Can U.S. and Great Plains Agriculture Compete in the World Market?

By Alan Barkema and Mark Drabenstott

The past 15 years have seen extraordinary change in the nation's farm trade. The 1970s began with farm exports a small, little-noticed part of U.S. agriculture. Starting in 1972, those exports began to boom, swelling to nearly $44 billion in 1981. As exports grew, so did confidence that the United States would be the world's granary for years to come.

The export boom crashed in the 1980s, and U.S. agriculture's confident expectations gave way to serious questions. Can the United States compete in the world food market? Will the United States be forced to downsize its agricultural industry in the face of weak demand abroad? The answers bear on the future of U.S. agriculture in fundamental ways that will influence the financial health of the industry, the regional mix of agricultural production in the United States, and the evolution of farm policy.

This article concludes that U.S. and Great Plains agriculture both retain significant competitive advantages but that more rapid growth in world food trade is needed to exploit those advantages. Conclusions about competitiveness in agriculture are necessarily imprecise because farm and trade policies here and abroad distort markets. Moreover, investments abroad have significantly diminished the competitiveness of U.S. agriculture. Nonetheless, evidence shows the United States still holds a strong competitive position in a number of farm commodities because of its leadership in agricultural technology and its superior agricultural infrastructure.

To support these conclusions, the article focuses on U.S. and Great Plains agriculture in four steps. First, recent trade patterns for basic U.S. farm commodities are discussed to show the challenge facing U.S. agriculture. Second, the essential factors that determine the competitiveness of U.S.

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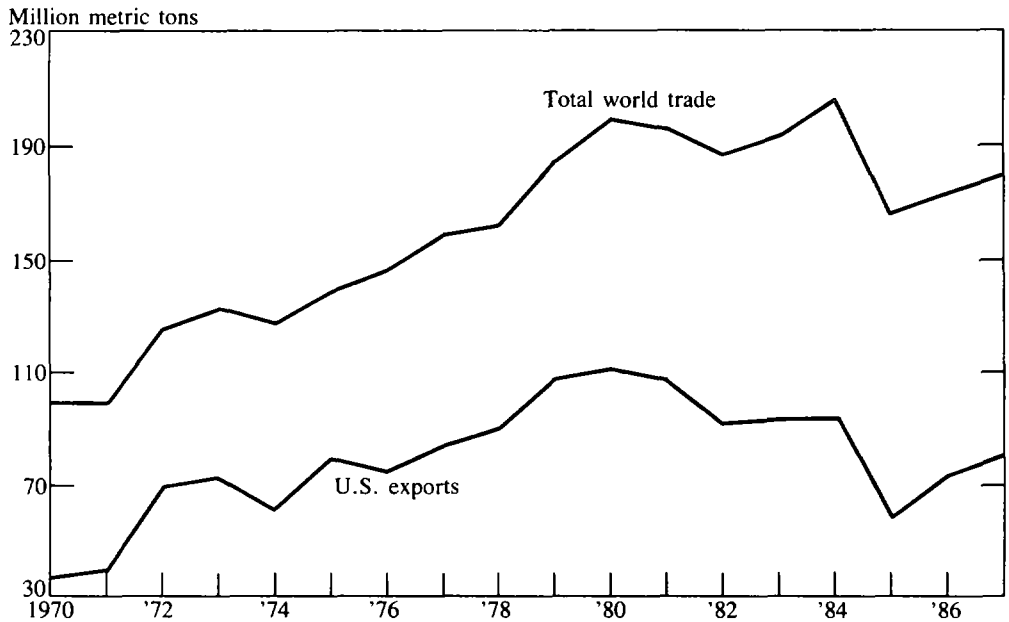
CHART 1
World wheat and coarse grains trade



agriculture are identified. Third, current and prospective trends in these key factors are compared for the United States, separate U.S. growing regions, and other countries. Finally, future directions in the competitiveness of U.S. and Great Plains agriculture are explored in light of possible trade and policy developments.

Trends in U.S. agricultural trade

Two clear trends have been at work in U.S. agricultural trade in recent years. First, world food trade has been stagnant as a result of a weak world economy. This stagnation has meant the United States has been facing an extremely weak market for its farm products. And second, competing supplies have increased.

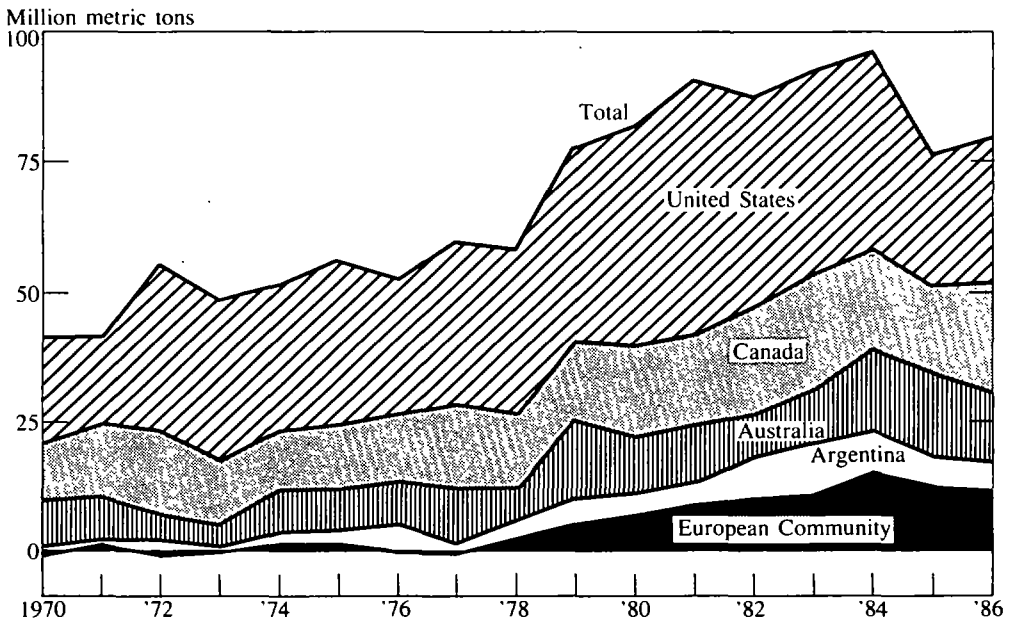
In discussing these trends, this section focuses on the farm commodities most basic to U.S. agricultural trade—feed grains, soybeans, and wheat. Together, these commodities account for roughly 60 percent of the value of U.S. agricultural exports. These crops also are the principal commodities produced in the Great Plains states.[1] Thus, focusing attention on this handful of commodities leads to some broad conclusions about both U.S. and Great Plains agriculture.

Slowing world food demand

Burgeoning grain trade in the 1970s made the United States the world's most important food exporter. In the 1970s, world trade in wheat and coarse grains grew at an annual rate of more than 7 percent (Chart 1). Growth in world trade

[1] The Great Plains region includes all or parts of the states of Colorado, Kansas, Montana, Nebraska, New Mexico, North Dakota, Oklahoma, South Dakota, Texas, and Wyoming.

CHART 2
World wheat trade: major exporters



stopped in the early 1980s, however, and then declined sharply in 1985. Growth in world wheat and coarse grain trade stagnated because of the crippling effects of the 1981-82 recession. Also, many developing countries suffered sharp reductions in foreign exchange when world commodity prices slumped as a result of the unwinding of price inflation in many industrial countries. Wheat and coarse grain trade has rebounded some in the last two years, but still remains well below peak levels.

The slump in world trade quickly translated into lost export markets for U.S. farmers. U.S. exports of wheat and coarse grains peaked in 1981, leveled out for two years, and then began to decline. Reductions in world trade came mostly at the expense of the United States. In 1985, for example, more than 85 percent of the 40 million metric ton drop in world trade was in U.S. exports.

Increasing world supply

The export difficulties of U.S. producers were made worse in the early 1980s by the sudden emergence of keen competition abroad. Competition grew from production expansion in traditional importing areas—the European Community and China, for example—as well as in traditional exporting areas. Although foreign production had increased steadily throughout the 1970s, strong growth in world demand made room for those additional supplies. Not until world trade stopped growing and began shrinking did U.S. agriculture come face to face with its foreign competition.

Wheat markets. The world wheat market became extremely competitive in the 1980s. When world trade was expanding in the 1970s, the United States was able to increase its market share from a fifth in 1970 to almost a half in 1981 (Chart 2). But as world demand fell and other

supplies increased, the U.S. share fell to a fourth in 1985. Meanwhile, Argentina, Australia, Canada, and the European Community steadily built market share. The European Community, for example, was a net importer in the 1970s, but it has held 13 to 15 percent of the world wheat market for the past few years. Australia's market share is more than half again larger than in the 1970s. And the Canadian share has nearly doubled, while Argentina's share, though still small, has tripled.

Feed grain markets. The United States has remained the major exporter of feed grains throughout the 15-year cycle in world grain trade. Even so, the United States has lost some of the overwhelming market share it had in the late 1970s. By 1979, the United States held nearly 80 percent of the world corn market, only to watch that share dip to between 50 and 60 percent the last two years. Argentina has clearly added to its market share, although sizable variations in production affect its share any given year. A collection of small exporters also has cut into the U.S. market.

Soybean markets. U.S. producers are still the dominant soybean exporters, but their position has eroded. The United States supplied four-fifths of the world soybean market in the 1970s, but that share has fallen to as low as two-thirds in 1984. Argentina has become a strong competitor and Brazil remains a key world supplier. Soybean trade has also suffered in recent years from large supplies of competing oils, notably Malaysian palm oil.

Effects on great plains agriculture

What effect have these fundamental trends in world supply and demand had on Great Plains agriculture? The most significant effect has been on the intensity of cultivation. Having broad regions of marginal crop land, the Great Plains traditionally has devoted a large portion of its acreage to grazing. The surge in U.S. farm exports caused many marginal acres to shift into crop land use. The Great Plains had about 48.8 million acres in the production of wheat, corn, soybeans, and sorghum in 1970. By the time U.S. farm exports peaked in 1981, that crop base had been boosted to 76.0 million acres, a 55 percent increase. The expansion in the Great Plains accounted for 37 percent of the total U.S. expansion in these crops. The problem facing the region now is the reduction of this expanded crop base. Much of the Great Plains' grain is produced on marginal land and is not needed under current world demand.

Summary

U.S. agriculture is facing weak world demand and large world supplies. As residual supplier to the world market, the United States has borne a disproportionate burden in reduced exports, increased stocks, and excess production capacity. The Great Plains responded to the growth in world trade in the 1970s by swinging some 27 million acres into crop production. Now, U.S. and Great Plains agriculture must ponder whether they can remain competitive in the world market, and if not, how to idle excess productive capacity.

What determines competitiveness?

This section assesses the current competitiveness of U.S. and Great Plains agriculture. Competitiveness is defined as the ability to attain and maintain a given share of the world export market.[2] Distinctions are also made between static

[2] The definition of the term competitiveness used in this article is that adopted by John C. Dunmore, "Competitiveness and Comparative Advantage of U.S. and Southern Agriculture," Conference on Competitiveness of Southern Agriculture, Atlanta, Georgia, November 1986. Dunmore also provides an excellent comparison of the concepts of comparative advantage and competitiveness.

and dynamic assessments of competitiveness. The static competitiveness of U.S. agriculture is assessed by comparing production costs in the Great Plains and other major U.S. producing regions with foreign production costs. By contrast, the rate at which cost competitiveness is changing—dynamic competitiveness—is gauged by exploring trends in U.S. and foreign agricultural productivity. In short, costs of production provide a static picture of competitiveness while trends in productivity provide a more dynamic assessment of competitiveness.

Costs of production

A comparison of the costs of producing agricultural commodities in the United States with production costs in competing countries provides a starting point for assessing U.S. agriculture's competitiveness in world markets. Three problems arise in using a comparison of production costs to assess competitiveness, however. First, economic theory suggests that production increases and production costs rise accordingly when government policies subsidize production or penalize competing imports. Use of production and export subsidies and import penalties around the globe dictates, therefore, that a comparison of production costs provides only a crude measure of competitiveness.

Second, trade theory suggests that production costs compared across countries should measure opportunity costs, the value of production inputs in their best alternative uses.[3] But opportunity costs are rarely measured. Instead, prices of inputs used in producing agricultural commodities are used to estimate opportunity costs because these inputs are usually bought on competitive markets. For example, the cost of labor used in producing farm products usually reflects the value of farm labor in its best alternative use, such as an industrial wage rate.[4] Third, currency

[3] Competitiveness is closely related to comparative advantage, the cornerstone of economic trade theory, but important differences distinguish the two concepts. At issue is which products should be produced domestically and which should be imported. According to the theory of comparative advantage, each trading partner should specialize in the production and export of those goods produced with resources in relatively abundant domestic supply. Likewise, each country should import from its trading partners those goods produced with resources in relatively scarce domestic supply. Scarce domestic resources are then freed for other, more profitable uses. By specializing in the production of goods in which each country holds a comparative advantage and trading for other products, the trading partners collectively make the most efficient use of their resources.

The theoretically elegant concept of comparative advantage is relevant to the trading patterns that would occur as individual countries assess the relative costs of producing or trading for various products in a world free from price distortions imposed by government policy. The real world, however, is replete with trade, agricultural, and tax policies that distort market prices. In brief, comparative advantage applies to an idealized world of perfect markets that exists only in theory, and competitiveness applies to the world as it actually is. For a more complete and mathematically rigorous discussion of the theory of comparative advantage, see Edward E. Leamer, *Sources of International Comparative Advantage, Theory and Evidence*, The MIT Press, Cambridge, Massachusetts, 1984.

[4] The method of measuring capital costs in crop production budgets presents a special problem. A land charge, either a direct rental payment or an indirect charge representing the opportunity cost of capital committed to land ownership, is part of the full economic costs of crop production that the producer must take into consideration in long-run business planning. If crop revenues fall below production costs, including the land charge—perhaps due to a decline in crop prices after a reduction in export demand—the price of land would eventually fall, reducing the opportunity cost of invested capital as well. With no more profitable alternative use for land, however, crop production would continue, perhaps at a less intensive level. Therefore, differences in land charges are not emphasized in the cross-country cost comparisons in this study.

Similarly, an argument can be made for excluding charges for farm machinery and other nonland capital inputs from these production cost comparisons. The ambiguity surrounding the different methods of accounting for these nonland capital charges in different countries adds error to cost comparisons. Excluding these charges from consideration, however, would mask important differences in the cost structures of capital-intensive and labor-intensive production technologies. Therefore, the costs chosen for emphasis in the cost comparisons in this study are

exchange rate fluctuations can also complicate cost comparisons. To minimize the effect of the recent large cycle in the value of the dollar, six-year average exchange rates are used in the cost comparisons in this study.[5] In summary, these problems suggest that little attention should be given to slight differences in production costs between countries.

Domestic production costs. Comparison of production costs in different regions of the United States is useful because a decline in export demand for U.S. crops might well be reflected in cutbacks in production in higher production-cost regions before lower production-cost regions. Inflation-adjusted or real costs of producing corn, soybeans, and wheat have declined significantly in each of the major producing regions in the 1980s. The average cost of producing winter wheat in the United States is lowest in the Central Plains region, and the average cost of producing corn and soybeans is lowest in the Corn Belt/Lakes States region (Table 1). These data suggest that shrinking world crop markets would have a greater impact in the Northern and Southern Plains than in the Central Plains or Corn Belt.

Foreign production costs. A comparison of average production costs in the United States with average costs in other countries provides a general overview of U.S. agriculture's current cost competitiveness. Wheat production costs in Argentina, a country that uses almost no commercial fertilizer, are almost 35 to 50 percent lower than in other principal exporting countries (Table 1). Argentina is also the low-cost producer of soybeans. Thailand, with labor-intensive production technology, holds a narrow lead over Argentina as low-cost producer of corn. Except for Argentina, average U.S. wheat production costs are competitive with costs in other countries. Furthermore, average production costs in the lower cost corn and soybean-producing regions of the United States are only modestly higher than Argentine costs. On balance, U.S. production costs for its principal export crops are competitive with most other major exporters, but the United States can no longer claim outright cost advantage.

A comparison of production costs across countries should also recognize that costs vary according to the quantity of grain produced. Production costs in any year vary widely from farm to farm within a region or country because of differences in yield potential, production technology, and management expertise. Some of a country's

inclusive of nonland capital costs but exclusive of land costs.

For a more complete discussion of similar problems in the development and use of cost-of-production budgets, see David A. Harrington, "Costs and Returns: Economic and Accounting Concepts," *Agricultural Economics Research* 35(4), pp. 1-8, 1983.

[5] Several adjustments are made to annual production cost estimates in this analysis. Average annual costs in each country are based on the mean yield during the years 1980 through 1985 to minimize the effects of annual, weather-induced yield variation on production costs. Average costs in each country are then adjusted to the 1987 price level using the country's index of consumer prices. Each country's costs, stated in terms of 1987 prices, are then exchanged to U.S. dollar equivalents using the mean real exchange rate prevailing during the six-year period from 1982 through 1987. This six-year mean was chosen because it averages across a large cycle in the value of the U.S. dollar. Note that the use of a higher exchange value of the U.S. dollar—the value of the dollar in early 1985, for example—would reduce the apparent cost competitiveness of the United States. For example, Brazil's high rate of domestic price inflation and a relatively low mean real exchange rate of the dollar bias Brazilian soybean production costs upward in Table 1.

Sources of production cost data include: USDA, "Economic Indicators of the Farm Sector: Costs of Production," various issues; J. Dawson Ahalt, "Annual Agricultural Situation Report, Argentina," April 1985; B. F. Stanton, "Production Costs for Cereals in the European Community: Comparisons with the United States, 1977-1984," A.E. Res. 86-2, Department of Agricultural Economics, Cornell University, Ithaca, New York, March 1986; and Gerald F. Ortman, Valter J. Stulp, and Norman Rask, "Comparative Costs of Agricultural Commodities Among Major Exporting Countries," Working Paper ESO 1325, Department of Agricultural Economics and Rural Sociology, The Ohio State University, Columbus, Ohio, 1986.

TABLE 1

Crop production costs in principal exporting countries

1987 U.S. dollars per metric ton

Wheat Production Costs

	United States*							
	Central Plains	Northern Plains	Southern Plains	Lake States/ Corn Belt	Argentina	Canada	United Kingdom	Australia
Total Variable	47.66	64.71	82.14	67.02	44.34	63.67	82.64	56.53
Total Fixed	91.13	92.14	91.61	83.71	42.33	115.59	64.23	102.56
Total Production	138.79	156.85	173.75	150.74	86.67	179.26	146.87	159.09
Total Production Costs minus Land Charge	111.90	132.97	147.70	122.33	70.34	137.39	117.78	125.07
Avg. Yield 1980-85†	2.2	2.1	1.7	2.8	1.8	1.9	6.4	1.3

Corn Production Costs

	United States			
	Central Plains	Lake States/ Corn Belt	Argentina	Thailand
Total Variable	53.81	49.92	47.91	44.92
Total Fixed	63.00	60.06	41.62	35.93
Total Production	116.80	109.97	89.53	80.85
Total Production Costs minus Land Charge	97.23	85.46	74.84	68.78
Avg. Yield 1980-85†	6.1	6.7	3.3	2.2

Soybean Production Costs

	United States				
	Central Plains	Lake States/ Corn Belt	Delta	Argentina	Brazil
Total Variable	63.38	59.73	103.81	82.02	179.91
Total Fixed	148.05	150.22	140.85	71.04	112.78
Total Production	211.44	209.96	244.65	153.06	292.69
Total Production Costs minus Land Charge	152.11	141.38	196.58	130.08	229.64
Avg. Yield 1980-85†	1.8	2.3	1.5	2.1	1.7

Source: See footnote 5.

*States included in U.S. production regions are: Central Plains (South Dakota, Nebraska, Kansas, Colorado); Northern Plains (Idaho, Montana, Wyoming); Southern Plains (Oklahoma, Texas, New Mexico); Lake States/Corn Belt (Minnesota, Wisconsin, Iowa, Michigan, Illinois, Missouri, Indiana, Ohio); and Delta (Arkansas, Louisiana, Mississippi).

†Metric tons per hectare.

total crop is always produced at a cost above the country's average production cost, and some is always produced at a cost below the average. Therefore, a complete assessment of the relative cost competitiveness of different regions or countries must compare production costs throughout a range of production levels.

Data to support a more complete analysis of corn, wheat, and soybean production costs are extremely limited. This lack of data severely restricts the ability of analysts and policymakers to understand the true nature of the competitive challenge facing the United States. Data are available, however, to suggest that the production cost of a large part of each crop produced in the United States is below the average cost in most other countries. A unique U.S. Department of Agriculture study of U.S. costs in 1974 and 1981 showed that the variable cost of approximately 60 percent of total U.S. corn production in both years was less than the average variable cost for the crop as a whole. The portion of the total U.S. wheat crop produced at a less-than-average variable cost increased from about 40 percent in 1974 to about 55 percent in 1981.[6] These limited data suggest that a substantial portion of the U.S. corn and wheat crops may be produced at costs lower than competitor countries with moderately lower average production costs.

Recognition that the production and export volumes of U.S. wheat, corn, and soybeans are several fold larger than the production and export volumes of other major exporters, especially the low-cost producers like Argentina and Thailand, is also critical. For example, the United States produced 20 times as much corn as Argentina in 1986, six times as much wheat, and seven times as many soybeans (Table 2). Clearly, U.S. agriculture would maintain a significant presence in world markets, even with a moderate reduction in U.S. production volume, because such a reduction would lower average U.S. production costs by limiting high-cost domestic production. In summary, the analysis suggests that U.S. agriculture, the high-volume producer, would be a strong competitor in world markets even without being the world's least average-cost producer.

TABLE 2
Production and export volumes of principal exporting countries, 1986
Thousand metric tons

	Production	Net Export
Corn		
Argentina*	9,500	5,500
Thailand*	4,100	2,800
United States	209,632	38,025
Wheat		
Argentina*	9,000	4,490
Australia	16,700	15,000
Canada	31,850	20,000
EC-12	66,923	12,600
United States	56,793	27,650
Soybeans		
Argentina*	7,500	2,500
Brazil	17,000	2,800
United States	54,622	19,051

*Low-cost producer

Agricultural productivity

The preceding discussion focused on the current competitiveness of U.S. agriculture. The

[6] Furthermore, in 1981, 80 percent of the corn crop and 75 percent of the wheat crop were produced at variable costs not more than 20 percent over the national average variable cost. See USDA Economic Research Service, "Agricultural Food Policy Review: Commodity Program Perspectives," Agricultural Economic Report Number 530, July 1985, pp. 142-147.

TABLE 3
Indices of agricultural output per unit of labor input
(1974-76 = 100)

	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
Brazil	100	98	106	102	111	123	127	123	124	133
Thailand	101	102	100	119	108	116	120	120	133	130
Argentina	99	112	113	125	131	115	126	138	127	142
Australia	103	102	103	123	123	112	128	116	147	149
Canada	101	112	120	130	127	138	157	170	169	171
United Kingdom	99	100	114	122	127	138	141	155	159	182
United States	102	108	119	124	134	129	148	153	129	158

Sources: FAO Production Yearbook, various years; U.S. Department of Agriculture, *World Indices of Agricultural and Food Production*, various issues.

remainder of the section focuses on the rate at which the competitive position of U.S. agriculture appears to be changing—the dynamic competitiveness of U.S. agriculture—by reviewing recent trends in agricultural productivity. Because complete time series of production costs are available for few countries, an alternative indicator of trends in production efficiency must be considered. One readily available indicator of production efficiency is the index of agricultural labor productivity, a measure of total agricultural product per unit labor input.

The index of agricultural labor productivity provides an alternative to production costs for comparing trends in agricultural productivity in the United States and six of its principal competitors in agricultural trade. Total agricultural product per unit of labor input increased by approximately one-third from 1975 to 1984 in Thailand and Brazil, countries with growing agricultural labor forces (Table 3). Higher rates of growth in agricultural labor productivity were obtained in countries with declining agricultural labor forces. Agricultural labor productivity advanced almost 45 percent in Argentina and Australia, 70 percent in Canada, and 83 percent in the United Kingdom, bracketing the 55 percent increase in productivity in the United States. Improvement in production technologies leading to greater production efficiency clearly played a major role in boosting agricultural output in countries with declining agricultural labor forces. Furthermore, U.S. agriculture's intermediate record of productivity growth suggests that foreign producers will continue to contest U.S. agriculture's position in world markets.

Summary

Average production costs for the United States' principal export crops are not the world's lowest, but these costs are competitive with average production costs in most major exporting countries. On average, the United States produces corn and soybeans at nearly as low a cost as the world's least-cost producers. Average production costs of wheat in the United States are competitive with average costs of all other major wheat exporters except Argentina. Moreover, the United States produces and exports far greater volumes than the current least-cost producer of each commodity, and production costs of a significant portion of U.S. production may well be below costs in competitor countries. Hence, these data suggest

that the United States continues to be a strong competitor in world agricultural markets.

The United States' record of intermediate growth in productivity, however, suggests that the future position of U.S. agriculture in the world marketplace is not certain. More rapidly advancing agricultural productivity in other parts of the world could be reflected eventually in lower foreign production costs and erosion of U.S. market share. The following section broadens this perspective on U.S. agriculture's future competitiveness by considering two factors significant in determining U.S. agriculture's future in world markets—infrastructure and policy.

Future competitiveness of U.S. agriculture: the key factors

This section considers the factors that will determine the position of U.S. agriculture in world markets in the longer run. First is an examination of the underlying infrastructure supporting U.S. agriculture. Then the effects of agricultural and trade policies are reviewed.

Agricultural infrastructure

The previous section suggested that maintaining the ability to produce and market large volumes of commodities efficiently is critical to maintaining U.S. agriculture's competitiveness. Maintaining production efficiencies depends on a steady stream of innovative production technologies from the industry's research and development infrastructure. Similarly, moving large commodity volumes from farm gate to export terminal depends on an efficient marketing and transportation infrastructure. These two key infrastructure components have formed a solid but often forgotten foundation for U.S. agriculture in the past. However, this infrastructure base has shown signs of weakening in recent years. Further deterioration in agriculture's infrastructure base could jeopardize U.S. agriculture's future in world markets.

Agricultural research and development. Technological innovation holds much promise for productivity growth, declining production costs, and a strong future competitive posture for U.S. agriculture. But a recent slowing in the growth of funding for agricultural research and development could adversely affect the sector's future productivity. Without domestic gains in productivity, continued productivity gains abroad could eventually cause further erosion in the competitiveness of U.S. agriculture.

The United States is believed to hold a lead over other countries in developing and applying new biotechnologies, the newest and one of the most promising areas of agricultural research.[7] The principal sources of the U.S. lead in these new technologies are well-established public and private research and development capabilities. However, growth in spending on agricultural research in the United States, public and private, has slowed sharply in recent years.[8] Adjusted for inflation, average growth in public spending on research in the 1980s has been less than a fourth of the rate in the 1960s. After strong growth in the 1970s, growth in public extension funding has fallen by half in the 1980s. Growth in private research spending also weakened in the 1980s though not as much as growth in public spending (Table 4 and Chart 3). As a result, the private

[7] For a more thorough assessment of the United States' position among other countries in developing new technologies and a summary of the expected impact of new technologies on U.S. agriculture, see U.S. Congress, Office of Technology Assessment, *Technology, Public Policy, and the Changing Structure of American Agriculture*, OTA-F-285, March 1986.

[8] This discussion is drawn from the more complete history of public agricultural research in the United States found in Wallace E. Huffman and Robert E. Evanson, *The Development of U.S. Agricultural Research and Education: An Economic Perspective*, forthcoming.

TABLE 4

Decade average growth rates in real agricultural research and extension spending

(in percent)

	Public	Private	Total	Extension
1950s	3.4	—	—	2.8
1960s	4.2	3.5	3.8	1.8
1970s	2.3	3.8	2.9	3.7
1980-84	0.9	2.7	1.9	1.8

Source: Huffman and Evanson. See footnote 8.

sector enlarged its share of annual real agricultural research expenditures from an average of 55 percent in the 1970s to an average of 60 percent in the 1980s.[9]

Despite the private-sector's relatively consistent record of supporting agricultural research, private-sector research cannot fully substitute for public-sector research. The public-sector role includes the advancement of basic knowledge, the development of generic applications of new technologies, and the training of new scientists—activities that are not commercially feasible in the private sector. In summary, a greater public commitment to research is very likely needed for U.S. agriculture to improve its record of productivity growth and maintain its competitive position in world markets.

Transportation infrastructure. The development and maintenance of the transportation infrastructure that delivers exportable supplies from the farm gate to the export terminal is a vital determinant of competitiveness that cannot be overlooked. U.S. capital investments in the 1970s built a system capable of transporting the huge volumes of grain flowing into export channels in the early 1980s. Grain industry analysts estimate that the U.S. transportation system today could accommodate grain exports of nearly 200 million metric tons a year, nearly twice the volume that strained the system in the 1970s. Transportation costs in the United States have been shown to be roughly the same as those in Canada and the United Kingdom, slightly less than those in Argentina and Australia, and well below those in Brazil, where transportation infrastructure is especially lacking.[10]

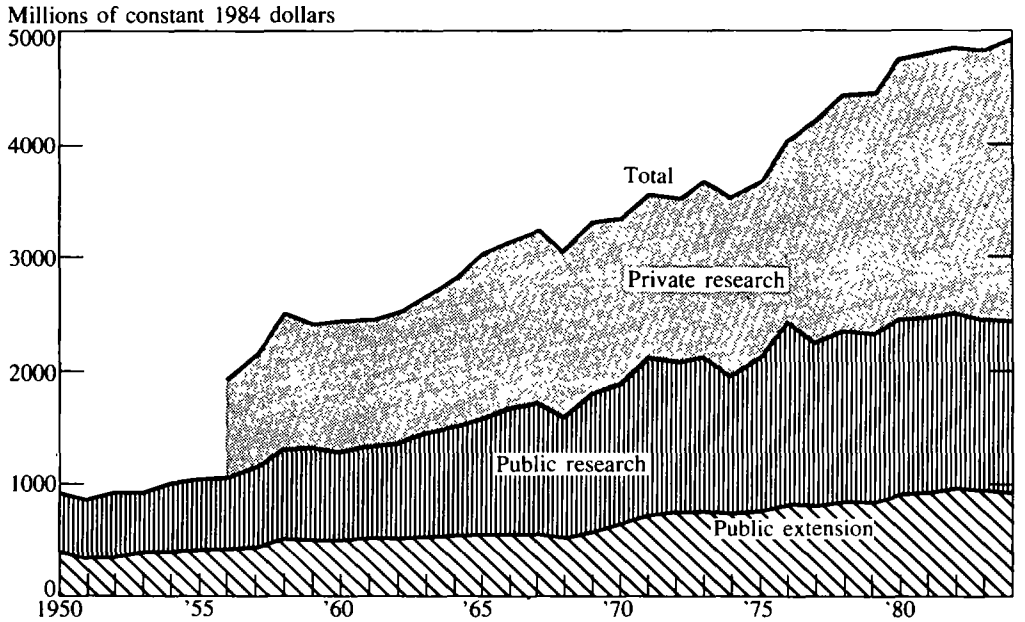
Approximately half of the U.S. system's estimated peak capacity has been idled, however, by the sharp decline in export volume, and the system's capacity has diminished slightly in recent years. The large excess U.S. transportation capacity indicates that significant expansion in domestic export volume could be readily absorbed with little increase in relatively low marketing costs. At larger export volumes, the contribution of a well-developed transportation infrastructure to U.S. agriculture's competitiveness on world markets would likely increase as capacity con-

9 The recently increasing share of research spending in the private sector can be attributed in part to a significant private sector interest in the most recent biotechnology research. Specific data on the level of private biotechnology research are not available, but private sector spending on biotechnology research is believed to exceed public spending on biotechnology research by two to three times. See Michael J. Phillips, "Enhancing Competitiveness: Research and Technology in Agriculture," in *Competing in the World Marketplace: the Challenge for American Agriculture*, proceedings of a symposium sponsored by the Federal Reserve Bank of Kansas City, October 31, 1985, pp. 25-47.

10 For example, U.S. corn transportation costs to export terminals represent a significant proportion, about one-fifth, of nonland production costs plus transportation costs. But U.S. domestic transportation costs are only about four-fifths as large as Argentina's. See Ortman et al., "Comparative Costs of Agricultural Commodities Among Major Exporting Countries," and also Tenpao Lee, C. Phillip Baumel, and Robert W. Acton, "The Impacts of Transportation Rates on World Soybean Trade Competition," in Richard Shibles, ed., *World Soybean Research Conference III: Proceedings*, Westview Press, Boulder, Colorado, pp. 116-123.

CHART 3

Real U.S. spending on agricultural research and extension



Source: Huffman and Evanson. See footnote 8.

straints push marketing costs much higher in other countries.

Farm and trade policy

The future competitiveness of U.S. and Great Plains agriculture cannot be separated from the future course of U.S. farm and trade policy. Farm programs are well entrenched in both exporting and importing countries, considerably distorting world food markets. Japan, for example, insulates its farmers from world markets through an extensive system of import quotas, domestic price supports, and nontariff barriers. Because Japan is such an important food importer, these programs increase market price volatility elsewhere and effectively limit the efficiency of the market for the food-exporting countries.

The United States is entering the important Uruguay General Agreement on Tariffs and Trade (GATT) negotiations with a fairly simple bargaining position—that participants agree to phase out all agricultural import restrictions and all subsidies that directly or indirectly affect trade over a ten-year period. What effects might such agricultural trade liberalization have on U.S. agriculture? Many in U.S. agriculture believe that reducing government support here and abroad would make the U.S. more competitive, allowing it to increase its market share. But is that necessarily so?

One recent U.S. Department of Agriculture study suggests that U.S. farmers would not benefit from multilateral trade liberalization.[11] The study concludes that the net effect of global withdrawal

[11] See Vernon Roningen, John Sullivan, and John Wainio, "The Impact of the Removal of Support to Agriculture in Developed Countries," paper presented at the American Agricultural Economics Association annual meeting, East Lansing, Michigan, August 1987.

TABLE 5
Future directions in the competitiveness of U.S. and Great Plains agriculture

			Trend in Market Share		U.S. Cost of Production Relative to Rest of World
Sluggish Trade Growth	Farm Policy Trend	Public Cost	U.S. Agriculture	Great Plains Agriculture	
Outcome 1	Status quo	High	Stable	Stable	High
Outcome 2	More market-oriented	Medium	Stable to weak	Weak	Moderately high
More Rapid Trade Growth					
Outcome 3	Status quo	Medium to low	Stronger	Stronger	Moderate to low
Outcome 4	More market-oriented	Low	Stronger	Stronger	Low to very low

of farm subsidies would be higher world prices, lower value for U.S. production, and lower income to U.S. producers. However, U.S. consumers would benefit from lower retail prices as domestic price supports were withdrawn. The benefit to consumers would outweigh the reductions in farm income. An important assumption of the study is that 1984 world trade levels would continue to prevail. Thus, the study's findings are consistent with declining U.S. competitiveness in major crops when world food trade is sluggish. This is as expected. As shown in the preceding section, the United States derives its principal competitive edge by being able to deliver large volumes at low unit cost. When operating at only half of its export capacity, the United States cannot be fully competitive, even if farm policy becomes more market-oriented.

Implications for the future of U.S. and Great Plains agriculture

How competitive will U.S. and Great Plains agriculture be in the future? The factors discussed above suggest that the industry's competitive position depends on two principal factors: the rate of growth in world food trade and the direction of U.S. farm policy. The rate of advance in U.S. biotechnology application to agriculture will also be important—potentially critical—but for now, it appears less vital than the other two factors.

Four outcomes appear possible in the next ten years. These can be ordered according to two levels of growth in world food trade—sluggish and more rapid. These two trade outcomes can be paired, in turn, with unchanged farm policy and more market-oriented farm policy, both here and abroad.

Sluggish trade growth

Current U.S. macroeconomic policy of large budget deficits that lead, in turn, to large trade deficits and a weak dollar is one principal factor in sluggish trade growth. That policy could lead to high U.S. interest rates, slowing economic growth here and in the developing world. The sluggish growth in world trade deprives U.S. agriculture of its most significant competitive factor—its ability to deliver large volumes of grain at low unit costs. In short, sluggish growth in trade deprives the United States of its infrastructure advantage and its cost advantage at high levels of output—advantages that only come into play at much larger trade levels.

With sluggish trade growth, the United States

could choose one of two farm policy paths. A status quo policy would appear likely, given depressed U.S. commodity prices. Such a policy would entail high public costs from the United States being forced to subsidize exports (Table 5, Outcome 1). High public expenditures would allow the United States and the Great Plains to retain market share. Strictly speaking, both U.S. and Great Plains agriculture would remain competitive. But farm production costs would be high relative to the rest of the world. The high relative cost results from marginal acres being kept in production by continued target price protection. Thus, competitiveness is being "purchased" by expensive policy measures.

Adoption of a more market-oriented farm policy when growth in world trade is sluggish would reduce the United States' market share—competitiveness in its narrow sense—while lowering somewhat the relative cost of U.S. farm production (Table 5, Outcome 2). The United States would retire more of its high production-cost acres—including many acres in the Great Plains—and overall average costs of production would decline somewhat. U.S. production costs would still remain moderately high relative to the rest of the world, however, because foreign costs are relatively low at low levels of world output. In effect, the weak export demand would still prevent the United States from flexing its infrastructure muscle and taking advantage of its elastic resource base. For the Great Plains, market share might decline slightly because the region would still have somewhat higher production costs than some other growing regions of the world.

More rapid trade growth

A U.S. macroeconomic policy of greater fiscal and trade balance would help to lower interest rates, in turn, stimulating long-run growth here and abroad. Growth in trade could be stimulated even further if major industrial nations, such as West Germany and Japan, adopted more expansionary fiscal and monetary policies. With the U.S. and other industrial economies in greater balance, more capital would be available for funding economic growth in the developing countries. Despite a somewhat stronger dollar, U.S. agriculture would benefit, on balance, from a much improved world economy. This macroeconomic setting would push U.S. agriculture toward its competitive potential—using more fully its infrastructure advantage and producing larger volumes at low costs. With strong world demand, no other producer can deliver large volumes at costs competitive with the United States.

With more rapid growth of trade and a status quo farm policy, competitiveness strengthens in both the United States and Great Plains (Table 5, Outcome 3). Under this scenario, other producers would be expanding into the sharply rising portions of their cost curves. Meanwhile, U.S. costs would rise somewhat, although the increase in unit costs would be less for the United States than for most (if not all) foreign producers.

A more market-oriented farm policy coupled with more rapid trade growth gives U.S. agriculture its greatest competitive advantage (Table 5, Outcome 4). Resources are used at high levels while some marginal acres go idle as support prices decline. Costs of public programs are low, and the relative cost of U.S. farm production is very low. U.S. costs would be marginally lower than under Outcome 3 because some marginal lands would likely be withdrawn and resources would be allocated more efficiently. The Great Plains also is most competitive under this outcome, although on a proportionate basis, the region probably must make more resource adjustments than the nation as a whole.

Summary

In sum, U.S. agriculture becomes more competitive as the growth in demand for U.S. farm

exports increases. That improvement will be influenced by the future direction of macroeconomic policy in the United States and other industrial nations. If export demand remains weak, the United States can "buy" competitiveness by maintaining a status quo farm policy. Continuing current programs while demand is weak, however, will leave U.S. costs of production high relative to the rest of the world, raising some questions about the ability of the United States to compete in the long run. Thus, U.S. and Great Plains agriculture must consider the future with one eye on macroeconomic developments and the other on farm and trade policy developments. Competitiveness may well be purchased by high public outlays if world economic growth is slow. Only when demand growth is vigorous will market forces confer significant competitive advantage to the United States, and especially, the Great Plains.

Conclusions

Can U.S. and Great Plains agriculture compete? The answer is yes. But a complex set of narrower conclusions combine in that simple answer. First, U.S. agriculture needs strong trade growth to flex its greatest competitive muscle. The United States has a great reservoir of resources that the market brings into play only at higher levels of world trade. Much of the United States' resource reserve that strong demand brings into productive use lies in the Great Plains. If growth in world demand is sluggish, the United States—and especially the Great Plains—faces a difficult choice: let the market remove farm resources or keep resources in production at high public cost. The choices favored by the nation and the Great Plains may not be the same.

Second, the United States may need to pay more attention to the place of infrastructure in competitiveness. Much of the United States' competitiveness in world agriculture stems from its unmatched array of research and transportation. The infrastructure is in some jeopardy, however, with only half of the transportation network fully used. Moreover, the United States is making comparatively smaller investments in research than some competitors. Thus, longer run questions remain about the ability of U.S. agriculture to stay ahead of the rest of the world. For the Great Plains, the future of agricultural infrastructure could spell the economic future for many small communities.

Finally, better data are needed to provide rigorous empirical answers to some of the hypotheses presented. The United States must better understand how its costs compare with those of other countries. The data for making solid judgments are simply not available. The stakes are high as the United States enters a new round of GATT negotiations. It is unfortunate that the potential effects of the possible outcomes must be estimated so tenuously.