced wheat checkoff program. As far as the authors of this study are aware, however, no evaluations of the effectiveness or returns to the state wheat checkoff programs have been conducted.

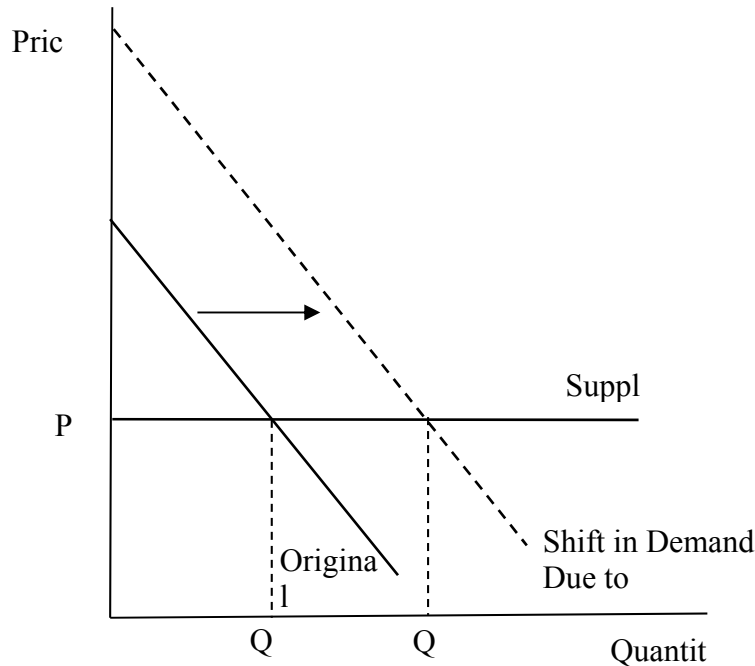
Consequently, this analysis of the future returns from an enhanced wheat checkoff program relies on what is known about the benefits of checkoff programs in general from studies of the effectiveness of those other checkoff programs and available forecasts of wheat market supply, demand, and prices. The analysis is, therefore, highly hypothetical and based on numerous assumptions about the level of future checkoff expenditures, the relationship between expenditures and market variables, and the level of future market supply, demand and prices among many others. *Accordingly, the conclusions of this analysis are also hypothetical in nature and intended only to provide guidance for decisions regarding the implementation of an enhanced wheat checkoff program.*

This section begins with a discussion of the general effects of a checkoff promotion program, including a review of the conclusions of recent studies regarding the return to other commodity checkoff programs. Then, following a discussion of the methodology used in this analysis, the results of the analysis of the potential returns to an enhanced wheat checkoff program are detailed.

The Impact of Promotion on Demand

Measuring the effects of promotion on the demand for a commodity like wheat is simple in concept. Promotion is intended to increase the demand for the commodity as illustrated in Figure 27. If successful, the consequence is a shift in the demand for the commodity to the right. All that the analyst needs to do, then, is measure the extent of the demand shift. However, actually measuring the magnitude of any shift in commodity demand that can reliably be attributed specifically to the promotional efforts of the related checkoff program is a good deal more complicated. Early efforts to measure the demand effects of promotion programs relied largely on anecdotal evidence and simple comparisons of gross investments in promotion and gross changes in sales. During periods of rapidly expanding markets, rising prices, and growing

Figure 27: Illustration of the Effect of Promotion on the Demand for Wheat



checkoff investments, this approach tended to yield some persuasive stories and even more impressive upward-sloping graphical relationships between promotion expenditures and sales. The problem with this approach, however, is that various factors other than promotion programs affect the volume and value of commodity sales, such as relative price changes, agricultural policies, changes in incomes, population growth, competition from other products, and consumer health concerns and demographics, just to name a few. The problem becomes all too apparent in years when markets turn down and prices drop. Program managers find that taking credit for rising demand and prices in good years forces them to take the blame for declining demand and prices in bad years.

Over the years, increasingly sophisticated statistical methods have been developed to isolate and measure the unique contribution of promotion programs to the performance of the sales of the commodity being promoted. Most common has been the use of econometric regression techniques and models to statistically disentangle the effects of promotion program activities on commodity sales and demand from those of other market forces. The process usually requires a large amount of not only historical data on the sales of the product and advertising expenditures over time but also data related to the many other relevant market forces that might have affected sales over the same period. The application of the statistical technique to the data allows for the measurement of the unique contribution of each market force considered, including promotion, to the change in sales observed over the years.

Even if the statistical analysis indicates that a promotion program has had a positive and statistically significant effect on market sales, however, the question remains as to whether the

increase has been large enough to cover the cost of the program. For that reason, the next step in the measurement process is to use the statistical results to calculate some aggregate measure of the effectiveness of the promotion expenditures. A standard method of determining if checkoff promotion pays has been to calculate the average return per dollar spent on advertising and promotion, i.e., a benefit-cost ratio (BCR), as the increase in market sales revenue or cash receipts (net of promotion costs) per checkoff dollar spent on promotion activities. An estimated BCR of greater than 1 is taken as an indication that the program is beneficial because net revenues (or profits) have increased by more than one dollar for every dollar spent on promotion. On the other hand, a BCR of less than 1 is taken to mean that the promotion program has been an unprofitable investment for stakeholders since each dollar spent generates less than a dollar in additional net revenue.

Title V of the 1996 Farm Bill requires an independent evaluation of the effectiveness of all new and existing commodity promotion programs, not less than every five years, to assist Congress and the Secretary of Agriculture in ensuring that the objectives of the programs are met. In compliance with that legislation, a large and growing number of studies have analyzed the effectiveness of checkoff programs. Most those studies have found that checkoff promotion programs increase producer net revenues by more than the cost of the promotion programs that generated those revenues. The consensus apparent across a wide range of studies by many researchers covering a large number of checkoff commodities is that the return to stakeholders from advertising and promotion by commodity checkoff organizations is positive and robust (Table 2). In general, commodity checkoff program advertising and promotion have been found not only to be effective in increasing sales but also to have increased sales by more than enough to cover the costs of the advertising and promotion activities. Although varying widely across commodities and time periods, the BCRs calculated by most checkoff studies of the effectiveness of domestic advertising and promotion programs generally fall in the range of about \$2 to \$10 (Table 2). The BCRs for soybeans and grain sorghum, the only two grains with a national checkoff program, are reported to be \$6.5 and \$8.5, respectively⁴, meaning that their respective checkoff programs return \$6.5 and \$8.5 to producers for every checkoff dollar spent on promotion and advertising (Williams, Capps, and Lee, 2014 and Capps, Williams, and Málaga, 2013, respectively). Other studies of the returns to a diverse group of checkoff commodities report BCRs in the range of \$0.54 to \$44.9 from their respective promotion programs with a median of \$6.5 (Table 2).

Importantly, note that the BCR for any commodity checkoff program is not indicative of the amount of the additional net revenues (profit) the program generates for producers or the magnitude of the impact of the program on market demand or price. Despite the reasonably high BCRs calculated for most checkoff programs, the total amount of checkoff funds by those programs spent is actually quite small relative to the value of production of the checkoff

⁴ A negative estimated export promotion elasticity for the sorghum checkoff program was not statistically significant.

Table 2: Selected Generic Commodity Promotion Studies: BCRs and Promotion Elasticities

Commodity	Study	Benefit-Cost Ratio		Promotion Elasticity*
		average \$ earned per \$ spent on promotion		% demand change from a 1% expend. change
Almonds ^e	Crespi and Sexton (2005)	6.2 ^b		0.13
Cotton	Williams et al. (2011)	Producer	5.7	Retail 0.05
		Importer	14.4	Mill 0.03
Dairy	USDA (2012)	All Dairy	3.05	0.078
		Fluid milk	2.14	0.071
		Cheese	4.26	0.033
		Butter	9.63	0.042
		Exports	5.12	0.066
Dried Plums ^e	Alston et al. (1998)	2.7 ^b		0.05
Eggs	Schmit and Kaiser (1998)	0.54-6.33 ^a		0.006
Hass Avocados	Carman, Li, and Sexton (2009)	2.5-4.0 ^a		0.148-0.372 ^a
Highbush Blueberries	Kaiser (2010)	9.12		0.109
Honey	Ward (2008)	6.02-7.91 ^a		0.082
Meat: Beef	Kaiser (2014)	11.2		0.018
Pork	Kaiser (2012)	17.4		0.006-0.046 ^d
Lamb	Ghosh and Williams (2014)	14.44		0.037
Mushrooms	Richards (2011)	Retail	9.4-18.3 ^g	0.008-0.089 ^g
		Food Ser.	1.41-5.35 ^g	0.039-0.058 ^g
Orange Juice ^f	Williams et al. (2004)	2.9-7.0 ^a		0.127-0.428 ^a
Potatoes	Richards and Kaiser (2012)	5.17		0.32-0.116 ^g
Raisins	Kaiser, Liu, and Consignado (2003)	5.1-15.3 ^a		0.029-0.133 ^a
Rice	Rusmevichientong Kaiser (2009)	6.21-14.48 ^a		0.21
Sorghum	Capps, Williams, Málaga (2013)	Food/ind. Use	8.48	0.046-0.048 ^a
		Exports	-0.144 ^c	-0.33-0.066 ^{c,g}
Soybeans	Williams, Capps, and Lee (2014)	6.5		0.023-0.047 ^g
Strawberries ^e	Carter et al. (2005)	44.0 ^b		0.16 ^h
Table Grapes ^e	Alston et al. (1998)	44.9		0.16
Walnuts ^e	Kaiser (2005)	1.65-9.72 ^a		0.005
Watermelon	Kaiser (2012)	27.73		0.098 ^h
Wheat	Kaiser (2010)	Exports	9.51-20.00 ^a	0.295-0.412 ^a
MEDIAN		6.5		0.049
MEAN		9.8		0.093

* Includes both domestic and export demand promotion elasticities.

^a Depending on the model used or elasticities assumed. ^b Marginal BCR. ^c Not statistically different from zero.

^d Long-run and depending on the market segment analyzed. ^e California. ^f Florida. ^g Depending on market segment and/or program type. ^h Expenditure flexibility.

commodity (cash receipts). Soybean producers, for example, have spent over a billion dollars on checkoff programs since the 1970s. Nevertheless, those expenditures actually have been quite meager when compared to the value of annual soybean sales (cash receipts) over the same period. Between 1970/71 and 2012/13, total soybean checkoff investments have amounted to only between 0.03% and 0.44% of total soybean farm cash receipts each year. The same is the case for other commodity checkoff programs regardless of the size of their program. Lamb producers spend only about \$1.5 million a year on lamb promotion through their checkoff program which amounts to only about 0.1% of the value of lamb sales. With such low advertising-to-sales ratios (often referred to as the checkoff investment intensity), the overall impact of commodity checkoff programs could hardly be expected to be highly significant in a practical sense in its effects on U.S. production, prices, revenues, exports, and world market shares even if the impact could be said to be statistically significant.

The low checkoff investment intensities across commodities is one reason for the wide variation in the reported BCRs across checkoff programs (see Table 2). Benefit-cost ratios are calculated as the ratio between the additional industry net revenues (profits) generated by checkoff programs and the cost of the advertising and promotion required to generate that additional revenue (i.e., checkoff expenditures). Because small increases in industry net revenues are generated by checkoff programs with even smaller expenditures of checkoff dollars, small changes in the revenues generated (the BCR numerator) or in checkoff expenditures (the BCR denominator) can result in large changes in the calculated benefit-cost ratio.

Checkoff groups sometimes interpret estimated BCRs much in excess of 1:1 to imply large absolute impacts of their program on the market. Nothing could be further from the truth. A BCR of 5:1, for example, results by dividing a \$5 billion industry profit benefit by a \$1 billion checkoff investment or by dividing a \$5 benefit by a \$1 investment. Both investments yield a 5-to-1 return. Thus, the level of the BCR is actually independent of the level of the revenues earned and checkoff dollars spent. That is, there is no unique BCR associated with a given level of expenditures or revenues. Small checkoff programs with low levels of checkoff expenditures and producer revenues generated can have higher BCRs than large checkoff programs with high levels of checkoff expenditures and producer revenues generated. For example, the \$14.44 BCR of the lamb checkoff program with annual checkoff expenditures of about \$1.5 million is much higher than the \$6.5 BCR of the soybean checkoff program which spends over \$120 million annually.

Also, checkoff groups often erroneously assume that high BCRs are the objective of their programs. In fact, the objective is to generate additional sales that add to producers' profits. They also erroneously tend to assume that checkoff programs with the highest BCRs are the most effective checkoff programs. In fact, however, a high BCR actually implies that producers are underinvesting in their checkoff program which imposes an opportunity cost on the industry. That is, a high estimated BCR tells producers how much additional revenue they could earn for each additional dollar of increased assessment and expenditures given how the checkoff funds

are being spent by their checkoff organization. So the high BCR to the lamb checkoff program of \$14.44 means that by *not* increasing the level of the lamb checkoff assessment and, therefore, investments in lamb promotion, lamb producers *fail to earn* the additional \$14.44 that is available to them for every additional dollar they might choose to invest. As the level of expenditures increase, of course, the BCR would be expected to drop to some extent because the increase in revenue generated would be less than the increase in expenditures. That is, the increase in revenue generated for every additional dollar declines as expenditures increase. That is known as the law of diminishing returns. So, in fact, given an effective, efficient, and growing checkoff program, the optimal BCR is equal to one because checkoff expenditures will have increased to the point where any additional expenditures will return less to producers than the additional investment.

Of course, a low BCR can also result from an inefficient, ineffective checkoff program that has little impact on market sales or sales. For that reason, in addition to the BCR, an important measure for checkoff programs is the checkoff promotion elasticity, that is, the percentage change in demand generated from a 1% change in checkoff expenditures. A checkoff promotion elasticity close to zero would, of course, mean that the promotion program operated by the checkoff organization with the funds contributed by producers is totally ineffective in moving demand. That is, there is no “bang” for the “bucks” invested by producers. In this case, the estimated BCR would be zero. The higher the checkoff promotion elasticity, the higher the “bang” for the “bucks” invested by producers. But what is a reasonable level for a promotion elasticity? Across the numerous studies of commodity checkoff programs, the estimated domestic and export demand promotion elasticities vary between 0.005 to 0.428 and -0.3 to 0.98 (Table 2). The median domestic and export promotion elasticities of 0.049 and 0.051 imply that the few highly positive reported domestic and export promotion elasticities skew their means (0.076 and 0.122, respectively) upward substantially. Given these reported checkoff promotion elasticities, a reasonable expected promotion elasticity is around 0.05 meaning that a 10% increase in checkoff promotion expenditures tends to increase commodity demand by 0.5% and a doubling of expenditures would be expected to generate about a 5% increase in demand.

Methodology

This section first reviews the key assumptions made in the analysis of the potential returns to an enhanced wheat checkoff program. A discussion of the two-step methodology followed for calculating the potential returns to an enhanced wheat checkoff program is then followed by a discussion of the results of the benefit-costs analysis.

Key Assumptions

An analysis of the potential returns to an enhanced wheat checkoff promotion program over some future period requires three key sets of assumptions: (1) an assumed checkoff promotion

elasticity, (2) an assumed level of additional checkoff expenditures over the period of analysis, and (3) a forecast baseline for demand and prices over that same period from which to measure the changes generated by the assumed checkoff expenditures. In determining a checkoff promotion elasticity to use for a domestic wheat demand promotion program, we assume that such a program would be as effective as the average existing domestic checkoff program. Figure 28 plots the domestic promotion elasticities estimated for 44 checkoff activities (retail, food service, etc.) in the U.S. domestic market by the 23 checkoff programs listed in Table 2. The mean across all those estimated promotion elasticities is 0.076. Clearly, however, there are at least two outliers (that is, unusually high values). Dropping the two outliers from the set of promotion elasticities reduces the mean promotion elasticity to a more reasonable 0.061 across the studies considered. Rather than using just one measure of the promotion elasticity, however, we calculate the promotion elasticities that are one standard deviation above and below the mean (0.10 and 0.02) to use for calculating a reasonable range of potential demand impacts of promotion reflecting an enhanced wheat checkoff program that may be somewhat more or less effective than the average commodity checkoff program in promoting demand. These promotion elasticities are referred to as “promotion effectiveness” measures in this study.

For wheat export demand promotion funded with enhanced checkoff funds, we also assume that such an enhanced wheat promotion program would be as effective as the average existing export demand checkoff program. Figure 29 plots the 26 export promotion elasticities reported by the relevant checkoff program studies in Table 2. Some of the studies reported export demand elasticities for multiple exported commodities. Note that there are both negative and positive outliers in this case. Removing all of the negative export promotion elasticities (most of which are statistically insignificant) and the unreasonably high export promotion elasticities of about 0.2 or higher leaves 18 export promotion elasticities with a mean of 0.072. The export promotion elasticities that are one standard deviation above and below that mean are, respectively, 0.148 and 0.014.

To determine the potential level of additional checkoff expenditures into the future, we can begin by assuming a plausible range of additional wheat checkoff assessments. Currently, state wheat checkoff assessment rates vary widely from \$0.01/bu in Arkansas and Wyoming, \$0.15/bu in North and South Dakota⁵, \$0.2/bu in Arizona, Idaho, Colorado, Kansas, Minnesota, Montana, Oklahoma, and Texas, and \$0.05/bu in California, Oregon, and Virginia to 0.25% of the value of a bushel of wheat in Kentucky, 0.4% of the value of a bushel of wheat in Nebraska, 0.5% of the value of a bushel of wheat in Maryland, Michigan, North Carolina, and Ohio, and 0.75% of the value of a bushel of wheat in Washington. By way of comparison, the national soybean and sorghum checkoff assessment rates are currently set at 0.5% of value and 0.6% of value, respectively. The variance in the state assessments rates provides a reasonable range for considering the effects of different potential levels of additional checkoff expenditures on the returns to wheat producers.

⁵ South Dakota's wheat assessment rate will change to 0.4% of value in 2015.

Figure 28: Estimated Domestic Demand Promotion Elasticities for 44 Checkoff Activities Over 23 Checkoff Programs

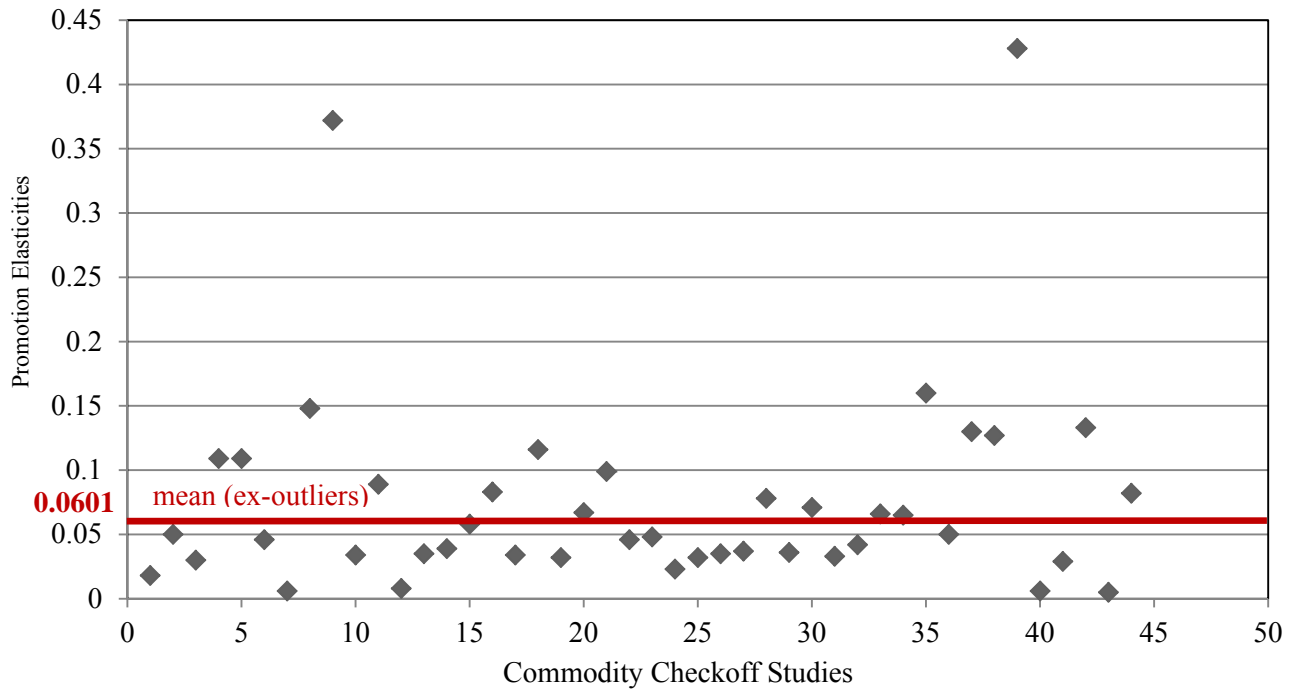
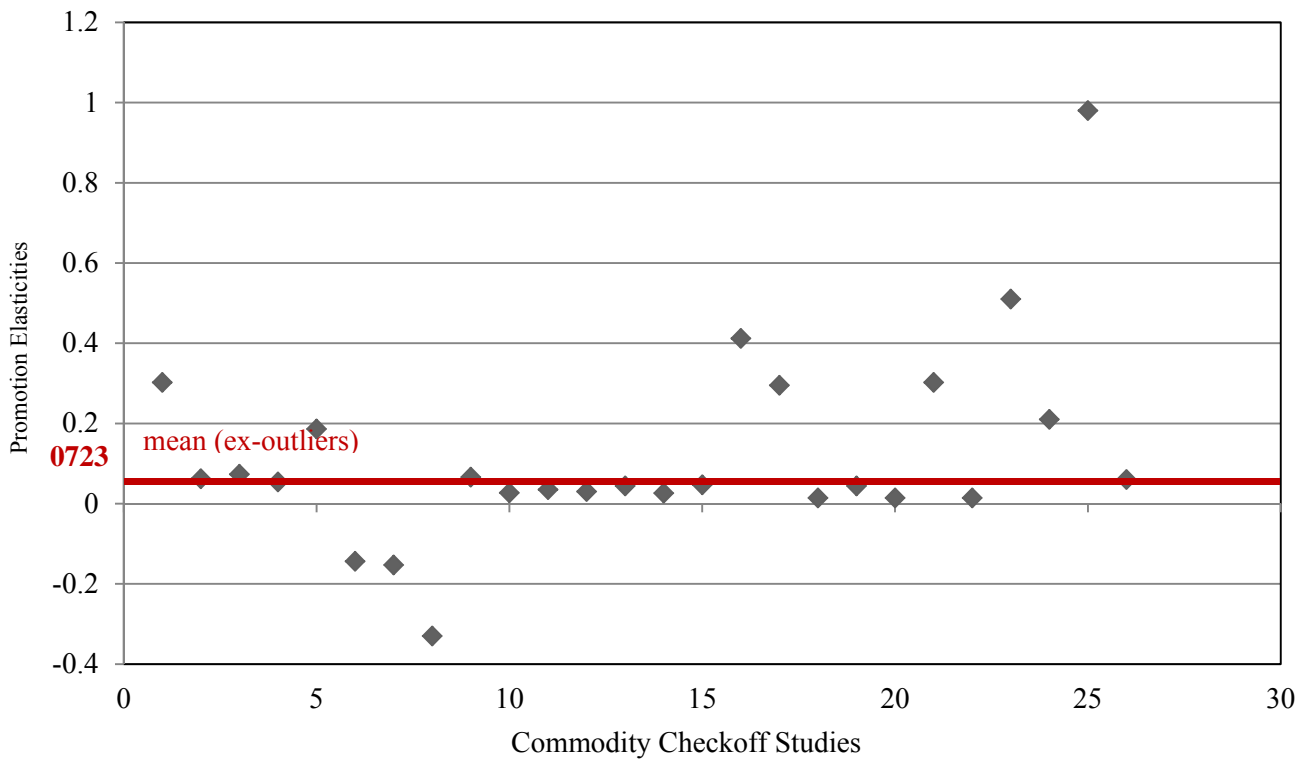


Figure 29: Estimated Export Demand Promotion Elasticities Reported for 23 Checkoff Programs



The assumed additional checkoff assessments can then be multiplied by some forecast level of wheat production for the per bushel rates or some forecast of wheat farm price for the percent of value rates to calculate the total amount of additional checkoff funds that could be made available in this way for wheat promotion. For the wheat production and price forecasts, we use two alternative sources of wheat market forecasts, USDA (Westcott and Trostle, 2014) and FAPRI (2014). The resulting amounts of additional wheat checkoff collections at the alternative additional assessment levels assuming 100% participation by producers using the FAPRI and USDA forecasts of wheat production and farm price through 2019/2020 are given in Tables 3 and 4, respectively. The estimated additional wheat checkoff collection totals at the \$0.01/bu, \$0.15/bu, and \$0.02/bu additional assessment levels using the USDA wheat forecast data (Table 4) are slightly higher than those using the FAPRI forecast data (Table 3) because the USDA wheat production forecasts are slightly higher than those of FAPRI on average. However, the estimated additional wheat checkoff collection totals at the additional 0.4% and 0.5% of value assessment rates using the FAPRI forecast data (Table 3) are substantially higher than those using the USDA forecast data (Table 4) because the FAPRI wheat farm price forecasts are higher than those of USDA on average.

This method of calculating the additional funds that might be available to fund an enhanced checkoff program is a realistic way of determining the potential cost to producers of funding such a program over a realistic potential future. Obviously, any number of other mechanisms might be devised to raise the additional funds to finance an enhanced checkoff program in future years. The method we use, however, produces a plausible range of additional checkoff funds that could be actually be raised over the next few years and the corresponding cost to wheat producers. Using the FAPRI forecast, the average annual range of potential additional wheat checkoff funds would range from \$21.5 million to \$67.5 million depending on the additional checkoff assessment level (Table 3). Using the USDA forecast gives a corresponding potential average annual range of \$21.6 million to \$57.0 million in additional wheat checkoff funds (Table 4).

Steps in the Analysis

Using these assumptions, the analysis of the potential returns from an enhanced wheat checkoff program proceeds in two steps. First, an estimated impact of an enhanced wheat checkoff program on U.S. wheat sales (domestic, export, and total) over 2012/13 to 2019/20 (the FAPRI forecast period) is first estimated assuming that the additional checkoff funds would be as effective in impacting sales as the average existing checkoff program. Using the mean of the checkoff elasticities for domestic sales promotion or export promotion (e_A) reported in the most recent studies of 23 checkoff programs, the marginal impact of checkoff promotion (A) on domestic wheat demand or wheat exports (Q) is measured as:

$$(1) \quad \frac{\partial Q}{\partial A} = e_A \frac{\bar{Q}}{\bar{A}} .$$

Table 3: Additional Wheat Checkoff Collections at Alternative Additional Assessment Levels using FAPRI Wheat Production Forecast, 2012/13-2019/20

Year	FAPRI Forecasts			Additional Wheat Checkoff Collections at Alternative Additional Assessment Rates				
	U.S. Wheat Production	U.S. Wheat Farm Price	U.S. Wheat Revenue ^a	\$0.01/bu	\$0.015/bu	\$0.02/bu	0.4% of value	0.5% of value
	million bu.	\$US/bu	\$US million					
2012/13	2,266	7.77	17,606.8	22.7	34.0	45.3	70.4	88.0
2013/14	2,130	6.87	14,633.1	21.3	31.9	42.6	58.5	73.2
2014/15	2,030	6.27	12,728.1	20.3	30.5	40.6	50.9	63.6
2015/16	2,160	5.73	12,376.8	21.6	32.4	43.2	49.5	61.9
2016/17	2,130	5.72	12,183.6	21.3	31.9	42.6	48.7	60.9
2017/18	2,146	5.79	12,425.3	21.5	32.2	42.9	49.7	62.1
2018/19	2,154	5.87	12,644.0	21.5	32.3	43.1	50.6	63.2
2019/20	2,166	5.90	12,779.4	21.7	32.5	43.3	51.1	63.9
Total			107,377.1	171.8	257.7	343.6	429.5	536.9
Mean			13,422.1	21.5	32.2	43.0	53.7	67.1

^a Production x price.

FAPRI forecast source: FAPRI (2014)

Table 4: Additional Wheat Checkoff Collections at Alternative Additional Assessment Levels using USDA Wheat Production Forecast, 2012/13-2019/20

Year	USDA Forecasts			Additional Wheat Checkoff Collections at Alternative Additional Assessment Rates				
	U.S. Wheat Production	U.S. Wheat Farm Price	U.S. Wheat Revenue ^a	\$0.01/bu	\$0.015/bu	\$0.02/bu	0.4% of value	0.5% of value
	million bu.	\$US/bu	\$US million					
2012/13	2,266	7.77	17,606.8	70.4	88.0	45.3	70.4	88.0
2013/14	2,130	7.00	14,910.0	59.6	74.6	42.6	58.5	73.2
2014/15	2,220	4.90	10,878.0	43.5	54.4	44.4	50.9	63.6
2015/16	2,205	4.35	9,591.8	38.4	48.0	44.1	49.5	61.9
2016/17	2,145	4.30	9,223.5	36.9	46.1	42.9	48.7	60.9
2017/18	2,080	4.45	9,256.0	37.0	46.3	41.6	49.7	62.1
2018/19	2,100	4.60	9,660.0	38.6	48.3	42.0	50.6	63.2
2019/20	2,120	4.75	10,070.0	40.3	50.4	42.4	51.1	63.9
Total			91,196.1	172.7	259.0	345.3	364.8	456.0
Mean			11,399.5	21.6	32.4	43.2	45.6	57.0

^a Production x price.

USDA forecast source: Westcott and Trostle (2014)

Assuming that all additional wheat checkoff collections are spent on domestic or export demand promotion (or both), the potential change in domestic demand or exports in each year at each additional checkoff expenditure level is calculated by multiplying equation (1) above by the checkoff collections in each year at each checkoff rate assessment level. Then, multiplying the quantity impact (for domestic demand or exports) by the price forecasts from USDA and FAPRI provides two separate forecasts of the domestic and export sales revenue change related to the checkoff expenditures for each additional alternative assessment level in each year (the “USDA checkoff revenue forecasts” and the “FAPRI checkoff revenue forecasts”). To provide a

reasonable range of results, this calculation also is done using promotion elasticity values (the rates of “program effectiveness”) that are one standard deviation above the mean promotion elasticity (“high” program effectiveness) and one standard deviation below the mean promotion elasticity (“low” program effectiveness). The result is six sets of potential additional sales revenue impact measures for both domestic demand and exports in each year corresponding to the three promotion effectiveness measures (“high,” “low,” and “mean”) for the two sets of wheat farm price forecasts (USDA and FAPRI).

The second step is to calculate the BCR levels that would result if the potential additional sales revenue increases calculated were achieved with the five alternative additional checkoff program assessment levels (\$0.01/bu, \$0.015/bu, \$0.02/bu, 0.4% of value, and 0.5% of value)⁶. The result is 3 sets of BCRs at each assessment level: (1) a “low” BCR using the “low” promotion effectiveness measure, (2) a “mean” BCR using the “mean” program effectiveness measure, and (3) a “high” BCR using the “high” program effectiveness measure). The 3 sets of estimated BCRs correspond to each of the alternative additional checkoff assessment levels for both domestic demand and export demand. These BCRs are calculated assuming that either domestic demand or exports are promoted with all available additional checkoff funds but not both at the same time. A third set of BCRs are calculated for total demand which assumes that both domestic demand and exports are promoted simultaneously with the additional funds. In this case, the forecast additional checkoff funds are allocated to domestic demand and exports according to the weight of each in total demand.

Benefit-Cost Analysis

As usually calculated, a Producer Benefit-Cost Ratio (PBCR) is the additional industry revenues (net of checkoff assessments) earned by producers valued at the farm level as a consequence of the checkoff expenditures divided by the historical level of checkoff expenditures made to generate that additional revenue. The gross revenue BCR is, thus, calculated as:

$$(2) \text{ } GBCR = \sum_{t=1}^T \frac{R_t}{E_t}$$

where R is the additional revenues generated by the checkoff program over the period of analysis (T years) and E is the checkoff expenditures over that same period. Because the checkoff represents a cost to producers, checkoff expenditures in each year (E_t) must be netted out of the additional profit generated (R_t) in those years (i.e., $R_t - E_t$) to arrive at the *net* grower profit BCR:

$$(3) \text{ } NBCR = PBCR - 1 .$$

⁶ We do not use a 0.25% of value paid in one state because the funding level implied is not much different from the lower end of the per bushel rates used. Also, we exclude the 0.75% of value level in a few states from consideration as being too high for an initial *additional* checkoff under a new enhanced checkoff program.

In this analysis, two alternative sets of additional revenue generated (R_i) are calculated (the “USDA checkoff revenue forecast” and the “FAPRI checkoff revenue forecast” as discussed earlier). Five alternative sets of checkoff expenditures (E_i) are calculated corresponding to the five alternative levels of additional wheat checkoff assessments (see Tables 3 and 4). Because the USDA and FAPRI checkoff revenue forecasts were each generated for three demand variables (domestic demand, exports, and total demand) with three alternative estimates of checkoff promotion impact (“high,” “low,” and “mean” checkoff program effectiveness) at the five alternative levels of additional checkoff expenditures, 90 alternative BCRs are calculated to represent the potential range of BCRs that the wheat industry might realistically expect from the implementation of an enhanced wheat checkoff program.

The calculated BCRs are presented in two tables representing the BCR estimates based on the two sources of wheat market forecasts (FAPRI and USDA). Table 5 provides the BCR estimates based on the FAPRI forecasts. Table 6 provides the BCR estimates based on the USDA forecasts. As indicated earlier, the BCR estimates for “domestic demand” in the two tables assume that all additional checkoff funds at the respective additional assessment levels were spent on only on domestic demand promotion. Likewise, the BCR estimates for “export demand” in the two tables assume that all additional checkoff funds at the respective alternative assessment levels were spent only for export promotion. Finally, the BCR estimates in both tables for “total demand” assume that the additional checkoff funds at each alternative assessment level were spent simultaneously for both domestic and export demand promotion. In the latter case, the share of the additional checkoff funds spent on domestic and export demand promotion were set to be proportional to the shares of domestic and export demand in the total U.S. demand for wheat.

There is little qualitative difference between the BCR estimates based on the FAPRI and on the USDA forecasts. The BCR estimates based on the USDA estimates are somewhat smaller than those based on the FAPRI forecasts primarily because of the lower forecast farm price of wheat and, therefore, a smaller value of the demand generated by promotion expenditures. In both cases, the export demand BCRs vary more widely than is the case for domestic demand promotion because of the greater variance in the export promotion elasticities than for domestic demand promotion elasticities across checkoff promotion studies. For that reason, the lowest and the highest estimated BCRs in both cases are for export demand promotion. The lowest export demand BCRs are for the highest levels of checkoff expenditure and the lowest level of export promotion elasticity. At the same time, the highest export promotion elasticities are for the lowest levels of checkoff expenditure and the highest level of export promotion elasticity.

The estimated domestic demand promotion BCRs based on the FAPRI and USDA forecasts are in the range of \$1.38 - \$36.12 and \$1.41 - \$30.72, respectively (Table 5). For export demand promotion, the BCR estimates based on the FAPRI and USDA forecasts are in the range of \$0.36 - \$43.88 and \$0.35 - \$36.66, respectively. For total demand, the BCRs are in the range of \$0.92 - \$39.64 and \$0.93 - \$33.30, respectively. Note that the BCRs at all levels of program effectiveness

Table 5: Potential BCRs for an Enhanced Wheat Checkoff Based on FAPRI Forecasts

Additional Assessment Levels	Domestic Demand Promotion			Export Demand Promotion			Total Demand Promotion		
	Low	Mean	High	Low	Mean	High	Low	Mean	High
	net revenue per checkoff \$ spent			net revenue per checkoff \$ spent			net revenue per checkoff \$ spent		
\$0.01/bu	6.44	21.28	36.12	3.25	20.99	43.88	5.00	21.15	39.64
\$0.015/bu	3.96	13.86	23.75	1.84	13.66	28.92	3.00	13.77	26.10
\$0.02/bu	2.72	10.14	17.56	1.13	9.99	21.44	2.00	10.08	19.32
0.4% of value	1.98	7.91	13.85	0.70	7.80	16.96	1.40	7.86	15.26
0.5% of value	1.38	6.13	10.88	0.36	6.04	13.36	0.92	6.09	12.01

Table 6: Potential BCRs for an Enhanced Wheat Checkoff Based on USDA Forecasts

Additional Assessment Levels	Domestic Demand Promotion			Export Demand Promotion			Total Demand Promotion		
	Low	Mean	High	Low	Mean	High	Low	Mean	High
	net revenue per checkoff \$ spent			net revenue per checkoff \$ spent			net revenue per checkoff \$ spent		
\$0.01/bu	5.35	18.04	30.72	2.55	17.35	36.36	4.10	17.73	33.30
\$0.015/bu	3.24	11.69	20.15	1.37	11.23	23.97	2.40	11.49	21.87
\$0.02/bu	2.18	8.52	14.86	0.78	8.18	17.73	1.55	8.36	16.15
0.4% of value	2.01	8.01	14.01	0.68	7.69	16.73	1.41	7.87	15.23
0.5% of value	1.41	6.21	11.01	0.35	5.95	13.18	0.93	6.09	11.99

(low, mean, and high) for both forecast scenarios decline as the additional funding level increases. That is the expected result since revenues tend to increase at a decreasing rate as funding increases at a given level of program effectiveness. In other words, the impact of each additional dollar spent on promotion is not constant but rather declines as funding increases. Again, that is the principle of diminishing returns. So as funding increases, industry revenues also increase, capturing some of the unrealized benefits of spending at lower levels. But the additional revenue generated by each additional dollar spent (known as the marginal revenue) tends to decline as funding increases so that the revenue increases at a decreasing rate. As a result, the BCR, which is calculated as the ratio of revenues to expenditures, declines as funding increases. The BCR increases at lower levels of funding because the marginal revenue (the gain in revenue per dollar spent) is higher at lower levels of revenue. But even though the BCR is

higher, the industry revenues generated are also lower. As a consequence, estimated BCRs really should not be compared across checkoff programs (although it is done all the time). A higher BCR for one checkoff program compared to another may simply mean that the funding level is much lower for the high BCR program and have nothing at all to do with the relative effectiveness of the investments of checkoff funds between the two programs.

One interpretation of these results is that the range of possible BCRs is too wide to be useful for determining whether or not to move forward with an enhanced wheat checkoff program. Perhaps a better interpretation of these BCR results, however, is that despite the wide disparity in assumed demand promotion effectiveness, potential funding levels, and wheat market forecasts, the BCRs across most assumptions are positive and greater than one. That is, an enhanced wheat checkoff program is likely to be effective in generating a positive return to producers under most assumptions. To remind us of the possibility that an enhanced wheat checkoff program might not benefit wheat producers under all possible assumptions, however, some of the estimated BCRs turn out to be less than one, meaning that less than one dollar is returned to producers per additional dollar spent on promotion. Note, however, that all BCRs estimated to be less than one assume a “low” level of program effectiveness. Under the assumption of an average or high level of program effectiveness, the estimated BCRs all much in excess of 1.

Another way to use these result is to determine the additional checkoff assessment level needed to achieve a given BCR at different levels of domestic demand promotion effectiveness (using the FAPRI forecast numbers for this analysis). Table 7 provides examples of achieving a BCR of 6-to-1 at different levels of promotion effectiveness and the additional checkoff assessment level required to achieve that BCR given all the assumptions implicit in this analysis as discussed earlier. Given an average (mean) level of promotion effectiveness, a 6-to-1 BCR can be achieved with an additional 0.5% of value checkoff assessment (about 3.2¢/bu) that generates \$60.8 million in checkoff funds annually (\$547.0 million over 9 years) which creates cumulative additional domestic sales revenues of \$3,828.8 million over the nine-year period of analysis (2012/13 through 2019/20) (the bold middle column in the top of Table 7). Note that investing that same amount of additional checkoff funds from the additional 0.5% of value assessment at a lower level (low) of promotion effectiveness (that is, a less effective promotion program with the same number of additional checkoff dollars) would yield a lower additional sales revenue of \$1,278.2 million over the nine year period along with a lower BCR of 1.3 (see the column to the left of the bold column in the top part of Table 7). If, however, those same funds were invested more effectively (“high” effectiveness), the cumulative, nine-year additional revenue earned would increase to \$6,379.4 million with a higher BCR of 10.7 (the top right column of Table 7).

At a lower level of promotion effectiveness, however, achieving a 6-to-1 BCR would require fewer additional funds to achieve the additional lower level of revenues that are generated with the lower level of promotion effectiveness (bold left column in the bottom of Table 7). The additional revenues returned to producers, however, would also be much smaller (\$1,082.5 million over the nine years for the low level of effectiveness with a 6-to-1 BCR compared to

Table 7: Additional Wheat Checkoff Assessment Required to Achieve a Target 6-to-1 BCR

BCR Target: 6-to-1	Effectiveness of Additional Checkoff Expenditures		
	Low	Mean	High
Target Revenue (\$mil)	1,278.2	3,828.8	6,379.4
Total Expenditures Required (\$ mil)	547.0	547.0	547.0
Average Expenditures Required per Year (\$ mil)	60.8	60.8	60.8
Assessment per bushel (¢/bu)	3.2	3.2	3.2
Assessment % of value	0.5	0.5	0.5
BCR (\$ revenue/\$ expenditure)	1.3	6.0	10.7
BCR Target: 6-to-1	Low	Mean	High
Target Revenue (\$mil)	1,082.5	3,242.4	5,402.3
Total Expenditures Required (\$ mil)	154.6	154.6	154.6
Average Expenditures Required per Year (\$ mil)	17.2	17.2	17.2
Assessment per bushel (¢/bu)	0.9	0.9	0.9
Assessment % of value	0.1	0.1	0.1
BCR (\$ revenue/\$ expenditure)	6.0	20.0	34.9

\$3,828.8 million over that period with an average level of promotion effectiveness with the same 6-to-1 BCR). Note that the same low level of funds invested at higher levels of promotion effectiveness would generate much higher BCR levels (\$20.0 and \$34.9 for an average and a high level of effectiveness, respectively), indicating the need to increase funding to capture unrealized revenues.

Also note that a low level of additional checkoff funds can generate higher levels of returns to producers if the promotion programs are more effective in promoting demand. For example, compare the \$5.4 billion in additional sales that could be generated over nine years with additional annual checkoff expenditures of just \$17.2 million at a high level of promotion effectiveness in the lower half of Table 7 to the \$3.8 billion in additional revenues that could be generated at a lower level of promotion effectiveness with additional annual expenditures of over \$60 million (upper half of Table 7). The implication is that the level of BCR as well as the level of revenues returned to producers from a checkoff program depend not only on the level of checkoff funding but also the effectiveness of the checkoff funded activities in generating demand. Obviously, a high level of checkoff funds that is squandered will return much less to producers than a much smaller amount of checkoff funds that is effectively managed and invested to promote demand.

Finally, also note from Table 7 that BCRs tend to be inversely related to the level of funding at the same level of checkoff program effectiveness. For example, investing the additional funds from the relatively small checkoff of \$17.2 of annual expenditures at a high level of promotion effectiveness would generate \$5,402.3 million over nine years (2013/13-2019/20) and a BCR of 34.9 (bottom right column of Table 7). At that same level of promotion effectiveness, however, a higher level of additional promotion expenditures of over \$60 million annually would generate nearly a billion dollars more of additional producer revenue over the same nine years (\$6,379.4 million in the top right column of Table 7) but a lower BCR of 10.7.

Conclusions and Implications for the Implementation of an Enhanced Wheat Checkoff Program

Two main questions were addressed in this study: (1) What are the strengths, weaknesses, opportunities, and threats facing the U.S. wheat industry and how might the implementation of an enhanced wheat checkoff program prove helpful in combatting any negative market effects? (2) Would the implementation of an enhanced wheat checkoff program likely benefit wheat producers?

Key Conclusions of the Study

Regarding the first question, the study concludes that despite reasons for optimism about the U.S. wheat industry, a number of specific negative forces threaten the future viability and profitability of the industry. The key negative forces facing the industry on both the supply and demand sides of the market include:

- low relative growth of wheat productivity;
- low relative returns to wheat production;
- increased market price volatility;
- the complexity of crop insurance as opposed to traditional farm policy tools;
- disruptions of or inaccessibility to transportation systems for wheat producers;
- wheat quality concerns;
- the uninformed consumer regarding GMO, gluten, and other wheat consumption issues;
- growing wheat export competition; and
- uncertain future domestic demand for wheat and the impact of noneconomic demand drivers like health and diet.

The implementation of an enhanced wheat checkoff program, strategically designed to target these forces in the wheat industry, could effectively help counteract their negative market effects. A few examples of activities that might be funded by an enhanced checkoff program to combat these negative forces include the following:

- research to boost yields, lower the cost of production, develop new wheat varieties that are drought tolerant and disease and pest resistant that meet end-user specifications;
- support for the development of producer decision aids and other producer information and tools to support efficient farm production decisions;
- the organization of a Wheat Transportation Coalition funded by the checkoff to focus on key issues in wheat transportation;
- research on the safety and nutritional aspects of U.S. wheat and wheat products;
- mass media campaigns directed to wheat product consumers, health providers, government agencies, and others based on sound scientific evidence to combat growing gluten- and GMO-related concerns;
- trade servicing in the U.S. and wheat importing countries to demonstrate U.S. productive capacity and reliability as a supplier, advertising in trade periodicals; promotional material for food buyers; and other similar activities;
- technical assistance to food manufacturers to expand the type, quality, and number of uses of wheat and wheat products; and
- consumer promotion including media campaigns to promote consumption of wheat-based products; consumer education seminars; baking/cooking seminars for institutional nutritionists, cooks, and food buyers, etc.

Regarding the question of whether or not producers might actually benefit from the implementation of an enhanced wheat checkoff program, the primary conclusion of this study is that such a program would likely return more to wheat producers than the additional cost of the program to producers. More specifically, the report concludes:

- The range of potential benefit-cost ratios (BCRs) to an enhanced wheat checkoff program is quite wide but most potential BCRs are greater than one under all alternative assumptions of the analysis. That is, an enhanced wheat checkoff program would likely generate a positive return to producers under most assumptions.
- The levels of the returns to an enhanced wheat program and of the associated BCRs depend critically on the effectiveness with which the additional funds are invested to enhance demand, the level of the funding increase, and future wheat prices and quantities. Obviously, a high level of checkoff funding could generate a low return to producers if the additional checkoff funds are squandered. By the same token, a lower level of additional funding could generate higher returns if the additional funds are more effectively managed and efficiently invested to enhance demand. Also, the value of the returns to producers will be affected by the level of the future price of wheat.
- A high BCR should not be considered the main target for an enhanced wheat checkoff program but rather the additional revenues to producers generated by the checkoff investments. BCRs and funding levels tend to be inversely related at same level of promotion effectiveness. That is, as funding grows, revenues grow as well but at a decreasing rate so that BCRs decline as funding increases. As a consequence, estimated BCRs really should not

be compared across checkoff programs even though such comparisons are common practice. A higher BCR for one checkoff program compared to another may simply mean that the funding level is much lower for the high BCR program and have nothing at all to do with the relative effectiveness of the investments of checkoff funds between the two programs.

- A high BCR generally implies that a checkoff program is underfunded. As funding increases, the checkoff investments capture some of the revenues that are unrealized at lower funding levels. In the process, however, the BCR tends to drop. Given a level of program effectiveness, the optimal BCR, therefore, is 1-to-1 because any additional increase in funding will generate smaller increases in revenue than the additional checkoff cost to producers. For most effective checkoff programs with currently healthy BCRs, however, an extraordinarily large increase in checkoff funding would normally be required for their BCRs to drop to the 1-to-1 level. In the late 1970s with total checkoff funding around \$10 million, the (voluntary, state-level) soybean checkoff program generated an estimated BCR of about 14-to-1 (Williams, 1985). Over time, funding for the soybean checkoff program has grown dramatically to over \$120 million. The most recent estimated BCR for the soybean checkoff program is 6.5-to-1 (Williams, Capps, and Lee, 2014). Even the extraordinary increase in soybean checkoff funding has not driven the soybean checkoff BCR to 1-to-1 likely because soybean checkoff promotion investments continue to be made at incrementally higher levels of effectiveness.
- The same level of BCR can be generated by many different levels of additional funding depending on the levels of program effectiveness. By the same token, different BCRs can be generated for the same level of additional funding depending on the level of program effectiveness at that level of additional funding. At a given level of program effectiveness, however, higher levels of funding generate higher levels of revenues for producers and result in lower BCRs. An increase in program funding along with an increase in program effectiveness can result in higher BCRs.

Implications for the Implementation of an Enhanced Wheat Checkoff Program

The study results and conclusions provide the basis for drawing some implications for the establishment, operation, and potential returns of an enhanced wheat checkoff program. The primary implication is that such an enhanced program is likely to work in the sense that producer returns are likely to be greater than the costs of the program. The real question is how much of a return could producers expect? The answer to that question depends critically on how effectively the additional wheat checkoff funds are invested and on the level of additional funding.

Other, related implications of this study include the following:

- The BCR to additional funds spent under an enhanced wheat checkoff program would likely be high in the early years of the program and then drop over time if the additional funding level increases. However, learning, increased experience, and greater efficiency in investing

the additional funds available to promote demand under an enhanced checkoff program of a given size over time would likely generate some scale effects that enhance the BCR to the additional funds invested even without an increase in the level of the additional funding.

- What checkoff funds are spent on makes a difference for the returns to producers. For example, a large increase in checkoff funds that is squandered or invested in ineffective promotional efforts will likely return less to producers than a smaller increase in funding that is invested in highly effective promotional activities. Studies of other checkoff programs suggest that some activities may be more effective than others in enhancing demand. For example, Williams, Capps, and Lee (2014) show that one reason for the decline in the soybean checkoff BCR over the years has been a long-term decline in the proportion of funds invested in export promotion which tends to have a higher promotion elasticity than domestic demand promotion for soybeans. Also, state checkoff groups tend to invest a large share of their funds in production research to enhance yields and reduce production cost. Such an option is available for an enhanced wheat checkoff program as well. Williams, Capps, and Lee (2014) demonstrate for the soybean checkoff program, however, that the allocation of checkoff funds to soybean production research over time has increased to the point that the supply effects of those investments are beginning to overwhelm the demand-enhancing effects of domestic and export demand promotion. The consequence has been an erosion of the estimated soybean checkoff program BCR over time.
- Given the critical nature of how any increase in wheat checkoff funds is allocated among potential promotional activities under an enhanced wheat checkoff program, those charged with managing the allocation of the increased funds would be well-advised to conduct a study of best practices across commodity checkoff groups to determine not only the most impactful type of activities in which to invest but also the most effective mechanisms for managing and investing the additional checkoff funds. “Doing things right” is important in terms of developing processes to collect and manage additional checkoff funds, defining the administrative responsibilities of those charged with managing the additional funds, establishing goals, objectives, budgets, and so on. More important, perhaps, is “doing the right things” in terms of the markets (retail and/or food service promotion, domestic and/or international, demand promotion and/or production research, etc.) and the types of activities (television, radio, internet, and/or print advertising, point-of-sale promotions, coupons, recipes, technical and trade servicing, support for advertising activities of wheat product manufacturers and retailers, etc.) in which to invest the additional checkoff funds. An in-depth review of best practices in the commodity checkoff industry would be important as an early activity of a newly implemented enhanced wheat checkoff program.
- Setting the initial level of the additional wheat checkoff assessment is important and should probably not begin at a high level. This study demonstrates that the BCR would likely be high for an initial modest increase in wheat checkoff funds which would communicate well to stakeholders and provide the basis for seeking an additional increase in the funding level over time. Also, attempting to manage too many funds early in the life of an enhanced wheat

checkoff program could result in waste and inefficiency until those charged with managing the increased funds gain sufficient experience with administering and investing the funds.

- To demonstrate the effectiveness of checkoff promotion activities to stakeholders and to provide guidance for program management, those charged with managing any additional funds generated through an enhanced wheat checkoff program should plan for periodic external evaluations of the program's effectiveness. Such return-on-investment studies are required generally every five years for federally mandated checkoff programs.
- To facilitate such evaluations, an early consideration in the process of implementing an enhanced wheat checkoff program should be the development of a system or process to collect and maintain all data and other information regarding checkoff program activities and expenditures by type of activity, product, and market segment. Failure to develop such a system at the outset could severely limit the ability of researchers to provide useful evaluations of the impact of the increased checkoff funding.
- Care must be taken in communicating the results of this benefit-cost analysis (or any future benefit cost analyses of an enhanced wheat checkoff program) to stakeholders. Past experience suggests that inevitably some producers will ask something like: "If the returns to producer contributions of checkoff dollars (or additional checkoff dollars) are so high, then where are my high returns for every checkoff dollar that I have been already been assessed?" The question conveys a common lack of understanding of not just the results of checkoff evaluation studies but also how a checkoff program returns value to them. The basic problem is that all producers can easily identify the line on their balance sheets for the cost to them of the checkoff assessments they have paid. But there is no line on their balance sheets for what their contributions to the checkoff program have returned to them in additional revenues. They often fail to understand that the "returns" to their checkoff contributions are actually included in the revenue line on their balance sheets. Some part of that revenue has come from the larger volume of the commodity that the checkoff program has enabled them to produce and sell. This study concludes that, if an enhanced wheat checkoff program is implemented, the revenue line on wheat producers' balance sheets will be supplemented by additional revenues much in excess of their additional contributions of checkoff dollars. If such a program is actually implemented, a competent ROI evaluation of the program would be designed specifically to identify that part of the industry revenue stream that has been generated by the additional checkoff dollars rather than by any other market event or force. Then, when compared to the actual costs of the program, the "returns" that producers realize often becomes more apparent. For example, the most recent study of the soybean checkoff program (Williams, Capps, and Lee, 2104) concludes that about 5% of soybean farm cash receipts are generated by the checkoff program.
- Finally, a common mistake made by checkoff groups is to represent a checkoff program to stakeholders as the panacea to their financial problems in an effort to gain support for the establishment or enhancement of such a program. In fact, checkoff programs are only one of many forces that affect markets, including relative price changes, weather, agricultural

policies, changes in incomes, population growth, competition for consumer sales from competing suppliers and products, consumer health concerns, demographic trends, and many more as discussed in the first section of this report. Frankly, many of those forces are much more powerful drivers of commodity markets like wheat than checkoff programs. Nevertheless, stakeholders often come to expect large impacts on their bottom lines from their contributions or any increase in their contributions to a checkoff program given the benefits touted for such programs. Checkoff programs, however, actually generate a small amount of funds to invest in promotion compared to the size of their industries, generally no more than a fraction of 1% of the total industry sales each year. With such a low level of investment compared to sales, the overall market impact of a commodity promotion program could hardly be expected to be huge. When they fail to see the large impact on their returns that they have been led to expect, producers tend to become disenchanted with the program and how it is being managed. Consequently, beginning in the early stages of discussion of an enhanced wheat checkoff program, the actual potential of the program should be emphasized to avoid unrealistic expectations if the program becomes reality. Also helpful would be to consistently characterize an enhanced wheat checkoff program (before and after implementation) as an effective tool for producers to work collectively to help reduce downside pressure on prices and profits in bad years and contribute to higher prices and profits in good years rather than as a panacea to all the financial problems they face. A subsequent ROI study after some period of program implementation that shows positive returns would serve to reinforce support for the program.

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