

# Contents

Chapter	Page
Introduction .....	3
Factors Behind the Decline of U.S. Agricultural Exports,...	4
The Role of Technology Transfer .....	5
Relative Costs of Production .....	5
U.S. Competitiveness in High-Value Agricultural Products .....	6
Questions for the Future .....	6
Consequences for the American Workplace .....	7
Areas for Policy Analysis .....	9
Trade Negotiations .....	9
Trade Promotion .....	10
Addressing the Third World Debt Problem .....	10
Research and Development .....	10
Modification of U.S. Domestic Farm Policies .....	11
1. Influences on International and U.S. Trade in Agriculture .....	15
Agricultural Trade and the World Recession .....	15
The Value of the U.S. Dollar .....	16
U.S. Agricultural Policies .....	17
Policies of Other Nations .....	18
Government Support for Agriculture .....	19
2. World Trends in Agricultural Production and Trade .....	23
Crop Production Trends .....	23
Harvested Area ..., .....	23
Yields .....	25
Production .....	27
Extensive v. Intensive Agricultural Production .....	29
U.S. Market Shares .....	31
The Long-Term Outlook for International Trade .....	33
World Trade in Wheat, Corn, and Soybeans .....	34
3. Cost-Competitiveness of U.S. Agriculture .....	39
International Comparisons of Production Costs .....	39
Trends in Prices Paid and Received by Farmers .....	41
U.S. Costs of Production .....	41
Regional Production Costs and Agricultural Structure .....	45
4. Technology Transfer and the Competitiveness of U.S. Agriculture .....	51
Agricultural Technology Transfer .....	51
Patent Information .....	51
Indirect Transfer of Agricultural Technology .....	56
The Role of International Agricultural Research Centers .....	57
Agricultural Research Capacity .....	58
Capacity Transfer: Foreign Students Trained in the United States .....	59
Technology Transfer and Major Export Crops .....	59
International Transfer of Corn Technology .....	60
International Transfer of Wheat Technology .....	62
International Transfer of Soybean Technology .....	63
International Transfer of Emerging Agricultural Technologies .....	63
Conclusions, .....	65
5. U.S. Trade in High-Value Agricultural Products .....	69
Factors Influencing HVP Trade .....	69
The Significance of HVP Exports .....	69
Barriers to Expanding U.S. Trade in HVPS .....	71
World and U.S. Trends in HVPS .....	73
International HVP Markets .....	73

## Contents—continued

	Page
Marketing Programs . . . . .	74
Leading U.S. HVP Export Commodities . . . . .	75
Oilseed Products . . . . .	75
Tobacco and Cigarettes . . . . .	78
Cattle Hides . . . . .	81
Rice . . . . .	82
Corn Gluten Feed . . . . .	84
Tallow . . . . .	85
Beef . . . . .	87
Pork . . . . .	89
Poultry, . . . . .	89
Wheat Flour . . . . .	92
Horticultural Products . . . . .	94
Appendix: Contributions . . . . .	101

## List of Tables

Table No	Page
I-1. Projected Growth Rates in Crop Yields . . . . .	5
I-2. If U.S. Trade in Agriculture and Other Products Increases by a Dollar, Which Business Sectors Benefit From This Gain? . . . . .	8
I-3. Jobs Produced by a Million Dollar< Worth of Exports (or Jobs Lost by a Million Dollars' Worth of Imports) in the Categories Indicated . . . . .	9
1-1. Agricultural Trade-Weighted Indices of the Foreign Exchange Value of the U.S. Dollar . . . . .	16
1-2. Simulated Impacts of a 10-Percent Appreciation in the Value of the Dollar . . . . .	17
1-3. Price Support and Export Policies of Major U.S. Wheat, Corn and Feed Grains, and Soybeans and Products . . . . .	19
1-4. Direct Government Assistance to Agriculture, Selected Countries, 1978-80 . . . . .	20
2-1. Wheat: Harvested Area, Selected Countries, 1969-84 . . . . .	23
2-2. Corn: Harvested Area, Selected Countries, 1969-84 . . . . .	24
2-3. Soybeans: Harvested Area, Selected Countries, 1969-84 . . . . .	24
2-4. Rates of Change in Harvested Area of Cereal Grains, Cereal Yields and Production, By Region, 1969-71 to 1979-81 and Projected, 2000 . . . . .	24
2-5. Rates of Change in Harvested Area of Oilseeds, Oilseed Yields and Production, By Region, 1969-71 to 1979-81 and Projected, 2000, . . . . .	25
2-6. Wheat Yields, Selected Countries, 1969-84 . . . . .	25
2-7. Corn Yields, Selected Countries, 1969-84 . . . . .	26
2-8. Soybean Yields, Selected Countries, 1969-84 . . . . .	26
2-9. OTA Projections of Crop Yields, Crop Production, and Average Annual Growth Rates for Yields and Production . . . . .	27
2-10. World and U.S. Production of Corn, Wheat, and Soybeans, Selected Periods,, . . . . .	28
2-11. World Production and U.S. Share for Wheat, Corn, and Soybeans, 1970-85 . . . . .	28
2-12. Sources of Change in Cereal Grain Production, by Region, 1969-71 to 1979-81 and Projected to 2000: Average Annual Changes in Area and Yield as a Percent of Change in Production . . . . .	29
2-13. Sources of Change in Oilseed Production, by Region, 1969-71 to 1979-81 and Projected to 2000: Average Annual Changes in Area and Yield as a Percent of Change in Production . . . . .	30
2-14. U.S. Ending Stocks and Stock-to-Use Ratios for Wheat, Corn, and Soybeans, 1970-84 . . . . .	31
2-15. World Exports and U.S. Market Share for Wheat, Corn, and Soybeans, 1970-85, . . . . .	32
2-16. World Coarse Grain Exports, 1979-86 Crop Years,.. . . .	33

## Contents—continued

<i>Table No.</i>	<i>Page</i>
2-17, Production and Consumption of Cereal Grains, 1978-80 and Projected to 2000, by Region . . . . .	34
2-18, Production and Consumption of Oilseeds, 1978-80 and Projected to 2000, by Region . . . . .	34
2-19, World Exports as a Share of World Production, 1970-83 . . . . .	35
2-20, Trade Patterns Implied By Projected Balance of Production and Consumption of Cereal Grains and Oilseeds, 1978-80 and Projected for 2000, by Region. . . . .	36
2-21, Projected Shifts in Shares of World Trade in Cereal Grains and Oilseeds, 1978-80 to 2000 . . . . .	36
3-1, Average Variable Costs of Production for Wheat, Corn and Soybeans, Selected Countries and Regions, 1980-82 . . . . .	40
3-2, Indexes of Price Received by Farmers for Crops and Prices Paid for Production Inputs, Selected Countries, 1976-82 . . . . .	42
3-3, Average Variable Cost of Production for Wheat, Corn and Soybeans, U.S. and Selected Regions, 1980-82 . . . . .	43
3-4, Percent of Wheat Crop Produced at Less Than Specified Variable Cost of Production, 1974 and 1981 . . . . .	44
3-5, Percent of Corn Crop Produced at Less Than Specified Variable Cost of Production, 1974 and 1981 . . . . .	44
3-6, Production Costs, Farm Size, and Yields for Corn, Wheat and Soybean Enterprises in Selected Crop Production Areas, 1983 . . . . .	46
4-1, Plant Patents in the United States, 1970-84 . . . . .	53
4-2, U.S. Patents Granted in Agricultural Technology Fields . . . . .	54
4-3, Indices of International Trade in 13 Agricultural Technology Fields, 1978-84: Trade Index for Patents by Country; U.S. Trade Index for Patenting Activity With United States . . . . .	55
4-4, Total Origin Patents and Patents Granted in 13 Agricultural Technology Fields, 1978-84 . . . . .	55
4-5, U.S. Patents Granted in Agricultural Technology Fields . . . . .	57
4-6, Total Publications in 24 Countries for 10 Applied Agricultural Science Fields and U.S. Share, 1973-77 and 1978-82 . . . . .	57
4-7, Agricultural Research Expenditures and Scientist-Years, by Region, 1959-80 . . . .	58
4-8, Total Number of Ph.D. Degrees Awarded in 20 Fields Associated With Agriculture and Home Economics and the Proportion of Degrees Awarded to Non-U.S. Citizens With a Temporary Visa . . . . .	60
4-9, Technology Fields With At Least Medium Productivity and Transfer Potential . .	64
5-1, Major HVP Exporters: Leading Commodities and Major Markets, 1980 . . . . .	70
5-2, U.S. Leading HVP Export Commodities, 1985 . . . . .	75
5-3, U.S. Horticultural Exports, 1985 . . . . .	94
5-4, U.S. Fresh Noncitrus Fruit Exports, 1985 Value . . . . .	95
5-5, Leading Vegetable Exports, 1985 Value . . . . .	97

## Contents—continued

Figure No	List of Figures	Page
I-1.	U. S. Trade in Food, Feeds, and Beverages.	3
I-2.	U.S. Merchandise Trade Balance . . . . .	4
3-1.	Wheat Produced at Less Than the Specified Variable Cost per Bushel, 1981	43
3-2.	Corn Produced at Less Than the Specified Variable Cost per Bushel, 1981	44
5-1.	World and U.S. Soybean Meal Exports . . . . .	76
5-2.	U.S. Soybean Meal Exports by Destination, 1983..	77
5-3.	U.S. Soybean Oil Exports by Destination, 1983 ..	77
5-4.	World and U.S. Exports of Tobacco. ....	79
5-5.	U.S. Unmanufactured Tobacco Exports by Destination; 1983 “..	80
5-6.	World and U.S. Exports of Cigarettes .. ..,	80
5-7.	U.S. Cigarette Exports by Destination, 1983 ..	80
5-8.	U.S. Cattle Hide Exports by Destination, 1983	82
5-9.	World and U.S. Rice Exports .. .. , .. , .. , .. , .. , ..	84
5-10.	U.S. Rice Exports by Destination, 1983 ..	84
5-11.	World and U.S. Exports of Animal Fats. “.. “.. “..	86
5-12.	U.S. Inedible Tallow Exports by Destination, 1983	87
5-13.	World and U.S. Beef Exports ....	88
5-14.	U.S. Beef Exports by Destination, 1983	89
5-15.	U.S. Poultry Meat Exports by Destination, 1983	89
5-16.	World and U.S. Poultry Meat Exports	90
5-17.	World and U.S. Wheat Flour Exports , .	93
5-18.	U.S. Wheat Flour Exports by Destination, 1983 .. .	93
5-19.	U.S. Citrus Fruit Exports by Destination, 1983.	94
5-20.	U.S. Fresh Noncitrus Fruit Exports by Destination, 1983	95
5-21.	U.S. Shelled Almond Exports by Destination, 1983	96