THE SOYBEAN SUBSECTOR IN ECUADOR: AN ANALYSIS OF STRUCTURE AND GOVERNMENT POLICY

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ABSTRACT

**THE SOYBEAN SUBSECTOR IN ECUADOR:
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The primary purpose of this analysis is to provide government officials in Ecuador with information on the soybean subsector. Toward this end, this paper describes and analyzes the economic system which encompasses the flow of soybeans and soybean products from producer to consumer. Particular attention is given to the interaction between industry structure, the conduct of private sector participants and existing government policy. Also, weaknesses in existing government policy are identified and alternate policy approaches are explored.

Two methodologies, the Subsector Studies Approach and the Structure-Conduct-Performance Paradigm, were employed to guide and organize the research and analysis. Also, a simple technique based on the opportunity cost concept was employed to examine the costs to the consumers of soybeans and soybean products of existing government policy.

Primary sources of data and information include existing literature, data previously collected by Ecuadorian Government agencies, information volunteered in key informant interviews, and field surveys conducted by Dr. David Tschirley.

ACKNOWLEDGEMENTS

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In addition, I would like to acknowledge the unending assistance of Dr. David Tschirley. His help, which took many different forms and lasted from the beginning of the research to the end, was absolutely instrumental in the completion of this project. Also, for the comments and perspective of Dr. Subbiah Kannappan, I am very grateful.

Finally, I wish to acknowledge the Department of Agricultural Economics at Michigan State University and Sigma One Corporation, the primary USAID contractor on the Agricultural Sector Reorientation Project in Ecuador, for providing the financial support for this study.

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LIST OF ACRONYMS

AFABA	Asociacion de Fabricantes de Alimentos Balanceados - Balanced Feed Manufacturers' Trade Association
APROCICO	Asociacion de Productores de Ciclo Corto - Maize and Soybean Producers' Association
BNF	Banco Nacional de Fomento - National Development Bank
ENAC	Empresa Nacional de Almacenamiento y Comercializacion - Grain Marketing Agency of The Government of Ecuador
GOE	Government of Ecuador
MAG	Ministry of Agriculture
USAID	United States Agency for International Development

CHAPTER ONE

INTRODUCTION

1.1 History of Government Intervention

In the 1950s, Ecuador adopted a development strategy of import substitution. In line with this strategy, imports for many products were restricted and policies were designed to promote domestic production of those products. Indeed, direct government participation in the market place became the rule rather than the exception. Price supports and controls were used extensively to direct investment and to transfer income.

The soybean was first introduced into Ecuador in the 1950s. Since then, the government has attempted to direct the development of the soybean sector through many different methods. Domestic production has been promoted through the use of administered prices, import restrictions and recently through direct government participation in the soybean market. Government institutions have been designed to offer subsidized credit for soybean production, to provide technical assistance to farmers, and to buy, dry, store and sell soybeans to support an official price. In addition, the government has developed and dispersed improved seed varieties.

The development of the soybean sector has also been influenced by other government objectives such as the desire to maintain availability of affordable foodstuffs to the

general population. Controls on the price of cooking oil, one of the two main soy-based products, is a manifestation of this objective.

1.2 Agricultural Sector Reorientation

In 1984, a decision was made by the government of Ecuador (GOE) to move toward a more market-oriented economy, away from extensive direct government participation. Toward this end, a comprehensive effort to reassess agricultural policies was begun with the technical and financial assistance provided by the United States Agency for International Development (USAID).

This study of the soybean subsector was a part of the joint USAID-GOE Agricultural Sector Reorientation Project. In line with the objectives of the Agricultural Sector Reorientation Project, the intent of this study was to assess existing government policy that relates to the soybean subsector and to suggest policy alternatives where appropriate to meet stated government objectives.

1.3 The Role of the Policy Analyst

The main purpose of the policy analyst is to provide support to government decision makers. The initial task of the policy analyst is to provide a description of how the economic

system to be studied actually functions. Secondly, the analyst should attempt to identify problems in the economic system or areas in the economic system where improvements can be made. Thirdly, the analyst should list alternative courses of actions that the government can take that will satisfy to some degree the government's stated set of objectives. Fourthly, the policy analyst should attempt to identify the full range of probable consequences associated with each course of action.

Underlying policy analysis is the recognition that government objectives can and often do conflict. Indeed, a policy designed to achieve one specific objective may preclude or even detract from the achievement of another objective. Thus, choosing between alternatives involves implicitly weighing the importance of one objective against another.

It is the identification of the costs and benefits of the various policy alternatives in a way meaningful to decision makers that determine the value of the work of the economic analyst. This approach to policy analysis will be taken in this paper.

1.4 Policy Analysis and the Soybean Industry

As will be explored later, existing government policies that influence the soybean subsector do satisfy, to a large extent, government's stated objectives. Still, areas for

improvement in the implementation of these policies can be identified. Moreover, the policies chosen involve serious trade-offs that perhaps should be considered more explicitly in policy development.

Also, the conventional wisdom espoused by participants in the soybean subsector is that the cost of achieving stated policy objectives has been borne disproportionately by the poultry industry and ultimately by poultry consumers. This conventional wisdom will be explored.

1.5 Objectives

As stated above, the underlying purpose of this study is to provide government policy makers with information about the soybean subsector in Ecuador, in order to assist in the policy decision process.

Toward this end, the following steps will be undertaken:

1. Describe the historical development of the soybean subsector.
2. Describe and analyze the structure of the soybean subsector.
    a. Identify the various marketing channels employed for soybeans and soybean products.
    b. Quantify the flow of soybeans and soybean products through these channels.

c. Identify participants in the marketing of soybeans and soybean products.

3. Examine the characteristics and behavior of market participants.
4. Analyze how existing government policy has shaped the soybean subsector and participant conduct.
5. Provide rough estimates of the opportunity costs of existing government policies.
6. Identify alternatives to existing policy along with the economic and social consequences associated with these alternatives.

1.6 Analytical Framework

Two widely-accepted research methodologies, the Subsector Study Approach and the Structure-Conduct-Performance Paradigm, have been employed to organize this research effort.

1.6.1 Subsector Analysis

The Subsector Study Approach is not rigidly defined nor is it linked to any particular set of analytical tools. Rather, this approach delineates the scope of the research to be undertaken.

A subsector, has been defined conceptually by Shaffer as "the vertical set of activities in the production and

distribution of a closely related set of commodities".(8, p.1014) Thus, the area of analysis encompasses all industries that are related in some way to the commodity of interest. In this sense, the scope of subsector analysis has been likened to that of a "systems" approach.

The comprehensiveness of the area of research helps to ensure that important variables are not excluded from the analysis. Still, a subsector is believed to be a manageable unit of analysis.

In contrast, other approaches tend to focus on an area of analysis that is more narrowly defined. Specifically, traditional Industrial Organization (I-O) studies have concentrated on groupings of firms that perform a particular economic function, such as processing, wholesaling or retailing. Thus, in I-O studies, performance is evaluated at a particular stage in the economic system rather than for the system as a whole.

Underlying the subsector approach is the recognition that performance of the system as a whole (all economic activities from production to consumption for the commodity of interest) is not necessarily equivalent to the sum of performance of the various stages. To be sure, interaction or coordination between the stages contribute to a large degree to overall performance.

For this reason, the effectiveness with which stages are vertically coordinated becomes an important focus of subsector

studies. Which coordinating mechanisms are employed, why they are employed, and how these mechanisms contribute to overall performance are all questions that are emphasized in subsector analysis.

This type of approach is particularly well suited for policy analysis. Identification of weaknesses in the coordination between stages offer opportunities for policy makers to improve performance through policy design. Also, identification of interdependencies between stages in a subsector can help to identify unwanted side-effects of a proposed policy change prior to adoption.

The specific application of this conceptual framework begins with the delineation of the relevant research unit. For soybeans in Ecuador, the subsector to be studied includes firms (or farmers) that are involved in the production of soybeans, in the assembly and delivery of soybeans to processing firms, in the processing of soybeans into soybean oil and meal, in the further processing of soybean oil and meal into cooking oil and balanced feeds, and finally in the delivery of these soybean products to consumers of cooking oil and balanced feed.

1.6.2 Structure-Conduct-Performance Paradigm

The method of analysis chosen for this study will draw from the Structure-Conduct-Performance (S-C-P) paradigm

developed by industrial organization theorists. A basic premise of the S-C-P paradigm is that characteristics of the Structure of a market such as number of firms, relative size of firms and the ease of entry into the industry, influence participant Conduct (behavior) such as competitive practices, methods of vertical coordination and price setting policies. Participant conduct, in turn, is believed to shape the industries Performance. Performance of an industry is generally measured in terms of how well the industry contributes to meeting stated social objectives. Common performance criteria include efficiency, income distribution, and economic growth.

In this study, the interaction between structure and conduct at all stages within the soybean subsector will be examined. Further, how structure and conduct at each stage within the subsector impact performance of the subsector as a whole will be analyzed.

1.7 Sources of Information

Data and information analyzed in this paper have been gathered from a variety of sources through various methods. Sources employed include existing literature, data previously collected by Ecuadorian government agencies, policy amendments published in public registers, information volunteered in key informant interviews, and data collected through field surveys

conducted by Dr. David Tschirley as part of his study titled Market Coordination and Supply Management in the Feedgrains/Poultry Subsector of Ecuador.[1]

More specifically, aggregated data, such as acreage planted, production quantities and poultry population figures were gleaned from various published and unpublished reports and memoranda generated by several government agencies. Similarly, price series were constructed from government records. Data was cross-checked where possible and indeed some discrepancies were found to exist. The discrepancies are deemed inconsequential to the outcome of this analysis. These discrepancies, however, would perhaps limit the accuracy of a rigorous quantitative approach.

Unstructured key informant interviews were conducted with government officials, industry association spokesmen and numerous industry participants at the soybean crushing and oil refining level, the feed grain manufacturing level, and the poultry production level. Topics of the interviews ranged from the historical development of the soybean industry and government policy procedures to industry operating procedures and conduct of other participants in the soybean subsector. As such, information collected in key informant interviews was largely qualitative in nature: few numerical data were collected through this approach. Again, where possible, information was cross-checked with other sources.

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[1] See reference 29.

A wealth of information on the marketing practices of soybean producers, assemblers, and feed manufacturers was provided by a series of field surveys conducted by Dr. David Tschirley during 1987 and 1988. Dr. Tschirley's analysis of the survey data along with this author's own review of the data were particularly useful in identifying structural characteristics and marketing practices employed at these levels in the marketing chain.[2]

It should be mentioned here that some gaps in data or information could not be overcome by this researcher. As a result, some significant questions remain unanswered. These unanswered questions will be pointed out throughout the paper. In addition, a lack of historical and current data has precluded the use of some common economic tools, such as calculation of price elasticities and margin comparisons.

1.8 Organization of this Paper

This paper is organized into six chapters. Following this introductory chapter, chapter two will outline the general characteristics of the supply and demand conditions for soybeans and soybean products in Ecuador. On the supply side, area planted, production and imports of soybeans and soy products will be addressed. On the demand side, this chapter will discuss growth in consumption for soy products over the

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[2] See references 27, 28, 29.

last 20 years and the implications for development of the marketing system.

Chapter three will describe the marketing channels for soybeans from the producer to the consumers of soybean oil and soybean meal. As such, key participants, their market behavior and possible concerns about market behavior that result from the structure of the marketing channel will be addressed.

Chapter four will describe existing government policy related to the soybean subsector. Stated policy objectives, the policy procedure, and government institutions involved in this procedure will be described. This chapter will also include a section on policies or goods considered external to the soybean subsector that nonetheless should be considered in the design of soybean policy. The last section of this chapter will outline possible operational deficiencies in the policy tools and procedures currently employed.

In chapter five, a rough accounting of the economic costs of the existing government policies related to the soybean subsector will be presented. Also, price formation, price trends and their implications will be discussed.

Based on the findings in the chapters one through five, chapter six will examine specific modifications or alternatives to existing government policy. Alternatives presented will tend to address operational deficiencies in existing policies. Each alternative will also be analyzed in its effects on stated policy objectives.

Chapter seven will sum up the major findings of the paper and will identify possible areas for further research.

CHAPTER TWO

CHARACTERISTICS OF SUPPLY AND DEMAND

2.1 The Utilization of Soybeans in Ecuador

In Ecuador, soybeans are used primarily as raw material in the manufacture of cooking oil for human consumption and balanced feed for animal consumption. To a lesser extent, soybean oil is used as an ingredient in margarine. Also, lecithin, a by-product of soybean processing, is used in the manufacture of soap and confections.

2.2.1 Soybean Meal

In terms of weight and market value, soybean meal is the primary output from the processing of soybeans. It is used in Ecuador as the principal source of vegetable protein in balanced feeds for poultry production, and to a lesser extent for shrimp and pork production. By weight, soybean meal in Ecuador ranges from 42% to 48% protein. An exact breakdown of consumption by industry is not available. However, it has been estimated that 70 to 90% of soybean meal in Ecuador is consumed by the poultry industry. To date, the use of soybean meal for human consumption has not been exploited in Ecuador.

The proportion of soybean meal within balanced feed mixtures varies with the use of the feed. Mixtures for poultry

production generally contain a higher proportion of soybean meal (12% on average) than mixtures for shrimp production (5% on average). Also, within the poultry industry, feed mixtures for growth tend to have a greater proportion of soybean meal than feed for fattening. The exact percentage however, can vary substantially with the costs of soybean meal and other ingredients. Indeed, large balanced feed manufacturers reformulate the ingredient mix to minimize cost as often as weekly using linear programming models.

In Ecuador, direct substitutes for soybean meal include peanut meal and cottonseed meal. However, the high cost of these sources of protein in addition to the scarcity of supply in Ecuador, generally has precluded use of these substitutes.

Fish meal, a source of animal protein, can be substituted for soybean meal in poultry feeds, however, only to a limited extent due to the unfavorable effect on the flavor of the poultry meat. In addition, severe quality problems which plague the fish meal industry in Ecuador has influenced the degree to which fish meal is substituted for soybean meal.

2.2.2 Soybean Oil

As mentioned above, soybean oil is used primarily as an ingredient in cooking oil. It is sold in pure form or in a 50/50 mixture with palm oil. As will be addressed below, the soybean oil-palm oil mixture is the most common form of

cooking oil in Ecuador. It should be noted that legally, cooking oil in Ecuador cannot contain more than 50% palm oil.

2.2.3 Conversion rate

Soybeans are converted into soybean products in two basic phases, processing or crushing, and refining. The processing phase includes crushing and flaking of the soybeans and removal of the crude soybean oil using solvent extraction or pressure methods. The refining phase transforms crude soybean oil into edible oil through degumming, bleaching and deodorization processing. It is in this second phase in which lecithin is produced as a by-product.

The conversion rate of soybeans to soybean products varies with the extraction method employed and with the quality of the soybeans. Roughly, however, the conversion rate of soybeans to soybean products (in terms of weight) is as demonstrated in Figure 1.

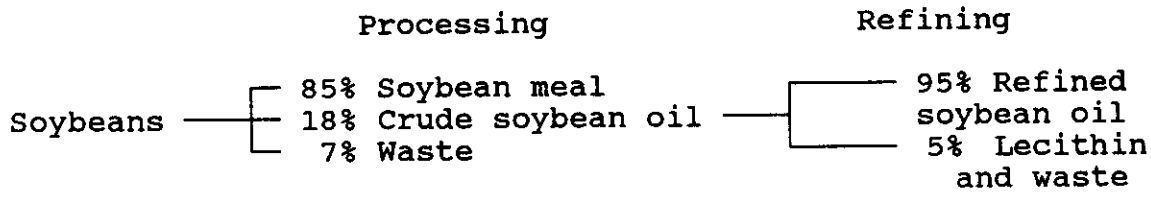


Figure 1. Conversion Rate of Soybeans to Soybean Products

Thus, 100 kilograms of soybeans can be converted into 75 kilograms of soybean meal and 18 kilograms of crude soybean oil with 7 kilograms of waste. The 18 kilograms of crude soybean oil is then converted into approximately 17.1 kilograms of refined soybean oil.

2.2 Supply of Soybeans and Soybean Products

2.2.1 Domestic Production of Soybeans

Domestic production of soybeans has grown rapidly since its cultivation was first introduced into Ecuador in the latter part of 1950. As will be addressed later, this is due to both expansion of area planted and to increased yields. This growth also reflects the success of government policy in promotion of domestic cultivation.

Specifically, as demonstrated in Figure 2, area of soybeans harvested has followed a trend of remarkable and practically uninterrupted growth since 1970. Indeed, soybean area harvested expanded approximately 22% in 1985, 21% in 1986, 45% and in 1987. Area planted in soybeans has dropped in a few years, most notably in 1983, as a result of severe rains and flooding caused by the climatic condition called el Niño.

Favorable economic and climatic conditions for soybeans in recent years have also attracted new participants (farmers)

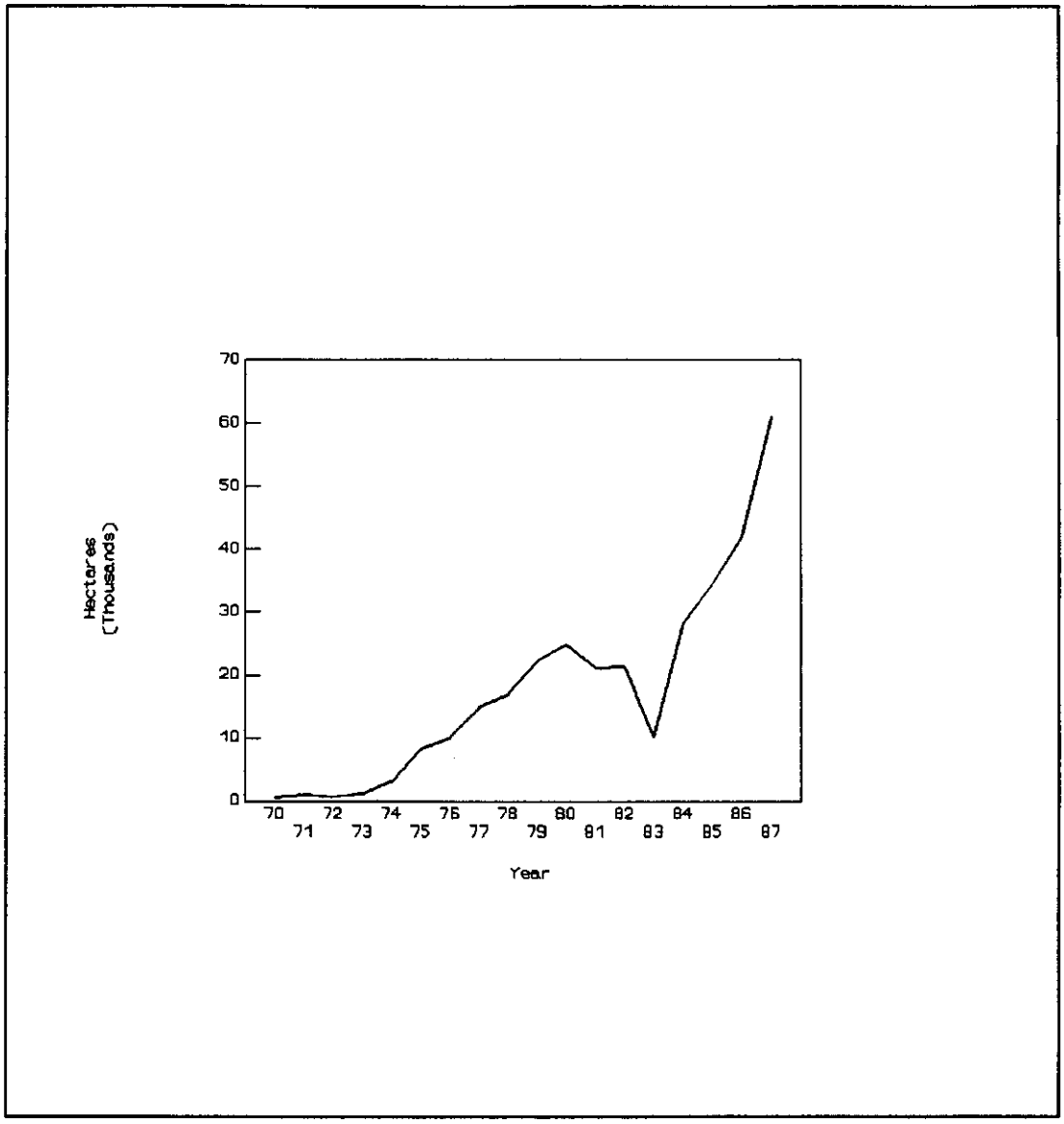


Figure 2. **Soybean Area Harvested**

Source: **Ministry of Agriculture**

into soybean production. In a recent survey of soybean farmers, 18% of those interviewed in the northern region of the province of Los Rios, the most productive soybean region, had not planted soybeans prior to 1987.(29, p.173) Similarly, 3% of those interviewed in the southern region of the province of Los Rios had not planted soybeans in prior years.(29, p.173) The total number of farmers involved in soybean production is estimated at about 1,200, nearly double the figure cited for 1982.(29, p.:6, p,12)

Soybean yields have also increased substantially since the soybean was first introduced. See Figure 3. In 1970, yields averaged .98 metric tons per hectare. By 1986, the average yield had nearly doubled to 1.82 metric tons per hectare. Estimates for 1987, place the average yield at 1.93 metric tons per hectare. These higher yields are attributed to improved seed varieties, increasing use of fertilizers and to greater mechanization.(MAG, personal communication: 6, p.7) Despite the rising trend, yields have fluctuated significantly from year to year due to variation in weather. As a basis for comparison, yields in Brazil, Argentina and the U.S were 1.8, 2.1, and 2.3 metric tons per hectare respectively in 1986.(23, p.98)

As a result of the increases in area planted and soybean yields, soybean production has increased considerably. Total production in 1987, 116,280 metric tons, was three times the level of production just three years earlier. Indeed, soybean

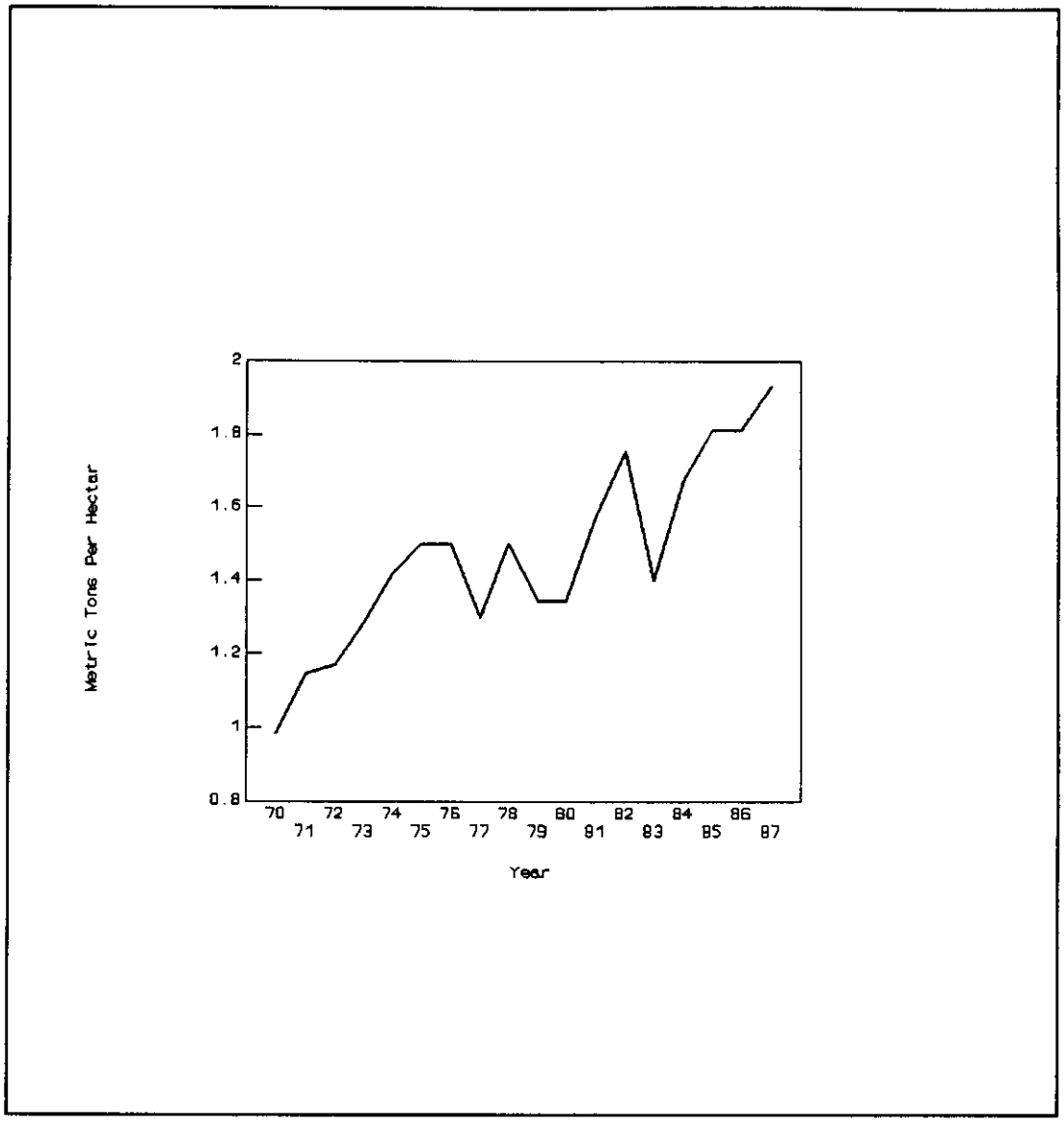


Figure 3 **Soybean Yields**

Source: **Ministry of Agriculture**

production increased 17% in 1985, 47% in 1986 and 47% in 1987. See Figure 4.

2.2.2 Domestic Production of Soybean Products

Actual figures on domestic production of soybean oil and soybean meal were not available to this analyst. Similarly, annual data on the amount of soybeans processed in Ecuador and soybean inventories held by processing firms at year end were not available, making accurate extrapolation of figures on annual soybean oil and meal production impossible.

However, by applying the standard conversion rates, of soybeans to soy products, to annual domestic soybean production, rough estimates of annual production of soybean oil and soybean meal were generated. See Figure 5.

It is important to stress that these figures are rough estimates based on total annual soybean production in Ecuador. Implicit in these estimates is the simplifying assumption that all domestic soybean production is processed in the year of harvest. Thus, actual production of soybean products could vary significantly around the estimates if year-end inventories of soybeans held by processors change from year to year.

Moreover, it is widely believed that some quantity of domestic soybean production is not processed into oil and meal

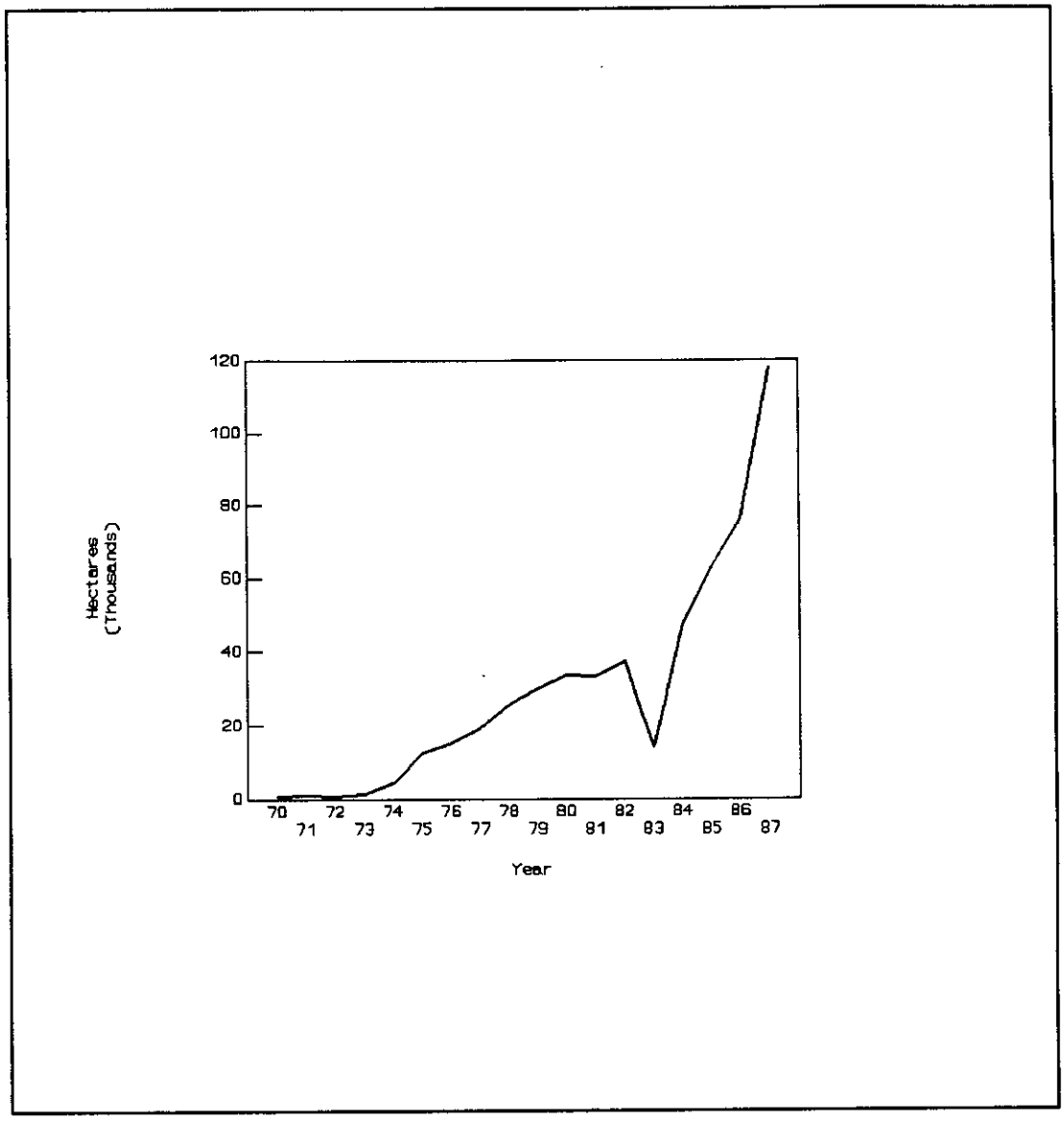


Figure 4 **Soybean Production**

Source: **Ministry of Agriculture**

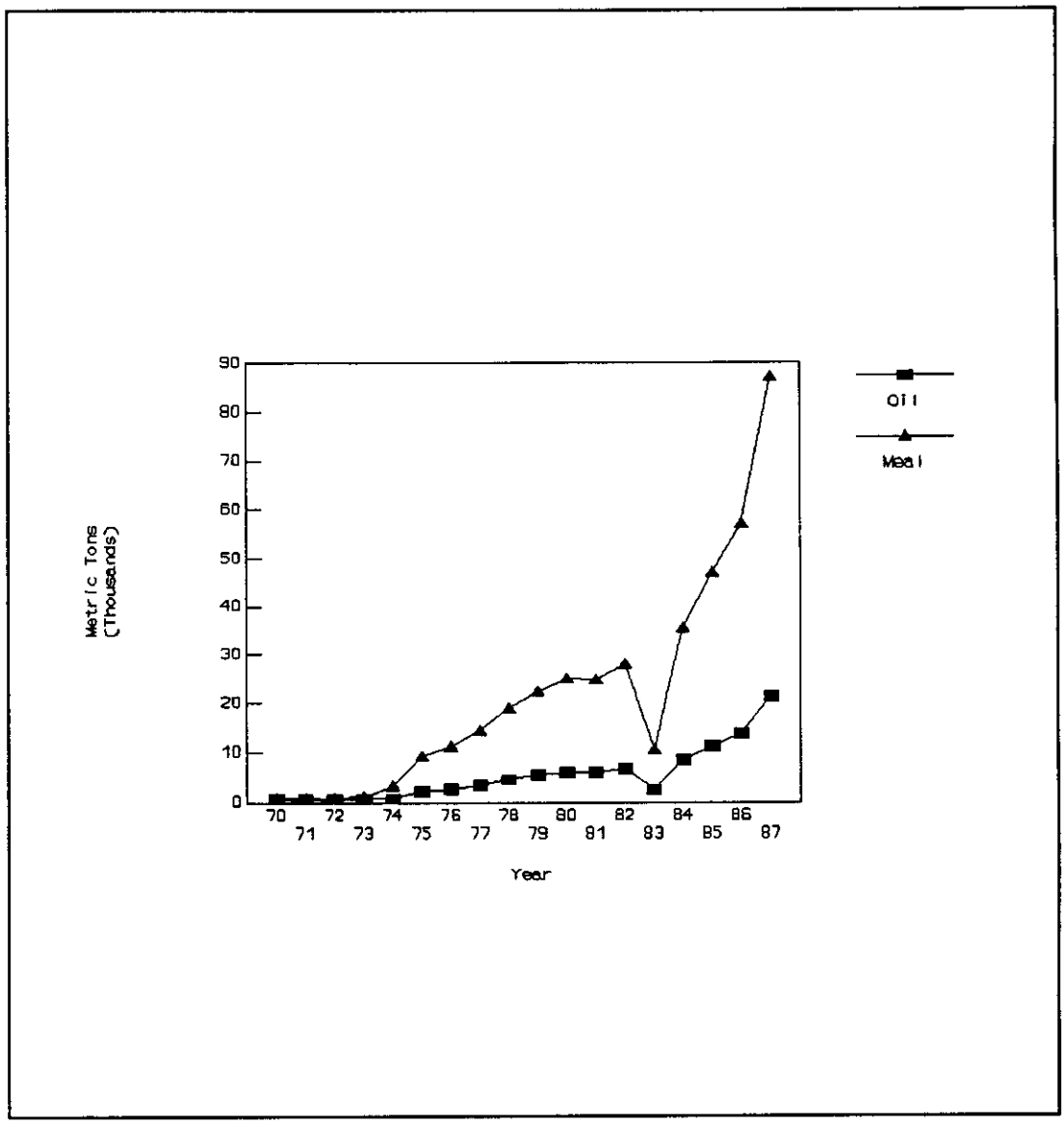
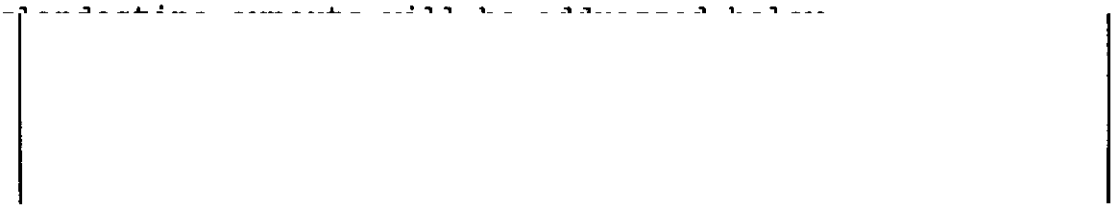


Figure 5 Estimated Production Of Soybean Oil And Meal

Source: Ministry of Agriculture

but is exported clandestinely to Colombia each year.[3] As such, it is likely that the extrapolated figures overestimate the actual production of soybean products. The issue of clandestine exports will be addressed below.



Despite the rapid expansion of domestic soybean production, Ecuador continues to import soybeans, soybean meal and soybean oil as needed to meet the gap between production and domestic demand. The evolution of these imports is demonstrated in Figure 6.

As shown, imports of soybean oil peaked in terms of volume in 1983, the year of El Niño, and declined substantially in each of the three years following. The most recent figures available, for 1987, place the level of soybean oil imports slightly higher than that in the prior year but still well below the level of imports recorded in all other years since 1970.

As a result, the proportion of imported soybean oil to total supply of soybean oil has fallen notably over the last few years. Indeed, imported soybean oil represented approximately 46% of total apparent supply in 1987, far below the peak ratio of 96% registered in 1983, the year of El Niño.

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[3] In 1988, the prices of soybeans in Colombia and Peru were, respectively, more than double and triple the price in Ecuador.

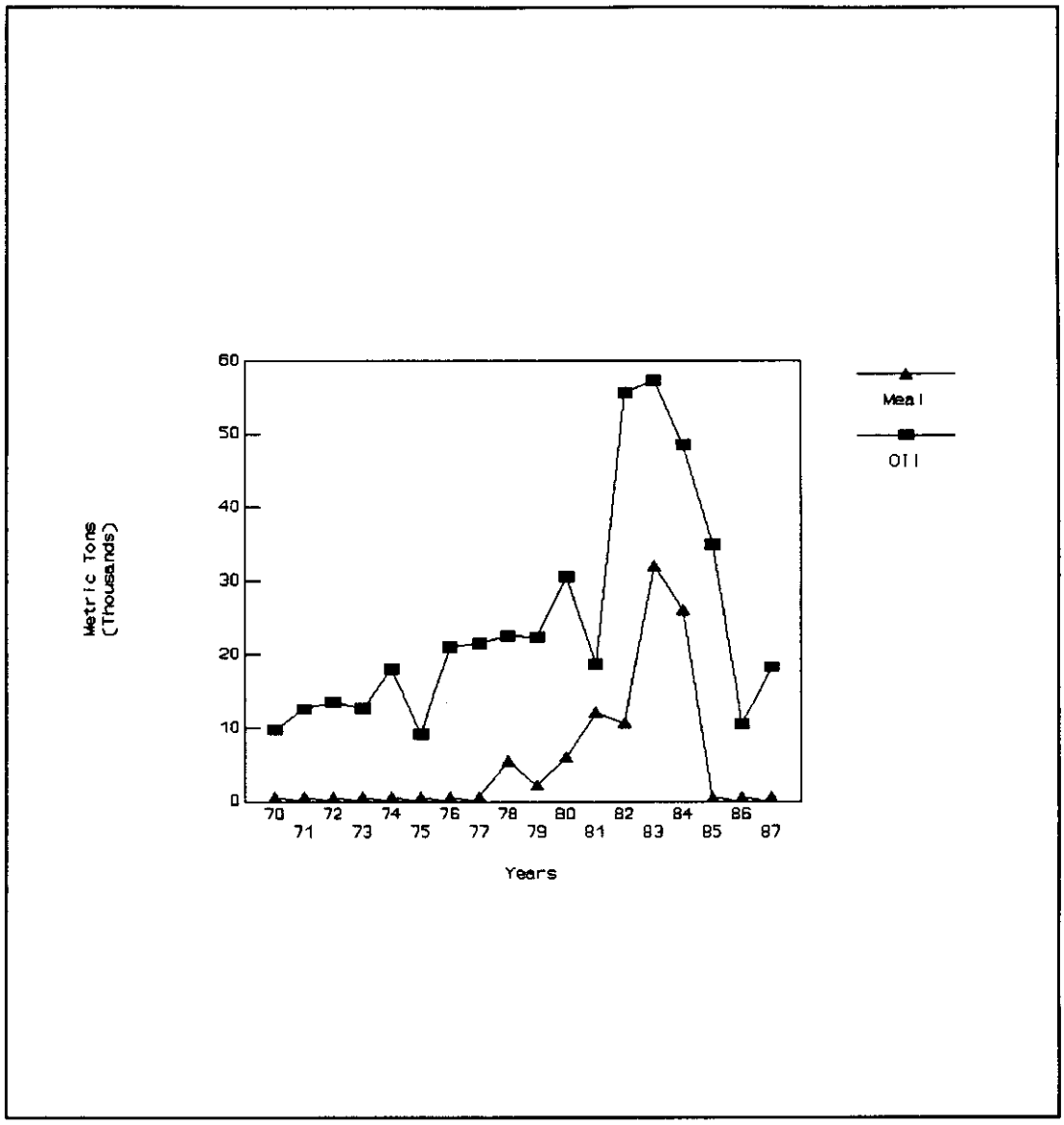

Figure 6 **Imports of Soybean Oil And Meal**

Source: **Ministry of Agriculture**

Even still, at 46%, imports represent a sizable portion of total apparent supply. See Figure 7.

It is also important to note that the level of imported soybean oil has been declining at a faster rate than the level of domestic production of soybean oil has been increasing. Consequently, total apparent supply of soybean oil has followed a downward trend over the last five years. At roughly 25,000 metric tons, total apparent supply of soybean oil in 1986 was approximately 40% of the supply achieved in the peak year of 1982. Total apparent supply in 1987, at approximately 39,000 metric tons, albeit greater than in 1986, was still substantially below the levels attained in the previous four years.

In addition, manufacturers of cooking oil have compensated for the declining supply of crude soybean oil by substituting other edible oils, in particular palm oil, in recent years. As a result, the proportion of soybean oil to total supply of cooking oil has fallen substantially since 1985. Specifically, soybean oil accounted for less than 50% of domestically produced cooking oils in 1987, down substantially from 66% the prior year and 99% the year before that. See Figure 8.

In contrast, the total supply of soybean meal continues to follow an upward trend. See Figure 9. Indeed, estimated total supply in 1987 increased 47% over the previous year to 88,517 metric tons. Again, this estimate is based on total

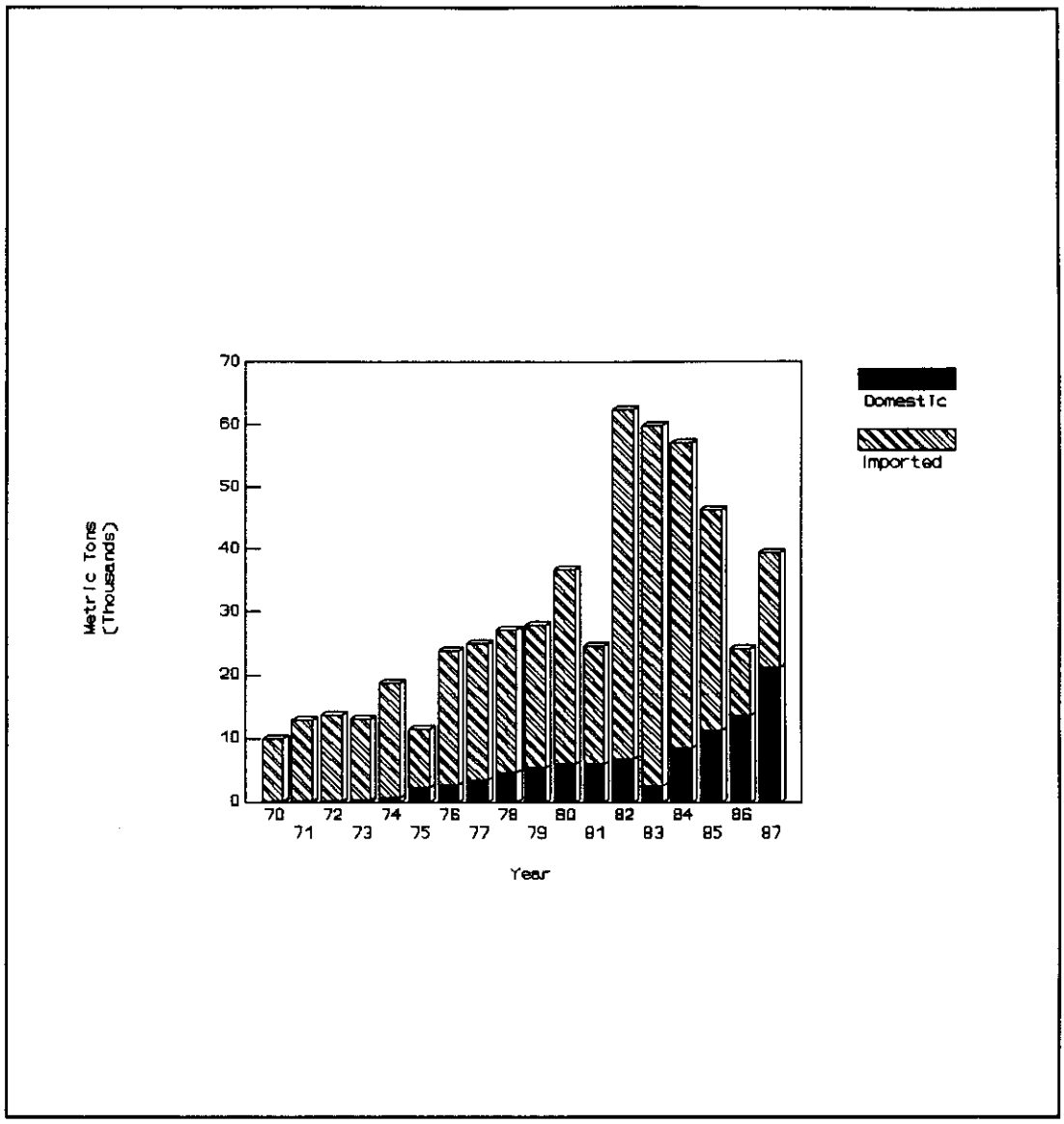

Figure 7 Estimated Domestic Supply of Crude Soybean Oil

Source: Ministry of Agriculture

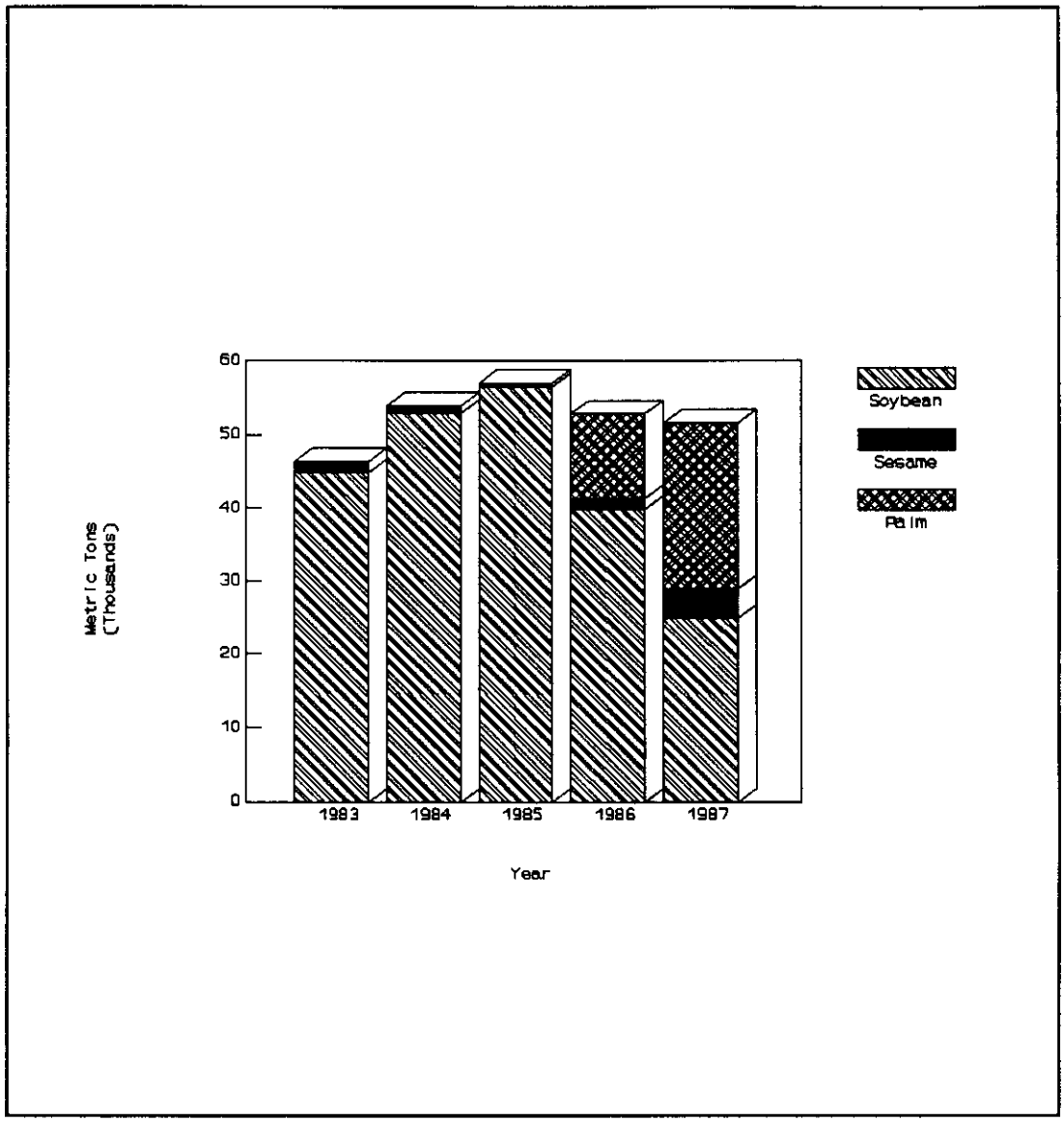

Figure 8 **Ingredients of Cooking Oil**

Source: **Ministry of Agriculture**

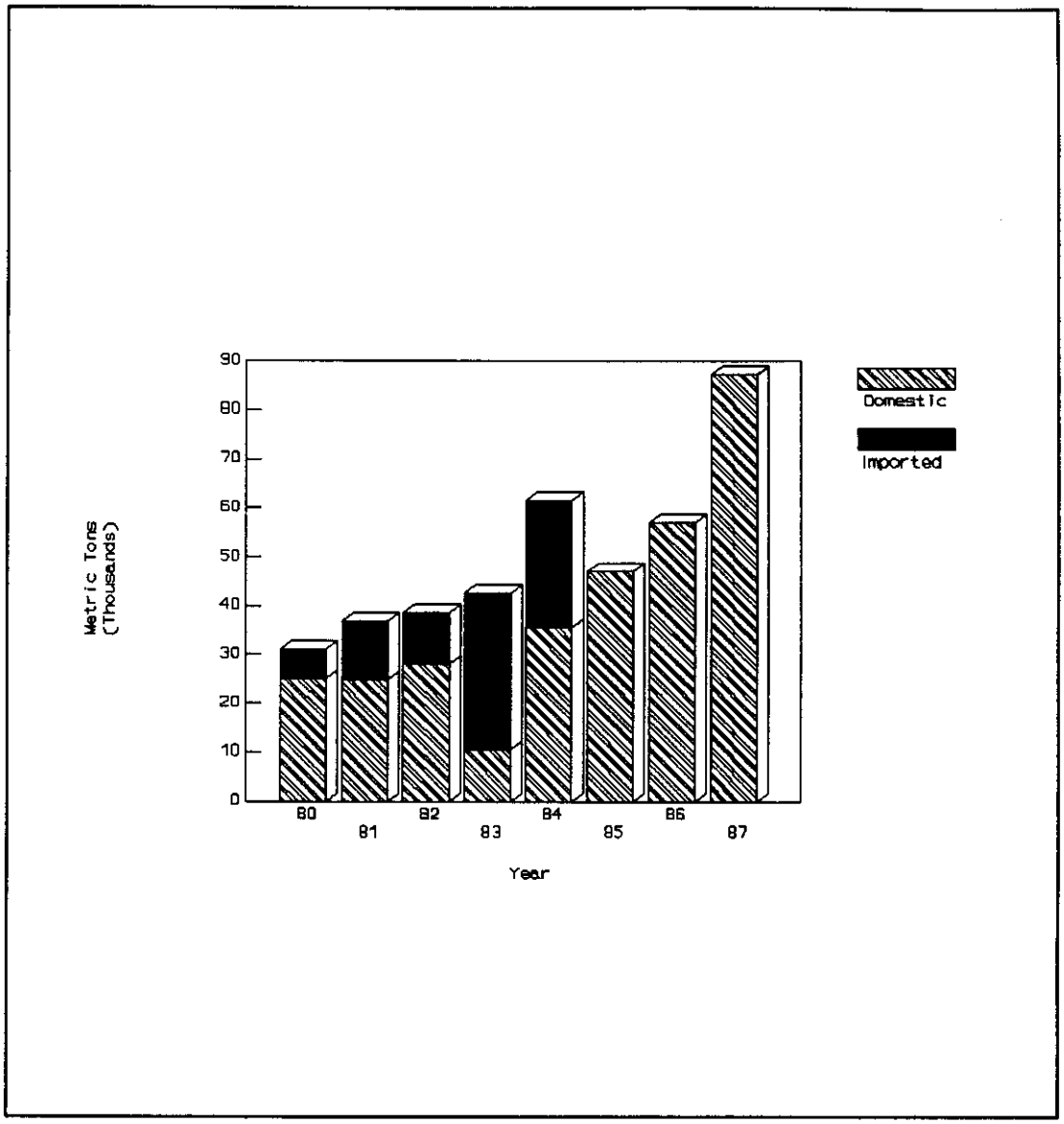

Figure 9 **Estimated Domestic Supply of Soybean Meal**

Source: **Ministry of Agriculture**

domestic soybean production and thus most likely overstates the actual figure. Also, it is believed that some quantity of soybean meal is clandestinely exported to Colombia. If so, the supply of soybean meal actually available for domestic consumption may be significantly less than the estimates suggest.

Ecuador relies almost entirely on domestic production to meet its needs for soybean meal. Indeed, only very small quantities of raw soybeans or soybean meal have been imported since 1984, the year following El Niño.

2.3 Demand for Soy Products

2.3.1 Soybean Oil

A substantial portion of the cooking oil produced in Ecuador is believed to be exported clandestinely to Colombia and Peru. The actual quantity of these exports is not known. Estimates, however, have run as high as 30% of total domestic supply.(31 p.22)

Perhaps more importantly, data on cooking oil actually consumed in Ecuador is not available. Moreover, estimates of cooking oil consumption in Ecuador that are based on domestic production would greatly overstate actual domestic consumption due to the inclusion of soybean oil that is clandestinely exported.

As a result of this lack of reliable data, a rigorous assessment of demand for cooking oil in Ecuador is not possible. Still, identification of factors that affect total demand for cooking oil may be helpful in understanding the soybean subsector.

Three main categories of factors that affect the level of demand for soybean oil in Ecuador can be identified. First, and perhaps the most important, is the category of factors that affect the actual consumption of cooking oil in Ecuador. Factors included in this category are changes in per capita income, growth in population, shifts in consumer preference for cooking oil versus substitutes such as shortening and lastly, the relationship between prices of cooking oil and substitutes.

A second category of factors consists of elements that impact the level of clandestine exports of soybean oil to Colombia and Peru. Included in this category are the retail price of soybean oil in Colombia and Peru, the retail price of soybean oil in Ecuador, the market rate of exchange between Ecuadorian Sucres and Colombian and Peruvian currencies and lastly the risks and costs involved in illegally transporting soybean oil across the border.

A third category consists of factors which influence manufacturers of cooking oil to use edible oils other than soybean oil, such palm oil, as ingredients in cooking oil. Included in this category are the relative costs of using

soybean oil versus other edible oils, the relative supply of soybean oil versus other edible oils, consumer preference for soybean oil versus other edible oils and lastly legal constraints such as a government regulation that states that cooking oil may not contain more than 50% palm oil.

An important observation about the factors mentioned above is that nearly all of them are currently influenced either directly or indirectly by government actions. Thus, the current level of cooking oil demanded is to a large extent determined by existing government policy. Another important point is that although the demand for soybean oil is closely linked to the demand for cooking oil, the relationship is not exactly one to one. Indeed, the proportion of soybean oil used in cooking oil has decreased since 1985 as processors have increased their use of palm oil.

2.3.2 Soybean Meal

Demand for soybean meal is perhaps more easily quantified than for soybean oil as estimates of animal consumption requirements can be generated by applying standard balanced feed formulas to animal production figures. Tschirley, using this method, found that from 1981 to 1987 the supply of soybean meal was generally insufficient to meet the

requirements of the poultry industry.[4] Moreover, Tschirley's calculations suggested that, at its peak in 1986, the soybean meal requirements of the poultry industry were roughly double the available supply.(29, p.68).

Since 1986, however, poultry production has fallen slightly while the estimated supply of soybean meal increased significantly. Indeed, ENAC, the government grain buying and storing agency, readied itself to buy 313,280 hundredweight of the domestic soybean crop in 1987 in anticipation of a projected oversupply of soybean meal of around 10,000 metric tons. Furthermore, the government has estimated that domestic supply of soybean meal in 1988 should be more than adequate to meet the 54,000 metric tons required by the poultry and shrimp industries.

However, AFABA, the association of balanced feed manufacturers and poultry producers, continued to solicit the government throughout 1988 to allow imports of soybean meal along with other balanced feed ingredients to offset a perceived scarcity in the market place. This issue will be further addressed in a later chapter.

Again, it should be mentioned that while exact figures are not available, government sources suggest that the poultry industry accounts for 80 to 90% of soybean meal consumption in Ecuador. The other 10 to 20% is consumed primarily by the

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[4] Tschirley's calculations did not include soybean meal requirements of the shrimp industry.

shrimp industry. A U.S government source, however, estimates the proportion of soybean meal consumed by the shrimp industry to be somewhat higher; approximately 23% of total consumption.

Estimation of future demand for soybean meal requires making strong simplifying assumptions. Indeed, a simple supply and demand model for poultry products developed by Tschirley suggests that the supply of soybean meal would have to rise by anywhere from 11% to 112% over the next ten years, depending on the assumptions that are made.(23, p.82) The intermediate growth scenario (most likely case) suggests that soybean meal requirements will increase by 53% over the next ten years, or an average of 5% annually.

Again, this model only addresses the needs of the poultry industry. Thus, the estimated 5% annual increase in soybean meal requirements would have to be adjusted slightly upward to include growth in consumption of soybean meal in the shrimp industry.

It is worth stressing that the output of the poultry industry as a whole declined by 1% in 1987 following years of remarkable growth (approximately 20% on an annualized basis from 1970 to 1986). The only other drop in production since 1970 was in 1983-84 due to the effects of El Niño. The blame for the drop in 1987 was placed squarely on rising prices and shortages of primary inputs, such as soybean meal. See Figure 10.

2.4 Policy Considerations

Several of the characteristics of supply and demand for soybeans and soybean products in Ecuador have important implications for the design of government policy. One important characteristic is the joint product nature of soybean oil and soybean meal. An implication of this characteristic is that a policy designed to affect the production or consumption of one soybean product may indirectly affect that of the other soybean product. To help guard against unintended cross effects, government policy for both soy products should be designed simultaneously.

Similarly, the supply and demand for substitutes and compliments to soybean products may affect the supply and demand for the soybean products themselves. For example, the demand for soybean meal is indirectly affected by the availability and quality of feed corn. If the price of feed corn rises due to declining supply, poultry producers may reduce poultry production and consequently demand less soybean meal. Likewise, the demand for soybean oil is linked to the availability of substitutes, such as palm oil. If the cost of using palm oil decreases in relation to soybean oil, demand for these oils may shift accordingly. As such, these relationships should be considered explicitly in the design of soybean policy.

In addition, the large domestic harvest of soybeans in 1988 has tremendous implications for government policy. With this harvest, domestic production of soybeans has approached, if not reached, the level where domestic requirements for soybean meal are fully met. As a result, the issue of whether or not to continue the rapid rate of expansion in domestic production must be promptly addressed.

Clearly, if the current rate of growth in domestic production (35% annually on average from 1984 to 1988) is continued, processors of soybeans will be less and less willing to pay high prices. As a result, the government would be forced to enter the market to a greater and greater extent to maintain the official support price.

Conversely, if growth in soybean production is aligned with the growth in the demand for soybean meal, by stabilizing or lowering the support price for soybeans (in real terms), the use of imported soybean oil or domestic substitutes, such as palm oil would have to be increased to keep up with the growing demand for cooking oil.

Regardless of the stance taken, the government's task of balancing supply with demand for soybeans and soybean products is made substantially more complex by the clandestine outflow of soybeans and soy products to neighboring countries. For example, the efficacy of the policy of controlling cooking oil prices to increase its availability to the domestic population is substantially undercut by clandestine exports. Indeed,

controlling domestic cooking oil prices may actually decrease domestic availability as rising prices in neighboring countries will tend to increase the financial incentive to export. Clandestine exports in some instances, however, work in favor of government policy. For example, greater exports of soybeans helps to maintain the official support price by bidding up the price paid at the farm level. In either case, the design of government policy should take into account the cross border flow of soybeans and soybean products.

Another characteristic that has important implications for policy design is the dynamic nature of supply and demand for soybean meal within the poultry industry. To be sure, poultry production is both a determinant of, and determined by, the supply of soybean meal. For example, as poultry production increases, the demand for soybean meal also increases. Yet, as the price of soybean meal rises with demand, poultry production may decrease. Thus, a large variation in the supply or demand for soybeans from one year to the next could set off a self perpetuating cycle of expansion and contraction in poultry and soybean meal production. As such, the design of government policy should attempt to balance the rate of growth of poultry production with that of soybean meal production.

CHAPTER THREE

MARKETING CHANNEL STRUCTURE

3.1 General Characteristics

The marketing structure of soybeans in Ecuador has a few important overall characteristics. First, unlike other feed grains in Ecuador, the movement of soybeans from producer to processor is rather direct, with a limited presence of middlemen. Functions that are often associated with middleman such as assembly, transportation, storage, and drying are to a large extent performed by other participants in the marketing channel. As a result, there are fewer exchanges of ownership and fewer alternative channels in the marketing system for soybeans than for other feed grains in Ecuador.

Second, exchange of ownership of soybeans or soybean products within the marketing channel, for the most part, does not take place in conditions associated with a competitive market place. Instead, the range of market conditions include an unbalanced number of buyers and sellers, unbalanced economic power between buyers and sellers, contract exchanges, and government intervention.

Third, almost all production of soybeans is marketed (99% in 1987). This is in contrast with other feed grains, such as hard corn, in which a larger percentage is produced for consumption directly on the farm. (29, p.156)

Fourth, the working of the marketing system as a whole is simplified by the relatively homogenous nature of participants. Specifically, soybean farming is generally pursued on a large and relatively scientific scale and is heavily concentrated in specific geographic areas. Also, the soybean crushing industry is composed basically of four large firms with similar characteristics which are also geographically concentrated.

Fifth, industry associations exist at every level within the marketing system. Moreover, these associations perform very important functions in the marketing of soybeans.

3.2 Structure of the Marketing System

The flow of soybeans and soybean products through the marketing system is represented graphically in Figure 11. The flow chart is designed to illustrate the range of activities performed by the various subsector participants and the significance of the participants (in terms of volume) in performing each activity. Toward this end, the width of a box representing a participant is roughly proportional to the participant's significance in the performance of an activity.

From the farm level, harvested soybeans are sold either directly to soybean crushers/extractors, to rural assemblers or, as in the most recent year, to ENAC, the government grain buying and selling agency. Soybeans sold to the latter two,

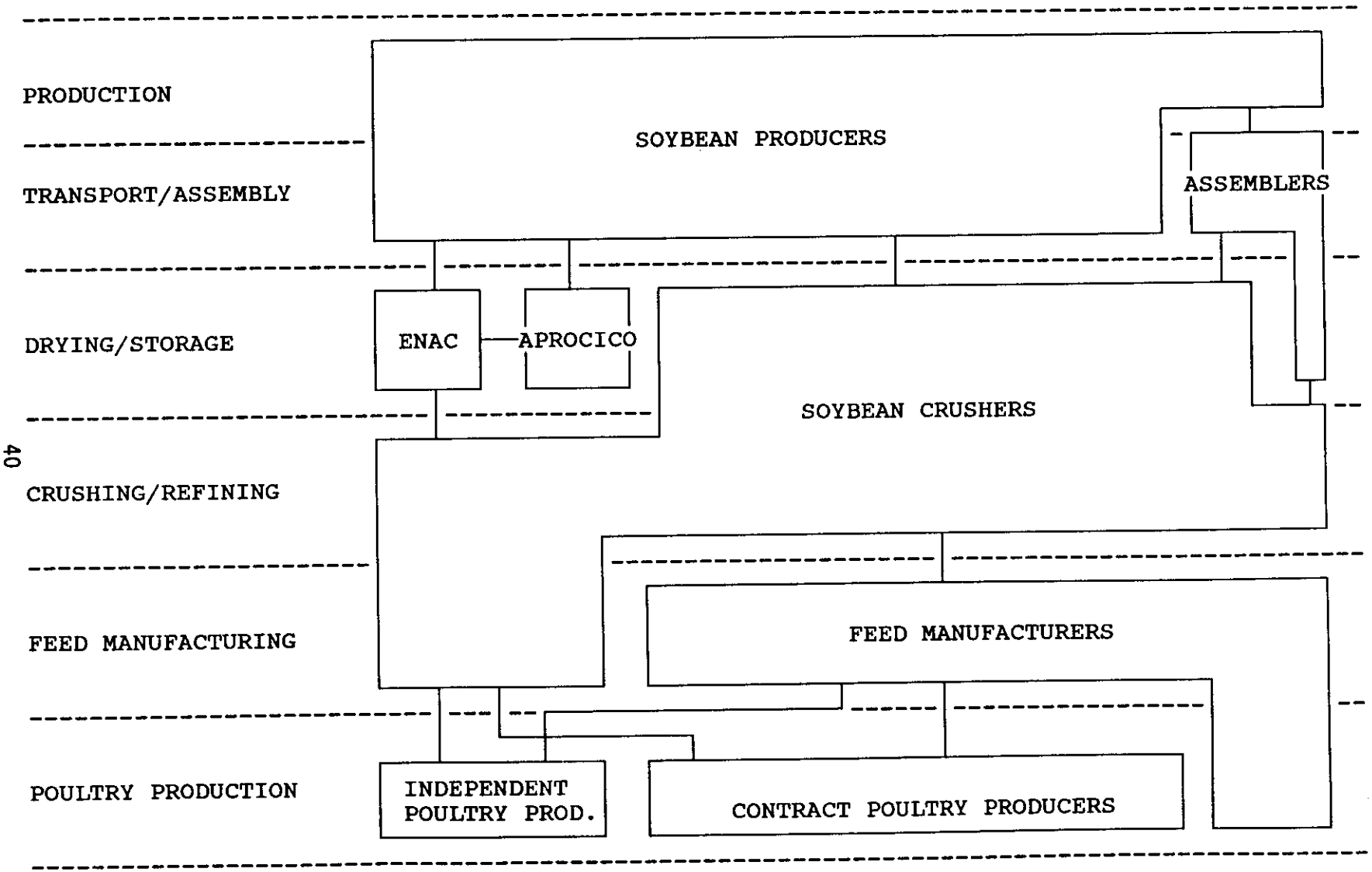

Figure 11 **Flow Chart of Soybean Marketing Channels**

assemblers or ENAC, are in turn sold to the soybean crushers. Direct sales to the soybean crushers account for the majority of the volume marketed, amounting to roughly two thirds of the total in 1987.(29, p.178)

The soybean crushers dry and store the soybeans soon after harvest and process them throughout the year into crude soybean oil and soybean meal. The crude soybean oil is then refined for use as cooking oil or as an ingredient in margarine.

A survey by Tschirley found that nearly all of the soybean meal produced by soybean crushers (98%) is sold to balanced feed manufacturers or directly to poultry and shrimp producers who mix their own feed. The remaining 2% is sold to intermediaries who resell the soybean meal to balanced feed manufacturers.(29, p.193)

From manufacturers, most balanced feed is sold to shrimp and poultry producers or is provided to them under contractual arrangements. A small percentage of feed is sold to intermediaries who resell the feed to independent poultry and shrimp producers.

Also, as will be discussed below, the majority of balanced feed consumed in Ecuador does not enter the market place.

3.3 Participant Characteristics

3.3.1 Soybean Production

Soybean production is highly concentrated in one geographic area, the coastal province of Los Rios. In 1987, approximately 98% of total soybean production was produced there. Production has concentrated in Los Rios, and around the city of Quevedo in particular, due to favorable climatic conditions and to the relative closeness to the oilseed crushers in Guayaquil and Manta. Indeed, the road system between the production areas and the oilseed processors is quite good by Ecuadorian standards. Prior efforts to cultivate soybeans in other areas such as the northern province of Esmeraldas have been abandoned due in part to relatively poor transportation system linking those areas.

Another important characteristic of soybean production that is closely related to geographic location is the seasonality of harvests and production volume. In northern Los Rios, the topographic and climatic conditions are such that soybeans can be cultivated throughout the year, producing two or even three crops annually. Nonetheless, with the exception of 1987, rotation with other crops, primarily hard corn, has been common practice in this area.

In 1987, however, many farmers in this region, responded to an increase in the support price for soybeans by planting a second crop of soybeans instead of rotating with corn as before. Whether or not this double cropping practice will continue is dependent on the relationship between the support price of soybeans and that of alternative crops, primarily hard corn. Also, a higher incidence of disease generally associated with continuous cropping of soybeans may prompt farmers to return to a crop rotation system.

In contrast, in southern Los Rios, cultivation of soybeans is generally limited to only one crop per year. A second crop of soybeans is precluded by widespread flooding during the rainy season. In this region, soybeans are rotated routinely with paddy rice.

The bulk of annual soybean production in Ecuador is harvested in October, November and December. Prior to 1987, generally 80 to 90% of total annual production was harvested during these months. In 1987, however, the practice of double cropping in northern Los Rios reduced this proportion to 62%.(29, p.174) The remainder, the rainy season crop, is harvested generally during the months of June to August.

Soybean farms are considered large by Ecuadorian standards. Indeed, soybean farmers interviewed by Tschirley in 1987 planted an average of 60 hectares of soybeans each. Moreover, the largest 45 soybean farmers, a quarter of the

total interviewed, planted an average of 162 hectares of soybeans each.

Soybean production is generally undertaken on a technologically advanced scale. Hybrid seeds, compound fertilizers, and chemicals are regularly employed. Also, machinery is commonly used for activities such as planting and harvesting. The relationships between size, technology and government policy will be addressed later.

Tschirley found that for those interviewed, the degree of specialization in soybean production increased significantly with size. A group of the 46 smallest farmers planted on average only 27% of their total cultivated land with soybeans, where the largest farmers, mentioned above, planted on average 68% of total cultivated land with soybeans.

Similarly, the selling practices of soybean farmers appear to vary with size. Larger farmers tend to sell directly to oilseed crushers while smaller farmers more often sell to intermediaries who in turn sell to oilseed crushers.

Also, it is relevant to note that this group of large soybean farmers produced 71% of the combined production of soybean farmers interviewed. This implies that the bulk of soybean production is marketed on a relatively large scale.

3.3.1.1. Producer groups

The farm level survey by Tschirley found that less than one-quarter of the soybean producers interviewed were members of any producer group or association.(29, p.43) Those that are members, however, tend to be large producers. Indeed, the average farm size of members of the largest soybean producer association, APROCICO, approached 200 hectares in 1982, more than twice the average farm size of all soybean farms today.(6,p.15)[5] Moreover, large producers of soybeans, more often than not, tend to be members of an association. Members of APROCICO alone produced upwards of 65% of total domestic soybean in 1985.(6,p.15)

Producer associations such as APROCICO offer services to members such as credit, and assistance in storage, drying and selling of soybeans. A service proposed by APROCICO but not yet provided is the sale of imported inputs, such as fertilizer, to members. Also, APROCICO has broached the idea of investing in facilities for crushing soybeans for its members. Results of the farm level survey, however, suggests that the range of services available to members of producers associations is very limited. The survey also suggested that the utilization of available services by members has been low.

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[5] Average farm size is defined as total cultivated area.

Perhaps more importantly, these groups play a very active role in the development of government soybean policy. APROCICO, in particular, maintains considerable influence over the development and enforcement of the official government support price for soybeans. APROCICO directly participates, along with soybean crushers, in negotiations with government officials over soybean price policy. Also, in 1987, APROCICO pressured ENAC, the government grain buying and selling agency, into entering the market to support the soybean price. Moreover, APROCICO, itself, received soybeans from its members for storage and later sale to ENAC in an effort to support prices.

The specific procedure by which the official support price is set will be discussed in chapter four below.

3.3.2 Assemblers

As mentioned above, the majority of domestic soybean production, in terms of volume and in number of sales, is sold directly to the soybean crushers. Indeed, less than one quarter of the sales made by those soybean producers interviewed in 1987 were to rural assemblers.

This low incidence of sales to assemblers can be attributed predominately to the higher prices paid by soybean crushers. According to the farm level survey, rural assemblers paid on average 10% less than soybean crushers.

The soybean farmers that did sell to assemblers, reported that they did so, despite lower prices, primarily because assemblers tend to pay in cash while soybean crushers tend to pay on average more than one and one-half months after receiving the crop. For those assemblers that did not pay in cash, the average delay in payment was still less than half that of the soybean crusher. Also, although most farmers still transported the crop themselves to rural assemblers, the distance traveled to assemblers' locations was significantly less than the distance to soybean crushers' locations.

The survey also found that small farmers sold to rural assemblers with greater frequency than large farmers. This is not surprising as one might expect smaller farmers to be less capable of handling long delays in payment than larger farmers. Also, as the survey suggests, the cost per unit of transporting soybeans may decrease somewhat as the amount of soybeans transported increases.

As noted above, few assemblers purchase soybeans on the farm. More often than not, producers will transport the soybeans themselves to a fixed location assembler. The survey also noted that few assemblers offer services, such as credit, or pre-season agricultural inputs to producers. These functions appear to be adequately handled by government agencies, such as the Banco Nacional de Fomento (BNF) and by producer organizations such as APROCICO.

In addition, the survey found that the vast majority of assemblers did not store soybeans but resold them to soybean crushers as soon as possible. As will discussed below, this practice of immediate resale reflects the disincentive for storage created by the government's policy of pan-seasonal prices. Also, it is worthwhile to note that roughly half of the survey respondents reported that they dried the soybeans prior to storage.

In sum, assemblers are relatively unimportant in terms of volume purchased. Also, for the most part, assemblers are passive participants in the marketing system. They do not actively promote production of soybeans by providing pre-season services such as loans or agricultural inputs to farmers, nor do they purchase directly on the farm. Moreover, more often then not, assemblers do not store or dry soybeans.

Nonetheless, they do inject liquidity into the marketing system by paying primarily in cash while selling on a time basis.

3.3.3 ENAC

In 1985, ENAC, the government grain buying and storing agency, was charged with the mandate of supporting soybean prices at the farm level through direct purchases in the market place. Since this resolve, ENAC has entered the market

only once, in 1987. At that time, ENAC bought roughly 10-15% of total domestic production.

ENAC did purchase soybeans one other time, in 1984, prior to the mandate. At that time, ENAC was called upon to support falling prices when a large flow of imported soybeans and soybean meal were followed by a better domestic harvest than expected. Reportedly, ENAC bought 50% of total domestic production in that year. In both cases, ENAC, in turn, sold to the soybean crushers after drying and storage.

Although, ENAC's actions were successful in boosting prices both times, its ability to continue to do so, and more importantly, do so cost-effectively, must be questioned. This issue will be addressed in chapter four.

3.3.4 Oilseed Crushers

Producers, assemblers and ENAC, in turn, sell all domestic soybeans to four large and one small, soybean crushing firms. Thus, only five firms produce all domestic soybean oil and meal in Ecuador. The large firms produce cooking oil, shortening and related products while the small firm, Castor, reportedly crushes soybeans for other firms in the cooking oil and shortening industry.

3.3.4.1 The Cooking Oil and Shortening Industry

The cooking oil and shortening industry as a whole is composed of twelve firms that vary substantially in size, output volume, inputs used and product variety. In regards to the latter, products of the industry include soap, margarine, shortening, cooking oil and, by virtue of its joint product nature with soybean oil, soybean meal.

In addition to soybeans, domestically produced inputs include African palm, cottonseed, peanuts, sesame seed, fish oil and recently corn. Imported inputs in recent years have included crude soybean oil, sunflower oil, rape seed oil, and animal fat. Crude soybean oil continues to be the most important imported input, in terms of volume. In 1987, imported soybean oil accounted for nearly 99% of imported inputs, by volume.

The cooking oil and shortening industry was established in Ecuador prior to the introduction of domestic oilseed production. Indeed, originally, the industry was set up only to refine imported crude oil. The capacity to process raw domestic inputs was added in tandem with the expansion of domestic cultivation of oilseeds.

Key transitions in the development of the cooking oil and shortening industry were: 1956, when solvent extraction methods were introduced in Ecuador; the 1970s, when solvent extraction was adopted on a large scale; and 1978, when

processing firms began to install silos for the storage of grain inputs.

Most of the firms that produce cooking oil and shortening are located in one area, the southern coast of Ecuador. Nine firms are located in either Guayaquil or Manta while the other three firms, which process only African palm, are located in the mountain region, adjacent to major african palm producing areas.

In 1986, the industry as a whole reportedly produced 138,352 metric tons of cooking oil, margarine and shortening.(20, Annex 1) Actual figures for 1987 were not available, however, a rough extrapolation from the quantities of inputs purchased by the industry in 1987 places total output for that year at about 140,000 metric tons. Albeit slightly higher than 1986, the estimate for 1987 is still below the peak level of output of approximately 150,000 metric tons in 1984.(31, p.24)

This drop from the 1984 level may reflect both reduced demand due to worsening economic conditions in Ecuador and reduced supply due to restriction of imported crude soybean oil.

3.3.4.2 Soybean Crushers

As mentioned above, only four of the twelve firms that make up the cooking oil and shortening industry actually

process domestic soybeans. All four of these firms began operations prior to 1970 and are among the largest in the industry. Together these firms produce nearly three-quarters of the total output of the cooking oil and shortening industry in Ecuador.

Specifically, La Favorita, the oldest and largest in the industry, was established in 1941. In 1986, this firm alone produced over 30% of total industry output of cooking oil and shortening.(31,p.24) The three other soybean processors within the industry, include Ales, the second largest cooking oil and shortening producer, Oleica, the fourth largest, and Phidaygesa, the fifth largest. In 1986, these firms produced 19%, 14% and 7% of total industry output respectively. Thus, these four processors together produced approximately 70% of total domestic output of cooking oil and shortening in 1986.(31, p.24)

In addition, a smaller fifth firm, Castor, reportedly purchased and processed domestic soybeans in 1987 on a "cost plus" basis for cooking oil producers that do not process domestic soybeans themselves. Until 1987, Castor was primarily a processor of castor beans. The firm reportedly began to process soybeans to offset the declining market for castor bean products. Still, to date Castor, has not produced cooking oil or shortening.

The actual quantity of domestic production processed by Castor was unavailable. Reportedly, however, the level is

nominal in relation to the volume processed by the four large firms. Nonetheless, entry of a new firm into the highly concentrated soybean crushing industry may signal a trend toward a more competitive environment. It is also worth noting here that Castor is not a member of the industry association of cooking oil and shortening producers. This association will be discussed below.

The four large soybean crushing firms use a solvent method to extract the soybean oil from the meal. Installed soybean crushing capacity of these firms is presented in Table 1.

Table 1. Industry Capacity for Crushing Soybeans[6,7]

La Favorita	200 metric tons/day	50,000 mt/year
Industrias Ales	120 metric tons/day	30,000 mt/year
Oleica	70 metric tons/day	17,500 mt/year
Phidaygesa	100 metric tons/day	25,000 mt/year
Total	490 metric tons/day	122,500 mt/year

Source: 1987 Soya Bluebook, U.S. Agricultural Attache Report

[6] It is unclear whether the stated capacity is appropriate for crushing other oilseeds such as peanut or cottonseed. Regardless, usage of peanut and cottonseed to date has not been significant thus competition for crushing capacity is not likely.

African palm is crushed by a number of small extractors close to production areas. The oilseed processors purchase the crude palm oil from these extractors. As such, the oilseed processors do not crush African palm themselves.

[7] Based on 24 work hour day.

Industry-wide capacity for crushing soybeans is somewhat higher however. La Fabril, another large cooking oil and shortening producer which does not currently process soybeans maintains the capacity for processing 70 metric tons per day or 17,500 metric tons per year using a screw press method of extraction. Also, installed capacity for Castor should be considered in industry-wide capacity estimates. Again, actual figures for this firm are not available.

Exact figures on the quantity of soybeans actually processed in 1987 are not available. Thus, the rate of utilization of industry-wide crushing capacity cannot be determined. As a point of reference, however, crushing domestic soybean production in 1987 in entirety would utilize 95% of the combined capacity of four large soybean crushers. Thus, if some quantity of domestic soybeans is exported rather processed domestically and the capacity of La Fabril and Castor are considered, unused soybean processing capacity for the industry as a whole at the 1987 production level was at a very minimum 20 to 30%.

It is important of note that soybean crushers buy soybeans soon after harvest but process the soybeans and sell the resulting oil and meal throughout the year. Thus, in addition to processing soybeans, these firms dry and store soybeans. Industry capacity to store soybeans is presented in Table 2.

Table 2. Industry Capacity to Store Soybeans

La Favorita	7,300 metric tons
Industrias Ales	3,000 metric tons
Oleica	8,000 metric tons
Phidaygesa	5,000 metric tons
Total	22,300 metric tons

Source: 1987 Soya Bluebook

As above, figures for Castor are not available. Storage capacity of La Fabril is 1,000 metric tons bringing total known industry-wide capacity to store soybeans to upwards of 23,300 metric tons. Also, these firms reportedly rent space in commercial storage facilities as needed.

Again, actual data on utilization of storage is unavailable. It should be pointed out though that the need for storage suggested by the level of domestic production in 1987, and by the fact the majority of production is marketed between October and January is somewhat above the known storage capacity. Thus, the renting of commercial space during peak harvest period is very likely.

As mentioned in chapter two, the use of palm oil as an ingredient in cooking oil has increased in recent years. Thus, it is important to note that six of the twelve cooking oil and shortening producers have recently installed equipment capable of fractionating African palm oil.(31, p.33) In 1985-86,

approximately 11,000 metric tons of fractionated palm oil were used in cooking oil. In 1986-87, usage doubled to 22,000 metric tons.(33, p.24) Sector-wide unused capacity for extraction of this derivative for 1986-87 was approximately 20%.

Increasing use of fractionated palm oil in cooking oil is clearly important as it appears to reflect not only decreased availability of soybean oil but also possibly an intentional expansion in the use of African palm. Indeed, growth in demand for vegetable shortenings, the primary usage of African palm, has fallen behind growth in demand for cooking oil. Also, it is relevant to note that some firms that produce cooking oil and shortening are integrated backward into the production of African palm.

3.3.4.3. Industry Association

All twelve firms that produce cooking oil and shortening are members of a single industry association, Asociación de Productores de Aceites y Grases. Like the producer associations at the farm level, this industry association represents the common interests of the members in government negotiations over soybean policy.

The association's role in the allocation of import quotas for crude soybean oil is particularly important. As will be discussed below, once import requirements for the industry as

a whole are determined, individual firm quotas are distributed by agreement within the association.

In addition, it should be mentioned that the association is credited with being the first organization, public or private, that was interested in the promotion of soybean cultivation in Ecuador. As early as 1960, the association had established a department to examine the possibility of growing soybeans, sesame, and peanuts in Ecuador.

Two points about the buying and selling practices of soybean crushers should be addressed. First, as mentioned above, soybean crushers tend to pay farmers on average at least one and one-half months after buying their soybeans. This delaying of payments is an understandable response by soybean crushers to spread out the large cash outflow at harvest time. However, this practice, in essence, just shifts the liquidity problem back to the farmers.

Secondly, the small number of firms that actually crush domestic soybeans in Ecuador increases the potential for collusive behavior. Indeed, price ranges for soybean meal are reportedly determined in meetings between the four large soybean crushing firms. Buyers of soybean meal did acknowledge, however, that the price of soybean meal does vary somewhat between soybean crushers. Also, there is no evidence of monopolistic restriction of supply.

3.3.5 Balanced Feed Manufacturers

In comparison to the soybean crushing industry, the balanced feed manufacturing industry has many participants. Also, production is not particularly concentrated in any one firm. In a 1987 survey of balanced feed manufacturers, the largest firm produced roughly 16% of combined balanced feed volume of those surveyed. The second largest produced half that percentage. The ten largest firms taken together produced roughly 60% of the combined balanced feed production.(29, p.55)

Buying practices of balanced feed manufacturers exhibit some degree of coordination with soybean crushers. Specifically, long term contracts between soybean crushers and feed manufacturers for periodic delivery of soybean meal have been reported among the large feed manufacturers. Actual figures on the volume sold under these contracts is not available. The survey of feed manufacturers, however, found that long term contracting was practiced by only two of the ten largest feed manufacturers interviewed and by only 8% of all other feed manufacturers interviewed.(29, p.193) A more common practice is the placement of orders in the month prior to delivery.

Approximately 85% of the 168 balanced feed manufacturers surveyed produced balanced feeds primarily for their own consumption or for consumption by an affiliated firm. In terms

of volume, a little more than one-half of production was consumed by the producing firm itself or by a firm with a common ownership. An additional one-quarter of production was produced for poultry producers that maintain contractual production agreements with the feed manufacturer. Consequently, only one-quarter of total production actually entered the market place in 1987.(29, p.56) This substantial integration and coordination between the balanced feed manufacturers and the poultry industry appears to have been motivated by the cost advantages that can be achieved with integration and perhaps more importantly by the need to assure that quality and a steady supply of feed is maintained.[8]

3.3.5.1 Industry Associations

Industry associations for balanced feed manufacturers are similar to those for soybean producers or cooking oil producers in that a primary purpose of these associations is representation in government decision making. Also, as with the soybean producer associations, not all feed manufacturers belong to an association. Similarly, membership is biased toward larger manufacturers. Specifically, of 168 manufacturers of balanced feed recently surveyed, roughly half belong to some type of industry organization such as AFABA,

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[8] In a survey conducted by Tschirley, the top concerns voiced by poultry producers included quality and availability of inputs.

an association of feed manufacturers and poultry producers. In terms of volume, however, approximately 80% of balanced feed is produced by manufacturers that belong to an industry organization.(18, p.24)

3.3.6 Poultry Industry

Firms within the poultry industry are far from homogenous. They vary substantially in size (as measured by feed consumption) and in the range of production activities actually performed. Within the poultry industry, production activities include generation of fertile eggs, incubation of chicks from the eggs, production of broilers (or other types of chicken suitable for consumption) from chicks and production of eggs for consumption. Some firms, regardless of size, have specialized in one particular activity while other firms have chosen to perform all or some of these activities. Moreover, a few of the largest firms perform the marketing functions of processing broilers, and the subsequent wholesale or retail distribution of these broilers. Thus, as Tschirley points out, it is difficult to generalize about firms within the "poultry industry".

Nonetheless, two general structural characteristics which have important implications in the marketing of soybean meal can be pointed out. The first characteristic, a tendency

toward ownership integration with balanced feed production, has already been addressed in the section above.

The second characteristic is the high frequency of coordination between balanced feed manufacturers and some poultry producers through contractual arrangements. Specifically, large feed manufacturing firms provide chicks, balanced feed, and technical assistance to small poultry producers in exchange for later delivery of the mature broilers at a pre-negotiated price. Upon delivery, these large firms process the mature broilers and sell them on the wholesale or retail levels.

A survey by Tschirley estimated that 40% of poultry feed for broilers in 1987 was consumed by these contract producers.(29, p.56) An official from the Ministry of agriculture and an industry participant have both suggested that the frequency of occurrence of this type of arrangement is increasing.

Also, although production is not currently concentrated among a few large firms within the poultry industry, movement in that direction is suggested. Exact figures are not available to corroborate this belief. However, a government official expressed an opinion that a trend toward increasing concentration of market share exists. This official stated that smaller firms that do not enjoy the advantages of size or integration continue to be squeezed out.

3.4 Subsector Coordination and Integration

The degree of vertical integration or coordination of activities between firms varies significantly within the soybean subsector. At the farm and assembly levels, there are few instances of active coordination, such as prepayment or buyer pickup, or of ownership integration. Soybean farmers apparently cultivate soybeans primarily in response to government support price and after harvest generally transport the crop to buyers, themselves. Soybean crushers apparently do not prepay or contract with soybean farmers or assemblers prior to harvest.

In prior years, however, this was not the case. One soybean crusher, Ales, which is also a manufacturer of farm equipment, reportedly sold tractors to farmers in exchange for soybeans. Another soybean crusher provided credit lines for the purchase of seed to large producers of soybeans. Soybean crushers also reportedly have picked up soybeans at farms with trucks returning from delivering processed products to retail and wholesale points.

This movement away from active coordination at the farm level is quite understandable. Indeed, in prior years, demand for soybean meal was not adequately met by domestic production. Thus, soybean crushers took it upon themselves to promote production through various methods of coordination.

Currently, however, soybean crushers believe that demand for soybean meal is adequately met by domestic supply. Also, given the cheaper price of imported crude soybean oil versus domestically produced soybean oil, there is little motivation for soybean crushers to promote domestic production. Moreover, for quite some time, the government has assumed the role of promoting domestic production, through price policy, that coordination by soybean crushers once filled. As an aside, it is interesting to note that some oilseed crushers have chosen to integrate backwards into production of African palm, but not soybeans.

Beyond the assembly stage, instances of integration and coordination are common. Possibly, the most prevalent link between stages is the ownership integration between balanced feed manufacturing and poultry production, as mentioned above.

Some of the larger participants in the soybean meal channel exhibit extreme vertical integration. One of the five soybean crushers, Oleica, is affiliated with the second largest balanced feed manufacturer, Nutril. Nutril, in turn, is also associated with a large producer of fish meal and began to integrate into poultry production in 1987. Vigor, another large balanced feed manufacturer, also integrated into poultry production in 1987.

Similarly, Pronaca, Ecuador's largest poultry producer, has integrated backwards into balanced feed manufacturing. Currently, Pronaca buys soybean meal directly from the oilseed

crushers and mixes its own feed. Moreover, in addition to selling poultry broilers and eggs on the wholesale level, Pronaca also sells its poultry products on the retail level, through its chain of restaurants that specialize in chicken.

3.5 Policy Considerations

Certain characteristics of the industrial structure and of the conduct of participants within soybean subsector should be explicitly considered in the design of soybean policy. One structural characteristic in particular, the severe concentration of production at the soybean crushing stage, arouses concern over the potential for collusive behavior between firms. Indeed, it appears that these four firms already collude in the price setting of soybean meal.

As such, a return to an entirely market oriented system may not be advisable. Soybean producers and consumers of cooking oil, like feed manufacturers, may not have the countervailing power necessary to insure that prices would be determined in a competitive framework. Indeed, without government intervention, the soybean crushing firms could also collude to determine the prices for raw soybeans and cooking oil. Moreover, the sizable investment associated with manufacturing cooking oil may act as a barrier to entry to new participants, thus insulating the four firms from future competitive pressures.

Another structural characteristic of the soybean subsector that is worthy of consideration is the increasing vertical integration from feed manufacturers through retail poultry outlets. Clearly, cost efficiencies associated with size, and reduced risk associated with greater assurance of input quality and availability, are two positive results of this integration.

However, integration can undermine competitive markets in the long term as non-integrated firms are squeezed out. Economies of size can effectively become barriers to entry for new participants. Also, as the frequency of integration increases, the quantity of balanced feed actually marketed decreases. Consequently, the spot market for balanced feed becomes more thin and the ability of large balanced feed manufacturers to affect the price level increases. Thus, extensive integration can lead to non-competitive markets in the long run.

Any current concern is mitigated, however, by the strong presence of many small poultry producers and the relatively low barriers to entry that presently exist.

CHAPTER FOUR

GOVERNMENT POLICY

4.1 History of Soybean Policy

Government efforts to promote domestic cultivation of soybeans formally began in 1972 as part of a plan to develop and diversify the agricultural sector as a whole. Administered prices, import restriction, extension of credit, provision of technical assistance, and research and development of appropriate seed varieties have all been methods employed to promote soybean cultivation.

4.2 Stated Policy Objectives

Since the 1970's, the government of Ecuador has pursued a number of policy objectives that affect, both directly and indirectly, the functioning and development of the soybean subsector. Diversification of the agricultural sector and substitution of domestic production for imports are two such objectives that have prompted the government to promote domestic soybean production. Promotion of domestic production has been pursued primarily through high government support prices to soybean farmers and through tight restrictions on the imports of soybeans and soy products.

Less direct objectives are to maintain basic foodstuffs at affordable prices for consumers and to control the level of inflation, in general. These objectives are reflected in retail price controls on refined cooking oils. Poultry and egg prices have also been controlled since the first quarter of 1988.

It is interesting to note that a slight shift in emphasis in stated objectives over the years is apparent. In prior years, domestic production of soybeans was promoted as a means to an end; that is, in order to provide the cooking oil industry with needed raw materials and to diversify the agricultural sector. Currently, however, production is also promoted as an end in itself, with the interest of farmers in mind.

4.3. Policy Procedure

4.3.1 Support Prices

Prior to each planting period, the Programa de Maiz y Soya within the Ministry of Agriculture surveys soybean farmers to determine a representative cost of producing soybeans. The Ministry of Agriculture then sets the official support price for soybeans 30% higher than this representative cost, to allow for a return on investment and transportation to the soybean crushing plants.

This official price has three important characteristics. First, this price is for soybeans that are sold clean and dry (12% humidity with 3% impurity). The price is reduced for soybeans with higher levels of humidity or impurity and conversely, increased for lower levels, in order to encourage proper handling and high quality. Secondly, it is important to note that the support price is for soybeans sold at the soybean crushing plant, not at the farm level. Thirdly, the official price is fixed for the entire season and is the same for the whole country.

More often than not, these support prices have been achieved voluntarily, without argument from the soybean crushers. As mentioned above, only in two years, 1984 and 1987, has it been necessary for the government agency, ENAC, to participate in the market to maintain the official support price for soybeans.

However, whether or not soybean crushers will be willing to pay a high support price for soybeans in the future must be questioned. Soybeans crushers feel that domestic production of soybean meal is increasing faster than demand. Also, the support price for soybeans has increased in real terms due to rising cost of production since 1986. Moreover, soybean crushers were reluctant to pay the official support price in 1987 until ENAC entered the market.

Despite the official process of basing the support price on the cost of production, it appears that some negotiation

between the government, the soybean producer associations and the association of cooking oil producers does take place.

4.3.2 Quotas

Quotas for imported soybean oil are set by the government on an annual basis. They are based on government and private industry estimates of supply and demand conditions for the following year. Specifically, on the supply side, the Programa de Maiz y Soya within the Ministry of Agriculture is responsible for providing national production estimates for soybeans. Concurrently, on the demand side, the Ministry of Industry estimates total domestic demand for retail cooking oil, shortening and margarine. Existing inventories of inputs and finished products and requirements for a strategic reserve of both are also considered. Based on these reports, the Ministry of Industry determines the quantities of imported soybean or other oils that will be needed to meet the deficit.

The Association of Cooking Oil and Shortening Producers develops its own estimates of supply and demand (through an independent auditing agency) for negotiation with the government ministries. Once industry-wide import needs for all inputs are agreed upon, specific allocation of quotas to individual oilseed crushers is distributed by agreement between the members of the Association of Cooking Oil and Shortening Producers. Prior to 1985, however, individual

quotas were allocated directly to firms by the government. Individual firm quotas were based on the proportion of domestic production purchased.

Oilseed crushers have agreed to purchase all domestic production. Indeed, by law, all domestic production must be bought prior to the importation of any input. Previously, however, this condition has been sidestepped. Quotas allocated in 1983 were exercised just prior to the main harvest in 1984. Oilseed crushers, having met the needs for prime materials with imported inputs, then reneged on the agreement to purchase all domestic production. It was in this year that ENAC purchased 50% of the domestic soybean crop.

Mid season adjustment of import quotas, both suspension and expansion, have been made to compensate for deviations from pre-season estimates due to factors such as poor weather and increased consumer demand. Adjustments have come at the impetus of the government and by request from the oilseed processors. This year (1987-88), solicitation for increases in import quotas have been made by the Association of Cooking Oil and Shortening Producers.

No imports of soybeans or soybean meal by oilseed crushers have been authorized since 1985. Some soybean meal, however, has been imported by USAID. Unlike soybean oil, it does not appear as if estimates of supply and demand for soybean meal are analyzed by the government on a regular basis.

Currently, soybeans and crude soybean oil are imported free of tariff charges and deposit requirements. Imports of refined soybean oil and soybean meal carry 80% and 20% ad-valorem tariffs, respectively.

4.3.3 Price Controls

The prices of cooking oil and shortening at the wholesale and retail levels have been administered by the government on and off since at least 1976. The particular mechanisms employed and the specific government authority responsible for this task have been varied. Currently, cooking oil prices are established by the Frente Economico within the Ministry of Industry.

Maximum prices for cooking oil and shortening are reportedly based on studies of cost of production that are undertaken by the Ministry. These cost of production reports are considered confidential and as such were not available to this analyst, nor to officials within the Ministry of Agriculture. Consequently, the specifics on how the cost of production is determined - in particular how the joint processing costs of soybean meal and soybean oil are allocated in these studies - are not known to this analyst. Like the process to determine quotas, the association of cooking oil and shortening producers often solicit the government for increases in the prices of cooking oil and shortening.

How effectively the controls on the prices of cooking oil and shortening have inhibited inflation must be questioned. Clearly, ceiling prices based on the cost of production will increase when the cost of production increases. Thus, the ability of controls to slow inflation is undercut when the cost of production is reevaluated frequently. To be sure, the ceiling price for cooking oil at the retail level was raised no fewer than 11 times in the period between 1981 and 1987.

Moreover, controls on the prices of cooking oil and shortening have been completely eliminated two times since 1984. Both times resulted in an immediate jump in the price of cooking oil. Renewed concerns over inflation prompted the government to reinstate controls both times. It should also be mentioned that the extent to which these controls have been physically enforced is not clear.

Aa an aside, a government official did report that a recent change in the way cost of production is determined by the Ministry of Industry does favor cooking oil producers. Specifically, in prior years, cost of production was based on the actual costs of both imported and domestic inputs. Currently, however, all inputs (domestic or imported) are reportedly valued at the higher domestic cost.

The price of soybean meal has also been controlled but only for a short period from 1983 to 1984, in the wake of El Niño.

4.4 Considerations Over Policy Implementation

The two main policy objectives, promotion of domestic production of soybeans and control of price of cooking oil to consumers, have both been accomplished to some extent. Area planted with soybeans has increased substantially over the last ten years while increases in the price of cooking oil have been stifled, although sporadically.

Nonetheless, some undesirable aspects of the way in which government policies have been implemented can be identified. First, the process by which imports are regulated is very cumbersome. Industry participants at both the oilseed processing and feed manufacturing levels have complained that government control of imports is too restrictive and that the government is slow to respond to requests for upward adjustment of quotas. Recently, industry associations at both levels have made public appeals for the government to increase the flow of imported prime materials to offset a scarcity of domestic inputs.

To be sure, some restriction of imports is necessary if domestic production is to be protected. Also, the government may need to take a restrictive stance on imports to achieve more broad macroeconomic goals. Nonetheless, the process, itself, by which quotas are allocated and reevaluated has quite possibly exacerbated the negative impact on industry participants of a restrictive import policy.

Tardy reevaluation of import quotas, in particular, can prolong or even exacerbate cycles of relative scarcity and glut of inputs and outputs. For the poultry industry, even a short period of scarce inputs can force a quick reduction in the poultry population. For the oilseed processing industry, fluctuation in availability of inputs can cause uneven and thus inefficient utilization of fixed capacity. Also, in a theoretical sense, the uncertainty associated with the supply of inputs can lead to relatively less efficient allocation of resources and investment.

Quite clearly, a system that allocates import quotas based on estimates of future production should include a mechanism for subsequent reevaluation of import needs that is both quick and consistent. It is fitting to note here that the quota system in general requires to some extent that government officials assume an adversarial posture with industry participants. More often than not, industry participants have economic incentive to continually push for higher quotas. Thus, each solicitation for a higher quota must be viewed by the government with much scrutiny. The government must decide whether an increase in imports is truly necessary or whether an increase as such will undercut efforts to protect domestic production. As mentioned above, this lesson was learned in 1984, when the oilseed crushing industry having met its needs with imported inputs at the end of 1983 did not have need for all of domestic production in 1984.

An alternative to the current system of regulation of imports by quotas will be discussed in the next chapter.

Another practice of policy implementation worthy of discussion is the procedure of pan-seasonal and pan-territorial pricing. As mentioned above, the support price for soybeans is fixed for the entire season and is the same for the entire country. This procedure does have two very distinct benefits. First, from an administrative viewpoint, this procedure is relatively easy to implement. Second, this pricing system complements the quota system. It prompts producers of soybeans to sell soon after harvest by effectively precluding any economic incentive to store soybeans. Thus, this policy helps to ensure that all domestic production is purchased by soybean crushers prior to imports.

On the negative side, the ability of soybean crushers to cover the large outflow of cash at harvest appears strained. This apparent liquidity crunch is in part then foisted back on the soybean producers in the form of substantial delays in payment. As will be discussed in chapter six, a more flexible pricing scheme would help to distribute the cash outflow over an extended time period.

It should be noted also that the current practice has worked reasonably well only because soybean crushers have been willing to buy soybeans at harvest and store them until processed. Again with the increasing size of the harvest, this willingness, or even ability, of soybean crushers to store

soybeans may not continue. If soybean crushers respond by paying less than the support price for soybeans, ENAC will be forced to enter the market and undertake the storage function. The cost to government and desirability of this occurring should be considered. As will be explored in chapter six, an alternative would be to allow support prices to vary enough over the course of the season to provide economic incentive for participants in the private sector to perform the storage function.

Similarly, the practice of basing the support price for soybeans on cost of production should be reconsidered. To a large extent, this practice effectively removes the incentive for soybean farmers to reduce costs. This practice also engenders a bias toward the use of capital inputs. Indeed, the use of imported fertilizer and chemicals can increase overall income by improving yields and raising the cost of production.

Another concern that should be addressed is the fragmented nature of the government policy procedure. Currently, it appears that policies are developed piecemeal by various agencies without regard to possible interactions or external effects. A prime example is the setting of support prices for feed corn and soybeans independently of one another. As was seen recently, the attractive support price for soybeans induced corn farmers to switch to soybeans and existing soybean farmers to forego rotation with corn. As feed corn is also a prime ingredient in balanced feeds, feed

manufacturers have remarked that the efforts to address the problem of the supply of soybean meal have only done so by creating problems in the supply of feed corn. Clearly a more comprehensive policy approach is suggested.

Also, from a theoretical viewpoint, the use of credit to promote soybean production has distorted the true cost relationship between factors of production and thus has engendered a bias favoring capital. Indeed, soybean farming in Ecuador has come to rely extensively on machinery and chemical inputs despite a high rate of unemployment. These adverse effects on employment and the inefficiency in resource allocation caused by this policy tool should be expressly considered in the policy process.

4.5 Soybean Policy in a Wider Development Perspective

Clearly, policy related to the soybean subsector should not be made in insolation from other government policy. Government budget and administrative constraints and long term developmental considerations, among other factors, suggest that soybean policy should be viewed within a wide perspective.

Some of the more important factors that are linked to soybean policy in a wider development perspective will be enumerated below. The scope of this paper, however, permits only a superficial discussion of these concepts. In depth

analyses of relevant issues such as comparative advantage are left to existing and future studies.

4.5.1 Constraints to Government Policy

Prior to determining which policy alternatives are favorable, one must establish which alternatives are even feasible. Several common obstacles that inhibit the successful implementation to government policy will be discussed below.

First, and perhaps most important, government budget constraints should be considered in the selection of policy alternatives. Clearly, for the support price scheme to work effectively, the financial resources available to ENAC must be adequate to implement this policy alternative. Similarly, a program of deficiency payments to producers as an alternative means to promote domestic production would probably entail substantially more government resources than the current support price scheme.

In addition, administrative and infrastructure constraints to implementation should be considered. In regards to the latter, the storage facilities actually available to ENAC that are capable of handling soybeans must be sufficient in capacity and must not conflict with the storage needs for other commodities stored by ENAC. Administratively, the government must have the support staff necessary to implement any chosen policy.

Information is also a common constraint to successful implementation. As mentioned above, the ability to regulate domestic supply is made substantially more complex by lack of data on actual domestic consumption versus clandestine exports.

It is also important to remember that successful policy implementation depends on private sector response. For example, price controls on cooking oil may not lead to greater access for domestic consumers but conversely to less domestic availability due to a greater out flow of clandestine exports. Similarly, how a private sector participant responds to a policy action may vary significantly in the time delay before response and in the intensity of response.

Also, as alluded to above, conditions external to the country or effectively beyond the control of government can become obstacles to successful implementation. Porous borders and price relationships in foreign countries are two such examples.

4.5.2 Long Term Considerations

Government resources are scarce and must be allocated across a wide range of activities. In making these allocations, the value of investing resources in the implementation of one policy is weighed, at least implicitly,

against the value of investing resources in other government activities.

In this sense, the contribution of soybean policy to a wide range of common social objectives such as economic growth, employment, equity, a stable food supply, and income distribution should be evaluated. If investment of government resources in other economic subsectors could contribute to greater achievement of social objectives then perhaps the current extensive effort to promote domestic production of soybeans should be reconsidered. To be sure, trade should be explicitly considered as a viable alternative to domestic production.

Without going into depth regarding comparative advantage, it should be mentioned that a current study by the Policy Analysis Unit within the Ministry of Agriculture concluded that Ecuador did not have a comparative advantage in the production of soybeans. The study also suggested that it was unlikely that a comparative advantage could ever be achieved. Further, the study went on to conclude that alternative crops such as banana and cocoa could provide substantial social benefits.(24, p.66)

CHAPTER FIVE

PRICE TRENDS, PRICE FORMATION AND GOVERNMENT POLICY

This chapter will examine price trends for soybeans and soybean products in Ecuador and the conditions under which these prices are determined. This chapter will also examine how the government policy of administering prices affects the cost of soybeans and soybean products to consumers.

5.1 Price Trends

5.1.1 Soybeans

The support price for soybeans followed a steep downward trend in real terms from 1975 to 1983 as demonstrated in Figure 12. Given that this official price is based on cost of production, this eight year real price decline can be interpreted as reflecting a decline in the real cost of production over this period. It is interesting to note that the area planted in soybeans continued to grow at a rapid pace during this period despite the decline in real prices.

Since 1983, however, the official support price in real terms has trended upward, posting substantial jumps in 1987 and 1988 in particular. This upward trend parallels a deterioration of the Ecuadorian Sucre in relation to other

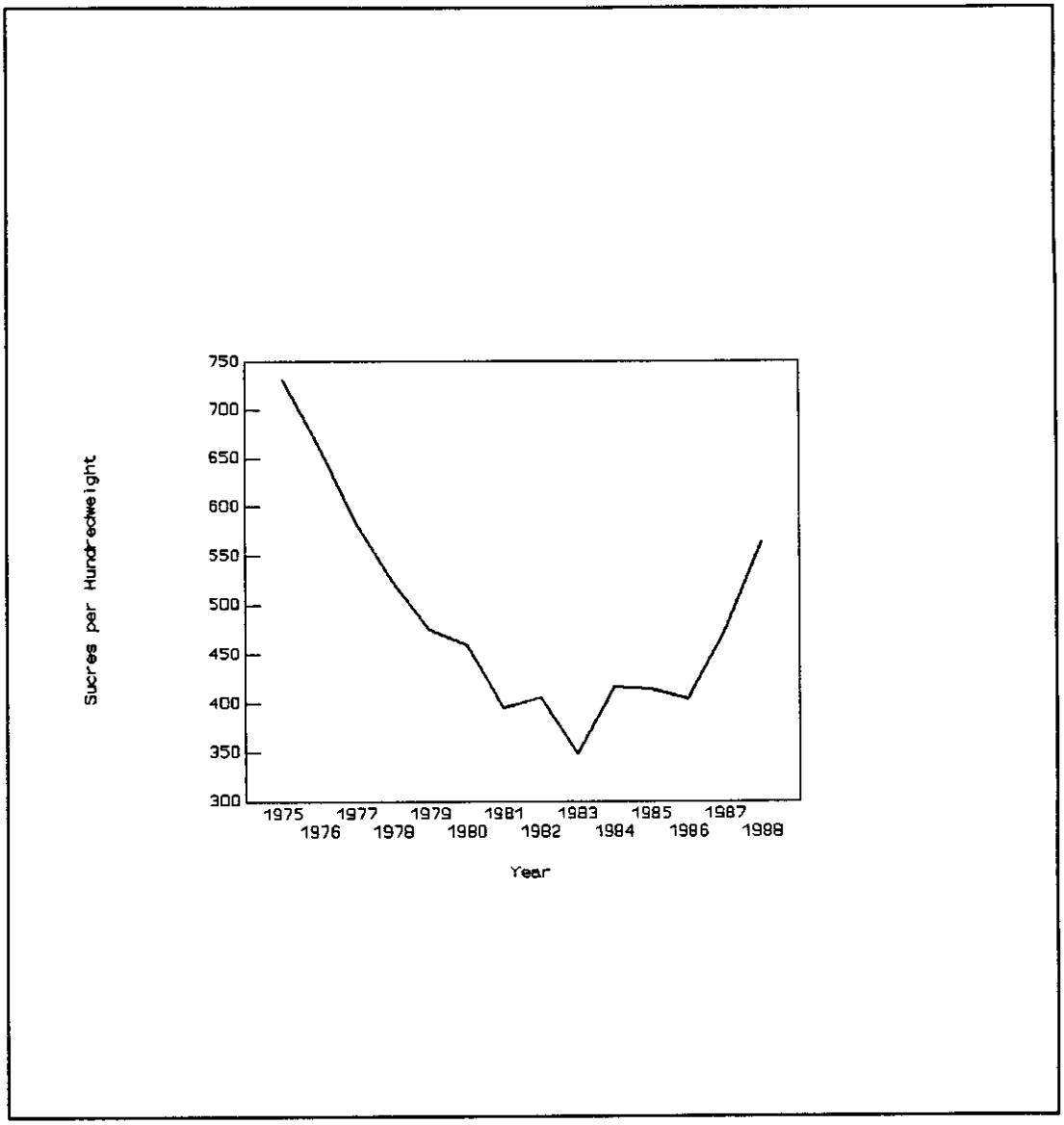

Figure 12 **Deflated Soybean Support Prices (Base Year = 1980)**

Source: **Ministry of Agriculture**

currencies and thus reflects at least partially an increasing domestic cost of imported inputs. As a result of this uptrend, the official support price of soybeans in real terms in 1988 was 10% higher than the official price set ten years earlier, in 1978. It should be noted that in 1985 and 1986, two years in which the support price fell slightly in real terms from the years prior, the average market prices exceeded the official support prices.

Domestic soybean prices remained well above the world market prices throughout 1987 (by roughly 50% in 1987) reflecting undersupply in the domestic market and higher production costs. The latter is reportedly due primarily to expensive imported inputs such as fertilizer and machinery, the high costs of which are further exacerbated by the oligopolistic structure of the input industry.

5.1.2 Cooking Oil

The maximum price of cooking oil declined dramatically in real terms from 1975 to 1980 reportedly prompting, along with rising per capita income, a substantial increase in per capita consumption of cooking oil. Since 1980, however, the movement of the real price of cooking oil has been erratic from year to year reflecting a surge in inflation in 1983 and the subsequent removals and reinstatements of price controls. See Figure 13. It is fitting to repeat here that the extent

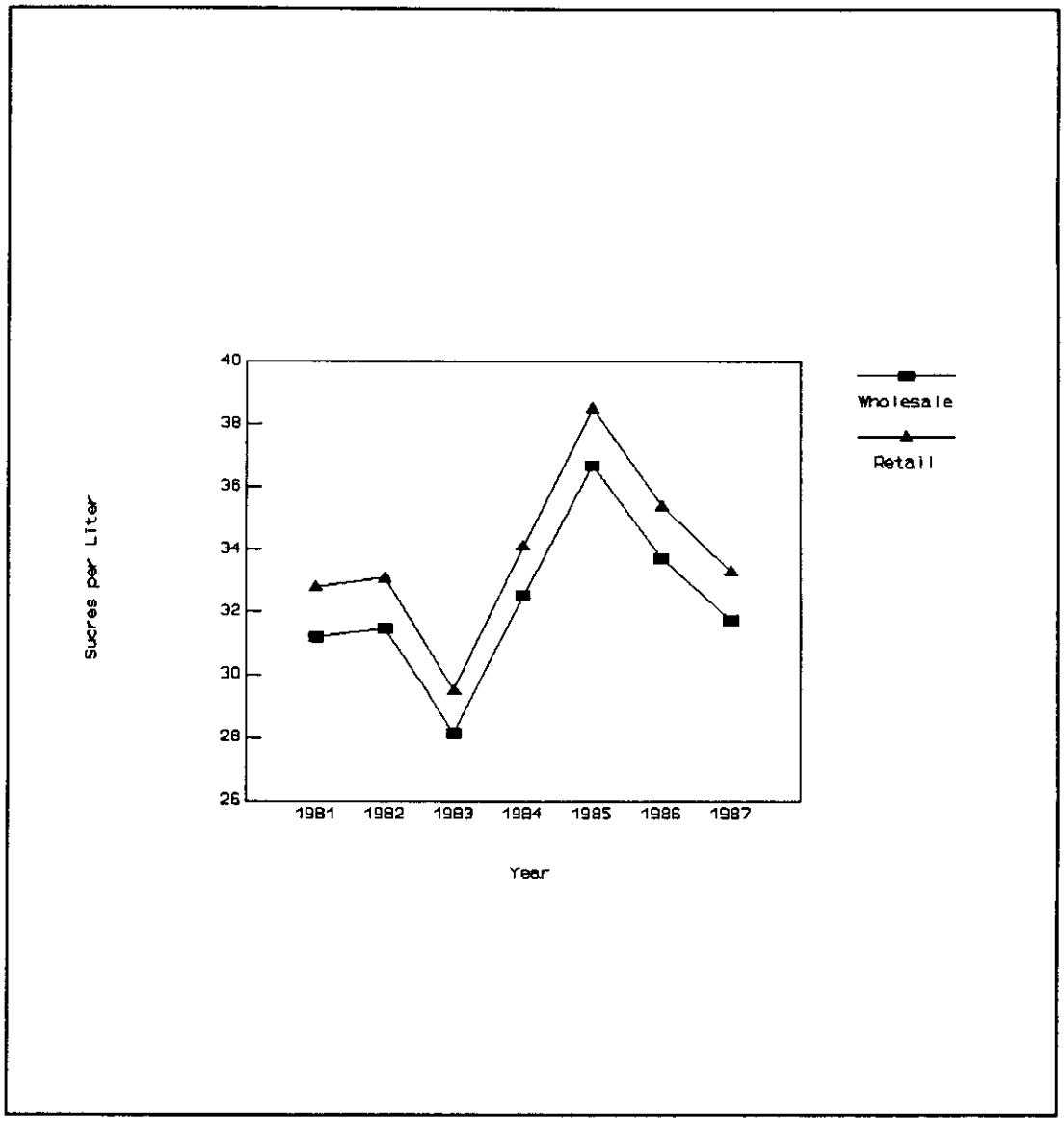

Figure 13 **Deflated Official Cooking Oil Prices (Base Year = 1980)**

Source: **Ministry of Agriculture**

to which these price controls have been enforced is not known.

Prior to 1984, official prices for cooking oil and soybeans tended to follow a similar pattern: both were declining in real terms. Over the last four years, however, the movements in the official prices of cooking oil and soybeans have exhibited little correlation. This lack of a definitive relationship between the price of cooking oil and the price of soybeans suggests a lack of coordination between two related price policies.

5.1.3 Soybean Meal

Prices for soybean meal in Ecuador have been collected only for the last two years. As such, long term trends cannot be explored. Movement of the average market price of soybean meal over the last two years is demonstrated in Figure 14.

As mentioned above, the consensus among government officials and consumers of soybean meal is that soybean meal in Ecuador is unjustifiably costly. To be sure, the price of soybean meal in Ecuador is high by world market standards. Specifically, over the period November 1985 to July 1987 the CIF Guayaquil price of imported soybean meal ranged from roughly 1/4 to 2/3 the price of the domestic equivalent.

The price relationship between soybean meal and raw soybeans in Ecuador is also unquestionably high by world

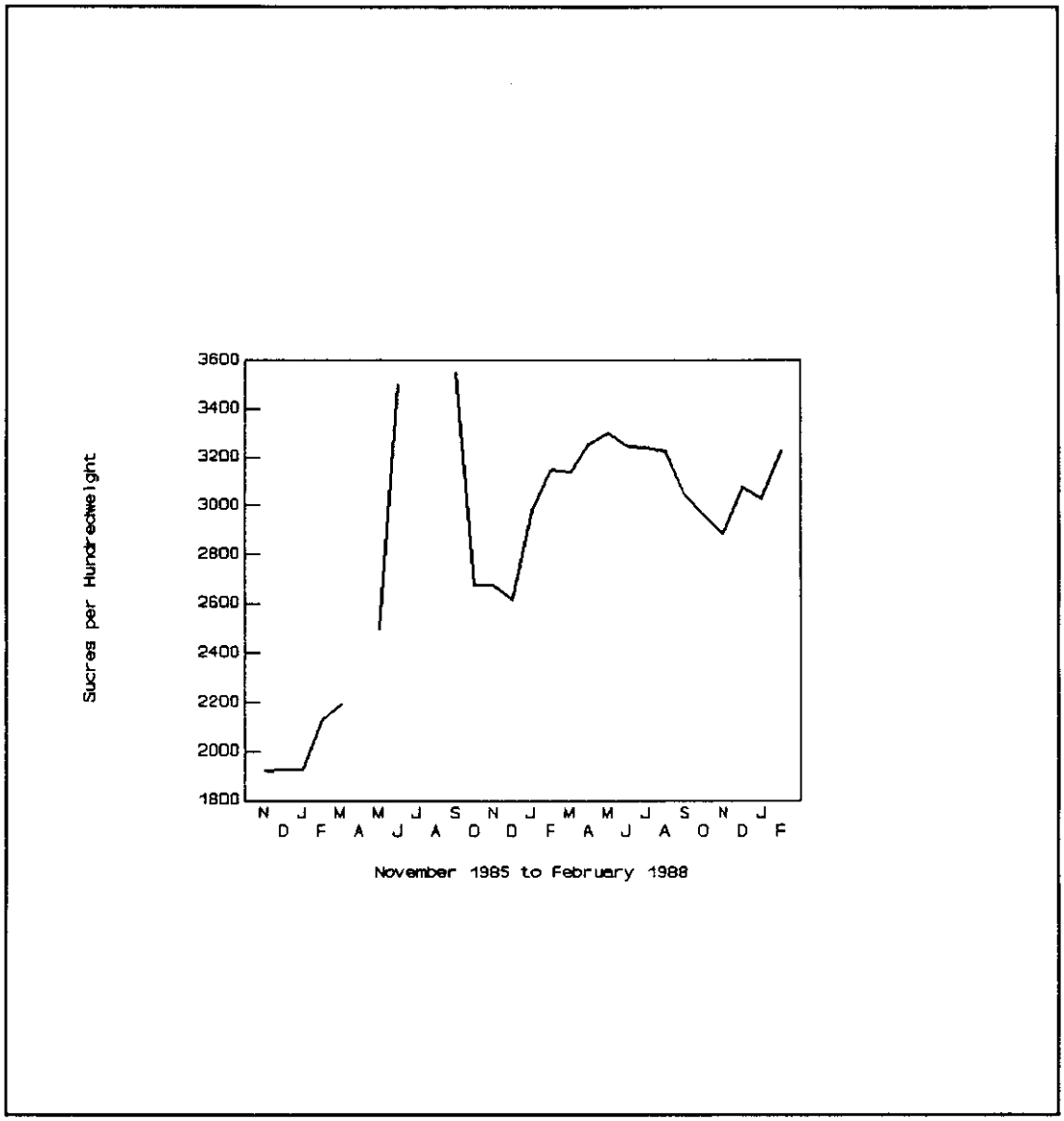

Figure 14 **Nominal Soybean Meal Prices by Month**

Source: **Ministry of Agriculture**

market standards. Over the period examined above, the price of soybean meal in Ecuador consistently exceeded the price for the equivalent weight in raw soybeans. In contrast, soybean meal and raw soybean prices on the world market maintained the opposite relationship.

5.2 Price Formation

In theory, prices that are determined in a competitive marketplace perform a number of economic functions. In the short run, flexible prices ensure that supply will equal demand. In the long run, prices act as signals for investment, helping to ensure efficient resource allocation. Also, prices coordinate the activities of firms that are vertically linked in the marketing channel.

In the soybean subsector, however, prices are not determined in a competitive market place for the most part. Soybean and cooking oil prices are administered by the government while prices for soybean meal appear to be influenced by the oligopolistic structure of the soybean crushing industry. How both of these conditions affect the economic role of prices will be discussed below.

5.2.1 Administered Prices as a Tool of Policy

The role of prices that are administered by the government is very different from the role of prices established in a competitive market place. First, administered prices are employed to direct investment to meet government objectives. As such, an efficient allocation of resources, as would be produced by a competitive market place, implicitly becomes a secondary objective to the government-determined socially desirable allocation of resources. Indeed, the support price for soybeans is set to attract investment into soybean farming regardless of the fact that trade is possibly a more efficient alternative.

Secondly, administered prices transfer income in patterns deemed socially desirable. Specifically, administered prices of cooking oil effectively transfer income to cooking oil consumers. Also, support prices for soybeans effectively transfer income to soybean farmers.

Perhaps most importantly, by administering prices, the other function of prices in a competitive market place, that being to equate supply with demand in the short run, is foregone. Prices are not adjusted to equate supply with demand. Instead, supply is adjusted to equal the demand at the administered price by regulating imports.

5.2.2 Soybean Meal Price Formation

Prices for soybean meal appear to be influenced by the oligopolistic structure of the soybean crushing industry. As mentioned above, the small number of firms that actually produce soybean meal in Ecuador suggests that a strong potential for price collusion does exist. Moreover, suspicions of collusive price setting practices have been reported in key informant interviews. Further, the high price of soybean meal in relation to raw soybeans lends support for these contentions. Nonetheless, without information on the cost of production or restriction of supply, this analyst cannot conclude whether or not prices are truly set collusively to collect monopoly rents.

Although actual practices for pricing soybean meal are not entirely clear, it may prove helpful to examine factors that may affect pricing conduct. First, it is important to note that although soybean oil and soybean meal are jointly produced, the prices for these products are not jointly determined. In a competitive market place, prices for either soybean meal or soybean oil will vary with the demand conditions for that specific product regardless of the price of the other product. In the competitive market place, the prices of the two products are related indirectly only in that the revenue from both products together influence a soybean crusher's willingness to process soybeans. After the soybeans

are processed, the "prices of oil and meal must adjust so as to balance their unrelated demands with their closely related supplies".(10, p.43)

This point challenges the conventional wisdom voiced by industry participants that the government ceiling on the price of soybean oil has induced an offsetting increase in the price of soybean meal. This conventional wisdom is also challenged by the basic economic tenet of profit maximization. Indeed, if a profit maximizing firm can unilaterally, or by collusion with other firms, set the price for soybean meal above a competitive market level, it would endeavor to do so regardless of the price of soybean oil. Thus, it appears that the high price of soybean meal cannot be rationalized by the conventional wisdom.

Secondly, it is relevant to examine the relative price elasticities of demand for the two jointly produced products, soybean oil and soybean meal. Empirical estimates of price elasticity are not available. However, it would appear that demand for soybean meal in the short run would be more inelastic than that for cooking oil. Indeed, demand for soybean meal is closely related to the poultry population and as such quantity demanded is bounded by minimum needs. Moreover, availability of appropriate substitutes is limited. In contrast, demand for cooking oil would appear to be relatively price elastic due to the nature of the product as

a consumer good and due to the availability of substitutes such as shortening.

In view of the relative price elasticities of these two goods, to maximize profits, a producer of soybean meal and soybean oil would endeavor to set the price for cooking oil low and the price for soybean meal high. Perhaps coincidentally, this price relationship is apparent in Ecuador.

5.3 The Direct Costs of Government Policies to Consumers

As mentioned above, implementation of government policies through administered pricing involves relatively little cost to the government. Instead, costs are borne more by the consumers that are forced to pay higher prices.

The intent of this section is to help quantify those additional costs to consumers of products affected by soybean related policy. Toward this end, a rough and simple methodology based on the concept of opportunity cost will be employed. World market prices for soybeans and soybean meal will be substituted for domestic prices and the possible savings to consumers of poultry products will be calculated.

5.3.1 Restriction of Soybean Meal Imports

The government policy of restricting imports of soybean meal is borne at least in part by balanced feed manufacturers but ultimately by consumers of poultry products in form of higher prices. For example, in July 1987, the cost of imported soybean meal CIF Guayaquil was 38% lower than the domestic soybean meal price. Had soybean meal been imported rather than produced domestically, a savings of S/ 1199 per hundred weight of soybean meal would have been realized by balanced feed manufacturers. If this savings had been passed on entirely to the consumers of poultry products, a decrease in the price of poultry meat and eggs by S/ 13.49 per pound (9.2%) and S/0.54 per egg (5%) would have been achieved.[9]

Of course, the cost to poultry consumers varies with the proportional difference between domestic and foreign prices and perhaps more importantly with currency exchange relationships. Nonetheless, the example used above is conservative and in all probability represents a lower bound, as the difference between imported and domestic prices in July 1987 was below the average price difference for the period 1986 to 1988.

It must be emphasized that the savings calculation is very rough and is intended more to demonstrate the magnitude, rather than a precise estimate. Also, this calculation is not

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[9] See appendix for calculations.

meant to suggest that if soybean meal is actually imported, that the price of poultry products would decrease by the above amounts. Surely, some of the cost savings could be captured by the poultry industry. Instead, the calculation is intended to demonstrate the magnitude of the distortion caused by policy. The assumption that all savings are passed on to consumers is made for convenience.

5.3.2 Support Price for Soybeans

Following a similar approach, had soybeans been imported in July 1987 and the cost savings passed on entirely to poultry consumers, the price of poultry meat and eggs would have fallen by S/9.37 (6.4%) per pound and S/.36 (3.3%) per egg. As stated above, these hypothetical decreases in price can be visualized as the costs to the poultry consumer of the policy objectives affecting the soybean subsector.

It should be noted that in the case of soybeans (versus soybean meal), consumers of cooking oil also bear some of the cost of this policy, albeit limited by price controls.

5.3.3 Relationship between Soybean Meal and Soybean Oil Prices

The conventional wisdom that the high price of soybean meal is a result of thin margins on cooking oil has already been challenged on theoretical grounds. Indeed, it would seem

unlikely that the price of soybean meal would fall if the ceiling on cooking oil was relaxed. Still, without cost of production figures, it is impossible to draw a solid conclusion. Also, the limited price series on soybean meal precludes comparison of a combined margin for soybean oil and meal to raw soybeans over time.

Nonetheless, if the conventional wisdom were indeed true, it could prove helpful to policy makers to examine the trade-off between the price of cooking oil and the price of soybean meal. Using the price relationships and the level of soybean oil imports for 1987, a 12.3% decrease in the price of soybean meal would be offset by a 10% increase in the controlled price of cooking oil without any change in the overall revenue from soybean meal and cooking oil sales. If this savings in the price of soybean meal were carried through to poultry consumers, a decrease in the price of poultry meat and eggs by only 2.9% per pound and 1.7% per egg would be realized. Thus, even if the control on cooking oil did prompt a higher price in the cost of soybean meal, the ultimate effect on poultry prices would be relatively minimal.

Again, this calculation is a rough approximation and applies only to the conditions in 1987. Sensitivity of soybean meal price to changes in the cooking oil price would of course vary with the proportion of imported soybean oil to total soybean oil supply and with the prevailing price relationships.

5.4 Summary

To summarize, prices set by the government are intended to direct investment and transfer income in patterns deemed socially preferable to patterns that would be determined in a free market. As a result, the balancing of supply and demand, a function of prices in a competitive market place, is undertaken by the government through regulation of imports.

These government policies clearly favor domestic producers of soybeans, soybean crushers, and consumers of cooking oils to the detriment of the poultry industry and ultimately poultry consumers. To a certain extent, consumers of cooking oil also bear some of the cost of promoting domestic production of soybeans. However, this cost is limited by the control on cooking oil prices.

As has been demonstrated by employing the concept of opportunity cost, the direct cost of policy to poultry consumers in the form of higher prices may not be insignificant. Moreover, assuming poultry consumption is not price inelastic, the growth of the poultry industry has suffered to some extent as a result of these policies.

The conventional wisdom that controls on the price of cooking oil has lead to a high price of soybean meal has been challenged but can be neither proven nor denied. Regardless,

the ultimate cost to poultry consumers of such a policy, if it indeed raised the price of soybean meal, would be small in relation to the benefits realized by consumers of cooking oil.

In addition, while the potential for non-competitive price setting is very real, the existence of such a practice can also be neither confirmed nor denied. Whether or not soybean crushing firms are taking monopoly profits cannot be determined without more information about the cost of production and some subjective determination of the appropriate return for level of risk assumed.

Regardless of pricing practices, high prices are ultimately due to demand and supply relationships. To be sure, soybean meal prices in Ecuador, although relatively high, have assured that the market has cleared. If the price of soybean meal were any lower, demand would have, in all probability, exceeded domestic supply and some other form of rationing would have been necessary.

Thus, increasing either domestic production or allowing imports of soybean meal would address the issue of high soybean meal prices regardless of the source of the problem.

CHAPTER SIX

POLICY ALTERNATIVES

The previous chapters have attempted to identify important factors that should be taken into account in the policy decision process. Chapter two reviewed the supply and demand conditions for soybeans and soybean products in Ecuador. Chapter three examined the structural characteristics of the soybean subsector that are relevant to the policy decision. Chapter four described current policy, identified operational problems associated with the current methods of policy implementation and discussed soybean policy in a wider developmental perspective. Finally, chapter five attempted to demonstrate the magnitude of the direct costs to consumers of meeting current policy objectives. With these considerations in mind, this chapter will present possible alternatives to current methods of policy implementation. The extent to which each alterative contributes to stated objectives will be the focus of this chapter.

6.1 Variable Levy System of Import Regulation

Clearly, promotion of domestic soybean production requires that some mechanism be employed for restricting imports of soybeans and soybean products. The import quota system now employed, though, has certain failings. The quota

system is cumbersome and, as a result, industry participants complain of periods of scarcity of necessary inputs. The quota system also inherently fosters an adversarial relationship between the industry and government, a further obstacle to effective implementation. An alternative approach for regulating imports is the variable levy system.

There are three basic elements to the variable levy system. First, imports are not restricted quantitatively. Second, a levy is applied to the imported good and as such is paid by the importer. Third, the amount of the levy varies and is equal to the difference between the world market price and a government set threshold price, the result being that goods are essentially imported at the government set threshold price.

The government can adjust the degree of domestic protection by regulating the threshold price. A threshold price that is set equal to the domestic market price completely eliminates the competitive advantage of a lower cost imported good. Similarly, a threshold price that is set above the domestic price encourages domestic consumers to purchase cheaper domestic production before considering the purchase of imports.

Imports are in essence automatically regulated to fill the gap between domestic production and domestic demand. Total protection of domestic production can still be achieved but without the periods of relative glut and scarcity associated

with rigid quotas that are imperfectly set or tardily reevaluated by the government.

Moreover, there is no adversarial relationship between industry and government under the variable quota system as quantitative restrictions are no longer utilized. Also, variable levies offer a another source of funding for other government promotion projects.

Clearly, the crucial element in the effective implementation of the variable levy system is the determination of an appropriate threshold price. In essence, the threshold price reflects the trade-off between the degree of import competition and the degree of domestic protection. Among other considerations, the cost of domestic production, the price of domestic substitutes, foreign exchange considerations, the cycle of production and the degree of import competition desired, all should be taken into account in determination of the appropriate level of a threshold price.

While a levy system would facilitate the timely importation of crude soybean oil or other soy products to meet excess demand, there is a trade-off with the other government objective of keeping the cost of cooking oil low. Currently, foreign crude soybean oil is imported at the world market price (i.e. no tariff is applied). Under the levy system, however, importers of crude soybean oil would effectively pay

the higher threshold price (i.e. the world market price plus a levy), thus raising the cost of production of cooking oil.

6.2 Administer the Price of Soybean Meal

One policy response to the contention that the price of soybean meal is unjustifiably high is regulation of the price of soybean meal. This response can squarely address the suspicion of unfair price setting practices employed by soybean crushers. If soybean meal prices, on the other hand, are deemed to fairly represent the cost of production, then the regulation of soybean meal prices would have to be weighed against the regulation of cooking oil prices. Thus, this approach would expressly weigh the objective of low price cooking oil against the opposing objective of low-priced balanced feed.

Moreover, the expansion of government price administration would undoubtedly be met with severe reluctance by the soybean crushing industry. Also, the effectiveness and efficiency of this approach, as with all government efforts to enforce prices, would rely on continual assessment of supply and demand conditions and timely readjustment of prices. Prices that are fixed far from the supply and demand conditions, with more consideration to social objectives, would undoubtedly lead to periods of relative scarcity and glut.

6.3 Allow the Importation of Soybean Meal

Another policy response to the contention that the price of domestically produced soybean meal is unjustifiably high or that the domestic supply is inadequate to meet demand is to allow soybean meal to be imported under a variable levy system.

As mentioned above, the threshold price could be set to provide an appropriate balance of domestic protection and price competition. For example, if the high prices of domestic soybean meal are found to result primarily from collusive price setting, the setting of the threshold price below existing domestic price would undercut the ability of the soybean industry to collusively determine prices. The consumers of soybean meal would benefit while soybean crushers would lose from this type of policy change. The government would also benefit as it would receive revenue in the form of import levies. However, whether domestic soybean crushers would be willing to produce soybean meal at a lower price is unclear.

If, instead, high soybean meal prices are found to be justifiable (eg. resulting from desirable policy or from unchangeable cost conditions) then the threshold price could be set slightly above the domestic price to ensure complete protection of domestic suppliers. This alternative to current

policy, however, would also ensure availability of soybean meal as needed. This policy change would provide a gain to consumers of soybean meal and to the government in the form of revenues. Domestic producers of soybean meal would be unaffected.

Clearly, careful consideration of how much competition to allow is crucial. The interests of soybean producers and soybean crushers are conflicting in this respect. As such, determination of an appropriate threshold price is a political, more than economic, decision.

6.4 Increase the Effective Protection on Domestic Soybean Crushing

The policy alternative above approached the problem of high soybean meal prices rather directly. A less direct, but perhaps more severe, approach is a policy that would encourage a change in the structure of the soybean crushing industry so as to reduce the possibility of collusion. An increase in the effective protection on domestic soybean crushing is one policy that would encourage a movement toward a less concentrated industry structure.

Currently, demand for soybean oil in excess of domestic supply is met entirely with imports of crude soybean oil. Indeed, as mentioned above, nine firms rely entirely on imported crude oil and refine it domestically. This approach

to meet excess demand for cooking oil does appear to be the most direct and rational. An alternative, however, would begin with establishing a variable levy system that discourages crude oil imports and instead encourages raw soybean imports.

As a result, these nine cooking oil producers that rely on imported soybean oil would be encouraged to import soybeans and process them domestically. Thus, the number of firms that process soybeans, and consequently produce soybean meal, in Ecuador would necessarily increase. Moreover, the quantity of soybean meal produced in Ecuador would rise significantly with processing of the imported soybeans. This increased supply of soybean meal along with the increased level of competition should force the domestic price of soybean meal lower.

On the other hand, cooking oil producers would lose substantially from this policy. They would have to pay more for imported crude soybean oil than they are now due to the variable levies imposed and would receive less for soybean meal. Consumers of cooking would also lose as the higher cost of production would probably lead to an increase in the price of cooking oil.

If the government did not raise the price of cooking oil, producers of cooking oil could respond by using other types of edible oils. Thus, the participant response could undercut the intended affects of such as policy. Also, the feasibility of this alternative is dependent on the ability of the cooking oil producers to process an additional quantity of soybeans.

Clearly, this policy would prove particularly burdensome to those seven firms that do not have soybean crushing capacity. However, a phasing in of this policy alternative over a period of time would reduce the burden.

From a broader economic development perspective, this structural change may indeed be desirable. Lower costs of soybean meal would assist in the development of the poultry industry while higher effective rates of protection on processing of the soybeans will encourage expansion of this industry at home.

Again, the crucial element in the effective implementation of this policy approach is the determination of the appropriate threshold prices. Many factors must be considered. First, the threshold price for soybean oil must be set relatively high and the threshold price for raw soybeans relatively low to encourage cooking oil producers to import soybeans. Still, the threshold price for soybeans must be high enough to protect the domestic soybean crop. Also, the threshold price for soybean oil should be set high enough to encourage full use of domestic crushing capacity but not so high as to preclude the use of crude soybean oil imports if crushing capacity is fully utilized.

Because of the joint product characteristic of soybean oil and soybean meal, the threshold price for soybean oil should be set below the total cost of importing soybeans and processing them into soybean oil and meal. In this way, the

domestic price of soybean meal would effectively determine at the margin whether cooking oil producers would prefer to import raw soybeans or crude soybean oil. Indeed, as long as the price of soybean meal was relatively high, cooking oil producers would tend to import soybeans and process them domestically. As the price of soybean meal fell because of increased supply, cooking oil producers would begin to prefer importing crude soybean oil instead of soybeans.

This can be seen in the two cases depicted in the Figure 15 below. In either case, a cooking oil producer has the option to import crude soybean oil at the threshold price AD or to import raw soybeans and process them domestically into soybean oil and meal for a total cost of AF. To compare the options, the revenue received from the sale of soybean meal should be viewed as partially offsetting the cost of importing and processing soybeans into soybean oil.

In case number one, it would be more economical to import raw soybeans because the revenue from the sale of soybean meal (CF) would effectively reduce the cost of domestically processed soybean oil to AC. In case two, it would be more economical to import crude soybean oil as the revenue from soybean meal (EF), being less than in case one, would reduce the effective cost of domestically processed soybean oil to AE, above the threshold price for crude soybean oil (AD).

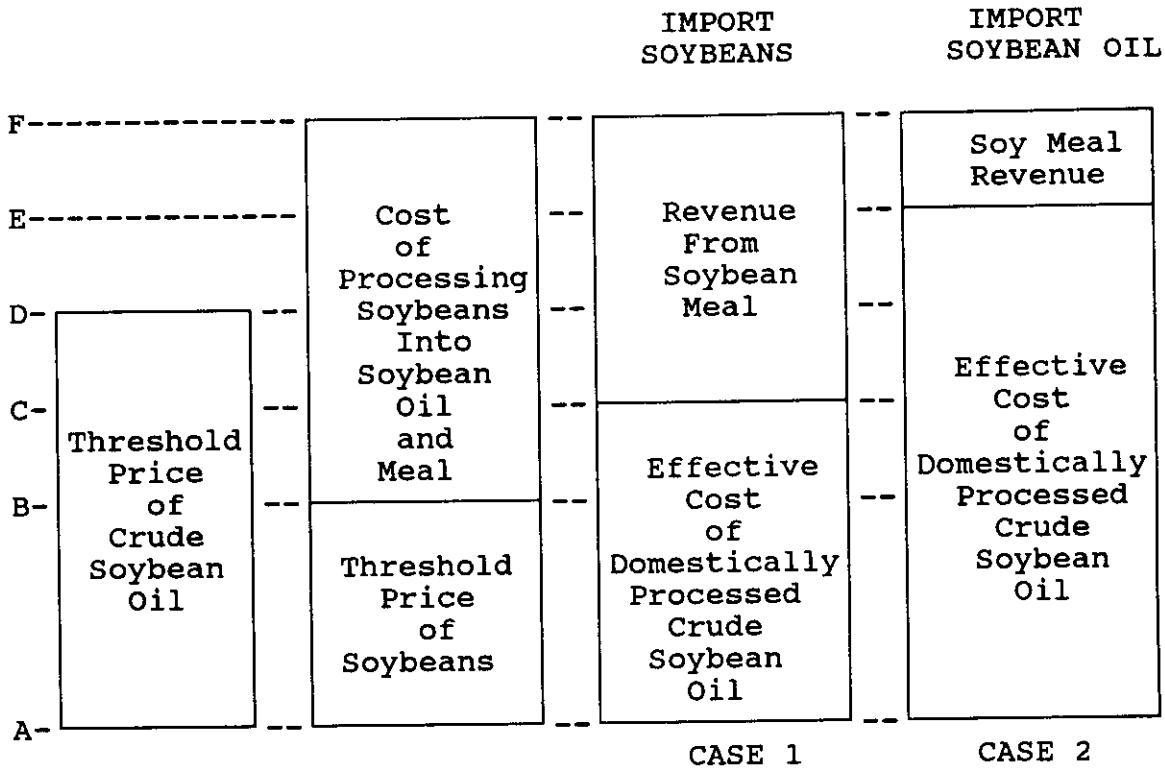

Figure 15 Effective Costs of Importing Soybean Oil and Soybean Meal

6.4 Market-Orientation Approach

In addition to import policy, government price policy should be reconsidered for a number of reasons. As mentioned above, pan-seasonal support prices discourage private sector storage. Rigid prices inhibit efficient allocation of resources. Support prices for soybeans, being based on the cost of production, provide little incentive for producers to reduce the cost of production over time. Prices that are supported above the market level are passed on to the consumer of the finished products in the form of higher prices. Also, prices that are inflexible can, and have, lead to periods of relative scarcity and glut.

An alternative approach would be to allow the market place to determine all prices in the soybean subsector. The domestic price of soybeans would be allowed to fall to a market determined level. These lower soybean prices could be passed on through the marketing channel to consumers of poultry products and cooking oil. Market prices, not being based on the cost of production, would encourage efficiency in production techniques. Flexible market prices would also encourage private sector storage and thus would help to disperse the liquidity squeeze at harvest among those capable and willing of accept it. Moreover, flexible prices would lead to a more efficient allocation of resources.

To continue to promote domestic production, mechanisms other than support prices, such as fertilizer subsidies or deficiency payments (from the government to the farmer), could be employed. On the negative side, policies to promote domestic production other than support prices can require substantial government funds and administrative resources. In these instances, however, revenues collected from import levies could be used to help offset budget outflows.

More importantly, this approach does not address the issue of the highly concentrated structure of the soybean crushing industry. If, as suspected, the industry is capable of influencing prices significantly, then the advantages of a market oriented price system would be notably undercut. Indeed, lower soybean prices would not necessarily translate into lower prices for finished products. Also, distortion in price signals would impede efficient allocation of resources. As such, complementary policies, such as policies that encourage entry of new participants into the soybean crushing industry, would be necessary.

CHAPTER SEVEN

SUMMARY AND SUGGESTED AREAS FOR FURTHER RESEARCH

7.1 Review of Important Characteristics of the Soybean Subsector

7.1.1 Supply and Demand

The demand for soybeans in Ecuador is derived from the demand for soybean meal for animal consumption and from the demand for cooking oil. Growth in demand for soybean meal by the poultry industry has tapered off over the last decade and is expected to increase more slowly. A "most likely" scenario developed by Tschirley suggests that soybean meal consumption by the poultry industry will grow by 5% per year over the next 10 years. Consumption of soybean meal by the shrimp industry is reportedly increasing but to date is still nominal in comparison to consumption by the poultry industry. Domestic production of soybean meal is believed to be sufficient to cover domestic demand. Still, some poultry producers, citing shortages in the market place, question this conclusion. The lack of consensus in this respect lends support to the contention the quantity of clandestine exports of soybeans and soybean products may be significant.

Growth in domestic demand for cooking oil also appears to have slowed at least partially due to economic conditions.

Also, domestic supply of oilseeds remains insufficient to meet demand for cooking oil even despite the accelerated growth in domestic production of soybeans in recent years. The balance, however, which is filled primarily by crude soybean oil imports, has been declining in recent years. Also, increased use of fractionated african palm oil has helped to fill the gap between demand for cooking oil and domestic production.

The level of clandestine exports of soybeans and soybean products has not been quantified. However, its significance is readily acknowledged. One estimate places clandestine exports of soybean oil at roughly one-third of domestic supply. Whether or not this flow of clandestine exports will continue to be significant is dependent directly on future cross border price relationships and thus indirectly on the price policy of the governments of Ecuador and Colombia and currency exchange relationships. Clearly, if the prices of cooking oil, soybeans and soybean meal in Colombia continue to exceed those in Ecuador, as they did from 1980 to 1987, the level of clandestine exports will continue to be significant.

7.1.2 Marketing System

The marketing channels for soybeans and soybean products are few and rather direct. Indeed, a limited presence of middlemen is characteristic throughout the soybean subsector. As such, functions normally associated with middleman, such

as storage and transportation, are more often than not performed by other participants in the marketing system.

Price formation in the soybean subsector generally does not take place under competitive conditions. Prices for soybean meal appear to be influenced by concentrated economic power while prices for soybeans and cooking oil are controlled or influenced by government policy.

The number and size of farms that cultivate soybeans continue to follow upward trends. Most farms that cultivate soybeans are considered large by Ecuadorian standards. Only about one-quarter of farmers that cultivate soybeans belong to producers associations. Nonetheless, associations such as APROCICO play an important part in policy development. In particular, associations are actively involved in negotiations over the government support price for soybeans. In this way associations help counteract the concentrated economic power of soybean crushers.

Four large firms continue to dominate the soybean crushing industry. However, one new small firm has recently begun to crush soybeans. This change may reflect a favorable movement toward increasing competition within this industry. Still, at this point in time, the potential for collusion between firms in setting the price of soybean meal is very high.

The balanced feed manufacturing industry is highly integrated with the poultry industry. Indeed, only one-quarter

of balanced feed produced in Ecuador actually enters the market place. The bulk is consumed by poultry firms owned by the feed manufacturing firms or by poultry producers that have production contracts with the feed manufacturing firms. This movement toward ownership integration and contract production has reportedly accelerated in recent years. Also, transfer of balanced feed from manufacturers to poultry producers is often coordinated by the use of forward contracts.

7.1.3 Implications for Government Policy

The conversion rate of soybeans into soybean products and the differing rates of demand for soybean oil and soybean meal have important implications for policy design. Indeed, whether to continue to promote domestic soybean production to meet demand for soybean oil or alternately to adjust promotion so that the supply of soybean meal does not exceed domestic demand is a pressing policy issue. Characteristics of supply and demand of other oilseeds, feed grains and substitutes and complements for soybean products should be considered in this decision.

The structural characteristics of industries within the soybean subsector also have important implications for government policy design. In particular, the oligopolistic-oligopsonistic structure of the soybean crushing industry decreases the desirability of greater market orientation and

possibly even encourages the adoption of more restrictive policy alternatives, such as price regulation for soybean meal.

7.2 Review of Current Government Policy

It is important to acknowledge that government efforts to promote domestic soybean production through government supported prices and import restriction have been quite successful. Indeed, yields and area planted have increased significantly over the last decade. The Government agency, ENAC, also proved effective in 1987 in defending the official support price through direct market participation. Moreover, the primary tools of current government policy, administered pricing and import restriction, are relatively inexpensive policy tools.

Despite the success, the current policy approach does contain weaknesses and inefficiencies that should be considered. Some of the more salient weaknesses of the current government policy approach are listed below:

1. A disincentive for private sector storage is created by pan-seasonal pricing of soybeans. This is not a pressing problem as ENAC and the soybean crushers apparently have had sufficient storage capacity to handle the prevailing volume. However, if domestic soybean production continues to expand at the rates achieved in 1985, 1986 and 1987,

then one must question whether ENAC and the soybean crushers would continue to be able, or willing, to store the increased quantity. Similarly, the squeeze on liquidity during the harvest period that is also due to pan-seasonal pricing may intensify.

Prices that are more flexible could provide market incentives for the participants in the private sector to willingly assume the storage function. Storage by firms other than oilseed processors could ease the liquidity crunch immediately following the harvest period and could lessen storage costs to ENAC.

2. Support prices for soybeans being based on the cost of production provide little incentive for soybean producers to reduce the cost of production over time. Indeed, the real price of soybeans has followed an upward trend in recent years.

3. A fragmented policy approach has resulted in unintentional adverse effects. Development of government policy appears to be rather piecemeal and as such has failed to recognize important interactions within the entire agricultural system. For example, the government policy to promote soybean production effectively undercut the government policy to promote corn production in 1987 and 1988. As stated above, many farmers reacted to attractive soybean support prices in those years by

planting a second crop of soybeans rather than rotating with corn as before.

Clearly, a more comprehensive policy approach is suggested. The recent establishment of the Policy Analysis Unit within the Ministry of Agriculture to help coordinate policy development will surely help correct this problem. Also, improved data and information systems would assist policy makers in designing a comprehensive policy.

4. The existing import quota allocation system is inflexible. Currently, import quotas for crude soybean oil are allocated annually based on projected supply and demand conditions. The government is apparently slow to respond, if at all, to industry solicitation for quota increases. Delayed response to proper solicitations may increase costs of production by creating patterns of under and over-utilization of capacity. Similarly, proper solicitations for imports of soybean meal, or any feed grain, that are unmet on a timely basis may have significant adverse effects on the feed manufacturing and poultry industries.

Also, it should be noted that the nature of the quota allocation system is to invite opportunistic behavior on the part of industry participants. Indeed, any price differential that favors imports over domestic production creates a substantial incentive for industry

participants to misrepresent the facts. As a result, a government concerned with protecting domestic production is forced to take a somewhat adversarial posture.

More frequent allocation of import quotas, semi-annual or quarterly, in addition to greater access to industry records would help mitigate these problems. Alternately, a variable levy system to regulate imports would not have many of the problems associated with a quota system.

5. Government controls on cooking oil from at least 1980 to 1987 created an incentive for clandestine exports to Colombia. Clandestine exports in these years significantly undercut the government's efforts to regulate domestic supply and thus to meet policy objectives such as improved domestic availability of cooking oil. Flexible cooking oil prices or more strict policing of border trade are two possible policy responses.

6. Perhaps, the most important consideration in evaluating current government policy is the high opportunity cost of promoting domestic production. Indeed, the price of domestic soybeans followed an upward trend in real terms from 1983 to 1987 and was substantially higher than world market prices. Consumers of soybean products bore the cost of this policy in the form of higher prices. In addition, domestic soybean meal

prices that were above world market prices through 1987 have quite likely slowed the rate of growth in the poultry industry. However, it should be mentioned here that the increase in soybean prices in the world market in 1988 has lessened the difference between domestic and international prices significantly. Thus, the opportunity cost of domestic price and import policy has also fallen since this research was undertaken.

Policy makers should carefully analyze the trade-offs involved in the decision to promote domestic production. Also, policy alternatives that may help to reduce domestic prices over time, such as a market orientation or increased import competition, should be considered.

7.3 Areas for Further Research

This paper clearly raises more questions than it answers. This is in part due to the nature of this author's perceived role of an economic analyst. Indeed, many questions have been left for the government decision-maker to answer.

Some questions remain unanswered, however, because of incomplete information available to this analyst or because of the limited scope of this paper. Certainly, many areas for further research can be identified. Some specific areas that are worthy of further research are listed below.

1. What are the costs of processing soybeans into meal and oil in Ecuador? How closely does the price of soybean meal reflect the cost of processing? Does the price of soybean meal reflect oligopolistic price setting?
2. What is the actual process by which the government determines the price of cooking oil? If the price of cooking oil is based on the cost of production, on what basis are joint processing costs allocated between oil and meal?
3. What is the magnitude and impact of clandestine exports of soybean oil, soybean meal and raw soybeans to neighboring countries? Conversely, how much of domestic production of soybeans, soybean oil and soybean meal is consumed domestically?
4. How much soybean meal does the poultry, shrimp, and livestock industries actually require?
5. Are the price and availability of soybean meal obstacles to growth in the poultry industry? Do other more constraining factors exist?
6. What are the relevant supply and demand elasticities for soybeans and soy products in Ecuador? How do domestic consumers respond to changes in prices or income?

7.4 A Final Note

In line with the research objectives presented at the outset of this paper, no specific policy recommendations have been made. Instead, the intent of this paper has been to provide policy makers with insight into the workings of the soybean subsector, its relationships with other economic sectors and the implications of various policy alternatives. Hopefully, with this information, the policy maker is better equipped to choose between policy alternatives.

APPENDICES

APPENDIX A

Calculation of the Cost of the Restriction of Soybean Meal Imports to Poultry Product Consumers

I. Price Difference Between Domestic and Imported Soybean Meal

Imported Soybean Meal Price - July 1987			
CIF Guayaquil (MT)[1]	US$	229	
Exchange Rate: Sucres per US$1.00[2]		X 196.5	
Sucres (MT)	S/	44998.5	
Sucres (per hundred weight)			2041.6
Domestic Soybean Meal Price - July 1987			
Sucres per hundred weight[3]			3241.0
Difference - July 1987			
Sucres per hundred weight			**1199.4**

II. Conversion Rates:

Poultry meat:	
Balanced feed (kgs) to poultry meat (lb)[4]	2.55
Average proportion of soybean meal in feed[5]	20%
Soybean meal (hwt) to poultry meat (lb)	**0.011243**
Eggs:	
Balanced feed (kgs) to dozen eggs[6]	2.05
Average proportion of soybean meal in feed[7]	12%
Soybean meal (hwt) to eggs (dozen)	**0.005221**

III. Savings to Poultry Product Consumers:

Poultry Meat:		
Difference between domestic and imported soybean meal	1199.4	
Conversion rate	X 0.011243	
Savings per pound of poultry meat		**13.49**
Percentage of retail price (S/147.27)		**9.2%**
Eggs:		
Difference between domestic and imported soybean meal	1199.4	
Conversion rate	X 0.0054421	
Savings per dozen eggs	6.5032	
Savings per egg		**0.54**
Percentage of retail price (10.9)		**5%**

APPENDIX B

Calculation of the Cost of Soybean Support Price Policy to Poultry Product Consumers

I. Price Difference Between Domestic and Imported Soybeans

Imported Soybean Price - July 1987		
CIF Guayaquil (MT)[8]	US$ 244	
Exchange Rate: Sucres per US$1.00[9]	X 196.5	
Sucres (MT)	S/ 47946	
Sucres (per hundred weight)		2175.3
Domestic Soybean Price - July 1987		
Sucres per hundred weight[10]		2800
Difference - July 1987		
Sucres per hundred weight		**624.7**

II. Conversion Rates:

Poultry meat:	
Balanced feed (kgs) to poultry meat (lb)[11]	2.55
Average proportion of soybean meal in feed[12]	20%
Soybean meal (hwt) to poultry meat (lb)	0.011243
Soybeans (hwt) to poultry meat (lb)	**0.014991**
Eggs:	
Balanced feed (kgs) to dozen eggs[13]	2.05
Average proportion of soybean meal in feed[14]	12%
Soybean meal (hwt) to eggs (dozen)	0.005221
Soybeans (hwt) to eggs (dozen)	**0.006961**

III. Savings to Poultry Product Consumers:

Poultry Meat:		
Difference between domestic and imported soybeans	624.7	
Conversion rate	X 0.014991	
Savings per pound of poultry meat		9.37
Percentage of retail price (S/147.27)		**6.4%**
Eggs:		
Difference between domestic and imported soybeans	624.7	
Conversion rate	X 0.006961	
Savings per dozen eggs	4.3485	
Savings per egg		**0.36**
Percentage of retail price (10.9)		**3.3%**

APPENDIX C

Relationship Between Soybean Meal and Soybean Oil Prices

I. Decrease in Soybean Meal Price Compensated by a 10% Increase in the Official Cooking Oil Price (Revenue Neutral)

Crude Soybean Oil Supply (MT) - 1987	39,540
Official Cooking Oil Price - 1987	197
Refined Soybean Oil Supply (liters)	37,563,000
10% Increase In Cooking Oil Price	X 19.7
Increase in Revenue	739,990,000

Soybean Meal Supply (MT) - 1987	87,227
Decrease in Revenue	739,999,000
Soybean Meal Supply (Hundred weight)	÷ 1,922,570
Decrease in Price of Soybean Meal (H.wgt.)	384.9
Average Soybean Meal Price - 1987	÷ 3,126.5
Percentage Decrease in Soybean Meal Price	12.3%

II. Effect on the Price of Poultry Products

Poultry Meat:

Decrease in Soybean Meal Price	384.9
Conversion rate	X 0.011243
Savings per pound of poultry meat	**4.33**
Percentage of retail price (S/147.27)	2.9%

Eggs:

Decrease in Soybean Meal Price	384.9
Conversion rate	X 0.0054421
Savings per dozen eggs	2.10
Savings per egg	**0.18**
Percentage of retail price (S/10.9)	1.7%

Notes to Appendices

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2. IMF International Monetary Statistics, March 1988.
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5. Average based on typical balanced feed formulas for broilers. Poultry Division, Ministry of Agriculture, Quito.
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12. Average based on typical balanced feed formulas for broilers. Poultry Division, Ministry of Agriculture, Quito.
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