JOURNAL OF AGRIBUSINESS FEBRUARY 1989

THE INTERNATIONAL SOYBEAN SITUATION: CAN SOUTHERN SOYBEANS COMPETE?

C. Parr Rosson,III, Charles E. Curtis,Jr., Greg W. Arburn, and Gordon L. Carriker

As the world's largest trader of farm products, the United States has generated an agricultural trade surplus every year since 1960. Over 40% of total U.S. farm output was exported in 1980, reflecting the "internationalization" of U.S. and southern agriculture. In the 1970s, expanding exports and higher farm prices seemed certain to continue as agriculture established a clear pattern of strong competitive advantage.

Yet, in the 1980s, both U.S. and southern agriculture experienced their most severe period of adjustment since the 1930s. From 1981 to 1987 the value of USA agricultural exports declined 40%, due about equally to lower commodity prices and to smaller export volumes. New competition for the traditional southern crops of tobacco, cotton and rice emerged in the early 1980s. Domestic fruit and vegetable producers also face strong competition from low cost, imported products. The USA share of the world export market for several important commodities declined significantly: wheat, from 45% to 30%; coarse grains, for 65% to 44%; and soybeans, from 90% to less than 60% during the 1980s. The U.S. share of world trade in traditional southern crops and products also declined. U.S. cotton exports fell from 32% to 25% of the total. Tobacco and rice exports have declined to 22% of world trade, and poultry now represents only 15%.

Declines in export volume and world market shares, growing surpluses and surging food imports have contributed to concern about the future of agriculture in the South. Some observers suggest that the farm sector has become less competitive, i.e., southern producers are no longer able to secure a profitable share of the world market. Perhaps nowhere has the farm crisis been more severe than in the soybean sector. Over the last five years, U.S. soybean acreage has declined from 71 million acres to 59 million acres. Southern soybean acreage fell from 24 million acres in 1982 to 14 million in 1987, representing almost 85% of the total U.S. acreage decline.

Recently, the U.S. has dominated world trade in soybeans (Table 1). Shares of the world export market have ranged from almost 90% in the early 1980s to 65% in 1985. Recent progress by international competitors has been substantial. While Brazil has not been a consistent supplier of soybeans, Argentine exports have increased steadily throughout the 1980s. While world soybean trade has almost returned to the levels of the early 1980s, U.S. soybean exports are almost 10% lower than before.

World trade in soybean meal represents a quite different situation (Table 2). The U.S. was the largest supplier of world soybean meal needs in the late 1970s with a market share approaching 45%. Since then, Argentina, Brazil, the European Community, and China have become much more important export traders. In 1980 Argentine soymeal exports represented only 2% of total trade. By 1988 Argentina accounted for 18% of world soymeal exports. This phenomenal export growth has occurred at the expense of primarily the U.S., but also Brazil and other exporters. During the 1980s, however, the U.S. share of world soybean meal trade declined by one-half from 42% to 24%. Concurrently world trade expanded 47% to 25 million tons. While these figures indicate a definite decline in U.S. competitive position relative to other countries, they do little to explain why the U.S. has lost market share and what the prospects for the future might be.

Factors Affecting International Competition

International competition means competition between producers and marketers in the USA and producers and marketers in other countries. But international competition takes place in an extremely dynamic framework. Production capacity, infrastructure, currency exchange rates, export/import restrictions, credit policies, shipping rates and regulations, and international policies affect a country's economic position relative to competitors.

Being competitive in world commerce means that a nation has the ability to secure and hold a profitable share of a specific market in spite of the efforts of other nations to secure that same market. Production, infrastructure, natural resource bases, and government policy are critical factors affecting international competition in soybeans.

Cost of production is a major factor influencing a country's ability to compete internationally. These costs are affected by the prices of inputs such as seed, fertilizer, land, labor and capital as well as by the natural conditions under which crops are

grown. As agricultural productivity increases, input costs per unit decline. The level of variable (cash) production costs indicates short-run competitiveness. The higher variable costs are relative to competitors (all other things being equal), the more likely output will decline if prices fall.

However, being the lowest cost producer does not always insure competitiveness in the international market. Infrastructure -- including transportation, communications, energy, roads and storage facilities -- is critical in determining the cost of production and delivery of a commodity to the international marketplace. For example, average costs of moving U.S. soybeans to export have been estimated to be about $0.67/bushel, while those in Brazil and Argentina are $1.18/bushel and $1.08/bushel, respectively (Ortmann, et al.).

Competitiveness is also influenced by government intervention in production or trade. For example, a country may be a high-cost exporter, not because of any deficiencies in agricultural production methods or in conditions of soil or climate, but because its currency is over-valued, or because domestic support prices are high relative to world prices, or because competitive exports are directly or indirectly taxed. A change in government policy, such as currency devaluation, export subsidies, or taxes, could transform a high-cost producer into a low-cost exporter.

Policies which affect terms of sale and payment for purchases also influence competitiveness. Developing countries with low incomes may pay higher prices or buy more when they are provided credit to finance purchases by the exporting entity. Willingness to accept payment in the importing country's currency can improve an exporter's competitiveness.

There are many reasons why countries adopt policies which affect the crops grown and exported. For example, the uncertainties of the export market may prompt a country whose resources are well suited to producing export crops to promote instead the production of other basic foods for domestic consumption. Countries with large external debt sometimes turn to agriculture as a source of export earnings to service their debt while importing the capital goods needed for economic growth. Argentina, for instance, has traditionally taxed exports of soybeans and other products to help finance industrial development.

AGRICULTURAL POLICIES IN ARGENTINA AND BRAZIL

As noted, government policies, both in the USA and other countries play a pivotal role in shaping a country's competitive position.

Argentina

Agricultural exports generate 70-80% of Argentina's foreign exchange earnings. Consequently, the government takes an active role in redistributing export earnings to other economic sectors. With production agriculture representing 15% of GNP, the government also has devised farm policies which, in effect, heavily tax agriculture. While minimum price supports are available, most Argentine farmers typically realize farm-gate prices only one-half to two-thirds the level actually received by U.S. farmers.

Argentina has recently taken measures to enhance competitiveness. While the export tax on soybeans was 28% in the mid-1980s, it has been reduced to 11%. An export tax of 3% is levied on soymeal and soyoil. However, under the "tributary return" system, the full amount of the 3% tax can be recovered by exporters after all export documentation has been completed. The major affect of this new system is to raise the export tax differential to 11% to stimulate meal and oil exports at the expense of soybeans. To stimulate the higher valued products effectively nets Argentina more foreign exchange earnings and domestic employment. With a $45 billion external debt and inflation near 300% annually, there is a critical need for foreign exchange.

Brazil

Agricultural policy in Brazil is characterized by minimum support prices, a production loan schedule and an export retention tax scheme for soybeans. Minimum prices of corn and soybeans for the 1989 season have been set at $2.65/bu and $3.25/bu, respectively. Although the soybean price is so low as to have little impact, the corn/soybean price ratio strongly favors corn. The purpose of this relationship favoring corn is to stimulate plantings in hopes of having adequate corn supplies for domestic needs.

The production loan schedule allows farmers to borrow certain minimum amounts of variable production costs at a 7-9% monthly interest rate. These rates are well below expected inflation of 20%/month and can be viewed as a production subsidy. Farmers with small soybean holdings can borrow up to 70% of total variable cash expenses prior to planting. Medium and large size farmers can borrow at 30-40% rates. While these figures may seem generous, they represent a marked reduction in the level of production loans during 1988 which ranged from 50% to 100%. As with minimum prices, these loan relationships favor corn over soybeans. Even so, Brazilian soybean output is projected to reach 20 million tons in 1990.

The export retention tax for soybeans favors meal and oil over raw beans. Soybeans

are taxed at a higher rate than meal or oil. With a domestic oilseed crushing capability far exceeding production, it makes sense that the government would try to retain as much employment in the industry as possible. Also, as raw beans are retained and crushed, additional foreign exchange can be earned on the value added to soybean meal. This is especially important since Brazil has an external debt of $105 billion, the largest in the developing world.

Results of recent research indicate that as Argentina lowers its export tax, soymeal and soybean exports will increase by over 6.5% annually (Arburn). Subsequent impacts of this policy action will be to displace almost 500,000 tons of Brazilian soymeal exports in Europe and Asia. Impacts on the USA are estimated to be minimal.

WORLD SOYBEAN PRODUCTION CAPACITY

The inherent capability to produce soybeans plays a critical role in influencing a country's competitive position. Although the U.S. produces about one-half of the world's soybeans, production has not kept pace with total world output. World soybean production has expanded 26% since 1980, while U.S. output has fallen 16%. Most of the increase in output has occurred in Argentina, Brazil and China. While the U.S. outproduces Brazil almost 3 to 1, the gap is narrowing. Argentina has almost tripled production, while China has increased soybean output 1.5 times since 1980.

Most of the expanded world output has occurred due to greater acreage in other countries. In fact, U.S. soybean acreage in 1987 had fallen 17% since the early 1980s. Concurrently, Argentina, Brazil and China together have increased acreage 47%. The acreage response in Argentina has been most dramatic, with harvested area essentially doubling during the 1980s.

Southern soybean acreage has experienced the most significant decline among all U.S. production regions. While Delta acreage fell by one-third during the 1980s, harvested area in the Southeast declined 60%. It is obvious that producers in the Southeast had trouble making a profit when soybean prices fell into the $4-$5/bu range. They had become less competitive with other regions in the USA and other countries.

Another major reason for greater production in other countries has been higher soybean yields. In Brazil, yields have increased from 18 bu/acre to 26 bu/acre and in China from 15 bu/acre to 21 bu/acre. Soybean yields in the Southeast have not increased beyond 24 bushels/acre in recent years and are well below those in Brazil. In Argentina yields have recently exceeded 30 bushels/acre.

COMPARATIVE PRODUCTION COSTS

Crop production budgets for full-season soybeans reveal that Argentina and Brazil have lower total costs than any USA region, $133/acre and $145/acre, respectively (Table 3). However, the USA Delta region has slightly lower variable costs than either of the major competing countries. The Southeast is the highest variable cost region at $100/acre. These figures might lead one to conclude that producers in the Southeast are not competitive. That conclusion would be misleading however.

Double-cropping wheat and soybeans results in a much stronger competitive position for southeastern producers. By allocating costs to soybeans following wheat, estimates of double-crop costs have been obtained. The results of this analysis depend on one critical assumption: wheat will be produced -- which is reasonable given current farm program provisions. The major soybean costs of double-cropping then become only the additional costs of following wheat with soybeans. For instance, this allows one-half of the land charge in the Southeast to be allocated to wheat. Under these assumptions, the Southeast becomes much more competitive with Argentina and Brazil. In fact, total costs are well below those of the other countries (Table 4). Breakeven yields for full-season and double-cropped soybeans are presented in tables 5 and 6. Full-season soybeans at $7.00/bushel require only a 14 bushel yield in the Southeast to cover variable costs. This compares to 13 bushels in Brazil and 11 bushels in Argentina.

For double-cropped soybeans at current prices, only 10 bushels are needed to cover variable costs in the Southeast. This compares favorably with 12 bushels in Brazil and 11 in Argentina. Comparison of total cost-covering yields for $7.00 beans are even more dramatic. While the Southeast can cover total costs with 16 bushel production, Brazil and Argentina require 19 and 18 bushels, respectively.

The ability to pursue this cost-base advantage is limited by the ability to expand small grain acreage (particularly wheat) in the Southeast. The current federal programs of base acres and limited cross-compliance force rigid small grain cropping patterns with little room for expansion. A decoupling policy (which would allow market-based cropping decisions) would probably result in a large increase in southern small grain/soybean acreage and production under the more competitive double-cropping scheme. It is also interesting to note that, since double-cropping is not a feasible practice for most of the North Central USA, comparative soybean profit advantage could shift to the South and Delta regions.

SUMMARY

In the short-run, if USA farm gate prices reflect world prices, and Southern soybeans can be produced and marketed for a profit then Southern soybeans are competitive. In the long run, domestic and international farm policies, debt levels, inflation rates, exchange rates, and changes in productive capacity will influence any given region's competitive position. For the South, a move to increased cost efficiency (i.e. more double-cropping) and enhanced producer marketing skills will not only maintain our competitiveness but may well increase our prospects for profitable production.

C. Parr Rosson, III, Charles E. Curtis, Jr., Greg W. Arburn and Gordon L. Carriker, Associate Professors and Research Assistant, Clemson University, Clemson, SC., and Research Associate, Department of Agricultural Economics, Kansas State University, respectively.

REFERENCES

(1) Agricultural Policy Working Group. 1987. "The Competitiveness of U.S. Agriculture."

(2) Arburn, Gregory W. 1988. "Competitive Position of U.S. Soybeans in a Dynamic World Economy." Unpublished Master's Thesis, Clemson University, Clemson, South Carolina, August 1988.

(3) Dunmore, John M. 1986. "The Competitive Position of Southern Agriculture." Proceedings of the Competitive Position of Southern Agriculture in a World Economy, Atlanta, Georgia, November 4-6, 1986.

(4) Ortmann, Gerald F., Walter J. Stulp, and Norman Rask. "Comparative Costs in Agricultural Commodities Among Major Exporting Countries," Dept. of Agricultural Economics and Rural Sociology, Ohio State University, ESO-1325.

(5) Rosson, C. Parr, Gary Vocke, and Keith Scearce. 1988. "Global Competition and Southern Agriculture," Southern Agriculture in a World Economy, Leaflet No. 2, Southern Rural Development Center, SRDC No. 10 6-2, Mississippi State University.

(6) U.S. Congress, Office of Technology Assessment. 1986. A Review of U.S. Competitiveness in Agricultural Trade.

(7) United States Department of Agriculture, Foreign Agricultural Service. World Oilseed Situation and Market Highlights. Circular Series, Supplement 1-88, January 1988.

(8) U.S. General Accounting Office. 1987. Agricultural Competitiveness: An Overview of the Challenge to Enhance Exports. GAO/RCED-87-100.

Table 1. Soybean Exports, World and Selected Regions, 1978-1988

Year	World	Argentina	Brazil	U.S.	China	Other[a]
			1,000 metric tons			
1978	22,512	1,969	659	19,061	90	733
1979	24,679	2,791	638	20,117	274	859
1980	28,456	2,374	1,239	23,818	207	818
1981	25,155	2,704	1,712	19,712	143	884
1982	29,045	2,000	600	25,285	118	1,042
1983	28,563	1,417	1,307	24,634	288	917
1984	26,078	3,011	1,591	20,148	730	598
1985	25,241	3,292	3,476	16,279	1,090	1,104
1986	26,080	2,541	1,198	20,142	1,250	949
1987	28,662	1,350	3,350	20,600	1,750	1,612
1988	29,760	2,400	2,700	21,360	1,450	1,810

a. Paraguay and others.
Source: USDA, Foreign Agricultural Service. World Oilseed Situation and Market Highlights. Circular Series, various issues.

Table 2. Soybean Meal Exports, World and Selected Regions, 1978-1988

Year	World	Argentina	Brazil	U.S.	China	Other[a]
			1,000 metric tons			
1978	15,249	370	5,368	5,516	30	3,965
1979	15,477	382	5,446	5,997	31	3,621
1980	17,315	350	5,493	7,196	66	4,210
1981	19,794	423	8,587	6,154	185	4,445
1982	20,794	775	8,500	6,266	260	4,993
1983	28,563	1,547	8,239	6,449	586	11,742
1984	26,078	2,100	7,706	4,862	694	10,716
1985	22,288	2,875	8,441	4,460	650	5,862
1986	23,050	3,170	7,383	5,476	1,050	5,971
1987	25,700	3,320	8,370	6,661	1,150	5,959
1988	25,350	4,600	7,600	6,030	1,600	5,500

a. Paraguay, the European Community, and others.
Source: USDA, Foreign Agricultural Service. World Oilseed Situation and Market Highlights. Circular Series, various issues.

Table 3. Estimated Costs of Production for Full-Season Soybeans, Three U.S. Regions, Brazil, and Argentina, 1986 Dollars

	South-east	Midwest	Delta	Brazil	Argentina
	U.S. dollars/acre				
Variable costs:					
Fert. and seed	37.54	30.50	15.59	50.71	13.86
Chemicals	21.98	18.74	21.28	10.80	8.01
Machinery	23.88	28.06	25.73	19.98	43.66
Labor	12.11	17.70	9.95	4.72	11.79
Int. on op. cap.	5.56	5.05	4.31	2.92	2.29
Total var. costs:	101.07	100.05	76.86	89.13	79.61
Fixed Costs:					
Machinery	26.45	38.44	35.81	17.95	27.94
Land	28.86	71.35	31.74	31.18	18.99
Miscellaneous (8% of TVC)	8.09	8.00	6.15	7.13	6.37
Total fixed costs:	63.40	117.79	73.70	56.21	53.31
Total costs:	164.47	217.84	196.05	145.34	132.91

Source: Various states, Cooperative Extension Service, 1985-86 Enterprise Budgets; Ortmann et al., p. 32.
Note: Exchange rates used: 13.84 cruzados per U.S. dollar (Brazil) and 0.89 australes per U.S. dollar (Argentina). These are mid-1986 exchange rates (exchange rate series af) as reported in International Financial Statistics and Ortmann et al., p. 10.

Table 4. Estimated Production Costs for the Soybean Enterprise in Double-Cropping Wheat and Soybeans, South Carolina, Brazil and Argentina, 1986 dollars

	Southeast U. S.	Brazil	Argentina
	U.S. dollars/acre		
Variable costs:			
Fet. and seed	10.00	47.69	13.31
Chemicals	20.95	10.80	7.69
Machinery	21.89	19.89	41.91
Labor	11.28	4.70	11.32
Int. on op. cap.	5.50	2.81	2.19
Total var. costs:	69.62	85.89	76.42
Fixed costs:			
Machinery	24.00	16.87	24.59
Land	12.50	25.68	16.71
Miscellaneous (8% of TVC)	5.40	6.87	6.11
Total fixed costs:	41.90	49.42	47.42
Total costs:	111.52	135.31	123.84

Source: Ortmann et al., for Brazil and Argentina and Clemson University Cooperative Extension Service budgets for South Carolina.
Note: Double-cropped soybean costs for Argentina arrived at by assuming the same proportional relationships existed between Argentine full-season costs and double-cropping costs as those exhibited in the Brazilian budgets, i.e., variable costs are 96% of full season and fixed costs are 88% of full season costs.
Note: Exchange rates used are 0.89 australes per U.S. dollar and 13.84 cruzados per U.S. dollar with yields of 1.80 MT/Hect for Brazil and 2.10 MT/Hect for Argentina as reported in Ortmann et al., p. 32.
Note: Cost categories were combined from the individual budgets in order to make direct comparison of the line-item costs.

Table 5. Full-Season Soybean Yields Required to Cover Total Variable Cost and Total Cost at Various Per Bushel Prices, in U.S. Dollars, Three U.S. Regions, Brazil, and Argentina

Price	Southeast	Midwest	Delta	Brazil	Argentina
$$/bu					
		Variable Cost Breakeven Yields			
4.50	22.5	22.2	17.1	19.8	17.7
5.00	20.2	20.0	15.4	17.8	15.9
5.50	18.4	18.2	14.0	16.2	14.5
6.00	16.8	16.7	12.8	14.9	13.3
6.20	16.3	16.1	12.4	14.4	12.8
6.40	15.8	15.6	12.0	13.9	12.4
6.60	15.3	15.2	11.6	13.5	12.1
6.80	14.9	14.7	11.3	13.1	11.7
7.00	14.4	14.3	11.0	12.7	11.4
7.50	13.5	13.3	10.2	11.9	10.6
8.00	12.6	12.5	9.6	11.1	10.0
8.50	11.9	11.8	9.0	10.5	9.4
9.00	11.2	11.1	8.5	9.9	8.8
		Total Cost Breakeven Yields			
4.50	36.5	48.4	43.6	32.3	29.5
5.00	32.9	43.6	39.2	29.1	26.6
5.50	29.9	39.6	35.6	26.4	24.2
6.00	27.4	36.3	32.7	24.2	22.2
6.20	26.5	35.1	31.6	23.4	21.4
6.40	25.7	34.0	30.6	22.7	20.8
6.60	24.9	33.0	29.7	22.0	20.1
6.80	24.2	32.0	28.8	21.4	19.5
7.00	23.5	31.1	28.0	20.8	19.0
7.50	21.9	29.0	26.1	19.4	17.7
8.00	20.6	27.2	24.5	18.2	16.6
8.50	19.3	25.6	23.1	17.1	15.6
9.00	18.3	24.2	21.8	16.1	14.8

Table 6. Double-Cropped Soybean Yields Required to Cover Total Variable Cost and Total Cost at Various Prices, in U.S. Dollars, for South Carolina, Brazil and Argentina

Price	Southeast U. S.	Brazil	Argentina
$$/bu			
	Variable Cost Breakeven Yields		
4.50	15.5	19.1	17.0
5.00	13.9	17.2	15.3
5.50	12.7	15.6	13.9
6.00	11.6	14.3	12.7
6.20	11.2	13.9	12.3
6.40	10.9	13.4	11.9
6.60	10.5	13.0	11.6
6.80	10.2	12.6	11.2
7.00	9.9	12.3	10.9
7.50	9.3	11.5	10.2
8.00	8.7	10.7	9.6
8.50	8.2	10.1	9.0
9.00	7.7	9.5	8.5
	Total Cost Breakeven Yields		
4.50	24.8	30.1	27.5
5.00	22.3	27.1	24.8
5.50	20.3	24.6	22.5
6.00	18.6	22.6	20.6
6.20	18.0	21.8	20.0
6.40	17.4	21.1	19.4
6.60	16.9	20.5	18.8
6.80	16.4	19.9	18.2
7.00	15.9	19.3	17.7
7.50	14.9	18.0	16.5
8.00	13.9	16.9	15.5
8.50	13.1	15.9	14.6
9.00	12.4	15.0	13.8