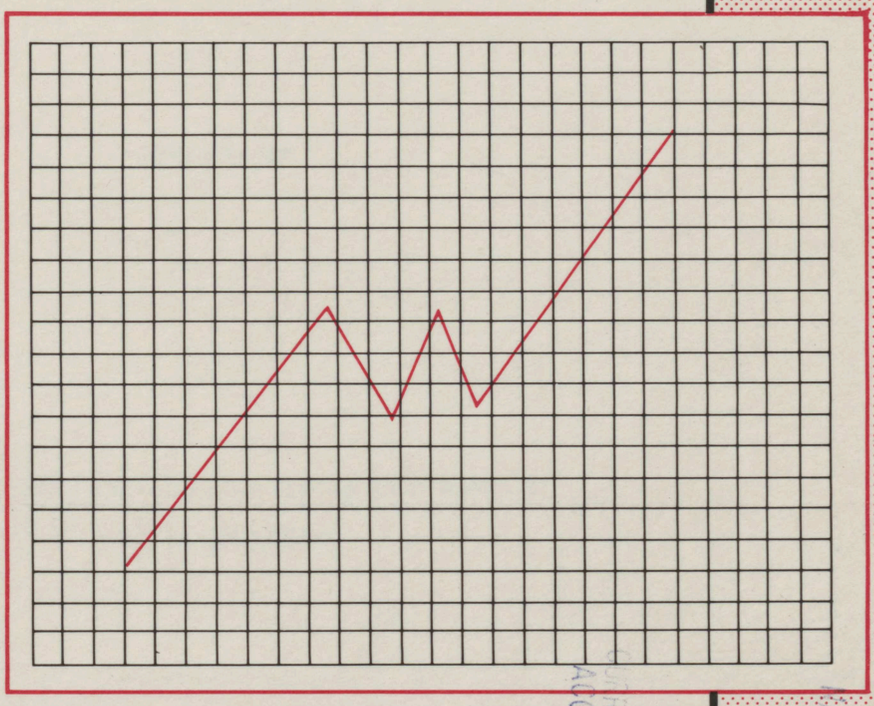

AGREKON

FOUR-MONTHLY JOURNAL
ON AGRICULTURAL ECONOMICS

Vol. 27 No. 2
JUNE 1988

Price R2,67
(plus GST)

THE COST-COMPETITIVENESS OF MAJOR EXPORTING COUNTRIES OF MAIZE, WHEAT AND SOYBEANS I: PRODUCTION AND MARKETING COSTS

by G.F. ORTMANN and N. RASK*

ABSTRACT

U.S. competitiveness with regard to agricultural commodities has been of major interest recently because of the declining U.S. share in world agricultural trade. Competitiveness, defined as the ability of a country to achieve a market share, is determined by a number of factors which affect the excess supply and excess demand conditions of exporters and importers, respectively.

On the supply side, this study deals with the costs involved in producing and marketing maize, wheat and soybeans by various middle-income and high-income countries. Private economic costs are used as reported by each country and reflect natural endowments and technology levels as well as specific government policies.

Production costs, representing farmer experience over several years, and costs of marketing are adjusted for inflation and converted to dollar equivalents at mid-1986 exchange rates.

INTRODUCTION

The issue of competitiveness in agricultural export markets is one of major concern to exporting countries. In the United States (U.S.), the world's leading agricultural exporter, the competitiveness issue has been highlighted recently by the rapid decline of the U.S. share in the grain and oilseeds markets. During the period 1981/82 to 1985/86, for example, the U.S. share of the world wheat trade declined from 48% to 29%, maize exports fell from a dominant 75% of world trade to 57%, and the U.S. share of the world soybeans and soybean products market decreased from 68% to 60%. This declining share, coupled with significantly lower world prices, is forcing a restructuring of the asset base in U.S. agriculture. The implications for credit institutions, input suppliers, marketing firms and farmers themselves are considerable.

In South Africa the issue of market share and competitiveness has become a major one because of sanctions and the threat of extended sanctions. If South Africa were able to offer its commodities on the world market at competitive prices, the threat of sanctions might be alleviated to some extent.

In this study the cost-competitiveness of major exporting countries in the maize, wheat and soybean markets is analysed. Included in the study are four middle-income countries (Argentina, Brazil, South Africa and Thailand) and five high-income countries (the U.S., Canada, Australia, the United Kingdom (U.K.) and France). Each of the countries studied is a major producer and exporter of one or more of the three commodities. Mean shares of the world maize, wheat and soybean markets for these countries for the period 1982 to 1984 are given in Appendix 1. The nine countries together account for about 90% of world exports of the three commodities.

In this article farm production and domestic marketing costs are considered as two major cost components that determine the cost-competitiveness of a country. Depending on resource endowments, infrastructure, distance from market and government policies, each competing country will have a unique position in world markets.

Government policies, both agricultural and non-agricultural, can either enhance or detract from the competitive situation that would exist in a free market. In fact, with considerable market interference in both importing and exporting countries, it is meaningless to determine free market economic costs of production as a basis for establishing competitiveness in international markets. Rather, in this study "private economic costs" are used, since it is recognised that most input costs reflect some level of government policy interference.

COMPETITIVENESS DEFINED

A great deal of confusion has arisen about the term "competitiveness". Perkins (1987: 17) referred to competitiveness as an ability to achieve a market share. Thus, under normal circumstances, a country is more competitive when its share of the export market increases, and *vice versa*. A useful definition of competitiveness is the one by the Harvard Business School (as cited by Perkins, 1987: 17): "National competitiveness refers to a country's ability to create, produce, distribute and/or service products in international trade while earning rising returns on its resources". This implies that market share is achieved by selling the commodity at a profit.

*University of Natal and Ohio State University, respectively. G.F. Ortmann acknowledges financial assistance from the Human Sciences Research Council (HSRC) and the Ohio Agricultural Research and Development Center (OARDC) at Ohio State University. Opinions expressed are those of the authors and do not necessarily reflect those of the HSRC or the OARDC

Article submitted: September 1987
Article received back from authors: January 1988

A number of factors influence a country's competitiveness. These may include, for example, the marginal costs (supply functions) of the country concerned and its competitors, and excess demand functions of importing countries. A shift in the excess demand function of a major importer, for instance, will influence the market shares of exporters when there are differences in the price elasticities of the exporters' excess supply functions. The excess supply functions reflect farm production and domestic marketing costs and government interventions such as taxes and subsidies (Sharples, 1987: 8-11). In addition to low cost or efficiency in farm production and domestic marketing, Stanton (1986b) identifies marketing skills, sources of subsidies, bilateral agreements and aid commitments as other major items that influence competitiveness in international markets.

In this study "cost-competitiveness" refers to the ability of a country to compete with another country in terms of the production and marketing costs of agricultural commodities. Private economic and marketing costs reflect natural endowments and technology levels as well as specific government policies. They are part of the overall competitiveness equation on the supply side. Detailed production and marketing costs are useful in that they illustrate differences in production and marketing structure, technology and policies among countries and they show which cost components are the most important in each country (Sharples, 1987: 11-12).

Production and marketing costs provide a short run picture of a commodity market. Assumptions are that production and marketing infrastructure is given, technology is known, investment in the sector is fixed, variable input prices are given and demand is stable. Major factors influencing a country's long run competitiveness include natural endowments, public and private investments, opportunity cost of inputs, technology, demand shifts and public policies (Sharples, 1987: 12-13).

RESEARCH PROCEDURE

The procedure used to estimate farm production and domestic marketing costs for various countries is described below.

Farm production costs

Factors that complicate comparative cost analyses among countries include: (1) Different methods of collecting and reporting cost data (data availability), (2) different inflation rates among countries and (3) varying exchange rates over time.

Data availability

Methods of collecting and reporting cost data vary among countries. The U.S. had the most comprehensive cost of production studies in the form of Economic Research Service (ERS) enterprise budgets. For every commodity a national average as well as regional averages for major producing areas are presented annually. In this study U.S. mean production costs of maize, wheat and soybeans were based on six years of ERS budget data (1980-85).

Of the other high-income countries considered, the U.K. had some of the best data available in the form of the University of Cambridge Annual Farm Reports. U.K. winter wheat production costs were based on two years of data (1982 and 1984) presented by Stanton (1986a: 80).

Australia, Canada and France do not have similar production cost data to those of the U.S. or U.K. Annual crop budgets are established by various organisations. Data presented in this study for Australia and Canada were based on the best data available to country specialists at the United States Department of Agriculture (USDA). For Australia, the 10-year mean wheat yield was used because of severe droughts in the 1980s. Australia's wheat yield showed no marked trend over the years 1948 to 1979 (Longworth and Knopke, 1982: 646). For France, wheat and maize production costs were based on three years of data (1980-82) derived by Stanton (1986a: 58-61, 68-69) for the Paris Basin.

Of the middle-income countries, South Africa had the most comprehensive production cost data available for maize and wheat. Soybeans are not an important crop at present. The Directorate of Agricultural Production Economics conducts annual surveys in major maize and wheat producing areas. Maize and wheat production costs were based on these survey results. For both commodities, six years of data were used (1979/80-84/85). Although this period includes years in which there was a drought it also includes years of record crops for both commodities.

For Argentina, maize, wheat and soybean cost data were derived from official (Argentinian) estimates (Ahalt, 1985), which are the best data available to the USDA. Mean yields were derived from actual yields over five years (1980/81-84/85).

For Brazil, budgets established by government organisations were supplemented with data from university surveys. Maize production costs for Thailand were based on five years of data (1980/81-84/85) received from the USDA. In general, data were accepted as obtained. However, in certain limited cases, estimates of omitted cost items were made; for example, labour costs and interest on nonland capital in Canada were based on rates for the U.S.

Land costs

Land costs (rents) are not included in this analysis because aggregate (industry) costs of a crop for a country are compared with aggregate (industry) costs of the same crop in other countries. Land rent is an indication of the profitability of a crop. In theory, if one were to include land costs, total costs (per ton) in each country would be the same (assuming the product price were the same, as for example in a free trade situation).

Total income is equal to cost if all costs including rents are included (Euler theorem). Land costs are also affected by domestic support

programmes. Land rent to the individual farmer is a cost of production in the opportunity cost sense, but in the aggregate land rents are price-determined and are, therefore, not included in this comparative cost analysis (Bullock *et al.*, 1977).

Accounting for inflation

Inflation rates, as measured by changes in the Consumer Price Index (CPI), vary widely among countries and usually vary from year to year in the same country. In this study production and marketing costs of maize, wheat and soybeans in various years were inflated to a mid-1986 basis using the relevant CPI in each country (International Monetary Fund, 1986). To make these costs comparable among countries, the mid-1986 cost estimates were converted to U.S. dollars using mid-1986 exchange rates.

Currency exchange rates

Although floating exchange rates for individual currencies have enhanced world trade, they have complicated analyses of time series data in comparative cost studies (Stanton, 1986a: 16). During the period 1980 to 1985 most currencies depreciated against the U.S. dollar in nominal and real terms (Goodloe and Byrne, 1985: 18; Stallings, 1985). Various indices, such as the Federal Reserve's weighted-average exchange value index (which measures movements of the dollar against currencies of the ten largest market economies) and the index of the agricultural trade-weighted dollar, show that the U.S. dollar reached a peak during 1985 (Economic Research Service, 1986: 17, 19). From February 1985 to February 1986 the nominal commercial rates for the dollar fell 29% against both the Japanese yen and the German mark. However, most agricultural competitor currencies did not strengthen against the U.S. dollar in 1986 (ibid.: 19).

Expectations in 1986 were that currencies of major agricultural competitors would not appreciate significantly against the U.S. dollar and were expected to remain at roughly their mid-1986 level for the foreseeable future. For the above reasons, mid-1986 (i.e., mean of June and July) exchange rates were used to convert mid-1986 production and marketing costs in foreign currencies to U.S. dollars. The effects of using real exchange rates averaged over a seven-year period (1980-86) are discussed in another article (Ortmann and Rask, 1988).

TABLE 1 - Mid-1986 exchange rates, Currency per U.S. dollar

Country	Currency	Exchange rates (Currency/U.S. dollar)
Argentina	australe	0,8889
Australia	dollar	1,5132
Brazil	cruzado	13,8400
Canada	dollar	1,3852
France	franc	7,0280
South Africa	rand	2,5381
Thailand	baht	26,2825
United Kingdom	pound	0,6631

Source: International Monetary Fund (1986)

Exchange rates of foreign currencies with the U.S. dollar during mid-1986 are shown in Table 1.

Domestic marketing costs

The costs of marketing maize, wheat and soybeans include handling, storage, transport and port handling costs, i.e., the costs of transferring the products from the farm gate to export ports and onto ships. They represent the difference between the "free-on-board" (f.o.b.) price and the farm gate price. For most countries marketing costs were obtained from country specialists at the USDA. For South Africa marketing costs of maize were obtained from Louw (1986). These were adapted for wheat. Marketing costs were estimated for the U.K. and France. For some countries "free-on-rail" (f.o.r.) costs were supplemented with port handling costs estimated from U.S. and Brazil data (Miranda, 1985).

RESULTS

Detailed production costs for maize, wheat and soybeans in various countries are presented in Appendices 2, 3 and 4 on a U.S. dollar per metric ton basis. Production costs are categorised into variable and fixed costs, where variable costs include cost items that are incurred if production takes place whereas fixed costs are incurred even if no production takes place in the short run. The costs include cash costs, capital replacement costs and imputed costs on factors such as family labour and nonland capital (economic costs). Land, management and risk costs were not considered. The sum of production and marketing costs are termed "free-on-board" (f.o.b.) costs here. The strict definition of f.o.b. cost is the farm gate price plus the marketing cost of getting the product from the farm gate onto a ship.

This section highlights some of the important cost elements giving rise to differences in production costs among various countries. A summary of maize, wheat and soybean production and marketing costs in various countries is given in Table 2.

It is evident from Table 2 that owing to relatively low production costs Argentina and Thailand have the lowest f.o.b. costs per ton for maize and Argentina the lowest costs for wheat and soybeans. These low costs are due mainly to the fact that Argentinian and Thai farmers have been achieving mean maize yields of over three and two tons per hectare, respectively, using little commercial fertiliser. In Thailand, maize production is labour and animal intensive, which makes Thailand unique among the countries considered.

Argentinian farmers use an advanced crop-cattle rotation system and have fertile soils. Good yields are achieved without the use of commercial fertilisers, which are high-priced because of government-imposed taxes. Argentina also has low chemical and capital replacement costs per ton. Export prices were subject to a 25% tax (depending on the crop) resulting in low net farm prices. To remain in production farmers use low-cost strategies.

TABLE 2 - Production and marketing costs of maize, wheat and soybeans in various countries in U.S. dollars per metric ton (mid-1986 price level and exchange rate)*

Particulars	Yield/ha (t)	Costs				
		Variable (1)	Fixed (2)	Total production (3)=(1)+(2) $ US/t	Marketing (4)	Total f.o.b. (5)=(3)+(4)
Maize						
Argentina	3,36	45,60	25,65	71,25	30,46	101,71
Brazil	2,22	73,28	40,45	113,73	37,37	151,10
South Africa	1,98	61,12	29,61	90,73	35,60	126,33
Thailand	2,07	43,98	23,36	67,34	33,92	101,26
United States	6,43	58,70	38,04	96,74	25,10	121,84
France	6,88	91,52	68,54	160,06	32,80	192,86
Wheat						
Argentina	1,81	42,26	24,79	67,05	29,50	96,55
South Africa	1,46	77,99	36,48	114,47	32,50	146,97
United States	2,24	68,27	64,54	132,81	30,60	163,41
Canada	1,94	57,66	66,75	124,41	30,80	155,21
Australia	1,50	42,45	51,47	93,92	35,40	129,32
United Kingdom	6,98	66,62	44,64	111,26	30,00	141,26
France	6,36	48,36	82,65	131,01	32,80	163,81
Soybeans						
Argentina	2,10	79,80	46,75	126,55	36,14	162,69
Brazil	1,80	121,96	33,71	155,67	43,50	199,17
United States	1,95	88,36	91,83	180,19	24,60	204,79

*Land rents not included
Sources: (1) Appendices 2, 3 and 4
(2) Stanton (1986a) for maize and wheat costs in France

In the event of the government reducing or abolishing taxes on agricultural inputs and export prices, farmers would probably respond by increasing the use of inputs. The volume of production could increase substantially.

For maize, France had the highest f.o.b. costs per ton owing to high production costs. Brazil showed the second highest production costs, mainly because of high fuel and labour costs per ton, primarily from low yields. Labour costs, which are low on an hourly basis, are high per ton because of labour-intensive cultivation and harvesting methods. Brazil also has high marketing costs owing to long transport distances and poor infrastructure.

South Africa, with the lowest maize yield of about two tons per hectare, had estimated production costs $6 per ton lower than those of the U.S. but f.o.b. costs of about $4,50 higher owing to higher marketing costs. The U.S. has relatively low marketing costs owing to an efficient infrastructure and the use of subsidised barges to transport maize. South Africa's share of the export market is small and is not expected to increase much in view of land and moisture constraints.

Of maize production costs in general, variable costs play a more important role in the middle-income countries (65% of costs on average) than in the U.S. (61% of costs). Developing countries may have greater flexibility in production in that they have less specialised investments (for example, machinery). Variable inputs such as fertiliser, chemicals and fuel usually have higher unit prices in developing countries, but the price of labour is lower. In Brazil, for example, fertiliser prices in 1985 were about 40% higher than in the U.S., but wages were about 10% of the figure for the U.S.

For wheat, Australia, with a mean yield of 1,5 tons per hectare, had the second lowest production and f.o.b. costs per ton. South Africa's wheat production costs ($114 per ton) are estimated to be just over $3 per ton higher than for the U.K. South Africa's costs compare favourably because they are based on the main production areas with higher yields. However, South Africa is a relatively small exporter of wheat and will remain so mainly because of land and moisture constraints.

Canada is estimated to have both lower production and lower f.o.b. costs for wheat than the U.S. Of the countries considered, the U.S. and France appear to produce wheat at the highest cost.

Of the wheat production costs, variable costs are more dominant in the middle-income countries than in the developed countries (66% and 51% of costs, respectively). The high-income countries have higher investments in machinery, as is evident from the capital replacement figures, and tend to have higher general overheads and labour costs per ton.

For soybeans it is estimated that both Argentina and Brazil have a substantial competitive advantage in production costs relative to the U.S. Variable costs in Argentina are low since few or no commercial fertilisers are used. Custom operation costs are high because most farmers in Argentina use contractors to harvest their crop. However, these high costs are partly offset by relatively low machinery costs per ton. In both Argentina and Brazil, fixed costs are substantially lower than in the U.S. This is the main reason for the two middle-income countries' cost advantage. Lower production costs more than offset the relatively high marketing costs in Argentina and Brazil.

In Brazil, about 20% of soybeans are double-cropped with wheat. Brazil has relatively high variable costs owing to high fertiliser prices and greater requirements of phosphates per hectare. As with maize and wheat, variable costs are dominant in

the middle-income countries whereas fixed costs account for 51% of total production costs in the U.S. Chemicals, machinery and general overheads are mainly responsible for the high cost of soybean production in the U.S.

CONCLUSION

The fact that the U.S. has been losing its share of world agricultural trade over the past five years has awakened interest in the issue of competitiveness, which has been referred to as the ability of a country to achieve a market share. This study has dealt with the cost-competitiveness of major exporting countries of maize, wheat and soybeans. Production and marketing costs are the principal factors, on the supply side, that affect competitiveness. "Private economic costs", as opposed to economic costs in a free market, were used because these reflect the cost of doing business in the real world. Land rents, management and risk costs were not included in the analysis.

Argentina and Thailand have a cost advantage in maize production that is due primarily to low farm production costs, particularly low commercial fertiliser, chemical and machinery costs. Argentinian farmers achieve good yields with little or no commercial fertilisers because of fertile soils and the use of advanced crop-cattle rotation systems. Costs in Thailand are based on a labour-intensive production system. The abolition of input and export taxes in Argentina may stimulate greater use of inputs and so give rise to higher yields.

The U.S. dominates the world maize market and is the price setter in that market. This domination may continue for some time since the U.S. has a cost advantage in maize production, apart from Argentina and Thailand. Although the latter countries are low-cost producers, they are somewhat limited by land and climate constraints; they could, however, increase yields with new technologies and favourable government policies. Brazil is the world's third largest maize producer, but it is a high-cost producer. Brazil appears to have a comparative advantage in soybean production when compared to the U.S.

With regard to wheat, the U.S. has a cost disadvantage owing to relatively high production costs (both variable and fixed). The U.S. may lose more of its market share in future to Argentina, Australia, Canada and some E.E.C. countries.

With regard to soybeans, it is clear that the two middle-income countries, Argentina and Brazil, have a cost advantage relative to the U.S. Brazil appears to have a comparative advantage in soybean production because of high maize and wheat production costs (Ortmann *et al.*, 1987: 18-21). It also has considerable potential for expanding production because of vast land resources and the use of new technologies. Improved infrastructure and port facilities will enhance the middle-income countries' competitive advantage.

South Africa's cost-competitive position is generally not favourable. For maize and wheat it ranked fourth of the major exporting countries considered. South Africa's share of the export market will probably remain small owing mainly to land and moisture constraints.

Generally, production costs, which are dependent on suitability of soil and climate, technology, management expertise and government policies, appear to be the most important element in determining the cost-competitiveness of a country. Variable costs are generally more dominant in middle-income countries than in developed countries. Production cost differences per ton between the high and middle-income countries appear to depend largely on differences in fertiliser costs, general overheads and capital replacement costs.

BIBLIOGRAPHY

AHALT, J.D. (1985). *Annual agricultural situation report* Agricultural Counsellor, Buenos Aires, Argentina, April 1985 1985

BULLOCK, J.B., NIEWOUDT, W.L. and PASOUR, E.C. (1977). Land values and allotment rents. *Amer. J. Agr. Econ.* 59: 380-384

DIRECTORATE OF AGRICULTURAL PRODUCTION ECONOMICS (various years). *General farm management results for maize and wheat* Department of Agriculture and Water Supply, Pretoria

ECONOMIC RESEARCH SERVICE (various years). *Economic indicators of the farm sector: Costs of production* USDA, Washington D.C.

ECONOMIC RESEARCH SERVICE (1986). *Agricultural outlook* USDA, Washington D.C., June 1986

GOODLOE, C.A. and BYRNE, S.B. (1985). Effects of exchange rate differences on agriculture in North America and Oceania. In: *North America and Oceania outlook and situation report* USDA. RS-85-1: 17-25

INTERNATIONAL MONETARY FUND (1986). *International financial statistics* Washington D.C.

LONGWORTH, J.W. and KNOPKE, P. (1982). Australian wheat policy 1948-79: A welfare evaluation. *Amer. J. Agr. Econ.* 64: 642-654

LOUW, P. de V. (1986). Personal communication. Economic Services Department, Maize Board, Pretoria

MIRANDA, G.M. (1985). *Identification of comparative advantage in the production of corn, wheat, soybeans and ethanol - Brazil and the United States* Unpublished M.Sc. thesis, Ohio State University, Columbus, Ohio

ORTMANN, G.F., STüLP, V.J. and RASK, N. (1987). *Comparative costs in agricultural commodities among major exporting countries* ESO 1325, Ohio State University, Columbus, Ohio

ORTMANN G.F. and RASK, N. (1988). The cost competitiveness of major exporting countries in maize, wheat and soyabeans II: Landed costs and effects of exchange rates. *Agrekon* 27: 2

PERKINS, P.R. (1987). Measuring economic competitiveness in trade. In: *U.S. Competitiveness in the World Wheat Market* Proceedings of a Research Conference, June 1986. USDA, ERS, Washington D.C., March 1987: 17-19

SHARPLES, J.A. (1987). U.S. competitiveness in the world wheat market: A prototype study. In: *U.S. Competitiveness in the World Wheat Market* Proceedings of a Research Conference, June 1986. USDA, ERS, Washington D.C., March 1987: 7-14

STALLINGS, D. (1985). Use of exchange rates in Latin America. In: *Latin America: Outlook and situation report* USDA, RS-85-9: 30-35

STANTON, B.F. (1986a). *Production costs for cereals in the European community: Comparisons with the United States, 1977-84* Department of Agricultural Economics, Cornell University, Research Report 86-2, March 1986

STANTON, B.F. (1986b). Comments on the ERS Wheat Competitiveness Conference. In: *Comments from trade and University review panels on ERS Wheat Competitiveness Conference* USDA, ERS, Washington D.C., 17-18 June 1986: 5-7

APPENDIX 1

EXPORTS AND MEAN SHARES OF THE WORLD MAIZE, WHEAT AND SOYBEAN MARKETS BY VARIOUS COUNTRIES, 1982-84

Country	Commodities		
	Maize	Wheat	Soybean equivalents*
	Million t		
World	69,16	111,01	45,17
Argentina	5,76	7,16	4,23
Australia	0,02	9,98	--
Brazil	0,50	0,00	10,30
Canada	0,56	21,16	--
France	4,28	14,40	--
South Africa	1,75	0,10	--
Thailand	2,85	0,00	--
United Kingdom	0,01	2,06	--
United States	48,56	42,11	29,41

	% of world total		
Argentina	8,3	6,4	9,4
Australia	0,0	9,0	--
Brazil	0,7	0,0	22,8
Canada	0,8	19,1	--
France	6,2	13,0	--
South Africa	2,5	0,1	--
Thailand	4,1	0,0	--
United Kingdom	0,0	1,9	--
United States	70,2	37,9	65,1
Total	**92,8**	**87,4**	**97,3**

*Trade in soybean products from non-producing countries is not included

Source: Food and Agriculture Organization of the United Nations (1985)

APPENDIX 2

PRODUCTION AND MARKETING COSTS OF *MAIZE* IN VARIOUS COUNTRIES (U.S. DOLLARS, MID-1986 PRICE LEVEL AND EXCHANGE RATE)

Particulars	Argentina		Brazil		South Africa		Thailand		United States	
Yield/ha (t)	**3,36**		**2,22**		**1,98**		**2,07**		**6,43**	
Variable costs	Per ton	%	Per ton	%	Per ton	%	Per ton	%	Per ton	%
Seed	14,06		6,07		4,01		2,77		7,26	
Fertiliser and lime	–		28,15		24,45		0,44		22,43	
Chemicals	0,54		0,48		6,25		0,26		7,55	
Custom operations	16,83		–		0,59		21,03		2,70	
Fuel and lubrication	7,17		18,47		11,78		--		7,51	
Repairs	5,46		4,62		6,65		1,59		4,82	
Drying	–		–		–		–		2,88	
Hired labour	–		–		1,17		15,11		0,66	
Miscellaneous	–		13,01		3,48		1,11		0,41	
Interest on variable costs	1,54		2,48		2,74		1,67		2,48	
Total variable costs	**45,60**	**64,0**	**73,28**	**64,4**	**61,12**	**67,4**	**43,98**	**65,3**	**58,70**	**60,7**
Fixed costs										
General farm overheads	–		2,10		1,32		3,39		6,96	
Taxes and insurance	6,74		3,79		0,75		--		6,45	
Capital replacement	6,16		9,49		13,57		1,99		13,80	
Labour	8,17		20,82		7,32		15,35		5,63	
Interest on nonland capital	4,58		4,25		6,65		2,63		5,20	
Total fixed costs	**25,65**	**36,0**	**40,45**	**35,6**	**29,61**	**32,6**	**23,36**	**34,7**	**38,04**	**39,3**
Total production costs	**71,25**	**100,0**	**113,73**	**100,0**	**90,73**	**100,0**	**67,34**	**100,0**	**96,74**	**100,0**
Marketing costs	**30,46**		**37,37**		**35,60**		**33,92**		**25,10**	
Total costs	**101,71**		**151,10**		**126,33**		**101,26**		**121,84**	

APPENDIX 3

PRODUCTION AND MARKETING COSTS OF *WHEAT* IN VARIOUS COUNTRIES (U.S. DOLLARS, MID-1986 PRICE LEVEL AND EXCHANGE RATE)

Particulars	Argentina		South Africa		United States		Canada		Australia		United Kingdom	
Yield/ha (t)	**1,81**		**1,46**		**2,24**		**1,94**		**1,50**		**6,98**	
Variable costs	Per ton	%	Per ton	%	Per ton	%	Per ton	%	Per ton	%	Per ton	%
Seed	9,72		8,41		8,31		8,57		3,84		8,91	
Fertiliser and lime	-		23,50		21,32		12,87		7,64		19,71	
Chemicals	4,98		8,26		3,56		7,62		6,68		13,92	
Custom operations	11,49		2,71		6,13		0,85		11,46		4,57	
Fuel and lubrication	7,98		14,44		13,80		9,65				4,23	
Repairs	6,66		9,32		9,63		13,44		10,81*		9,12	
Hired labour	-		0,16		0,95		-		-		-	
Miscellaneous	-		7,69		0,91		2,09		-		3,23	
Interest on variable costs	1,43		3,50		3,66		2,57		2,02		2,93	
Total variable costs	**42,26**	**63,0**	**77,99**	**68,1**	**68,27**	**51,4**	**57,66**	**46,3**	**42,45**	**45,2**	**66,62**	**59,9**
Fixed costs												
General farm overheads	-		1,67		9,85		2,92		9,58		12,25	
Taxes and insurance	5,97		1,26		9,51		7,09		3,36		-	
Capital replacement	6,81		18,01		25,30		30,22		22,81		11,02	
Labour	7,11		6,97		11,69		15,71		7,56		15,70	
Interest on nonland capital	4,90		8,57		8,19		10,81		8,16		5,67	
Total fixed costs	**24,79**	**37,0**	**36,48**	**31,9**	**64,54**	**48,6**	**66,75**	**53,7**	**51,47**	**54,8**	**44,64**	**40,1**
Total production costs	**67,05**	**100,0**	**114,47**	**100,0**	**132,81**	**100,0**	**124,41**	**100,0**	**93,92**	**100,0**	**111,26**	**100,0**
Marketing costs	**29,50**		**32,50**		**30,60**		**30,80**		**35,40**		**30,00**	
Total costs	**96,55**		**146,97**		**163,41**		**155,21**		**129,32**		**141,26**	

*Includes fuel, lubrication and repairs

APPENDIX 4

PRODUCTION AND MARKETING COSTS OF *SOYBEANS* IN VARIOUS COUNTRIES (U.S. DOLLARS, MID-1986 PRICE LEVEL AND EXCHANGE RATE)

Particulars	Argentina		Brazil		United States	
Yield/ha (t)	**2,10**		**1,80**		**1,95**	
Variable costs	Per ton	%	Per ton	%	Per ton	%
Seed	16,31		14,57		12,87	
Fertiliser and lime	-		55,04		13,04	
Chemicals	9,43		14,82		24,53	
Custom operations	27,67		-		5,08	
Fuel and lubication	13,26		20,85		16,26	
Repairs	10,44		6,58		10,22	
Hired labour	-		-		1,93	
Miscellaneous	-		6,09		0,37	
Interest on variable costs	2,69		4,01		4,06	
Total variable costs	**79,80**	**63,1**	**121,96**	**78,3**	**88,36**	**49,0**
Fixed costs						
General farm overheads	-		2,59		14,61	
Taxes and insurance	13,82		4,67		15,96	
Capital replacement	10,96		13,49		33,07	
Labour	13,87		6,48		16,68	
Interest on nonland capital	8,10		6,48		11,51	
Total fixed costs	**46,75**	**36,9**	**33,71**	**21,7**	**91,83**	**51,0**
Total production costs	**126,55**	**100,0**	**155,67**	**100,0**	**180,19**	**100,0**
Marketing costs	**36,14**		**43,50**		**24,60**	
Total costs	**162,69**		**199,17**		**204,79**	