AGRICULTURAL DEVELOPMENT IN SAUDI ARABIA WITH A PRIMARY FOCUS ON WHEAT PRODUCTION

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ABSTRACT

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Saudi Arabia used to be a food self-sufficient country, but has become a food deficient country even though the agricultural sector continues to employ the highest percentage of the civil labor force. The research considers why the country declined from food self-sufficiency to become the leading agricultural importer in the Third World. Research objectives were to examine gains and declines in productivity under the country's agricultural development plans and the status of wheat production as an example of agricultural development.

Data used for this research were secondary data from various government and international sources. Analysis employed simple quantitative and descriptive methods.

Findings of the study indicated that agricultural production is increasing rapidly, but not as fast as the increase in demand for agricultural products. Saudi Arabia is capable of re-gaining self-sufficiency in some of its agricultural products, such as wheat, but far from meeting all of its food needs.

DEDICATION

To my father, Saul, who passed on early in his life but who would be proud of this achievement.

ACKNOWLEDGEMENTS

Without the assistance of several people, completion of this study would have been impossible. Among those people I would like to especially thank my graduate advisor and chairman of my advisory committee, Dr. Milton H. Steinmueller. His understanding provided a comfortable working environment for me. To him I express my sincere gratitude. I would also like to express my sincere appreciation to Drs. P.E. Nickel and Lee M. James for serving on my thesis committee.

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CHAPTER ONE

PROBLEM STATEMENT, OBJECTIVES AND METHODS

1.1 Introduction

During recent decades there has been some change in economic theory with regard to the relative contributions of agricultural and industrial development to national economic growth. Transition from an earlier "industrial fundamentalism" has resulted in increased emphasis on the significance of agricultural development for the total development process.[1] In this sense, Hayami and Ruttan report

> It is increasingly recognized that the functions which the agricultural and industrial sectors must perform in order for growth to occur are totally interdependent. This clearly is an important contribution to economic 'doctrine' when contrasted with the naive industralization-first doctrines of the 1950s. 2

During the past decade, Saudi Arabia has undergone rapid economic development stemming from rapid increments in oil production and prices during this period. Saudi

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[1] Yujuro Hayami and Vernon W. Ruttan, Agricultural Development: An International Perspective. (Baltimore: The Johns Hopkins University Press, 1980).

[2] Ibid, p.25.

government officials, however, recognize that oil will not be a reliable resource forever, and that current oil revenues should be utilized to develop the country. A succession of five-year development plans promulgated since 1970 have increasingly reflected the need for economic diversification. Diversifying productive economy sectors and reducing the dependence on oil exports then, has become one of the important development goals.

In addition to the oil sector, the industrial and agricultural sectors have been considered to be the productive sectors in the Saudi economy. The country, which was once a major exporter of agricultural products, however, has become a net importer of these products. In terms of agricultural development, self-sufficiency is emphasized as an important goal of the country's agricultural policy. Saudi Arabia is currently the leading agricultural importer among the Third World countries. In light of this reversal of the country's agricultural position, the intent of this study is to investigate Saudi Arabia's agricultural development potential with regard to the resources with which the country has been endowed that can be applied to agricultural productivity.

1.2 Problem Identification

In the past, before the discovery of oil, Saudi Arabia's most important resources were agricultural resources.

This was due to the fact that agricultural sector employed, and still employs, the highest percentage of the country's civil labor force. In 1980, the Ministry of Planning in Saudi Arabia reported:

> Despite the discovery and development of oil, and subsequently, rapid development in other sectors, agriculture has remained the primary occupation of the Kingdom's population. In 1394/95, it is estimated that about 695,000 persons, or 40 percent of the civil labor force, was engaged in agriculture. By 1399/1400, although agricultural employment declined sharply by about 96,000 persons, the sector still remained the largest employer, with about a quarter of the Kingdom's civil labor force. 3

In terms of food self-sufficiency, Saudi Arabia was once a food self-sufficient country, but gradually became a food deficient country. Balghonaim reported that "according to the United States Department of Agriculture, it--Saudi Arabia--went from a condition of self-sufficiency to a dependency on imports for about two-thirds of the food consumed in 1975."[4] In the 1930s and 1940s, the country was not only food self-sufficient, but was also an exporter of some of its agricultural products. As Al-Turki reported,

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[3]Ministry of Planning (S.A.), Third Development Plan 1980-85, (Riyadh: Ministry of Planning Press, 1980), p.137 The years 1394/95 correspond to 1974/75, 1399/1400 corresponds to 1979/1980.

[4]S.S.M. Balghonaim, "Agricultural Development in Saudi Arabia," (M.A. Thesis, California State University, Sacramento, 1977), pp.108-109.

"Before 1949, Saudi Arabia was a net exporter of live animals, now it has become a heavy net importer."[5]

The increases in agricultural imports were not stopped by efforts under the first two five-year plans and the country is still moving rapidly in a negative direction in terms of food self-sufficiency. A large portion of the agricultural products consumed in Saudi Arabia are imported. The rate of increase, however, may not be increasing as rapidly. In 1983, the United States Department of Agriculture reported:

> Saudi Arabia is the leading agricultural importer among all Third World countries. It accounts for about one-fourth of OPEC's total agricultural imports and a slightly smaller share of all the food imports of the 22 countries in the Mid-East and North Africa. In 1982, Saudi agricultural imports increased by 17 percent to $6.7 billion, down from a 29 percent climb in 1981. 6

The increases in imports of food have come about while Saudi development plans and policy have been emphasizing agricultural development as one of its important development objectives. Food importation, apparently, has responded to other influential foreign Saudi Arabian social

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[5]Mansoor I. Al-Turki, "Accelerating Agricultural Development in Saudi Arabia." (Ph.D. Dissertation, Colorado State University, 1971), p.24.

[6]U.S.D.A. "Middle East and North Africa, World Agricultural Regional Supplement: Review of 1982 and Outlook for 1983," p.13.

and economic life. With the rapid evolution of oil as the main driving machine of the country's economy, its main source of foreign exchange and governmental expenditure, have come rapid increases in the Saudi people's standard of living and consumption patterns. Population has exploded as the country has imported hundreds of thousands of foreign workers to help build the expanding infrastructure made possible by the new oil wealth. It is essential to understand the influence of these economic and social trends of recent years on agricultural self-sufficiency in Saudi Arabia in order to examine the country's future agricultural development potential in light of its resources.

Emphasis on self-sufficiency--in the development plans--as the important goal of agricultural policy in the country has evidently failed to bring about accomplishment of this objective, in spite of advances in agricultural technology. The problem of this study, then, is to examine the various trends and influences in Saudi agriculture that have made Saudi Arabia a large importer of food products in the face of government emphasis on food self-sufficiency and to determine the country's future agricultural development potential. In this regard, the case of wheat production can be considered an illustrative example.

Among agricultural products, wheat has been considered as one of the most important agricultural commodities. Its importance can be derived from the heavy emphasis that

the Saudi government puts on wheat production subsidies that have fixed the wheat price at Saudi Riyals 3500 per one ton (in dollars, about $1045 per ton) since 1978.

In light of the above, the following questions are considered in this research.

1. Why did Saudi Arabia turn from food self-sufficiency to being the leading agricultural importer (in terms of both quantity and value) among all the Third World countries?

2. What accomplishment, if any, of the Saudi development plans in terms of agricultural development has been achieved?

3. Since wheat is an agricultural commodity that has received considerable attention from the Saudi government, where does the production of this commodity stand in terms of self-sufficiency?

4. To what extent have agricultural practices been developed by the adoption of agricultural technology?

1.3 Objectives of the Study

The objectives of the research are:

(1) to investigate the status of agriculture in Saudi Arabia;

(2) to explain why Saudi Arabia declined from self-sufficiency in food to a food-deficient country;

(3) to investigate, in detail, the status of wheat production as an example of agricultural development in the country; and

(4) to contribute to the literature on agricultural development in Saudi Arabia.

1.4 Methods and Organization

Information used as a basis for this research is obtained through written material (secondary data). Specific quantitative, as well as descriptive data, is employed. In this regard, one of the persistent problems of research about Saudi Arabia is the scarcity of reliable and available data. Obtaining such data was a crucial and difficult task. It was necessary to request published and unpublished materials from the various Saudi government ministries and agencies. Some of the data were in Arabic and had to be translated to English. Other written materials, used in this study, such as books, articles, dissertations and theses were obtained through the Michigan State University Library.

Analysis of the data obtained from books, reports, documents and similar sources was carried out through simple calculations and comparisons. Frequency and percentage statistics were employed in making comparisons and to express the data in tabular form.

The results of this research are presented in six chapters. In Chapter One the researcher introduces the topic, identifies the problem, specifies the objectives of the study, and states the methods and organization of the study.

In Chapter Two, an effort is made to review the physical conditions of Saudi Arabia in terms of its location

and size, climate, soil, water resources, and land qualities. In addition, population is discussed in this chapter because of its impact on demand for agricultural products.

The agricultural situation in the country is considered in Chapter Three. Major agricultural products, trends in agricultural production, area under actual cultivation, and productivity are analyzed. Agricultural land and cropping patterns are explained to facilitate this analysis. Factors affecting demand for agricultural products are also considered, in an effort to explain why Saudi Arabia shifted from a position of food self-sufficiency to become the leading food importer among the Third World countries.

Chapter Four presents the efforts made through three five-year development plans to develop agriculture. In this chapter the concept of "development" is considered and the agricultural development programs that were implemented under the three development plans are examined. Then, major problems facing such efforts are discussed and trends in some selected agricultural products during the development plan periods are examined.

Chapter Five of the thesis is devoted to a discussion of wheat production as an illustrative example of agricultural development efforts and results in Saudi Arabia programs concerning wheat production, trends in wheat production, wheat real prices, costs and benefits of wheat production, trade in wheat, and the effects of development

programs on wheat production will be discussed. Finally, in Chapter Six, a summary of the findings and conclusions of the study will be presented.

CHAPTER TWO

SAUDI ARABIA IN PERSPECTIVE

2.1 Introduction

In most of the Western world, Saudi Arabia (or Arabia) is known as a desert land where people live in tents and enjoy excessive wealth from oil that is being paid for by people in Western countries. Some people do not know the location of Saudi Arabia or that anything besides oil wells can be raised in the vast arid country.

To facilitate reader understanding of this study, it is important to provide some a brief background description of Saudi Arabia. This is the objective of this chapter, which covers the topics of location and size, population, climate, soil, land classification, and water resources. Such information gives clarity to the country's past and present agricultural situation and is important for understanding the following chapters.

2.2 Location and Size

Saudi Arabia extends over an area of some 2,200,000 square kilometers (about 830,000 square miles) and occupies about four-fifths of the Arabian peninsula or an area about

one-third of the size of the United States.[7] The area in which the country lies, the Arabian Peninsula, is a well-defined geographical unit, bounded on three sides by the sea. It is bounded on the east by the Arabian Gulf (Persian Gulf) and the Gulf of Oman, on the south by the Indian Ocean, on the west by the Red Sea, and meets the deserts of Jordan and Iraq in the north. This isolated peninsula, extending over more than one million square miles, is divided politically into several states, of which the largest is Saudi Arabia.[8]

The Kingdom of Saudi Arabia, itself, is bounded on the south by the Sultanate of Oman, the Yemen Arab Republic and the People's Democratic Republic of Yemen; on the north by Jordan, Iraq, and Kuwait; on the west by the Red Sea; and on the east by the Arabian Gulf, Bahrain, Qatar, and the United Arab Emirates.[9]

The country consists of six provinces or regions. Each region has its own distinctive characteristics and agricultural potential (See Figure 2.1).

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[7] A. El-Katib, Seven Green Spikes, FAO and the Ministry of Agriculture and Water in Saudi Arabia (Beirut: Dar Al-Qalam Press, 1974) p.3.

[8] The Middle East and North Africa, (London: Europa Publication Limited, 1980-1981), p.639.

[9] Foud Al-Farsy, Saudi Arabia: A Case Study in Development, (London Stacy International, 1980), p.24.

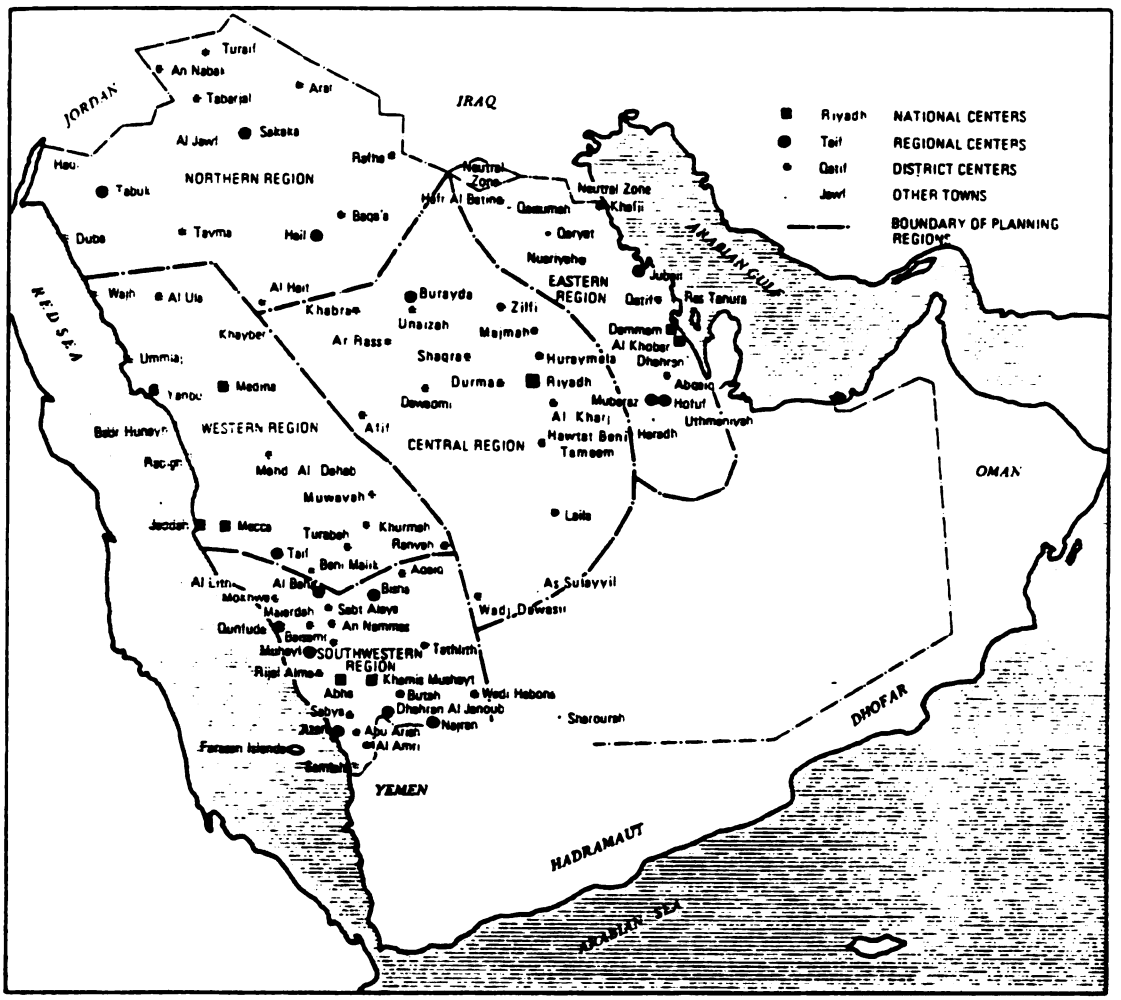

FIGURE 2.1: Kingdom of Saudi Arabia

Adopted From: Ministry of Planning (S.A.), Third Development Plant 1980-85, Ministry of Planning Press; Riyadh, 1980, p.xxxv.

The Western (Hijaz) Region is a coastal plain confined within a narrow space by mountains that drop sharply toward the Red Sea. This region has a long history of spiritual importance to the Muslim people since it contains the two holy cities of Mecca and Medina. In addition to Mecca and Medina, Jeddah and Taif are the region's major cities. The important feature of this region is the Al-Haji, in which one and a half to two million Muslims from all over the world make the journey to Mecca and Medina during the pilgrimage season each year.

The Central Region (Najd) is a vast eroded plateau, considered to be the heart of the Arabian Peninsula. Most of this region is arid, with some oases in the northern part. At the center of this region is the kingdom's capital city of Riyadh.

The Eastern Region (Al-Hasa) is the country's wealthiest area in resource endowments since it contains the massive oil deposits and associated oil production facilities. In addition, there are two agricultural areas--Al-Hasa and Al-Quataif--where palm dates are produced. Fishing activities are conducted on a large scale in this region. The main cities are Dharan, Dammam, Jubail, Al-Khobar, Al-Hasa, and Al-Quataif.

The Southern Region (Asir) contains a relatively fertile area of coastal mountains in the extreme southwest.

Mountain peaks rise to 10,000 feet with ample rainfall for cultivation. Asir includes the major towns of Abha, Jizan, and Najran. At the present time, the emphasis in this region is focused on agriculture and on development of summer resort areas.

The Northern Region (Al-Shamaliya) borders Jordan and Iraq at the most northern points of the country. The main towns in this province are: Tabuk, Hail, Sakaka, and Al-Jouff. Many oases make this region suitable for cultivated agriculture and for the production of meat through sheep, goat and camel raising.

The final region is the Empty Quarter which is a barren desert of sand. There is no habitation in this region.[10]

2.3 Population

Population estimates in Saudi Arabia have been in dispute for some years. An official estimate for 1956 put the population at 6,036,400. A census was held in 1962-63, but no figure was announced. The United Nations Population Division estimated the mid-1955 population at 6,750,000; mid-1970 at 7,740,000; and mid-1975 at 8,966,000.

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[10] For more detail about these regions, see Foud Al-Farsy, Saudi Arabia: A Case Study, pp.24-27.

A total population of 7,012,642 was announced after a census held in September 1974. Foreigners working in the country total around 1.5 million. The immigrant workers come mostly from countries such as Egypt, the Yemens, India, Pakistan, Taiwan, and South Korea, although a large number of skilled and technical workers come from Western countries.[11]

The population of Riyadh (the capital city) was estimated in 1974 at 667,000, with Jeddah (the second largest city and commercial center) at 561,000; Holy Mecca at 367,000; Holy Medina at 198,000; Taif (the summer capital) at 205,000; and Dammam at 128,000. The remaining population is distributed among the small cities and rural areas.[12]

The United Nations estimated the Saudi birth rate at 4.95 percent and the death rate at 2.02 percent, which produces an annual net population growth rate of 2.95 percent. The figure agrees substantially with the Saudi government's 1975 estimate of a 3.0 percent population growth rate.[13]

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[11] The Middle East and North Africa, (London: Europa Publications, Ltd., 1981-1982), p.664.

[12] Ibid.

[13] Abdulaziz Ism Daghistani, "Economic Development in Saudi Arabia: Problems and Prospects," (Ph.D. Dissertation, University of Houston, 1979), p.13.

2.4 Climate

Saudi Arabia lies in the tropical and subtropical zones. Summer and winter are the most identifiable seasons; summer extends the longest, from late May to September, while winter lasts from early December to February. The mean monthly temperature is between 14°C and 20° C. in the winter and 35°C in the summer. In the coastal areas near the Red Sea and the Arabian Gulf, humidity is high, while internal areas like Riyadh City have very low humidity.[14]

Rainfall in the country is unpredictable and irregular, with large variations from one year to another. Long periods may pass without rain and, when rain occurs, it may take the form of a violent storm of short duration. Severe erosion and destruction results from time to time because of these storms.[15]

The annual rainfall varies between regions and between areas within a region. In the northwestern part of the country, rainfall averages 30 mm. to 50 mm. annually, while it fluctuates between 40 and 90 mm. in the northeast. In the Central Region, rainfall decreases from north to south and from west to east, averaging from 110 to 85 mm.

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[14]Ministry of Agriculture and Water (S.A.), A Guide to Agricultural Investment in Saudi Arabia. (Department of Agricultural Development, 1979), pp.4-7.

[15]El-Khatib, Seven Green Spikes, pp.5-6.

per annum. In the western and southern part, the annual rainfall in the mountains exeeds 300 mm. and diminishes from south to north in this part.[16]

2.5 Soil

Geographically, Saudi Arabia can be divided into six zones. The first zone comprises the coastal plains which are located in the east along the Arabian Gulf, and in the west along the Red Sea. The eastern coastal plain is covered by a wide belt of shifting sands, while the western coastal plain is characterized by many short wadis which offer a combination of climate, soil and water which are suitable for agricultural production. Second, the highlands, located in the western part of the country, are a mountain series extending about 1,600 kilometers from the Gulf of Aqaba in the north to Aden in the south. The highest peak is over 2,750 meters. The central plateau, the third zone, is located east of the highlands at an elevation ranging from 600 to 1,800 meters. As Summan and Ad Dahna Plateaus make up the fourth zone. As Summan plateau is a hard, rocky plain, while Ad Dahna is a long and narrow sand belt. Fifth is the Najd Plateau and the Escarpment

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[16] Ibid.

Region which is dominated by several steep escarpments. Finally, there is the Great Sands Area which consists of the Great Nafud in the north and the Rub' Al-Khali (empty quarter).[17]

Geologically, Saudi Arabia consists of two parts (Figure 2.2). First, the eastern sedimentary basin comprised of a variety of rocks which, under certain conditions, become a good environment for storing oil and water. Second, the Precambrian (Arabian) shield which is the ancient land mass in the central part of the Western region of the country.[18]

The geography and geology of Saudi Arabia demonstrate, to some extent, the nature of the soil in this country. As mentioned above, most of the country consists of a plateau of base rock which in some places is covered by a thin layer of soil. The remaining part is covered by sand or sand dunes. The physiographic features of Saudi Arabia, combined with the aridity of the climate, have resulted in saline and alkaline soils that cover most of the country lands.[19] Thus

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[17]Ministry of Agriculture and Water (S.A.), A Guide to Agricultural Investment in Saudi Arabia, (Department of Agricultural Development, 1979), pp.2-4.

[18]Ibid, p.4.

19El-Khatib, Seven Green Spikes, p.6.

Sedimentary Basin and Western Precambrian (Arabian Shield).

FIGURE 2.2: Sedimentary Basin and Western Precambrian (Arabian Gulf)

SOURCE: Ministry of Agriculture and Water (S.A.) A Guide to Agricultural Investment in Saudi Arabia: Department of Agricultural Development, Riyadh: 1979 ,p.5

lands available for agriculture are limited and have low fertility and/or high salinity. El-Khatib reports:

> Lands suitable for the irrigated agriculture are limited and those which are available are composed mainly of alluvial soils developed from weathering of quartz sandstones, silt stones and shale having been thoroughly mixed by the action of wind and water or deposited in layers of varying texture. These soils are generally found in small depressions or narrow strips in Wadi channels. All of these lands are flat and nearly level. In some places, such as Al Hassa and Qatif, where agriculture is practiced much of the soil has lost fertility and become saline. 20

There are many different types of soil in Saudi Arabia. Among them are:

1. the desert marls which is found in Hijaz region;
2. heavy sand-gravel soil in Najd region and in some parts of the eastern region;
3. loam soils are found in some of the highlands of Najd; and
4. alluvial soils and sandy-loam soils are found in the banks around scattered wadis all over the country. 21

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[20] Ibid

[21] Balghonaim, Agricultural Development in Saudi Arabia, pp.16-17.

Al-Fiar quoted from Pasteur,

> The inherent fertility of the Saudi Arabia soils is low. Organic matter and nitrogen are largely absent; phosphorus is very low; potassium however, is generally available in quantities sufficient for growing most crops. 22

2.6 Land Classification

Land, in Saudi Arabia, is classified into three main categories: arable land, range land, and non-agricultural land, which represent 0.24 percent, 99.7 percent and 0.06 percent, respectively, of the total area of the kingdom (Table 2.1). Arable land has been estimated at 1.5 to 2.0 million hectares of which about 525,000 hectares are under cultivation. Most of the country is range land, consisting of permanent grassland, forest, semi-desert range land, and desert land. It comprises about 219,480,000 hectares or 99.7 percent of the total area. Non-agricultural land, which consists of settlements, roads, etc., covers about 116,000 hectares or about 0.06 percent of the total area.[23]

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[22] Al-Fiar, M.H. "Agricultural Marketing System in Taif, Saudi Arabia," (M.A. Thesis, Michigan State University, 1973) pp.25-26.

[23] Ministry of Agriculture and Water (S.A.) A Guide to Agricultural Investment in Saudi Arabia, (Department of Agricultural Development, 1979), pp.29-33.

TABLE 2.1: Land Area by Use in Saudi Arabia

Land Classification	Land Use	Area 1,000 Hectares	Percent
Arable	Cultivated land	525	0.24
Range Land	Permanent grassland	1,700	0.75
	Forest	2,780	1.25
	Semi-desert range land	140,000	63.60
	Desert (barren)	75,000	34.10
Non-agricultural land	settlements, roads, etc.	116	.06
TOTAL		220,121	100.00

SOURCE: Ministry of Agriculture and Water (S.A.), A Guide to Agricultural Investment in Saudi Arabia, 1979, p.31.

2.7 Water Resources

Water shortage is a global problem facing many countries in the arid and semi-arid zones. Studies made by the United Nations and other international agencies have reached the conclusion that there is a possibility of facing a water crisis in the near future in most parts of the world.[24]

In Saudi Arabia, water scarcity is one of the most important problems facing agricultural production. Asfour, holds that "the backwardness of agriculture is due to the intemperate climate and the scarcity of resources, particularly water."[25] Water scarcity results from the fact that there are no rivers or perennial streams in the entire country and rainfall is low, ranging from 30 mm. to 300 mm. per annum from one part of the country to another.[26]

Variability occurs in water quantity, quality and depth and, to some extent, reflects the geographical structure of the country. Karl S. Twitchell (1958) found that

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[24] Al-Zokair, A. "A Study of Agricultural Development in Al-Kharj, Saudi Arabia," (M.A. Thesis, Michigan State University, 1980), p.29.

[25] Asfour, E.Y., Long Term Projections of Supply of and Demand for Agricultural Products in Saudi Arabia, (Economic Research Institute, American University of Beirut, 1969), p.57.

[26] El-Khatib, Seven Green Spikes, p.6.

the water resources in Saudi Arabia are dependent upon topography, geological formations and climate.[27] Generally speaking, four main categories of these water resources exist: surface water, ground water, sea water (after desalination), and sewage water (after chemical and biological treatment).

2.7.1 Surface Water

Although there are no perennial streams in the usual sense, in some exceptional situations, limited spring water is available to some widely scattered areas of Saudi Arabia. The availability of such spring water has been important throughout the history of the country. The location of some cities, such as Mecca and Jeddah, was based on the location of springs. While the Eastern Region (Al-Hassa) may sometimes have more than 140 springs, most of them are small and depend on rainfall.[28]

With spring water, runoff water constitutes the main source of surface water in the country, but depends on rainfall which is very low and unpredictable. Runoff accumulates

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[27]Balghonaim, "Agricultural Development in Saudi Arabia," p.48.

[28]Al-Fair, "Agricultural Marketing System in Taif, Saudi Arabia," p.24.

in different parts of the country in scattered wadis (drought valleys) which remain dry most of the year, and sometimes for many years (Figure 2.3). Most important in Saudi Arabia are 90 wadis located on the Tihama plain which flow into the Red Sea. The water which flows through them amounts to about 62 percent of all runoff water in the country.[29]

In addition to the Tihama wadis, there are several wadis scattered throughtout the country. In the Southern Region, Wadi Turabah, Wadi Raynyah, Wadi Bishah, and Wadi Tathlith are the most important ones. In the Central Region, Wadi Bark, Wadi Nisah, and Wadi Al Sahba; and in the Northern Region Wadi Aruma, Wadi Al Batin and Wadi As Sirhan are the most important ones.[30]

2.7.2 Ground Water

Ground water has been used for domestic, municipal, industrial and irrigation purposes throughout the history of the Arabian Peninsula. Raleigh Barlowe reported,

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[29]Ministry of Agriculture and Water (S.A.), Water Resources and Projects,(Riyadh: Middle East Press, 1981), pp.19-20 (Arabic).

[30]Ibid

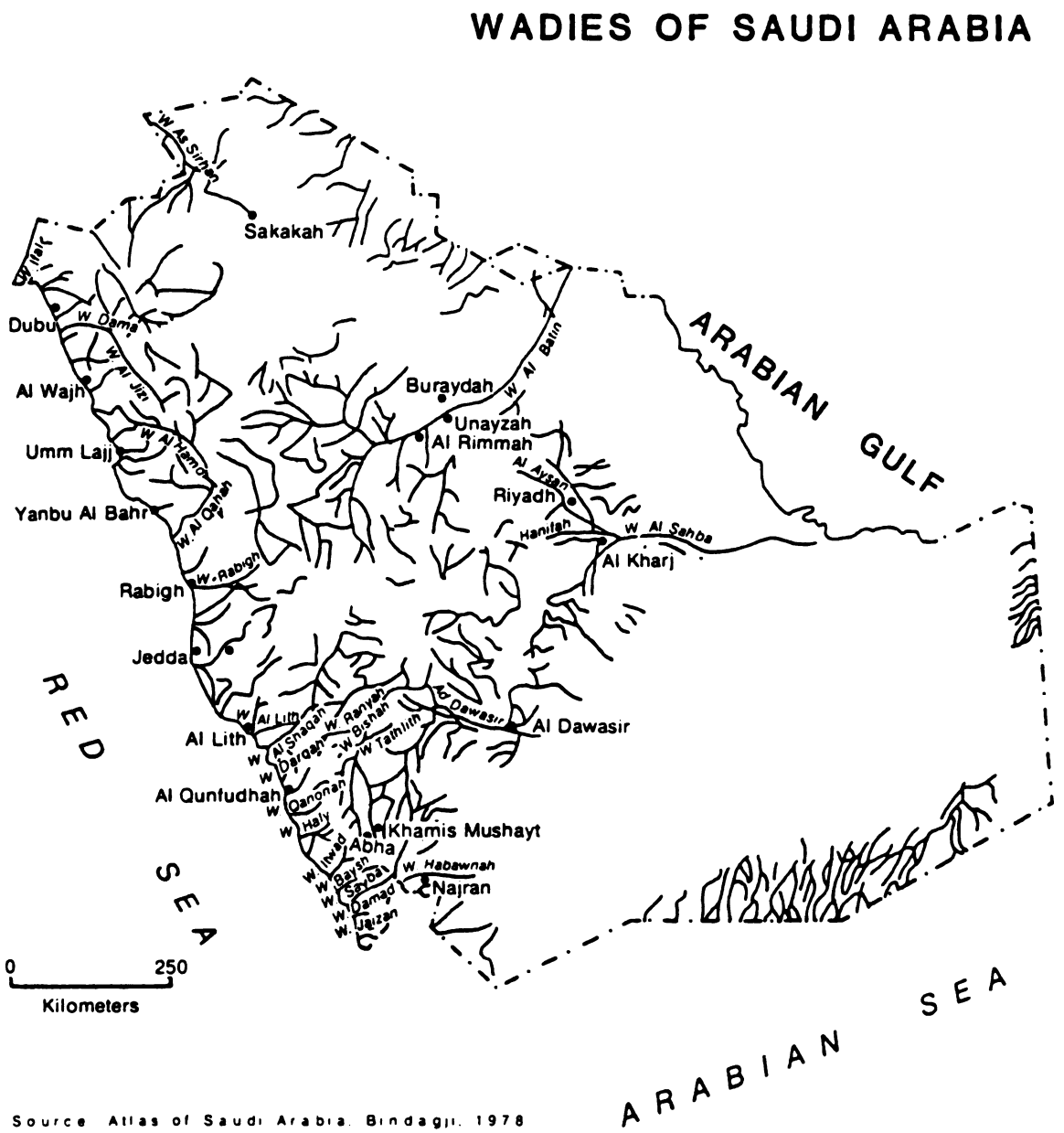

FIGURE 2.3: Wadies of Saudi Arabia

SOURCE: Abdulrahman K. Al-Zaidy, "Food and Agriculture in the Arid Environment of Saudi Arabia Under Human Pressures and Change," (M.A. Thesis, Michigan State University, 1980), p.73.

> Wells have been used as a source of domestic water supplies almost since the beginning of history. Throughout this period the use of ground waters has often been taken for granted with little consideration being given to the matter of water rights. 31

The scarcity of surface water has made ground water especially important. El-Khatib reports:

> Thus, the ground water resources of Saudi Arabia are of great importance for agriculture. Two-thirds of the country is underlain by sedimentary formations most of sandstones, limestones, shales, marbles, and alluviun and these are the main sources of ground water. 32

The Sedimentary Basin and the Precambrian (Arabian) Shield, discussed earlier in this chapter, function differently with respect to ground water and water runoff. These functions define the importance of these geological formations in agriculture.

The Sedimentary Basin zone covers about 1,640,900 square kilometers or nearly 73 percent of the country's area to a thickness of about 5,500 meters. Some layers of this area contain huge amounts of water, but the quality, quantity,

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[31] R. Barlowe, Land Resource Economics: The Economics of Real Estate, (Englewood Cliffs, N.J.: Prentice Hall, 1978), p.420.

[32] El-Khatib, Seven Green Spikes, p.6.

and depth of the water differ from one part to another and from one layer to another within this area. It has been found that some of these aquifers are 30,000 years old. The recovery of the water from rainfall is very low when compared with water extraction. The Sedimentary Basin is composed of about 28 aquifers (i.e., layers of rocks carrying water under certain conditions).[33]

The Precambrian Shield covers about 610,000 square kilometers or nearly 27 percent of the Kingdom. This zone is located in the western part of the country and includes some major cities such as Mecca, Jeddah, Taif, Medina, Hail, Afif, Najran, Bishah and some parts of the Asir, Ghammed regions. Water in the Precambrian Shield depends on the amount and frequency of rainfall and the resulting runoff water which penetrates through the soil and is stored in the underground. Accordingly, this zone is an independent source of water, especially for large uses. It is possible to utilize runoff water in this way for agricultural development as well as urban uses, especially from such large wadis as Wadi Bishah, Wadi Turabah, Wadi Nejran and Wadi Jizan.[34]

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[33]Ministry of Agriculture and Water (S.A.), Water Resources and Projects, pp. 20-31 (Arabic).

[34]Ibid.

Hydrological studies conducted in Saudi Arabia indicate that nine aquifers storing usable ground water cover large areas of the country.

1. Saq aquifer forms a size of 1,500 km. x 250 km. and a thickness of 300-600 meters. It could produce 315 million cubic meters of water annually without affecting the water level. The quality of water is excellent in this aquifer where the soluble salts range from 450-800 parts per million (PPM). Qasim area, Hail, and Tabuk are supplied by water from this aquifer.

2. Wajid aquifer forms a size of 250 km. x 300 km. with a thickness of 950 meters. Water discharge from this aquifer reaches 800 gallons per minute and its quality is excellent--soluble salts range from 400 to 800 PPM. This aquifer supplies Wadi Dawasir area with its water needs for agricultural as well as urban uses.

3. Tabuk aquifer forms a size of 900 km. by 150 km. with a thickness of 150 to 170 meters. It can produce about 70 million cubic meters of water without decreasing the water level. Water quality is good; soluble salts do not exceed 800 PPM. This aquifer also supplies Qasim area, Sakaka and Tabuk with some of their water.

4. Minjur aquifer forms a size of 800 km. by 600 km. with a thickness of 300 meters. Water quality in this aquifer is medium; soluble salts reach about 1,200 PPM. This aquifer supplies Riyadh city with some of its drinking water, in addition to the Al-Kharj area. Its production capacity reaches 70 million cubic meters annually.

5. Al-Bayyad aquifer has a length about 600 km. and thickness of 600 meters. The quality of water and discharge capacity are medium. It also supplies Riyadh city with some of its water needs.

6. Al-Wasi aquifer has a size of 800 km. by 1450 km. and a thickness of about 500 meters. Its production capacity is good, with good quality water. It also supplies Riyadh with some of its water needs.

7. Umm Er Radhuma aquifer has a length of 1000 km. and a thickness of 240 meters. Its production capacity is excellent, it reaches 3,000 gallons/minute with medium quality water whose soluble salts reach 1,800 PPM. It supplies some of the eastern part of the country and Wadi Harad.

8. Damam acquifer has a thickness of about 35 meters. Production capacity and quality of water are medium, with soluble salts that reach 1,300 PPM. It supplies agricultural needs for water in Qatif, Dammam and Al-Khobar.

9. Noejene aquifer, which has a thickness of 298 meters, has good quality water. It supplies Al-Hassa area with its agricultural water needs. 35

2.7.3 Sea Water

Sea water has become one of the water resources which, through modern technology, can provide drinking water for some places which suffer from water scarcity. Improved technology led the Ministry of Agriculture and Water to

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[35] Ibid, p.60.

construct the technological facilities to desalinate sea water to help overcome problems of water scarcity.

Water desalination in Saudi Arabia began around 1967 when the small town of Al-Wajh on the Red Sea coast faced a critical shortage of water after seven years of drought that sharply reduced ground water reserviors. To resolve the crisis, the Saudi Arabian government first drilled artesian wells forty-three miles outside AL-Wajh. Water from these wells was then transported to the town by trucks at a rate of about 240,000 gallons per month (five gallons per person per day for 2,500 inhabitants). The cost was about $20 per one thousand gallons. In late 1967 a desalination plant was installed, with a daily capacity of 65,000 gallons, which provided this town with 20 gallons of water per person per day for less than $2 per one thousand gallons.[36]

Conversion of sea water into drinking water was the responsibility of the Water Desalination Department at the Ministry of Agriculture and Water until a specialized

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[36]Al-Zokair, "A Study of Agricultural Development," pp.30-31.

governmental agency was established to take over this responsibility in 1974. This agency, the Saline Water Conversion Corporation, is responsible for producing water in the coastal areas of the country for urban and industrial uses where ground and surface water are unable to provide an adequate and safe supply.[37]

2.7.4 Sewage Water

Sewage water is a water resource in Saudi Arabia which has not been utilized well until now. Ministry of Agriculture and Water officials recognize recently the importance of such water and have begun to reuse it,after proper chemical and biological treatment, to protect public health. In addition to the Ministry of Agriculture and Water, the Ministry of Municipal and Rural Affairs, Ministry of Industry and Power, and the Ministry of Health work together to set the rules and parameters that govern the recovery and reuse of such water.[38]

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[37] Balghonaim, "Agricultural Development in Saudi Arabia," pp.55-57.

[38] Ministry of Agriculture and Water (S.A.), Water Resources and Projects, p.59.

2.8 Summary

It is apparent from this chapter that Saudi Arabia presents conditions that are, at best, inhospitable to most forms of agriculture. The climiate is hot and dry, rainfall is slight in most areas and there is little arable land. Yet, at one time, the country was a net exporter of food. In the following chapter, the agricultural situation is examined to see what can be grown under the conditions outlined here, in what quantities and in which areas.

CHAPTER THREE

THE AGRICULTURAL SITUATION

3.1 Introduction

After reviewing the major characteristics of Saudi Arabia with particular emphasis on those features related to agriculture, it is appropriate to discuss the agricultural situation in Saudi Arabia in more detail. The importance of doing so is because of the vital role of the agricultural sector as the major employing sector in the Saudi economy.

In this chapter, major agricultural production is examined in order to identify the most common agricultural practices in the country. Then, agricultural land, farm size and cropping patterns are discussed in order to facilitate analysis of trends in agricultural production, changing patterns in production and changes, if any, in agricultural productivity. Diverse factors affecting these areas are considered.

Additionally, trade in agricultural products is discussed, with a focus on trends in agricultural commodities imports, because Saudi Arabia is one of the leading food importing countries, as explained in Chapter One. Comparisons

are made between domestic agricultural production and product imports where it is appropriate to do so. Finally, factors affecting both imports of agricultural products and increasing demand for such products are examined.

3.2 Major Agricultural Products

As a result of variations in climate, soil, water resources availability, and farming practices, agricultural products vary from one region to another. Even though there is diversification in agricultural production, some important consumer products are not produced at all and others are produced in only small amounts. According to Asfour, "Except for some rice grown in the East, and some coffee grown in the Asir, several important consumer products, such as sugar and tea, are not produced at all in Saudi Arabia."[39]

The classification of major agricultural commodities produced in Saudi Arabia includes dates, wheat and cereal crops, vegetable crops, fruits excluding dates, animal fodder, and livestock for dairy and meat production.

3.2.1. Dates

Date palms are the predominant trees grown all over the country except in the high mountain areas in the southern

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[39]E. Asfour, Saudi Arabia--Long Term Projection of Supply and Demand, p.59.

region. Dates were and still are one of the staple food crops produced in sufficient quantities to meet local demand and to provide exports to some of the neighboring states.

> Dates are the only major staple food crop whose production is sufficient to meet local demand. They are grown in most parts of the country, though the products of El-Hasa and Medina areas are better known. Dates represent the major agricultural food crop and constitute the main element of diet of a large segment of the population. 40

Even though most available statistics show an increase in date production, some observers believe there has been a gradual decline, since the 1940s, in date production.

> Most observers have noted a gradual decline in cultivation of date palms since World War II. Date trees grown almost everywhere in the kingdom and formerly provided an important staple in the diet of many people, particularly the bedouin, as well as furnishing wood and fronds for building material. 41

According to a census taken by the Ministry of Agriculture and Water from 1382-85 A.H. (1962-65 A.D.), the palm trees numbered 8,711,185 with an estimated value of

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[40] Ibid, p.60

[41] R.F. Nyrop, et al., Area Handbook for Saudi Arabia, (Washington, D.C.: U.S. Government Printing Office, 1977), p.291.

about S.R. 3,000,000,000, and an average annual production of 222,000 to 252,000 tons at a price of S.R.250 to 750 per ton.[42]

Another later survey shows that there are about 11 million date trees,[43] while the latest date production estimate puts the quantity at 420,000 metric tons in 1983.[44]

3.2.2 Wheat and Other Cereal Crops

Most of the available data place the cereal crops as the largest group of crops produced in Saudi Arabia. Among these crops are wheat, barley, sorghum, millet and maize. "Cereal crops constitute the largest group of crops grown in Saudi Arabia, and among these, sorghum constitutes the leading crop. It is grown both as a winter and summer crop, mainly in the southwest region around Jizan."[45]

Other sources indicate that wheat is the largest and important crop in this group. It is grown mostly in the Central and Southern provinces. Barley, dura and dukhun

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[42]Hassan M. Marei, Date Palms Processing and Packing in Saudi Arabian Kingdom, (Riyadh: Al-Jazairah Press, 1971), pp. 41-42 (Arabic).

[43]Ministry of Agriculture and Water (S.A.) A Guide to Agricultural Investment, p.40.

[44]U.S.D.A. "Middle East and North Africa: Outlook and Situation Report," Economic Research Services, (RS-84-3, April 1984).

[45]Ministry of Agriculture and Water (S.A.), Guide to Agricultural Investment, p.40.

is produced primaily in the south.[46] "Wheat used to occupy the most acreage of any crop, and any surplus was easily marketed. Wheat cultivation was concentrated in the central part of the country, the Najd, and in the southwest corner Asir."[47] Its production was estimated in 1982 to 360,000 metric tons.[48]

3.2.3 Vegetable Crops

This group consists of tomatoes, watermelons, pumpkins, melons, onions, eggplant, squash, okra, green beans, dry beans, potatoes, cucumbers, snake cucumbers, and others.[49] Vegetable cultivation has increased during the last two decades among Saudi farmers. "A shift towards the cultivation of vegetables has contributed during recent years to a rise in the value of agricultural output and a change in the pattern of production at the expense of cereals."[50]

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[46] E. Asfour, Saudi Arabia--Long Term Projection, p. 60.

[47] R.F. Nyrop, et al., Area Handbook for Saudi Arabia, p.291.

[48] U.S.D.A. World Agricultural Situation, WAS 26.

[49] E. Asfour, Saudi Arabia--Long Term Projection, pp.59-61.

[50] E. Asfour, Saudi Arabia--Long Term Projection, p.61.

Nyrop, et al., have tried to determine some of the reasons for increased vegetable output.

> Many agronomists have noted the rapid growth of vegetable cultivation since World War II and have suggested that Saudi statistics do not adequately reflect this shift. Truck farming, particularly of melons and tomatoes, expanded substantially around most urban centers. The growth of towns, the higher urban incomes, and the improved transportation and marketing facilities all contributed to the increased cultivation of vegetables, but government policy affecting import duties and domestic prices was also very important. 51

3.2.4 Fruit (excluding dates)

Among cereals, vegetables and fruits, with the exception of dates, fruit constitutes the smallest of the three groups. Citrus makes up the largest proportion of fruit production. The Saudi Ministry of Agriculture and Water noted that in 1975-76 there were more than one million citrus trees, of which more than 600,000 were in the production stage. Citrus production is also receiving increasing attention and more citrus areas are being planted.[52]

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[51] R.F. Nyrop, et al., Area Handbook for Saudi Arabia, p.292.

[52] MOAW, Guide to Agricultural Investment, p.40.

Grapes are the second major fruit crop grown in Saudi Arabia, according to statistical reports from the United States Department of Agriculture's continuing series on the agricultural situation worldwide (WAS).[53] Other kinds of fruits grown in Saudi Arabia, particularly in the Southern region, are apricots, pomegranates, peaches, and figs.[54]

3.2.5 Fodder Crops

In this group, alfalfa is the main crop and is grown in most of the agricultural regions, except Jizan. Alfalfa is a high-yielding crop in the rotation cycle and most farmers use it to feed their animals.[55]

3.2.6 Stock Raising

Stock raising was traditionally done by bedouins who raised camels, sheep and goats by herding and grazing them in nomadic patterns throughout a desert area circumscribed by tribal authority. But this activity has diminished over

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[53] U.S.D.A., World Agricultural Situation, WAS 19 to 26.

[54] Salih Ali Al-Shomrany, "Agricultural Land Use Patterns in Relation to the Physical, Locational, and Socio-economic Factors in the Assarah Region of Saudi Arabia," (Ph.D. Dissertation, Michigan State University, 1984).

[55] R.F. Nyrop, et al., Area Handbook for Saudi Arabia, p.293.

the years as a result of changing life style throughtout the country, and because of the oil wealth and modernization.[56]

In the recent years, farms specializing in poultry, dairy, and sheep production have been developed under the encouragement of the Ministry of Agriculture and Water and the Saudi Arabian Agricultural Bank, by providing farmers with subsidies and loans.

Other agricultural products are being produced in the country, but are not listed in the most recently available statistics. Unlisted products are either produced in only small amounts or have been introduced so recently that statistical data have not been updated to reflect their production and any change in agricultural patterns.

3.3 Agricultural Land and Cropping Patterns

Production of the major agricultural products of Saudi Arabia, takes place under the conditions of climate, soil and limited water availability discussed in Chapter Two. These conditions are, at best, inhospitable. Along with other features, they affect agricultural practices, agricultural seasons and farm size.

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[56]Ibid, pp.293-295.

Of the two main agricultural seasons in Saudi Arabia, winter and summer, the winter season is the rainy season in most of the country's regions and thus the most suitable for farming, especially where land is rainfed rather than irrigated. Data concerning the total areas cultivated during the winter season show that in 1975/76 about 330,000 hectares of land were under cultivation of winter crops. Almost 72 percent of this land was not irrigated, the remaining 28 percent was irrigated (Table 3.1).

In terms of total agricultural land, 1979/80 data show that 15 to 20 millions donums were considered suitable for agriculture, and almost 6.1 million donums were actually under cultivation in 1979/80.[57] Of this land about 51 percent was rainfed and the rest was irrigated.[58]

Farm sizes vary from one region to another. The 1973 agricultural census shows that the total area held in farms was 534,801 donums in the Asir region; 3,365,831 donums in Qassim region and 12,134,623 donums in the entire country. The number of holdings shows 36,564; 5,972; and 180,670, holdings, respectively, for the two regions and

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[57] One Acre = 4.05 Donums, one hectare = 10 donums.

[58] Khalid A. Al-Hamoudi, "An Evaluation of the Current National Agricultural Data Base in Saudi Arabia: An Information System Approach," (Ph.D. Dissertation, Michigan State University, 1984, p.23.

TABLE 3.1: Cultivated Areas in the Various Emirates of the Kingdom (Areas in Hectares),[a] 1395/96 (1975/76), Winter Temporary Crops

Emirate	Irrigated	Not Irrigated	Total	Permanent Crops
Eastern	1,949	----	1,949	10,241
Riyadh, Afif, Al-Khasira	21,847	123	21,970	19,345
Qassim	17,186	----	17,186	4,818
Hail	4,885	----	4,885	5,817
Jawf, Quarayyat, Tabuk	61	151	212	2,360
Medina	1,867	1	1,868	4,301
Mecca-Ranyah	18,780	42,320	61,100	13,246
Asir-Bishah	15,709	16,582	32,291	7,833
Al-Bahah	1,563	5,202	6,765	560
Jizan	3,337	175,623	178,960	1,383
Najran	3,949	----	3,949	1,688
TOTAL	91,133	240,002	331,135	71,592

[a]Hectare= 10 donums, 4.05 donums = 1 acre

SOURCE: Saudi Arabia; MOAW, A Guide to Agricultural Investment in Saudi Arabia, (Riyadh: Department of Agricultural Development, 1979), p.41

the whole country. This means the average land holding was about 14.6 donums in the Asir region, 563.6 donums in Qassim, and 67 donums as the average farm size nationally (Table 3.2).[59]

The importance of examining trends in agricultural outputs and areas under actual cultivation is to measure both agricultural productivities and changes in agricultural patterns. The difficulty in doing so is that the statistical data concerning agricultural outputs and areas under cultivation are not well reported, particularly data for the years before the 1970s. The most useful source for 1971 and after is the Statistical Yearbook, a series published by the Central Department of Statistics of the Ministry of Finance and National Economy of Saudi Arabia. Data available in this series is based on estimation rather than on census.

> The current programme of sample surveys on the agricultural activities occurring during each year, include the estimation of crops acreages and production, and numbers of livestock and poultry for the settled areas of the Kingdom of Saudi Arabia... Although the list of holdings within each village was available, the sample unit chosen was the cluster of holdings or villages because of rapid changes in the number of holdings within a village. 60

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[59] Ibid

[60] Ministry of Finance and National Economy (S.A.), Statistical Yearbook: Fourteenth Issue, 1978: Jeddah: Dar Okaz, 1978, p.422.

TABLE 3.2: Land Holding by Region in Saudi Arabia (1973-74)

Emirate	Total Area[a] (Donums)	No. of Farms	Average Land Holding (Donums)	Average no. of Land Pieces	No.of Rainfed Farms	% of Rainfed Farms
Eastern	150,242	11,010	13.6	2	32	0.3
Riyadh	2,091,324	10,752	194.5	1	4,941	46.0
Quassim	3,365,831	5,972	563.6	1	224	3.8
Khasira	7,108	33	215.0	1	1	3.0
Afif	5,371	78	68.9	1	0	0.0
Hail	281,154	6,261	44.9	1	1,322	21.0
Tabouk	24,452	834	29.0	1	4	0.5
Quarayyat	7,302	191	38.0	1	1	0.5
Joaf	34,643	1,543	22.5	2	2	0.1
Ranya	29,218	950	30.7	1	1	0.1
Najran	84,217	2,490	33.8	3	376	15.0
Beisha	139,500	7,351	19.0	4	2,954	40.0
Jazan	2,792,700	36,253	77.0	2	12,466	34.0
Medina	175,212	7,404	23.7	1	355	5.0
Mecca	2,149,018	34,601	62.0	2	19,103	55.0
Al-Baha	262,530	18,383	14.3	4	12,506	68.0
Asir	534,801	36,564	14.6	5	35,027	96.0
Kingdom	12,134,623	180.670	67.0	3	89,316	49.0

[a] 4.05 donums = 1 acre

SOURCE: Adopted from: Khalid A. Al-Hamoudi, "An Evaluation of the Current National Agricultural Data Base in Saudi Arabia: An Information System Approach," (Ph.D. Dissertation, Michigan State University, 1984), p.24.

Differences in the data area or production of some crops are expected because of the following reasons:

1. areal factors such as, cold, heat, humidity and rain;
2. vital factors, such as, infection of pests and blights;
3. economic factors, such as, agricultural marketing, prices, policies and world prices;
4. international factors, such as, wars and other related international factors. 61

In addition to these factors, differences in this data could be a result of research errors such as sampling error, truncation errors, etc.

Even though these factors may affect agricultural data in this annual survey series, it remains the most adequate data available at this time. Data concerning the period before 1971 is not covered in this series and had to be obtained from other sources, even though they are not as dependable as this series.

3.3.1 Trends in Outputs and Area Under Cultivation

Data concerning agricultural outputs and areas under cultivation was collected for the period from 1950 to

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[61] Ibid, p.423.

1979/80 (for more details see Appendices A1 through A9) and analyzed by simple quantitative methods such as absolute numbers (indexes) and percentage change rather than a complicated method such as linear models for the sake of simplicity.

3.3.1.1 Trends in Outputs

Table 3.3 shows trends in agricultural outputs for selected years from 1950 to 1979/80. This table includes four variables. These variables are:

a. Field crops, which include all cereal crops that are growing in the country such as sesame, barley, millet, sorghum, maize, wheat and others.

b. Vegetable crops which include potatoes, tomatoes, okra, carrots, squash, egg-plant, cabbages, dry onion, watermelons, melons and others.

c. Dates which are the main perennial crop in Saudi Arabia.

d. All crops mentioned above in addition to fruits such as citrus, grapes, and others, but excluding alfalfa and other fodder crops.

Results from this table are as follows.

1. Combined crop outputs have increased from 355,657 tons (index of 100) in 1950 to 1,402,861 tons (index of 394.4) in 1979/80, which means that combined outputs have nearly quadrupled over a period of three decades.

TABLE 3.3: Trends in and Indexes of Agricultural Output in Saudi Arabia, 1950-1980

Crop	Production	1950	1957	1963	1971/72	1974/75	1979/80
Field Crops (Cereals)	Outputs[a]	71,300	168,815	236,235	119,834	289,445	267,289
	Indexes[b]	100	236.8	331.3	168.1	406.0	374.9
Vegetables	Outputs	29,226	21,240	345,485	613,770	718.060	696,876
	Indexes	100	72.7	1182.1	2100.1	2456.9	2384.4
Dates	Outputs	150,000	23,500	257,606	187,846	337,283	342,286
	Indexes	100	15.7	171.7	125.2	224.9	228.2
All Crops	Outputs	355,657	547,805	925,326	937,781	1,425,566	1,402,861
	Indexes	100	154.0	260.2	273.8	400.8	394.4

[a]Outputs in Tons

[b]Index base year: 1950=100

SOURCE: Derived from Tables 3.4 and 3.7

2. Field crops (cereals) have increased from 71,300 tons (index of 100) in 1950 to 267,289 tons (index of 374.9) in 1979/80, which means that these crops have multiplied almost 3.75 times.

3. Vegetable crops have increased from 29,226 tons (index of 100) in 1950 to 696,876 tons (index of 2384.4) in 1979/80, which means that vegetable outputs have been multiplied 23.84 times through this period.

4. Date production has increased from 150,000 tons (index of 100) in 1950 to 342,286 tons (index of 228.2) in 1979/80, which means that date production has been multiplied 2.28 times during the period.

Thus, vegetable outputs ranked first in total increment as an index followed by field crops (cereals) and then by the dates.

3.3.1.2 Trends in Area Under Cultivation

Table 3.4 shows the area under actual cultivation for each of the variables or output groups in Table 3.3. The results of this analysis are summarized below.

1. Areas for all crops under cultivation has increased from 95,316 hectares (index of 100) in 1950 to 579,645.7 hectares (index of 608.1) in 1979/80, which means that areas under actual cultivation for all crops have multiplied 6.08 times over the period (1950 to 1979/80).

TABLE 3.4: Trends in and Indexes of Areas Under Actual Cultivation (1950-1979/80) in Saudi Arabia (In Hectares)

		1950	1957	1963	1971/72	1974/75	1979/80
Field Crops (Cereals)	Areas	67,838.0	155,400.0	175,929.0	189,759.8	346,703.2	454,715.9
	Indexes	100.0	229.0	259.3	279.7	511.1	670.3
Vegetables	Areas	4,128.0	3,000.0	33,132.0	28,274.9	57,386.8	52,953.7
	Indexes	100.0	72.7	802.6	684.9	1,390.2	1,282.8
Dates	Areas	21,752.0	43,900.0	22,281.0	32,955.7	53,121.3	60,353.0
	Indexes	100.0	201.8	102.4	151.5	244.2	277.5
All Crops[a]	Areas	95,316.0	207,400.0	242,829.0	254,457.7	465,238.4	579,645.7
	Indexes	100	217.6	254.8	267.0	488.1	608.1

[a]Excluding alfalfa and other fodder crops

SOURCE: Calculated from Tables A-5 and A-7

2. Field crop (cereals) areas have increased from 67,838 hectares in 1950 to 454,715.9 hectares in 1979/80, which means that areas under cultivation for this agricultural group have multiplied 6.7 times over the period.

3. Vegetable cultivation areas have increased from 4,128 hectares in 1950 to 52,953.7 hectares in 1979/80, which means these areas have multiplied 12.82 times over the period.

4. Date cultivation areas have increased from 21,752 hectares in 1950 to 60,353 hectares in 1979/80, which means that areas of this farming activity have been multiplied 2.77 times.

Also in this analysis, it is clear that areas under vegetable cultivation were expanded most, followed by areas of cereal crops and then dates (in index numbers).

These analyses indicate that agricultural patterns in Saudi Arabia have been shifting toward vegetable cultivation at the expense of date cultivation (as measured in index numbers).

3.3.2 Agricultural Productivities

Comparing agricultural outputs by agricultural areas devoted to each cateogry in Tables 3.3 and 3.4 allowed the calculation of the agricultural productivity for each category (Table 3.5). This table shows that all

TABLE 3.5: Agricultural Productivities in Saudi Arabia, 1950-1979/80

Crops/ Years	Field Crops (Cereals)			Vegetables			Dates			All Crops[a]		
	Output[b]	Area[c]	Yield	Output	Area	Yield	Output	Area	Yield	Output	Area	Yield
1950	71,300	67,838.0	1.05	29,226	4,128.0	7.07	150,000	21,752.0	6.89	355,657	95,316.0	3.73
1957	168,815	155,400.0	1.08	21,240	3,000.0	7.08	23,500	43,900.0	0.53	547,805	207,400.0	2.64
1963	236,235	175,929.0	1.34	345,485	33,132.0	10.42	257,606	22,281.0	11.56	925,326	242,829.0	3.81
1971/72	119,834	189,759.8	0.63	613,770	28,274.9	21.70	187,846	32,955.7	5.70	973,781	254,457.7	3.82
1974/75	289,445	346,703.2	0.83	718,060	57,386.8	12.51	337,283	53,121.3	6.34	1,425,566	465,238.4	3.06
1979/80	267,289	454,715.9	0.58	696,876	52,953.7	13.16	342,286	60,353.0	5.67	1,402,861	579,645.7	2.42

[a]Excludes Alfalfa and other fodder crops

[b]Output in tons

[c]Area in Hectares

SOURCES: Appendix Tables A1, A2, A3 and A7

agricultural productivities (yield = tons per hectare) declined except vegetable crops. This result was unexpected because of the development of production knowledge and technology over the three decades and led the researcher to investigate this issue a little further, to be specific, two different crops of each category (mentioned above) were analyzed individually.

Of the field crops, wheat and barley productivities were analyzed (Table 3.6). The result of this analysis indicated that wheat and barley productivity (yield per hectare) increased, with the productivity of wheat increasing more rapidly than barley. This result does not confirm the results that depicted in Table 3.5 but the increment is very small when compared with the increment in areas under cultivation.

Of the vegetable crops, tomato and eggplant productivity were analyzed separately and results are shown in Table 3.7. The results show a small decline in tomato productivity and a small increment in eggplant productivity. These do not confirm the earlier analysis (Table 3.5), but also fail to indicate an increment in agricultural productivity commensurate with the increment total agricultural area.

These fluctuations in agricultural productivity could be a result of fluctuations in total production which are affected by one or a combination of the factors mentioned

TABLE 3.6: Productivity of Wheat and Barley in Saudi Arabia, 1950-1979/80

Crop	Production	1950	1957	1963	1971/72	1974/75	1979/80
Wheat	Output[a]	20,200	42,836	129,201	38,954.0	132,038.1	141,732.0
	Area[b]	21,800	43,800	89,890	38,321.0	62,101.1	67,226.0
	Yield[c]	0.92	0.97	1.43	1.01	2.12	2.10
Barley	Output	15,268	23,800	48,244	9,318.0	16,710.0	5,461.0
	Area	17,163	23,800	29,182	15,284.3	7,058.0	4,402.7
	Yield	0.88	1.00	1.62	0.60	2.36	1.24

[a]Output in tons

[b]Area in hectares

[c]Yield = tons per hectare

SOURCE: Appendix Tables A1, A2, A3 and A7

TABLE 3.7: Tomato and Eggplant Productivity in Saudi Arabia, 1950-1979/80

Crop	Production	1950	1957	1963	1971/72	1974/75	1979/80
Tomatoes	Output[a]	-----	-----	43,487	110,950.0	301,414.0	2,001,121.0
	Area[b]	-----	-----	3,692	10,958.6	20,869.9	17,616.5
	Yield[c]	-----	-----	11.77	10.12	14.44	11.36
Eggplant	Output	-----	-----	6,402	8,256.0	39,198.0	24,685.0
	Area	-----	-----	1,067	764.7	3,915.1	2,580.2
	Yield	-----	-----	6.00	10.79	10.01	9.56

[a]Output in tons

[b]Areas in hectares

[c]Yield = tons per hectare

SOURCES: Calculated from Appendix Tables: A1, A2, A3, and A8

previously. Also, the decline in agricultural productivity could be a result of one or more of the following:

1. land (soil) fertility decline--through extensive use over time, when fertility is not restored by adding fertilizers, or through failure to follow a good agricultural rotation cycle, etc.

2. physiological factors--such as using the same crop variety for a long period of time, which makes the plants more vulnerable to disease and reduces productivity.

3. failure of Agricultural Extension Services to improve farmers' production skills and knowledge.

To sum up this analysis, agricultural productivities in Saudi Arabia have been fluctuating while total agricultural outputs and areas under actual cultivation have been increasing. This means that any increment in agricultural output has been brought about by expansion of area under cultivation rather than by increasing agricultural productivity. Expanding the area under cultivation requires a lot of agricultural resources (i.e., land resources, water resources, labor, money) to bring about only small increments. Such development is inefficient in a country such as Saudi Arabia where there are shortages in water resources and labor supply.

3.3.3 Change in Agricultural Patterns

To further investigate this issue, changes in each of the categories of production, with the addition of two more categories, other fruit crops (citrus, grapes, and others) and fodder crops, were calculated as a percentage change of the total area under actual cultivation.

Table 3.8 shows the areas devoted to each category of production by hectares and its percentage of the total area. The results are summarized in the following points.

1. Areas devoted to field crops fluctuated from 71.17 percent of the total area in 1950 to 65.65 percent in 1963 and reached the highest level in 1979/80 when 74.71 percent of total agricultural areas were used for field crops. The total change between the beginning year (1950) and the ending year (1979/80) was an increase of 3.54 percent.

2. Areas devoted to vegetable crops increased from 4.33 percent of the total area in 1950 to 8.7 percent of the total area in 1979/80, an increase of 4.37 percent. This proportion was increased dramatically to a peak of 12.37 percent in 1963 and then began gradually decreasing.

3. Areas under date cultivation have experienced a dramatic decline from 22.82 percent of the total area in 1950 to 9.92 percent in 1979/80 for a total decline of -12.9 percent.

TABLE 3.8: Crop Patterns in Saudi Arabia, 1950 to 1979/80, (Areas in Hectares)

Crops		1950	1957	1963	1971/72	1974/75	1979/80	1979/80-1950
Field Crops (Cereal)	Area	67,838.0	155,400.0	175,929.0	189,759.8	346,703.3	454,715.9	
	% of Total	71.17	74.93	65.65	68.42	66.65	74.71	+3.54%
Vegetables	Area	4,128.0	3,000.0	33,132.0	28,274.9	57,386.8	52,953.7	
	% of Total	4.33	1.45	12.37	10.20	11.03	8.70	+4.37%
Dates	Area	21,752.0	43,900.0	22,281.0	32,955.7	53,121.3	60,353.0	
	% of Total	22.82	21.17	8.32	11.88	10.21	9.92	-12.90%
Other Fruit Perennials	Area	1,598.0	5,100.0	11,487.0	3,467.3	15,320.7	11,623.1	
	% of Total	1.68	2.46	4.29	1.25	2.95	1.91	+0.23%
Fodder Crops	Area	--------	---------	25,086.0	22,869.7	47,668.7	29,006.8	
	% of Total	0.00	0.00	9.36	8.25	9.16	4.77	-4.59%
All Crops	Area	95,316.0	207,400.0	267,915.0	277,327.4	520,200.7	608,652.5	
	% of Total	100.0	100.0	100.0	100.0	100.0	100.0	

SOURCE: Calculated by the author from (1) Mansor Al-Turki, "Accelerating Agricultural Development in Saudi Arabia," (Ph.D. Dissertation: Colorado State University), p.14; (2) Ministry of Finance and National Economy (S.A.), Statistical Yearbook, (Selected Issues from 1972 to 1980, Dar Okaz, Jeddah).

4. Areas devoted to other fruits (perennial crops) remained almost constant.

5. Data for the area devoted to fodder crops were not available for the years 1950 to 1957. In 1963 these areas represented 9.36 percent of the total area and declined to 4.77 percent in 1979/80.

It is apparent, then that agricultural patterns are undergoing important changes. Some farming activities are increasing while others are decreasing. Vegetables achieved the highest increase followed by the field (cereal) crops and the fruit crops other than dates. Dates showed the highest relative decline among the product categories, followed by fodder crops. It should be noted that all these groups are increasing in terms of outputs and cultivated areas, which means that changes among them are relative.

Data is not available for livestock and poultry production for the period before the 1960s. The first survey of livestock and poultry was done from 1960 to 1962 (1380 to 1382 A.H.).[62] Table 3.9 shows trends in and indexes of livestock and poultry production for some selected years during the 1960s and 1970s. From this

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[62] E. Asfour, Saudi Arabia--Long Term Projection, p. 119.

TABLE 3.9: Trends in and Indexes of Livestock and Poultry Raising in Saudi Arabia for Selected Years 1960-1980 (Q=Number)

		1960/1962	1972	1974/75	1979/80
Camels	Q	43,375	58,652	104,922	164,367
	Index	100	135.2	241.9	378.4
Cattle	Q	40,636	185,920	281,753	398,726
	Index	100	457.5	693.4	981.2
Sheep	Q	303,727	1,237,770	2,147,850	2,948,587
	Index	100	407.5	707.2	970.8
Goats	Q	193,189	755,210	1,242,216	2,240,468
	Index	100	390.9	643.0	1,159.7
Poultry	Q	186,185	331,313	826,302	606,191
	Index	100	178.0	443.8	325.6

SOURCES: Calculated by the researcher from:
(1) E. Asfour. Saudi Arabian Long Term Projection of Supply of and Demand for Agricultural Products, (Economic Research Institute, American University of Beirut, Beirut, 1965), p.119 and
(2) Ministry of Finance and National Economy (S.A.), Statistical Yearbook (Selected Issues from 1965 to 1980, Jeddah: Dar Okaz).

analysis, the livestock and poultry populations increased during this period. The largest increase was in goats, with cattle, sheep, camels, and then poultry also increasing in that order.

Some factors that contributed to bringing about the increases in domestic agriculture production should be discussed. In a complex and relatively long-term process such as agricultural production over a large geographical area, one can expect a combination of factors, (i.e., social change, economic, technological, and administrative factors), to influence the process either postively or negatively. Since agricultural production, generally, is increasing in Saudi Arabia, the focus here is on those factors that have contributed most to the overall increase.

Change in Administrative Structure: In 1948, agriculture was the responsibility of the General Directorate of Agriculture which was a department under the Ministry of Finance and National Economy. In 1953, this department was upgraded to a separate ministry--The Ministry of Agriclture and Water.[63] This administration change allowed the newly-formed Ministry of Agriculture the needed impetus to expand services. The expansion of

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[63]K.A. Al-Hamoudi, "Evaluation of the Current National Agricultural Data Base", p.21.

agricultural services through the expansion of this agency may be one of the factors that increased agricultural production.

Technological Change: One of the most important factors that contributed to an increase in agricultural production was the adoption of new technologies such as water pumps, tractors, and trucks. The water pump was introduced in 1955 in the district of Ghamid while the tractor and truck were introduced in the late 1950s in the same area.[64] These technological innovations were introduced later in this southern district because that part of the country had poor access to shipping and was almost isolated from the rest of the country by the Empty Quarter.

> With oil came money that bought trucks and transportation equipment.... A transport system, even only partially developed, provided a basis for a different form of economic organization. No longer were communities isolated from one another. Surplus products in one area could be economically transported and sold in another. 65

Economic Factors: Among economic factors that affected agricultural production positively were the

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[64] S.A. Al-Shomrany, "Agricultural Land Use Patterns", pp.139-140.

[65] R.F. Nyrop,et al., Area Handbook for Saudi Arabia, p.285.

establishment of the Saudi Arabian Agricultural Bank (SAAB), the provision of agricultural subsidies, and land distribution incentives.

> In fact, the Saudi government's effort to raise the level of productivity in agriculture dates back to 1962 with the establishment of the Saudi Arabian Agricultural Bank (SAAB). SAAB provides for (1) raising, storage and marketing of crops, livestock, poultry, fish and forestry products, (2) the reclamation of land, and (3) making available the facilities to find water. The bank provides loans and credit facilities. 66

In addition to the agricultural bank, a package of agricultural subsidies was introduced in 1973 that included farm machinery, fertilizers, animal feed, wheat, sorghum, and rice. In 1974, subsidies were expanded to include poultry farms, dairy farms, sheep and camels. In 1975, the Saudi government subsidized the transportation of 200 or more dairy cattle by paying the total cost of transportation at nominal prices.[67]

Another economic agricultural incentive was land distribution. In 1968, the Saudi government introduced a program of free land for agricultural purposes. The

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[66] I.A. Daghistani, Economic Development in Saudi Arabia, pp. 86-87.

[67] Ministry of Planning (S.A.), Second Development Plan, 1975-1980, p.122.

size of plots distributed to individuals ranged between 5 and 20 hectares, with a maximum area of 400 hectares for a company. The land was free, but remains under the control of the Ministry of Agriculture and Water, which oversees and regulates its use.[68]

A final impetus to increased agricultural production was the high demand for agricultural products. Evidence of the high demand can be derived from the fact that Saudi Arabia is one of the leading importers among the Third World countries, particularly in agricultural products (see Chapter One). Trade in agricultural products, and particularly the import list of such commodities, is an important indicator of supply and demand. The trends in this list, whether increasing or decreasing, are examined.

3.4 Trade in Agricultural Products

As mentioned in Chapter One, Saudi Arabia was self-sufficient in food during the 1930s. Gradually, production in relation to demand underwent changes that effectively reversed this situation. For example, changes before 1949, the country was a net exporter of live animals. Now, Saudi

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[68]Ministry of Agriculture and Water (S.A.), Guide to Agricultural Investment, pp.64-67.

Arabia is a heavy net importer of food, including animal-based products (See Chapter One). Accordingly when discussing the agricultural situation, it is important to take a look at trends in imports of agricultural products.

3.4.1 Imports of Agricultural Commodities

In order to analyze imports of agricultural commodities, these commodities are classified into five categories: cereals, fresh vegetables, fresh fruits, other, and total imports (See Tables 3.10 and 3.11). The cereal group consists of wheat, barley, maize, millet, rice, sesame seeds, and all imported flours (wheat, maize and white flour). Fresh vegetables include tomatoes, onions, leeks, potatoes, beans, lentils, chick peas, melons, peppers, and other vegetables fresh or chilled. The fruits group consists of bananas, oranges, mandarines, lemons, grapes, applies, pears and other fruits.

The "other" group consists of animal products, fats and oil and their products, beverages and prepared foodstuffs, and other agricultural commodities. Total imports includes all these goods (for more details see Appendix B).

These groups have been analyzed for the same fiscal years used in analyzing the trends in domestic agricultural production (1950, 1957, 1963, 1971/72, 1974/75 and 1979/80), with the addition of fiscal years 1953, 1960, 1967, 1972,

TABLE 3.10: Imports of Agricultural Commodities to Saudi Arabia for Selected Years 1950 to 1980, in Tons

Years	Cereals	Fresh Vegetable	Fresh Fruit	Others	Total
1950	87,141	5,560	5,488	37,281	135,470
1953	123,161	15,770	21,049	54,859	214,839
1957	123,998	19,079	24,126	145,388	312,591
1960	269,436	26,944	32,064	117,160	445,604
1963	298,541	26,538	26,963	67,832	420,874
1967	494,576	46,154	65,350	246,436	852,516
1970	531,123	36,630	68,557	195,207	831,517
1972	496,553	52,520	96,450	277,171	922,694
1973	394,911	62,143	113,116	290,031	860,201
1975	452,843	44,234	123,576	227,934	848,587
1977	818,972	135,911	216,057	815,538	1,986,478
1980	2,931,084	332,203	402,593	1,585,516	5,251,396

SOURCES: Calculated by the author from (1) E. Asfour, Saudi Arabia--Long Term Projection of Sapply of and Demand for Agricultural Products, (Economic Research Institute, American University of Beirut, 1965) pp. 110-115; and (2) Ministry of Finance and National Economy (S.A.), Statistical Yearbook (Selected Issues, 1965 to 1980).

TABLE 3.11: Indexes of Agricultural Imports to Saudi Arabia for Selected Years, 1950 to 1980 (1950 = 100) (in tons)

Year	Cereals	Fresh Vegetables	Fresh Fruit	Others	Total
1950	100.0	100.0	100.0	100.0	100.0
1953	141.3	283.6	383.6	147.2	158.6
1957	142.3	343.2	439.6	390.0	230.8
1960	309.2	484.6	584.3	314.3	328.9
1963	342.6	477.3	509.5	182.0	310.7
1967	567.6	830.1	1,190.8	661.0	629.3
1970	609.5	658.8	1,249.2	523.6	613.8
1972	569.8	944.6	1,757.5	743.5	681.1
1973	453.2	1,117.7	2,061.2	778.00	635.0
1975	519.7	795.6	2,251.8	611.4	626.4
1977	939.8	2,444.4	3,936.9	2,187.5	1,466.4
1980	3,363.6	5,974.9	7,335.9	4,252.9	3,876.4

SOURCE: Derived from Table 3.10

1973, 1975 and 1977. Data concerning imported commodities is more available than data concerning agricultural domestic production and its use increases the range of analysis and reduces possible error.

Table 3.10 shows the quantities of imported agricultural commodities by tons, while Table 3.11 shows the indexes of these commodities with a base year of 1950 equal to 100. From these tables, it is clear that total imports of agricultural goods increased over the study period. The increments varied from one year to another, being high in some years and almost steady in others.

Total imports increased from 135,470 tons in 1950 to 312,591 tons in 1957, an increment of about 130 percent over a period of seven years averaging about 18.6 percent a year. By 1960, total imports had reached 445,604 tons, raising the percentage increment to about 328 percent over the total imports of 1950, and about 42.6 percent over the total imports in 1957. By 1967, total imports jumped to 852,516 tons, almost double the quantity imported in 1963, but remained almost steady from 1967 to 1973. In 1977, another large increase in total agricultural products raised such imports to 1,986,478 tons, more than doubling the quantity imported in 1973. By 1980, these import quantities had increased dramatically again to 5,251,396 tons--an increment of about 2.6 times the imports of 1977. Thus

total agricultural imports increased dramatically in three periods, the first one between 1963 and 1967, the second between 1973 and 1977 and finally during the period 1977 to 1980.

In the period 1977 to 1979/1980, the increment in imports of fresh fruits ranked number one among other groups, followed by imports of fresh vegetables, "others, and the cereal group, in that order (Table 3.11). But in 1979/80 (Table 3.10), imports of cereals ranked number one with 2,931,084 tons, followed by "others", fresh fruits and finally, fresh vegetables (332,203 tons).

Table 3.12 shows trends in and indexes of imports of livestock, poultry and eggs. From this table it is clear that imports of all these products increased. Goats had the highest increments, followed by eggs, cattle and buffalo, sheep, poultry, and camels, in that order.

In comparing these results with results achieved from analyzing domestic agricultural production for the same period (Tables 3.3 and 3.9), several points are apparent.

1. In the cereal group, domestic production has increased, but imported quantities have increased even more rapidly than domestic production (See Figure 3.1).

2. Fresh vegetable imports increased dramatically, but domestic vegetable production increased even more than imports (Figure 3.2).

TABLE 3.12: Trends in and Indexes of Livestock, Poultry and Eggs Imports to Saudi Arabia (Q= Number) (1963-1980)

	Cattle & Buffalo		Sheep		Goats		Camels		Live Poultry[a]		Eggs in Shells	
Year	Q	Index	Q	Index	Q	Index	Q	Index	Q	Index	Q	Index
1963	14,838	100.0	593,693	100.0	16,508	100.0	11,450	100.0	980,396	100.0	19,000	100.0
1967	9,247	62.3	335,308	56.5	36,038	218.0	11,641	101.7	1,477,663	150.7	61,148	321.8
1970	46,464	313.1	554,448	93.3	485,398	2940.4	23,279	203.3	1,637,700	167.0	83,639	440.1
1973	52	0.3	548	0.1	698	4.2	20	0.2	283	0.03	88,547	466.1
1977	23,721	159.8	1,653,389	278.5	201,820	1222.6	20,626	180.1	5,993,673	611.4	233,910	1231.1
1980	125,744	847.5	4,162,011	701.1	244,597	1481.7	17,856	156.0	5,685,199	579.9	270,355	1422.9

[a]Base year for live poultry is 1964 instead of 1963 because the figures for 1963 were not available.

SOURCE: Adopted and calculated by the author from the Ministry of Finance and National Economy (S.A.), Statistical Yearbook, (Selected Issues from 1965 to 1980, Dar Okaz; Jeddah).

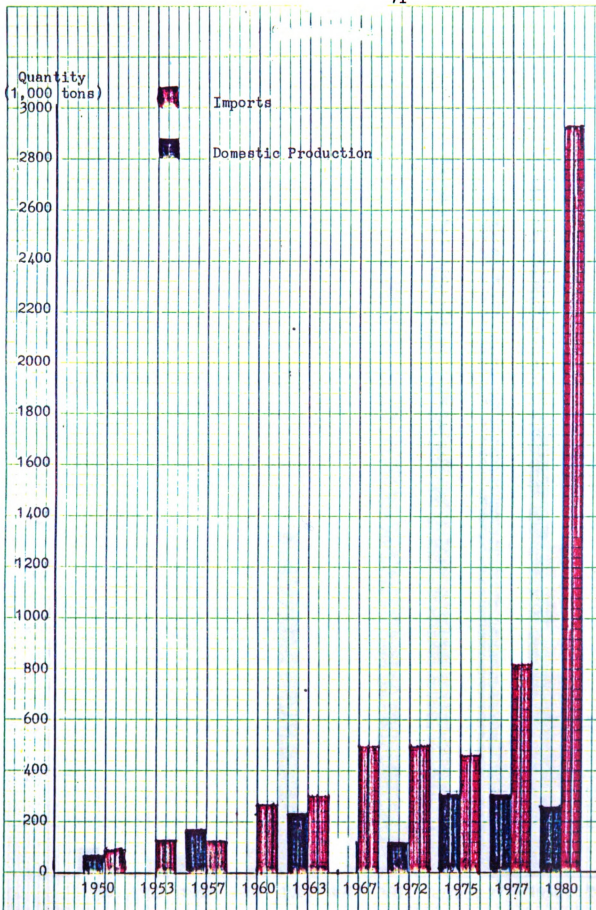

FIGURE 3.1: Cereal Crops

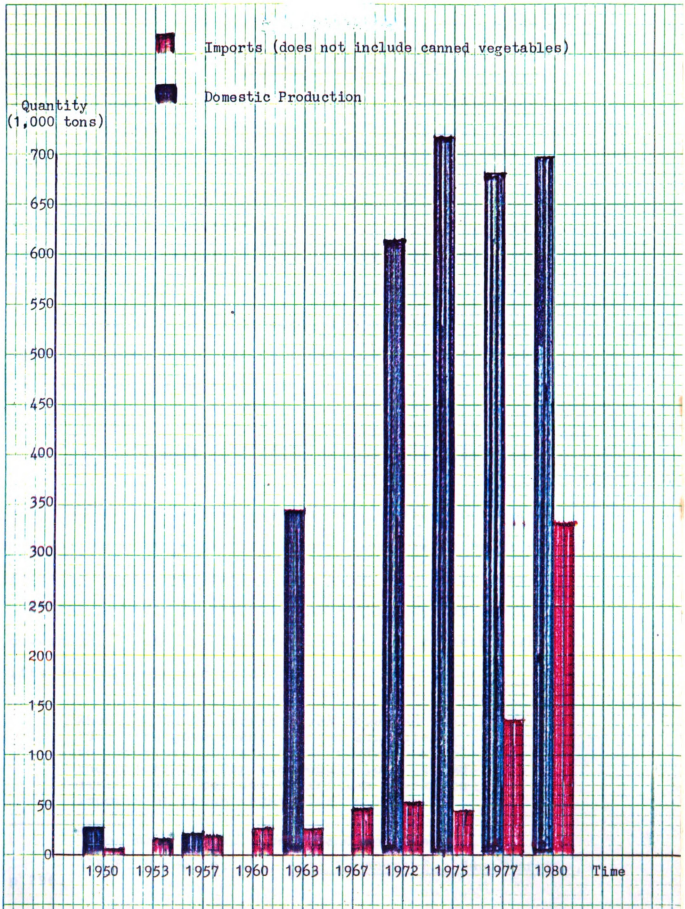

FIGURE 3.2: Fresh Vegetables

3. Domestic production of total agricultural commodities increased but total agricultural imports increased more rapidly, particularly after 1977 (Figure 3.3).[69]

4. Both domestic production and imports of livestock and poultry increased.

Thus, comparison between domestic agricultural production and imports of agricultural commodities, reveals that both of them are increasing rather rapidly, which means that demand for agricultural products is high and increasing with time trends (upward).

3.5 Factors Causing Increased Importation of Agricultural Products

There are several factors contributing to the increased importation of agricultural products to Saudi Arabia. First is import subsidies. Imports of some basic agricultural commodities have been subsidized by the Saudi government, either by direct subsidy or by reducing tariffs on some imported products.

> When the Saudi currency was devalued in 1959, the government granted subsidies to importers of many basic foods to keep the prices low for the population. In addition, a 10 percent tariff was levied on imports of fresh vegetables in 1962. 70

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[69] For more detail, see Appendices A and B.

[70] R.F. Nyrop, et al., Area Handbook for Saudi Arabia, p.296.

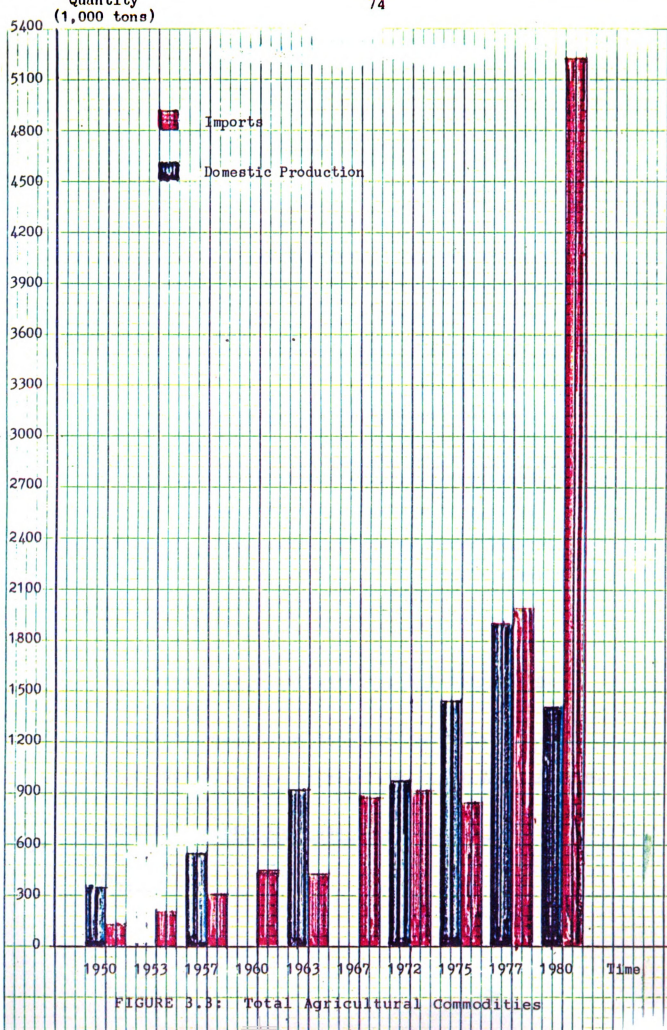

FIGURE 3.3: Total Agricultural Commodities

These subsidies applied, in 1379 (A.H.), to some twenty major food products, including twelve cereals, five oil products, dairy products, sugar and live animals.[71]

Imported agricultural product subsidies continued over time and the list was expanded to include new import items. "In order to control inflation the Ministry of Commerce expanded its program for subsidizing imported food."[72] This expansion included several items of dairy products, vegetable oils, milk, lamb carcasses[73] and barley. In 1980, subsidy payments for imported barley averaged over 70 percent.[74]

In addition to subsidies, imports of agricultural products increased because of developments in food marketing and ports. "Modernization of food marketing and ports, combined with wider dispersion of petroleum wealth, contributed to the boom in food imports."[75]

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[71]E. Asfour, Saudi Arabia--Long Term Projection, p.71.

[72]U.S.D.A., Africa and Middle East, 1980, p.71.

[73]R.F. Nyrop, et al., Area Handbook for Saudi Arabia, p.13.

[74]U.S.D.A. Middle East and North Africa, 1981, p. 13.

[75]Ibid.

International events have also had some effects on such imports. "Saudi Arabia imports of barley soared from 53,000 tons in 1978 to 405,000 tons in 1979. This was partly because of the rush to make purchases in France before the EC barley export payment of about $100 per ton ended on March 31, 1979."[76]

In addition to these factors, demand for agricultural products has been increasing rapidly. Otherwise, agricultural producers--domestic and imported--would not find consumers to buy the greatly increased amounts of food. The important factors in increased demand for such products include changes in consumption patterns, and economic and population growth.

3.6 Factors Contributing to Increased Demand for Agricultural Products

3.6.1 Patterns of Food Consumption and Cost of Living

Consumption patterns and cost of living are two important indicators in the continuing increasing demand for agricultural products which, in terms, affects importation of food stuffs.

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[76]U.S.D.A., Africa and Middle East, 1979, p.55.

In the past, Saudis possessed few material goods, but oil wealth has generated tremendous consumption of material goods. Though Saudi Arabia remained an underdeveloped country, standards of living improved considerably for the majority of the people from 1970 to 1975. Extensive programs were undertaken to improve living conditions. Examples of these programs include government financed housing and subsidized imported food. Another example of improving conditions was the average Saudi diet, which was about 2,200 calories per day in 1972, and 2,500 calories per day in 1975.[77] "The wealthier Saudi families now have an average daily per capita caloric intake of about 3,000, and foreign workers have a higher average."[78]

Information concerning household consumption patterns can be found in the Central Department of Statistics, consumer surveys for 1969-70 and 1977. This information shows a decline in the proportion of food in total household budgets. Specifically, the survey of 1977 shows that the average total expenditures in Saudi households was SR 5,927, of which SR 1,596 or 27 percent was allocated to food. Also, information shows that income elasticity

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[77]R.F. Nyrop, et al., Area Handbook for Saudi Arabia, pp.69-74.

[78]U.S.D.A. Middle East and North Africa, 1981, p.13.

of food is about 0.5881 which means a 1 percent increase in income results in an 0.5881 percent increase in the demand for food.[79] Table 3.13 shows income elasticity for selected foods.

As for cost of living by the early 1970s, the cost of living had increased geometrically. In 1973, observers placed inflation at 20 percent, and in 1974/75 at a rate ranging from 28 to 40 percent.[80]

In order to solve the problem of inflation, or at least to reduce its impacts, the government of Saudi Arabia adopted several policies such as abolishing road and excise taxes, reducing customs tariffs, and import surcharges, and extending the list of subsidized goods.[81] It also increased public employees' wages and salaries. The first increment was in 1974 and ranged from 30 percent for the lowest paid to 15 to 28 percent for the medium to high brackets. The second increment was in November 1975 at 12 percent across the board.[82] The third increment in these wages and salaries was in May 1981 which ranged from 35 to 40 percent.[83]

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[79] Robert E. Looney, Saudi Arabia's Development Potential: An Application of an Islamic Growth Model (New York: Lexington Books, 1982, pp.144-146.

[80] R.F. Nyrop, et al., Area Handbook for Saudi Arabia, pp.74-75.

[81] Ibid

[82] Ibid

[83] Jebran Chamieh, ed., Saudi Arabia: Record of Economic Development, (Sin El Fil, Lebanan: The Research and Publishing House, 1983), p.67.

TABLE 3.13: Saudi Arabia Income Elasticity of Demand for Selected Food Commodities

Commodity	(1)	(2)
Cereals	0.4315	0.2
Meat	0.6872	0.4
Dairy Products	0.4498	1.2
Oil and Fats	0.5129	0.5
Fresh Vegetables	0.4782	0.6
Fresh Fruits	0.5746	0.6
Sugar	0.6181	0.5
All Foods	0.5881	0.44

Sources: (1) Robert E. Looney, Saudi Arabia's Development Potential: Application of an Islamic Growth Model (New York: Lexington Books, 1982) p.145.

(2) E. Asfour, Saudi Arabia--Long Term Projections, p.19.

Information in these tables published in 1965 for Asfour figures and in 1982 for Looney figures.

3.6.2 Population and Economic Growth

As mentioned in Chapter Two, population estimates in Saudi Arabia have been in dispute for some years. An official estimate for 1956 puts the population at 6,036,400 and estimated the mid-1955 population at 6,750,000. In 1974 a census was held, and a total population figure of 7,012,642 was announced. The United Nations estimate for the mid-1970s put the total population at 7,740,000.

Another source estimated the Saudi population in mid-1980s at 8.2 million, the birth rate at 49, death rate at 18, annual rate of growth at 3.0, and 23 years to double the population.[84]

The important point here is that the Saudi population is increasing, although it is difficult to measure this increment because of the diversity in estimates from one source to another. The population growth rate, estimated at 2.95 percent by the United Nations, and at 3.0 by the Saudi government, is likely the most dependable indicator of the increment in the Saudi population.

From all this information, it may be concluded that the Saudi population at least doubled during the period from 1950 to 1980.

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[84]Huw R. Jones, A Population Geography, (New York: Harper and Row, Publishers, 1981), p.281.

Another important issue related to population is the number of foreign workers in Saudi Arabia. The 1974 census indicated that the non-Saudi population in the country was 791,105;[85] while other sources put the non-Saudi population at 1.5 million in the same year.[86] However, this figure increased dramatically and was estimated at over three million by 1981.

> The population of the 3 million workers from South Asia and Yemen, who receive relatively low wages, has declined while the number from the United States, Europe, and East Asia, who receive relatively high pay, has increased. The per capita income of the 8 million local residents continues to rise as more rural dwellers move to rapidly growing urban centers. 87

From this information, it is likely that the foreign workforce in Saudi Arabia doubled between the early 1970s and the early 1980s.

With a citizen population doubling from 1950-1980 and foreign workers in the country doubling from 1970-1980, such huge increments, over a relatively short period, can be considered one of the major factors underling greatly

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[85] Daghistani, "Economic Development in Saudi Arabia," p.13.

[86] "The Middle East and North Africa," 1982, p.664.

[87] U.S.D.A., Middle East and North Africa, 1981, p.11.

increased demand for agricultural products. Another of these factors is the economic growth experienced over the period.

Saudi Arabia is one of the largest oil producers and exporters in the world today. Oil production in commercial quantities started in 1938 with an annual production of 0.5 million barrels, which developed into 3,623.8 million barrels annually in 1980 (Table 3.14).[88] This means that oil production has been increased geometrically from 1938 to 1980. Accordingly, revenues from exported oil increased from $3.2 million in 1939 to $608.7 million in 1963; to reach $101,813 million in 1981 (Table 3.14).

This resulted in a high rate of economic growth. Table 3.15 shows the growth of GNP in the period 1966/67 to 1984/85. The total economic growth shows 8.75, 13.41 and 8.04, respectively, during the periods 1966/67, 1970/75, and 1975/80. From 1981-1985 it is estimated to be 3.28 in the period between 1980/85.

The high annual economic growth rate can be considered another of the most effective factors in raising demand for agricultural products, particularly when annual growth in the agricultural sector is the smallest one among the sectors.

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[88]Daghistani, "Economic Development in Saudi Arabia," pp.36-41.

TABLE 3.14: Oil Production and Oil Revenues, 1938 to 1983

Year	Production (Million Barrels)	Revenues ($ Million)
1938	0.5	---
1939	3.9	3.2
1940	5.1	---
1941	4.3	---
1942	4.5	---
1943	4.9	---
1944	7.8	---
1945	21.3	---
1946	59.9	10.4
1947	89.9	---
1948	142.9	---
1949	174.0	---
1950	199.5	56.7
1951	278.0	110.0
1952	301.0	212.2
1953	308.3	169.8
1954	350.8	236.3
1955	356.5	340.8
1956	366.7	290.2
1957	373.7	296.3
1958	385.2	297.6
1959	421.0	313.1
1960	481.3	333.7
1961	540.7	377.6
1962	599.7	409.7
1963	651.8	607.7
1964	694.3	523.2
1965	804.8	662.6
1966	950.0	787.9
1967	1,023.8	909.1
1968	1,114.1	926.8
1969	1,173.8	949.0
1970	1,386.3	1,214.0
1971	1,740.8	1,884.9
1972	2,201.8	2,744.9
1973	2,772.6	4,340.0
1974	3,095.1	22,573.5
1975	2,582.5	25,675.8
1976	3,139.3	30,754.9
1977	3,353.9	32,583.4
1978	3,038.0	32,234.0
1979	3,479.2	48,435.0
1980	3,623.8	84,466.0
1981	3,586.0	101,813.0
1982	2,367.0	70.479.0
1983 (Estimate)	1,825.0	37,123.0

Sources: (1) E. Asfour, Saudi Arabia--Long Term Projections, pp.124-125; (2) A.I. Daghistani, "Economic Development in Saudi Arabia," pp.37,38 and 148; (3) SAMA, Annual Report: 1403 (1983), (Riyadh: S.A. Printing Co. Ltd., 1983.

TABLE 3.15: Growth of GNP in the Period 1966/67 to 1984/85, Annual Compound Growth Percent Per Year (In 1969/70 Prices)

Economic Sectors	1966/67 to 1969/70	First Plan 1970/71 to 1974/75	Second Plan 1975/76 to 1979/80	Third Plan 1980/81 to 1984/85
Producing Sectors				
Agriculture	3.62	3.59	5.40	5.35
Other Mining	5.56	21.07	17.14	9.78
Other Manufacturing	11.76	11.39	15.37	18.83
Utilitiess	11.31	10.93	24.41	29.46
Construction	3.32	18.57	17.78	2.48
Service Sectors				
Trade	10.09	13.94	22.06	8.42
Transport	10.58	16.97	21.13	12.93
Finance	7.94	8.16	12.99	7.29
Other Services	9.76	7.09	13.91	2.95
Government	4.39	7.75	5.96	7.16
Non-Oil Economy	6.96	11.66	15.13	6.19
Oil Sector	10.34	14.80	4.78	1.34
Total Economy	8.75	k3,4k	7,94	3,28

SOURCE: Ministry of Planning (S.A.), Third Development Plan 1980/85, (Riyadh: Ministry of Planning Press), p.20.

3.7 Summary

In summarizing the agricultural situation in Saudi Arabia from 1950-1980, it is apparent that (1) domestic agricultural production increased during the period from 1950 to 1980; (2) agricultural productivity decreased during the same period; (3) agricultural patterns underwent dramatic changes; and (4) imports of agricultural products increased from one year to another, with particularly rapid growth in the 1970s. Not all of these changes were prescribed in the five year national development plans that encompass the best thinking of Saudi goals and directions of the country. The focus of the next chapter is on the three five-year development plans that guide agricultural decision-making from 1970-1975, 1975-1980 and 1980-1985.

CHAPTER FOUR

PAST DEVELOPMENT PLANS AND AGRICULTURAL POLICIES

4.1 Introduction

Before discussing development and development plans, it is useful to briefly discuss the foundations of the concept of development.

The term development has been widely and variously used, with different kinds of criteria, to distinguish countries from each other, such as "developed" countries and "underdeveloped" or "developing" countries. It is also used interchangeably with such terms as industrialization, urbanization, and modernization. A number of adjectives are used in conjunction with it, as in rural development, resource development, social development, economic development, and agricultural development.

One definition of development, according to Rogers, emphasizes the social process of an evolving society.

> Development is a widely participatory process of social change in a society, intended to bring about both social and material advancement (including greater equity, freedom, and other valued qualities) for the majority of the people through their gaining greater control over their environment.[89]

[89] E.M. Rogers, (ed.) Communication and Development: Critical Perspectives, (Beverly Hills, CA: Sage Publications, 1976), p.133.

In Saudi Arabia, the conception of development is entirely different than the conception mentioned above, in the sense that development is the responsibility of the government which plans and implements development throughout the country. This is due to the fact that the Saudi government does not allow its citizen to possess the important resources of production such as oil and minerals. The oil and the oil revenues that comprise 90-95 percent of the national budget are government properties.

A definition of development that is more applicable to Saudi Arabia is by Sanders, who finds that development "invovles national planning, allocation of resources and systematic movement toward definite goals."[90]

The emergence of development planning in Saudi Arabia can be traced to November 26, 1958 when the Saudi government established an "Economic Development Committee" as a semi-independent governmental body which was linked to the Ministry of Finance and National Economy. On September 17, 1960 the "Economic Development Committee" was dissolved and a "Supreme Planning Board" established as a result of the failure of the development committee to achieve

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[90] I.F. Sanders, "The Concept of Community Development." in L.J. Cary (ed.) The Community Development Process, (Columbia, MO: University of Missouri Press, 1970) p.9.

its goals. The "Supreme Planning Board" was replaced by the "Central Planning Organization" in 1965, which was given a more powerful status than its predecessor. On October 13, 1975, this agency was further upgraded to ministry status as the Ministry of Planning.[91] This ministry is largely responsible for the rapid pace and direction of development in Saudi Arabia.

In 1970, the Saudi government put into effect its first comprehensive five-year development plan. Following the first one, and based on its achievements and changing conditions, the Second Development Plan was devised for 1975-80, and the third Plan for 1980-85.

These three development plans are discussed briefly in this chapter, with primary focus on the agricultural sector.

4.2 First Development Plan (1970-1975)

The First Development Plan was established with four general goals: to maintain the religious and moral values of Islam, to increase the well-being of the citizens, to maintain the security of the country, and to maintain economic and social stability by achieving three objectives:

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[91] A.I. Daghistani, Economic Development in Saudi Arabia, pp.44-56.

1. maintaining a high rate of general national production growth

2. developing human resources to increase and facilitate their participation in the development process

3. diversifying productivity sectors and reducing the dependence on export of oil by increasing the productivity of other sectors. 92

The program to implement this plan was a relatively modest one costing 56,223 million Saudi Riyals (one dollar is equal to 3.34 Riyals), of which a large proportion (32,762 million Riyals) was allotted to economic and social development.[93]

In analyzing the First Development Plan, Helen Lackner (1978) detailed some of its achievements and failures which are summarized here.

-Increasing GDP by 10 percent a year does not give a real indication of the development of the economy since the increase in GDP is mostly due to the multiplication of oil revenues rather than to increased output in industry or agriculture.

-Agriculture failed to reach its target. The plan aimed for a 4.6 percent increase in production yearly over the plan period. The real rate of growth turned out to be 3.6 percent.

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[92]Saudi Arabia: Central Planning Organization, Development Plan 1390 A.H. (1970 A.D.), (Dammam: Al-Motawa Press, 1390 A.H.) p.25 (Arabic)

[93]"The Middle East and North Africa, 1980-81," London: Europa Publication, Ltd., 1980/81), p.646.

-The first plan's achievement in the health sector were limtied by difficulties of insufficient staffing, lack of organization and coordination between the different departments.

-The Plan's targets in telecommunications with automatic telephones and satellite connections were not fulfilled and work was concentrated in the large population centers at the expense of the rural areas.

-In industrialization, the general picture is one of highly underdeveloped industry.[94]

Since this was the government's first attempt at long-term planning for developing the country, one might have predicted that it would not achieve its targets as well as those countries that have had long experience with planning, but it was a necessary starting place.

> In conclusion it seems that the First Development Plan was by no means an unqualified failure, as it was an improvement on the previously chaotic situation. It started the establishment of the planning processes, collecting reliable statistics and created the possibility of measuring the degree of progress, defined in terms of modernisation.[95]

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[94]Helen Lackner, A House Built on Sand: A Political Economy of Saudi Arabia, (London: Ithaca Press, 1978).

[95]Ibid, p.146.

4.2.1 Agriculture Under the First Development Plan

The emphasis that was given to agricultural development under the first development plan had the main goal of increasing self-sufficiency and increasing productivity by utilizing available resources. Success was to be achieved by accomplishing several objectives:

(1) increasing agricultural production by 27 percent during the period of the plan, which means 4.6 percent annual growth rate.

(2) encouraging the use of fertilizers and machinery by subsidies.

(3) increasing the distribution of new lands.

(4) providing agricultural credits.[96]

Agricultural achievement under the first development plan were not very extensive. As mentioned previously, the annual growth rate was 3.6 percent instead of 4.6 percent, while the annual economic growth rate achieved was 10 percent.

4.3 The Second Development Plan, 1975-1980

The Second Development Plan covered the period 1975-80; its general goals were as follows:

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[96]Saudi Arabia, Central Planning Organization, First Development Plan, 1390 A.H. (1970 A.D.), (Dammam: Matawa Press, 1390 A.H.), p.32.

(1) maintaining the religious and moral value of Islam;

(2) assuring the defense and internal security of the country;

(3) maintaining a high rate of economic growth by developing economic resources, maximizing earnings from oil over the long-run, and conserving depletable resources.

(4) reducing economic dependence on export of crude oil

(5) developing human resources by education, training, and raising standards of health

(6) increasing the well-being of all groups within the society and fostering social stability under circumstances of rapid social change.

(7) developing the physical infrastructure to support achievement of the above goals.[97]

The second five-year plan provided for expenditures of no less than Saudi Riyals (SR) 498,230 million (about $142,000 million). The largest single investment item in this plan was defense, put at SR 78,157 million, followed by education at SR 74,161 million, urban development at SR 53,328 million and industrial and mineral production at SR 45,058 million.[98]

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[97]Ministry of Planning (S.A.), Second Development Plan 1975-1980, (Jeddah: Dar Okaz Press, 1975), p.4.

[98]"The Middle East and North Africa, 1980-81," (London: Europa Publications, Ltd., 1980-81), p.646.

In terms of achievements under the second development plan, Lackner (1978) predicted that the difficulties and problems that arose in the first development plan were likely to arise in the second one.

> The difficulties and problems which have arisen in the conception and implementation of the First Development Plan are also likely to arise in the Second for a number of reasons: both were devised with the assistance of U.S. consultants, both are a collection of piecemeal suggestions, both fail to take into consideration the restrictions imposed by an inadequate infrastructure, both fail to recognize the limitations imposed by the inexperience of the administration and the lack of manpower at all levels. 99

In contrast to the above, the Second Development Plan was considered by some as a successful endeavor.

> Despite the pessimism of most foreign commentators, the Saudis pursued the goals of the second plan with great determination, and the results have been, on the whole, successful. Difficulties were confronted and overcome: a crisis of port congestion was countered by improved efficiency and the rapid construction of new berths; runaway inflation was successfully met with spending controls and some cutbacks in projects; and the exploitative ambitions of foreign companies were kept in check. Although the main industrial projects fell behind schedule, infrastructure grew apace, endowing the country with the basic transport and communications facilities required by a modern industrial state. 100

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[99] Helen Lackner, House Built on Sand, pp.147-148.

[100] "The Middle East and North Africa, 1980-81," p.646.

4.3.1 Agriculture Under the Second Development Plan

The objectives for agricultural development, as mentioned in the Second Development Plan, were three:

(1) to raise the per capita income and improve the welfare of rural people,

(2) to minimize the country's dependence on imported food, and

(3) to release surplus labor for employment in other sectors.

These objectives were to be achieved by raising the level of productivity in agriculture and by bringing more land into production.[101]

The agricultural policy set in the Second Development Plan to meet these objectives was as follows:

> In order to reduce the Kingdom's dependence on food imports and to help develop its rural areas, the Government will:
>
> --Encourage private enterprise in food production, processing, and marketing while confining its own activities to those into which private entrepreneurs are unable or unwilling to enter.
>
> --Aim at a reasonable balance between the economic and social rewards available from agricultural activities in the rural areas and the rewards available from other economic endeavors in the urban areas.

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[101] Ministry of Planning (S.A.), Second Development Plan, 1975-80, p.123.

--Recognize future as well as present needs and consumer as well as producer needs in implementing agricultural programs.

The Government's strategy for affecting this national policy is based on the following eight principles:

--The best use of water resources, especially depletable resources.

--Maximum feasible self-sufficiency in the production of farm machinery, seed, fertilizer, and other inputs.

--Development by the private sector, including cooperatives, of the facilities and services required for food processing and distribution.

--The same guarantees for foreign investors in agriculture as for foreign investors in industry.

--Provision by the public sector of the physical infrastructure and the safety and animal health services required by the private sector in agriculture.

--Expansion of the credit available from both government and private sources for the development of agriculture, including fisheries.

--The provision, when studies show they are needed and feasible, of special economic incentives and programs to stabilize prices or support farm incomes.

--Protection of the environment from pollution associated with agricultural activities. 102

The agricultural achievements of the Second Development Plan were greater than those under the first one if measured by the annual growth rate which was 3.6 percent in the first plan, and 5.4 percent in the second one.

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[102] Ministry of Planning (S.A.), Second Development Plan, 1975-80, p.124.

4.4 The Third Development Plan, 1980-1985

The Third Development Plan extends for the period 1980 to 1985. The general goals mentioned in this plan are:

(1) to maintain the religious value of Islam, by applying, propagating, and fostering God's Sharia (law);

(2) to assure the defense of religion and the country, and maintain the internal security and social stability of the Kingdom;

(3) to continue balanced economic growth by developing the country's resources, by increasing the income from oil over the long term and by conserving depletable resources, thereby improving the social well-being of all citizens and providing the economic strength to attain all other fundamental goals of development,

(4) to reduce dependence on the production of crude oil as the primary source of national income,

(5) to develop human resources through education, training and the raising of health standards,

(6) to complete the basic infrastructure which is required for the attainment of these other goals. 103

Planned investment for the Third Development Plan is set at SR 782,000 million (about $235,000 million).

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[103] Ministry of Planning (S.A.), Third Development Plan, 1980-1985, (Riyadh: Ministry of Planning Press, 1980), pp.3-4.

The Third Development Plan is intended to shift emphasis away from infrastructure projects onto the productive sectors, with particular emphasis on agriculture. Also, the plan stresses the need for manpower training to reduce reliance on foreign labor and for Saudi private investors to be encouraged to play a more prominent role in the economy.[104]

It is too early to judge the Third Development Plan's achievements, but one can discover some of the highlights by comparing the goals and expenditures of these three development plans. The First Plan was focused on three main points: (1) maintaining a high rate of general national production; (2) developing human resources; and (3) reducing dependence on oil. In terms of costs, this Plan's expenditures were SR 56,223 million. The Second Development Plan focused more attention on economic growth (maintain a high rate of economic growth by developing economic resources, maximizing earnings from all over the long term, and conserving depletable resources), while in the Third Development Plan more attention was given to the "balance" in economic growth and improving the social well-being and

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[104]"The Middle East and North Africa," 1980, 81, p.646.

moral values. Also, in the Second Development Plan, the intent was to develop infrastructure while in the Third to complete it. In terms of expenditure, the Second Development Plan budgeted no less than SR 498,230 million, while the Third Development Plan budgeted no less than $782,000 million to accomplish its objectives.

4.4.1 Agriculture Under the Third Development Plan

More attention is given to the agricultural sector in the Third Development Plan than in the First and Second Plans. This can be derived from the objectives and policies regarding the agricultural sector.

> Objectives: The main objectives of the Kingdom's agricultural development are given below.
>
> (1) To establish and maintain a prudent level of self-sufficient in food production, recognizing both producer and consumer interests.
>
> (2) To provide the opportunities for attaining reasonable agricultural incomes and raise the welfare of rural people so as to achieve a balance between the economic and social rewards attainable in rural and urban areas.
>
> (3) To optimize the use of agricultural water resources.
>
> (4) To optimize the use of the Kingdom's land resources.

(5) To optimize the use of the Kingdom's marine resources.

(6) To improve the skill level in the agricultural sector.

(7) To protect the agricultural (including marine) environment.

In the achievement of the above objectives, the following policies will be pursued.

(1) Continue the detailed evaluation of the Kingdom's available water and land resources.

(2) Continue the improvement of efficiency of the traditional agricultural sector by the adoption of modern farming methods that minimize labor and water inputs, assisted by improved crop selection, the formation of farming cooperatives, improved subsidy schemes and the combination of extension services.

(3) Continue the encouragement of the private sector in the development of larger scale agricultural projects ranging from major integrated agricultural projects, such as the Haradh project, to individual crop, dairy, and livestock projects.

(4) Improve range management through protective measures and discouragement of overgrazing.

(5) Continue the efficient development of the major reclamation projects.

(6) Improve the sector's data base to provide reliable information for analysis by both the public and private sectors and assist the overall management of the agricultural sector.

(7) Review the agricultural subsidies available and improve their overall effectiveness.

(8) Review the Scheme for Barren Land Distribution and make appropriate adjustments to expedite its contribution to agricultural production.

(9) Increase the research effort concentrating on practical problems of production and marketing.

(10) Increase and promote training programs availability for both public and private sectors. 105

4.5 Agricultural Subsidies and Credits

Because Saudi Arabia is a developing country, agricultural practices were traditional. This traditional agriculture was in economic equilibrium until rapid change and population growth began. In addition, when increased oil earnings began flowing into the country the comparative advantage in Saudi economy became very high which caused many farmers to move from the agricultural sector to others because of the greater incentive (high rate of return) available in economic activities other than agriculture. Faced with declining agriculture, the Saudi government moved to develop the agricultural sector by using such techniques such as agricultural subsidies and credits to promote the adoption of new technologies and thus increase production.

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[105] Ministry of Planning (S.A.), Third Development Plan, 1980-1985, pp.149-151.

4.5.1 Agricultural Subsidies

In 1973, the Saudi government started introducing a subsidy package program in order to increase agricultural production. Farm machinery, fertilizers, animal feed concentrates, wheat, sorghum and rice were subsidized. In 1974, poultry farms, dairy farms, sheep, and camels were added to the subsidy program and in 1976, the total cost of transporting 200 or more dairy cattle was introduced to subsidize dairy farm activities (See Table 4.1). Other subsidies were introduced later on such as those on seed potatoes, dates and date palms planted. Some subsidies were changed, such as the wheat subsidy (See Table 4.2).

4.5.2 Agricultural Credits

The Saudi Arabian Agricultural Bank (SAAB) was founded in 1964 by the government in order to provide interest-free credit to the agricultural sector. Credit to support agricultural activities is provided through this bank under varying conditions (See Tables 4.2 and 4.3).

It was apparent that the Saudi Arabia's goals and objectives under the First and Second Development Plans, the agricultural development plans in particular, were not entirely met, although the latter period showed improvement. Now, over half-way through the Third Development

TABLE 4.1: Agricultural Subsidies: Saudi Arabia (1973-1975)

	Year Introduced	Amount
Inputs		
Farm Machinery	1973	45% of price
Fertilizers	1973	50% of price
Animal Feed Concentrated (36% protein)	1973	50% of price
Poultry Farms	1974	30% of price[a]
Dairy Farms	1974	30% of price[a]
Transportation of 200 or more dairy cattle	1975	Total cost of transportation
Feed for drought relief		At normal prices
Outputs		
Wheat	1973	SR 0.25/kg
Sorghum	1973	SR 0.25/kg
Rice	1973	SR 0.30/kg
Sheep	1974	SR10.00/head
Camels	1974	SR50.00/head

[a]20% if financed by Agricultural Bank. Poultry and dairy farm subsidies include only machinery and equipment.

SOURCE: Ministry of Planning (S.A.), Second Development Plan, 1975-80, (Jeddah: Dar Okaz Press, 1975), p. 122.

TABLE 4.2: Incentives for Agricultural Production: Saudi Arabia (As they appear in the Third Development Plan)

Type	Amount
Production Input:	
a. Fertilizer	50% of cost
b. Animal Feed	50% of cost
c. Potato Seeds	5 tons free
Machinery and Equipment:	
a. Poultry equipment	30% of cost
b. Dairy Equipment	30% of cost
c. Engines and Pumps	50% of cost
d. Fish trawlers	variables
Transportation:	
a. Air transport of cows	100% of cost
Production Output:	
a. Wheat	SR 3.5/kg[a]
b. Rice	SR 0.30/kg
c. Corn	SR 0.25/kg
d. Millet/Barley	SR 0.15/kg
e. Dates	SR 0.25/kg
f. Date palms planted	SR 50/tree
Agricultural Credit:	
All types	variable conditions
Agricultural Industrial Credit:	
All types	variable conditions
Land Acquisition:	
Land distribution	free

[a]Purchase price (1978/79)

SOURCE: Ministry of Planning (S.A.), Third Development Plan, 1980-85. (Riyadh: Ministry of Planning Press, 1980), p.

TABLE 4.3: General Credit Extended By the Agricultural Bank 1964/65 to 1982/83 (A.D.): Saudi Arabia

Loans	Short-Term Loans		Medium-Term Loans		Total Loans	
Years	No.	Amount	No.	Amount	No.	Amount
64/65	52	131,000	573	4,258,598	625	4,389,598
65/66	141	294,864	1,781	8,632,561	1,922	8,927,425
66/67	885	1,082,700	2,261	12,099,900	3,146	13,182,600
67/68	1,232	1,542,000	2,500	10,477,800	3,732	12,019,800
68/69	1,227	1,676,311	2,447	12,200,784	3,674	13,877,095
69/70	1,793	3,008,854	2,563	13,127,273	4,356	16,136,127
70/71	1,741	2,575,222	2,640	14,052,406	4,381	16,627,628
71/72	1,234	2,265,666	2,631	14,292,441	3,865	16,558,107
72/73	1,537	2,916,292	2,940	16,677,234	4,477	19,593,526
73/74	1,741	,3544,710	3,673	32,759,095	5,414	36,303,805
74/75	3,835	7,181,695	12,416	138,323,743	16,251	145,505,438
75/76	3,073	8,243,773	16,629	261,189,393	19,702	269,433,016
76/77	3,633	17,288,098	17,744	472,550,263	21,377	489,838,361
77/78	3,572	43,713,341	16,726	541,954,927	20,298	585,668,268
78/79	4,609	15,285,705	19,149	693,786,257	23,758	709,071,962
79/80	3,557	22,734,376	16,225	1,105,951,731	19,782	1,128,686,107
80/81	9,310	39,226,421	35,818	2,491,640,060	45,128	2,530,866,481
81/82	5,556	29,456,398	31,890	2,903,445,663	37,446	2,932,902,061
82/83	3,454	25,270,841	35,432	4,140,757,096	38,886	4,166,027,937
TOTAL	52,182	227,438,267	226,038	12,888,177,225	278,220	13,115,615,492

SOURCES: SAAB, Nineteenth Annual Report, 1402/1403 A.H. (1982/83 A.D.) (Riyadh: Safir Press, 1982), p.128

Plan period, it is important to identify some of the major problems facing such efforts.

4.6 Major Problems Facing Agricultural Development

In Saudi Arabia, developing the agricultural sector is an especially difficult task because of the many problems that confront this sector of the economy, historically and environmentally. Among these problems are those of water, transportation, marketing and comparative advantage.

4.6.1 Water Resources

As mentioned in Chapter Two, water resources are the most scarce resources affecting agriculture in Saudi Arabia. The water resources that exist comprise four categories: surface water, ground water, sea water (after desalination), and sewage water.

Surface water is the most scarce in Saudi Arabia, where there are no perennial streams or rivers, making runoff water the only real surface water in the country. Also rainfall is very low and unpredictable. Ground water is the main water resources in Saudi Arabia and used for such different purposes as domestic, municipal, industrial, and agricultural irrigation. Nine aquifers have been

identified in the country which store usable water. The main problems with these aquifers are that (1) the amount of water available in these aquifers is not precisely known, and (2) most of these aquifers contain water from a long time ago and are not rechargable from rainfall. In other words, this underground water is an exhaustable resource.

> The size of the Kingdom's water reserves is a closely guarded State secret. No one knows, or wants to say, how much underground water there is. There is much concern among both Saudi and Western agricultural specialists about the unrestrained use of a limited resource. Some of the experts note that some aquifers are millions of years old and aren't recharged by rainfall anymore; other report wells drying up at a rate of three feet a month. 106

Sea water is the only water resource that is not an exhaustable one, but it is also the most expensive water resource. Even though there has been great development in this water resource, it is considered inadequate for the country's needs and reserved to urban and industrial uses. Total water demand was estimated at the end of the First Development Plan period as 1,900, 300, and 170 million cubic meters per year for irrigated agriculture, oil well injection and urban uses, respectively. At that time, there were five desalination plants in operation, with a

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[106]Brad Heller, "Saudi Wheat Farms Tap Subsidies, Aquifers," The Wall Street Journal, May 29, 1984, p.30.

total installed capacity of 17.7 million cubic meters per year and power generation of 50 MW. This water desalination and power generating were later increased to 65.4 million cubic meters per year and 350 MW and this capacity was scheduled to reach 523 million cubic meters per year, with 3,145 MW of associated power generation at the first three years of the Third Development Plan.[107] This amount of water from desalination plants was a small portion of the total water demand at the end of the First Development Plan (1975) and the total demand should be increased by the end of the Third Development Plan (1985), by a considerable amount.

Sewage water is present in very small amounts due to the fact that this kind of water is available only in the large cities in the country. To the writer's knowledge, it has not been utilized yet.

Another dimension to this problem of water scarcity is the traditional way of irrigating agriculture in the country. This is the flow-irrigated system in which a farmer covers all planted areas by flow water and is considered an inefficient way of utilizing the available water. New irrigation systems have been introduced but are still few in number and too limited for large scale farming.

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[107]Ministry of Planning (S.A.), Third Development Plan, 1980-85, pp.116-118.

> New projects primarily use either the drip or sprinkler irrigation methods. The drip system is more widely used for irrigating vegetables and orchards and its use is being encouraged by MAW. The center pivot irrigation system was introduced in 1977 (1397) with only one such system. At present, there are over 30 systems in operation, and each is capable of irrigating up to 50 hectares. 108

In a summary, water scarcity is one of the major problems that affect Saudi agricultural development. It seems destined to continue to affect such activity in the near future.

4.6.2 Agricultural Marketing

The traditional markets in Saudi Arabia are the Al-Suq which represents the old-age Middle Eastern marketplace. Richard F. Nyrop, et al., describe these Suq markets and the changes in them over time.

> The suq is the old-age Middle Eastern marketplace. In its historical development in Saudi Arabia most local markets were small because of long, arid distances separating communities. Craftsmen, farmer, and nomad met at small weekly markets to exchange products.... Barter was the usual method of exchange and conversation was an integral part of the bargaining process.

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[108] Ministry of Agriculture and Water (S.A.), Guide to Agricultural Investment, p. 38.

> Conditions changed, but the suq tradition changed more slowly. Nevertheless, by 1976 barter had given way to the use of money in most parts of the country, the merchant had replaced the producer as the seller of goods in most markets, and fixed prices rather than bargaining were becoming more common. 109

As for agricultural marketing in particular, Mohammed Al-Fair discussed the agricultural market in Taif, Saudi Arabia, which is very similar to agricultural marketing in any part of the country. He indicated six components in the agricultural marketing process, all of which are related and depend on each other. The components are: (1) landholding, (2) farm management, (3) transportation, (4) the central market, (5) auctioneer, and (6) the consumer.

The present traditional system of agricultural marketing, involving these components is inefficient and needs to be improved. Until it is, agricultural development in the country will be retarded by inadequate markets. The most important problems within this system--as Al-Fair saw them--were

1. unstable prices which fluctuate from one day to another as a result of the producer's need to sell his product within 24 hours from the time of harvest at whatever prices he can get, especially perishable items;

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[109] R.F. Nyrop et al., Area Handbook for Saudi Arabia, p.305.

2. poor and costly transportation;

3. poor communication; and

4. lack of standards for grading and quality control. 110

Even though there has been great achievements in transportation and communication facilities, these four problems still exist and have a great impact on agricultural marketing at this time in Saudi Arabia.

In terms of transportation, most agricultural producing areas are located far away from the large populated areas where the large markets are. This forces the farmers to transport their products through long, arid distances to the markets, which is costly in money and time. It is worthwhile to mention that there is no single large firm or organization that buys the farmers' products at the farm. Instead, the farmers have to carry and to transport their products to the market no matter how far it is. In addition, transportation facilities, particularly for perishable products, are limited which causes a lot of damage and spoilage of locally grown fruits and vegetables.

Another problem in the agricultural market is the middleman who buys the farmers' products and sells them

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[110]Mohammed, Al-Fair, "Agricultural Marketing System in Taif, Saudi Arabia," (M.A. Thesis, Michigan State University, 1973).

within a short perid of time. They reap a very high profit, in some cases more than 100 percent (Table 4.4).

> Marketing margins are high and in some cases excessive. For fruits and vegetables, the farmers' share of the retail price is estimated at 35 to 45 percent. The commission agent charges a fee of 4 percent to 5 percent. The wholesale margin is around 10 percent, while the retail margin varies considerably and ranges between 30 percent to 120 percent over the wholesale price. 111

Marketing operations, such as grading, packing, storing, cooling and processing, are still undeveloped or fall short of the need for domestic produced and imported food stuffs. In short, the agricultural marketing system in Saudi Arabia is an undeveloped system in which the prices of both domestic and imported foodstuffs fluctuate. The most important factors affecting this market system and prices are:

(1) the absence of grading and standardization;

(2) costly transportation;

(3) short period of time which is devoted to wholesale process;

(4) poor communication between producer and consumer; and

(5) middleman intervention between producer and consumer, accompanied by a high retail margin over the wholesale price.

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[111] MOAW (S.A.), Guide to Agricultural Investment, p.47

TABLE 4.4: Price Spreads for Various Marketing Operations Over Auction Price in Riyadh on February 20, 1977 (1397) Saudi Arabia

Commodity	Auction Price Per Kg. SR.	Wholesale Price Per Kg. SR.	Wholesale Market Percent of Auction Price	Megabra[a] Retail Price Per Kg. SR	Megabra[a] Market Percent of Auction Price	Battah[b] Retail Price Per Kg. SR.	Battah[b] Market Percent of Auction Price	Malaz[c] Retail Price Per Kg. SR.	Malaz[c] Market Percent of Auction Price	Supermarkets Price Per Kg. SR.	Supermarkets Percent of of Auction Price
Tomatoes	1.71	1.88	110	3.30	193	4.00	234	4.00	234	---	---
String Beans	3.56	3.76	106	6.50	183	5.80	163	7.50	211	9.00	253
Big Green Beans	2.50	----	---	5.00	200	5.00	200	----	---	8.00	320
Carrots	2.25	2.50	111	3.33	148	4.00	177	5.00	222	---	---
Eggplant	2.13	2.94	138	4.00	188	4.00	188	5.00	235	5.00	235
Okra	10.75	13.00	121	13.50	126	13.50	126	13.50	126	---	---
Squash	---	----	---	5.00	---	4.50	---	9.00	---	---	---
Cucumber	8.12	----	---	---	---	8.75	108	8.25	102	11.00	135
Potatoes	2.59	3.00	116	3.88	150	4.00	154	4.50	174	---	---

a
b
c

Source: (Saudi Arabia), MOAW, A Guide to Agricultural Investment in Saudi Arabia, (Riyadh: Department of Agricultural Development, 1979), p.48.

4.6.3 Comparative Advantage

In a country such as Saudi Arabia, where agricultural development was and still is under the focus of the Saudi government, it becomes necessary to ask: what are some of the advantages and disadvantages that are affecting such development?

Before going over the advantages and disadvantages affecting development of the agricultural sector in Saudi Arabia, let us focus on the Principle of Comparative Advantage. This principle holds that "Each area tends to produce those products for which it has the greatest ratio of advantage or the least ratio of disadvantage as compared with other areas." In practice, however, this concept is affected "by operator choices and public decisions and policies as well as by physical conditions." Comparative advantage is measured by the economic ability of an area to compete with other areas in the production of particular goods or services and stems from the area's natural endowments. "Others involve favorable combinations of production inputs, favorable location and transportation costs, favorable institutional arrangements or desired amenity factors."[112]

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[112]Raleigh Barlowe, Land Resource Economics: Economics of Real Estate. (Englewood Cliffs, N.J.: Prentice-Hall, 1978), p.268-271.

In examining comparative advantage, there is a question of whether these five components represent advantages or disadvantages for Saudi agriculture.

First, natural endowments in Saudi Arabia, climate, soil and water resources represent disadvantages for agricultural development. In terms of climate, the high temperature level during the summer accompanied by dry weather and low level of rainfall all year long are barriers to productive agricultural practice and development. Soil is another disadvantage for agriculture in Saudi Arabia because it tends to be of a coarse texture and shallow depth overlying lithic or panalithic material. The exception to this situation can sometimes be found in oases and dry valleys. The lack of adequate water surplus is another important disadvantage for agricultural development in Saudi Arabia (See Chapter Two for the natural endowments and conditions of Saudi Arabia).

Second, favorable production combinations implies a favorable combination of the inputs needed for production, where an economic return or benefit should be ensured.

> Comparative advantage implies ability to realize an economic return for one's fixed inputs in the production of goods or services. It calls for favorable combinations of the inputs needed for production and also for

> satisfactory markets. A shortage of capital or skilled management or a lack of adequate marketing or credit facilities may easily outweigh any natural advantages associated with an era. Skilled labor is an important factor, and low labor costs per unit of production give an area a distinct production advantage. 113

In Saudi Arabia--where there are more than three million imported foreign workers--the labor shortage is accompanied by high labor costs. These are two important disadvantages for agricultural development. Also, agricultural markets, which are undeveloped markets, are another disadvantage.

Transportation considerations in Saudi Arabia are a third disadvantage. The major large cities are located in areas remote from oases and other good agricultural producing areas. This implies a high cost of transportation in terms of money and time--even though there has been great progress in roads and highway construction during the last ten years.

Fourth, comparative advantage can be affected by particular institutional arrangements.

> Nations with histories of political stability offer greater attractions for investors than nations threatened with frequent revolutions. Tariff barriers and

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[113] Ibid, pp. 271-272.

> trade restrictions have long been used to shut off outside competition and to enhance the production advantages enjoyed by local or domestic producers. Protective tariffs often given definite market advantages to agricultural and industrial enterprises that might otherwise be hard pressed for survival. 114

In Saudi Arabia, the political stability, since the establishment of what is now know as the Kingdom of Saudi Arabia in the early 1930s, can be considered an advantage for agricultural development in particular and for economic development in general. Agricultural subsidies and credits provided by the Saudi government are two other institutional arrangements that offer advantages for agricultural development. On the other hand, food import subsidies and low tariff rates can both be considered disadvantageous for agriculture.

Comparative advantage is affected by a fifth category of amenity factors, such as aesthetics and culture, education and local services. "Amenity considerations can be and often are ignored when significant economic advantages are associated with particular sites. Producers, workers, and consumers, are far more conscious of amenity factors now, however, than in the past."[115]

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[114] Ibid, p.273.

[115] Ibid, p.274.

In Saudi Arabia, agricultural activities were and still are one of the important economic activities. The agricultural sector is the largest employing sector in the country. This amenity factor can be considered an advantage for agricultural development. In fact, this factor is one of the different facets that made the Saudi government focus on agricultural development.

4.6.4 Farmers' Efficiency and Agricultural Extension Services

A study made in 1971 indicated that the Saudi agricultural sector was in disequilibrium and farmers were using resources inefficiently.

> Clearly, the substantial differences between value marginal products, marginal cost of land and negative marginal physical product of labor in the agricultural sector suggest disequilibria. Better utilization of labor and land, therefore, could increase production and efficiency. In other wrods, farmers are inefficient and production from the existing set of resources can be increased through production economics studies and educational program. 116

Another study entitled "Mechanization and Agricultural Development in Saudi Arabia" in 1401 A.H. (1981 A.D.)

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[116] Mansoor I. Al-Turki, "Accelerating Agricultural Development in Saudi Arabia," (Ph.D. Dissertation, Colorado State University, 1971), pp.43-44.

confirmed these findings. This study indicated that (1) average life of water pumps and engines was found to be about 3 years; (2) the average life of combine harvesters with 113 horsepower was found to be 2.9 years; and (3) the average life of tractors with 110 horsepower was found to be 2.8 years.[117]

These results indicated that the inefficient uses of these expensive machines increased the cost of production. On the other hand, other researchers believe that farmers in general are "poor but efficient."[118] To determine how these two views can co-exist requires further research.

T.W. Schultz argued that traditional agriculture arrived at an economic equilibrium over a long period of time. He assumed three important conditions that caused this eqiulibrium. "(1) the state of the art remains constant, (2) the state of preference and motives for holding and acquiring sources of income remain constant, and (3) both of these states remain constant long enough...."[119] The critical point here is, in Schultz" words, "that the state of the art remains constant for a long period, meaning

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[117] SAAB, Mechanization and Agricultural Development in the Kingdom, (Riyadh: Safir Press: 1401 A.H.) (1981 A.D.) pp.9-10 (Arabic)

[118] T.W. Schultz, Transforming Traditional Agriculture, (New Haven and London: Yale University Press, 1964),pp.44-52.

[119] Ibid, pp.29-30.

that production, knowledge and techniques remain constant for a long period. Thus, farmers can be said to be efficient according to the production knowledge available to them. They are not efficient, however, when compared with more developed areas. Accordingly, Schultz could say in 1964 that Saudi farmers were efficient according to their knowledge of production. By 1971 and even more by 1981, the country was in greater contact with the world outside the Arabian Peninsula and had to compare its agricultural productivity with more developed societies.

In light of this discussion, it is important to determine whether Saudi farmers now know how to utilize new production techniques and technologies such as tractors and combine harvest machines. And, if they do, do they use them efficiently and are there good maintenance services for such technological devices?

In answering these questions, it appears that demand for agricultural machinery is high in Saudi Arabia, which may reflect the labor shortage in the country. Information from the Saudi Arabian Agricultural Bank (SAAB) in 1982/83 confirmed the high demand for farming equipment.

> Farming machinery ranked second after projects this year with respect to the size of demand. Loans for farming machinery amounted to SR 821,273,316 or 19.7 % of the total loans. The service areas of Riyadh and Buraidah Branches obtained 55% of the loans in this field. It was possible

> through these loans to supply 6,348 ploughing machines, 281 tractors, 935 combines, 754 balers as well as many accessories thereto, including 14,191 ploughs, 1,493 prongs, 3,051 levelling coulters, 835 hole drillers, 1,187 sowing machiens and 1,947 line openers. 120

This high demand for agricultural machinery indicates that Saudi farmers know how to use such equipment, otherwise they would not buy it--assuming they are rational in their behavior. It is more doubtful that they know how to maintain and preserve such machinery over a period of years, long enough to justify the purchase on economic grounds. The same study by SAAB, mentioned that it was confirmed to SAAB personnel that there were a lot of complaints from farmers about the use of such new machinery and low efficiency in using the machines. This study also indicated that farmers are unaware about proper use and maintenance of such machinery, which is due, in large part to the inefficient role of Agricultural Extension Services, particularly in the field of farming machinery.[121]

The researcher's knowledge and experience in this field confirms this finding. The Agricultural Extension

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[120] Saudi Arabian Agricultural Bank (SAAB), Nineteenth Annual Report, 1401/1403, A.H. (Riyadh: Safir Press, 1982), p.13.

[121] SAAB, Mechanization and Agricultural Development in the Kingdom, (Riyadh: Safir Press, 1401 A.H.) (1981 A.D.), p.6 (Arabic).

Service in Saudi Arabia is the agency most responsible for inefficiency in using new agricultural technology in particular, and for lackluster performance among Saudi farmers in general. This area is one that has to be studied in more detail in order to determine the best ways of resolving it, increasing the efficiency of the Extension Services and upgrading experience with farm machinery.

At this point, we turn to trends in agricultural production during the Development Plans periods (1970 to 1984), particularly in light of the Plans' objectives and the problems that face such development efforts. It is important here to note that there is no complete data available for all agricultural products, particularly for the years 1980 and later. This discussion is thus concentrated on agricultural products that do appear in recently up-dated sources.

4.7 Production of Selected Agricultural Products During the Five-Year Development Plans (1970-1984)

In order to examine production trends in Saudi Arabia, seven agricultural crops have been selected. These crops are wheat, barley, corn, grapes, citrus fruit, dates, and meat. Table 4.5 shows the quantities produced from 1970 to 1983 measured in thousands of metric tons. In Table 4.6, the production in 1970 has been selected as a

TABLE 4.5: Production of Selected Agricultural Commodities 1970-1983: Saudi Arabia (1,000 MT)

Year	Wheat	Barley	Corn	Grapes	Citrus Fruit	Dates	Meat
1970	135	34	5	12	6	224	54
1971	72	18	5	29	6	188	56
1972	39	20	6	35	7	293	73
1973	63	18	11	31	8	360	68
1974	90	22	15	61	9	338	72
1975	193	22	18	66	13	345	75
1976	205	22	21	58	14	340	81
1977	150	25	25	55	12	335	82
1978	175	25	25	57	14	310	89
1979	200	25	25	60	15	320	95
1980	225	28	27	62	15	414	124
1981	275	6	29	66	22	372	125
1982	360	6	30	72	24	411	139
1983	695	6	25	74	25	420	158

SOURCES: U.S.D.A., World Agricultural Situation, (Economic Research Services), selected issues from WAS 19 to WAS 27.
U.S.D.A., Middle East and North Africa: Outlook and Situation Report (Economic Research Services, RS-84-3, April 1984), p.33.

TABLE 4.6: Increases in Agricultural Production of Selected Commodities: Saudi Arabia (1970 = 100)

Year	Wheat	Barley	Corn	Grapes	Citrus Fruit	Dates	Meat
1970	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1971	53.3	52.9	100.0	241.6	100.0	83.9	103.7
1972	28.8	58.8	120.0	291.6	116.6	130.8	135.1
1973	46.6	52.9	220.0	258.3	133.3	116.0	125.9
1974	66.6	64.7	300.0	508.3	150.0	150.8	133.3
1975	142.9	64.7	360.0	550.0	216.6	154.0	138.8
1976	151.8	64.7	420.0	483.3	233.3	151.7	150.0
1977	111.1	73.5	500.0	458.3	200.0	149.5	151.8
1978	129.6	73.5	500.0	475.0	233.3	138.3	164.8
1979	148.1	73.5	500.0	500.0	250.0	147.8	175.9
1980	166.6	82.3	540.0	516.6	250.0	184.8	229.6
1981	203.7	17.7	580.0	550.0	366.7	166.1	231.5
1982	266.6	17.7	600.0	600.0	400.0	183.5	257.4
1983	514.8	17.7	500.0	616.6	416.7	187.5	292.6

SOURCE: Calculated from Table 4.5

base for the following years' production. Analysis of the data from these two tables, yields the following results.

1. Wheat production declined from 1970 through 1972, and increased rapidly from 1973 to 1983 when production had been increased almost 5.5 times.

2. Barley production decreased from 1970 through 1973 and then increased slowly from 1974 to 1980. It then declined sharply to a small amount in the next three years.

3. Corn production increased rapidly from 1970 to 1982. The production of corn in 1983 was five times the production of 1970.

4. Grape production also increased very rapidly. In 1983, grape production was about six times the 1970 production.

5. Citrus fruit production has increased during the same period, but less than the increase in grapes or corn products.

6. Date production increased gradually from 1970 to 1983, but the increase in dates was less than increases in any other listed product.

7. Meat production has increased more rapidly than the increases in dates and barley, but less than grapes, corn, wheat and citrus.

In addition to the above, it is important to note that by 1983 production of all these items was increasing except barley. In 1983, the range of production of these seven crops was 695,000; 420,000; 158,000; 74,000; 25,000 and 6,000 MT for wheat, dates, meat, grapes, corn, citrus fruit and barley, respectively. Wheat production ranked first among these seven crops.

Another source noted that the contribution of the agricultural sector to the GDP in Saudi Arabia was estimated to increase by 10.0 percent during 1402/03 A.H. (1982/83 A.D.) against average annual increases of 6 percent during the preceding two years. The agricultural sector's share in non-oil real GDP, however, stood at 6 percent which is still relatively small.[122] Information concerning the relationship of agricultural production to consumption shows that the domestic production to consumption ratios were 86.6 percent for eggs; 71.0 percent for wheat; 33.0 percent for white meat; 28.9 percent for broiler chickens; and 9.5 percent for red meat. Milk production, it has been reported, was increased from 37,000 tons in 1401 A.H. (1981 A.D.) to 47,000 tons in 1402 A.H. (1982 A.D.) achieving an increment of 27 percent.[123] The latest information shows

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[122]Saudi Arabian Monetary Agency, Annual Report, 1401 (1983), (Riyadh: Saudi Arabian Printing Company, LTD, 1983), p.80.

[123]Ibid, pp.80-87.

that Saudi Arabia is nearly self-sufficient in milk and produces about one-third of its red meat needs and much of its poultry, while eggs are being exported and wheat production is expected to be above domestic needs of more than 400,000 to 500,000 tons in 1984.[124]

From this information it is apparent that, as a result of some of the efforts under three development plans, Saudi Arabia is capable of achieving self-sufficiency in some agricultural products, such as wheat, eggs, milk, and red meat. In general, however, the country is still far away from achieving self-sufficiency in all agricultural products and food needs.

As the crop which ranked first in production in 1983, it is obvious that wheat production in Saudi Arabia has been increasing very rapidly from 1980 into 1983 and 1984. An examination of this increment in wheat production and the factors that contributed to this achievement are the departure point of the next chapter.

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[124]Brad Heller, "Saudi Wheat Farms Tap Subsidies, Aquifers," The Wall Street Journal, May 29, 1984, p.30.

CHAPTER FIVE

WHEAT PRODUCTION

5.1 Introduction

As mentioned in Chapter Three, wheat is one of the major cereal crops and one of the major agricultural products in general in Saudi Arabia. It is an important item in the Saudis' diet and is used interchangably with rice. In addition, wheat is the main ingredient in the country's bakery industry. During the 1970s, Saudi Arabia was importing a large amount of its wheat from other countries. In 1979, it imported the largest amount of wheat and flour in its history, 888,237 tons, with a value of $242,848,000.[125] Yet by 1983, wheat production in Saudi Arabia was 695,000 tons and expected to exceed domestic needs of 400,000 to 500,000 tons (See Chapter Four). The reasons for this turnaround in wheat production in Saudi Arabia are the subject of this chapter.

5.2 Programs of Wheat Production

As a part of the Five-Year Development Plans, the Saudi Arabian government emphasized agriculture as an

[125] Food and Agricultural Organization of the United Nations, Trade Yearbook,(Rome: FAO, 1980).

important and basic natural resource that needed, and still needs to be developed. Among agricultural products, wheat ranked as the number one target for the attention of the Saudi government. Two programs were devised to develop wheat production.

5.2.1 Old Program

As mentioned in Chapter Four, a subsidy for wheat production was introduced in 1973 consisting of 0.25 Saudi Riyals per kilogram (See Table 4.1). The method that was used to carry out this program was based on sending committees all over the country, who were responsible for two things: (1) estimating the wheat production for each farmer, and (2) estimating Al-Zakat (2.5 percent of the production as a kind of tax). Because of the short harvest period it was impossible for these committees to estimate every wheat crop at its harvest. This meant that these committees were estimating the crops even if they were just planted. This was not a scientific measurement of the quantity of production. They were estimating the crop arbitrarily.

In addition to the above, there was concern about overestimating the crop for the purpose of obtaining more subsidy. A report to the Ministry of Finance and National Economy, based on the value of the subsidies that had been spent on this activity, noted that the production quantity should be 319 thousand metric tons in the year 1976/77, a

number that could not be accurate. Also, this report suggested that it would be better to give the Grain Silos and Flour Mills Corporation the responsibility of receiving all the wheat crop from the farmers in order to accurately measure each farmer's product.[126] More information about the amount of the subsidies and quantity of production for the period from 1973/74 to 1976/77 is illustrated in Table 5.1.

This program was not based on the use of any new technology, such as new high yielding varieties, fertilizers, and equipment. The varieties that were planted in this period, were local varieties, the introduction of such new varieties as "maxiback" was not successful. When it became apparent that subsidies alone were not having the desired effects, the old program was changed.

5.2.2 Current Wheat Program

The wheat production subsidy and policy were changed after 1978/79 (See Table 4.2). The major changes in the program were that the government of Saudi Arabia decided to buy the wheat production from the farmers at a price of 3.5 Saudi Riyals per kilogram. The agencies made responsible for the purchase was Grain Silos and Flour Mills Corporation

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[126]Turky M. Al-Sadairy, "Agricultural Subsidies in Saudi Arabia," (Ministry of Finance and National Economy, Unpublished Report, 1978).

TABLE 5.1: The Amount of Wheat Subsidy and Production Quantities Anticipated (1973 to 1977)

Year	1973/74	1974/75	1975/76	1976/77
Subsidy Value (SR)	36,428	13,433,355	15,444,394	78,800,178
Production (MT)	145.7	53,733.4	61,777.6	319,200.7

SOURCE: Turky Al-Sadairy, "Agricultural Subsidies in Saudi Arabia," (Unpublished Report to the Ministry of Finance and National Economy,[S.A.],1978), p.3.

which weighed the exact amount of the wheat crop. This agency was allowed to refuse any wheat variety which is not recognized by the agency and by the Ministry of Agriculture and Water as a good variety. The Grain Silos and Flour Mills Corporation, together with the Ministry of Agriculture and Water, was made responsible for providing the farmers with good variety wheat seeds.[127]

[127]Ministry of Finance and National Economy (S.A.), "An Economic Analysis Study of Current Wheat Production in Saudi Arabia," (Unpublished Report, 1982).

5.2.3 The Establishment of the Grain Silos and Flour Mills Organization

This organization was established in 1392 A.H. (1972 A.D.), but did not begin operations until 1395 A.H. (1975 A.D.) after three contracts for projects in Riyadh, Dammam and Jeddah had been assigned.[128] Its main goals were (1) achieving food stability in the country; (2) flour production; (3) production of animal feed; (4) concentrating and encouraging farming of those crops considered strategic and (5) providing a grain reserve for the country. The grain silos' storage capacity of 585,000 tons will be expanded to about one million tons by 1985. The headquarters is located in Riyadh, while other branches are located in Jeddah, Quasim, Hail, Khamis Mushayt, and Dammam.[129] Table 5.2 illustrates the current and intended grain storage capacity of these different branches. In terms of flour and animal feed production, this organization has the capacity to produce 3,180 tons of flour every 24 hours and 700 tons of animal feed every 8 hours (See Table 5.3).

After reviewing these wheat production programs, it became important to review the trend in wheat production in the recent years--particularly from 1978 and beyond--in order to find out the effect of such change on the wheat production.

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[128] Grain Silos and Flour Mills Organization (S.A.), Annual Report, 1401-1402 A.H. (Riyadh: Sahar Printing Press, 1982), p.5.

[129] Alyamamah Weekly Magazine, (Riyadh), 772, October 12, 1983, pp.14-17.

TABLE 5.2: The Storage Capacity (Current and Intended) of Grain Silos in S.A., by Location. (1,000 tons) (1981/1982)

	Current	Intended	Total
Riyadh	160	310	470
Quasim	135	285	420
Hail	50	100	150
Khamis Mushayt	40	---	40
Dammam	80	---	80
Jeddah	120	---	120
Total	585	695	1,280

SOURCE: Derived from Alyamamah Weekly Magazine, (Riyadh), Issue No. 772, October 12, 1983, pp.14-17.

TABLE 5.3: Flour and Animal Feed Production Capacity by Location in Saudi Arabia (1981/1982)

	Flour Mills (Tons/24 Hr)	Animal Feed (Tons/8 Hr)
Riyadh	960	100[c]
Dammam	540[a]	100
Jeddah	1,080[b]	100
Quasim	300	200
Khamis Mushayt	300	200
Total	3,180	700

[a] will be expanded to 700 tons/24 hours

[b] will be expanded to 1,680 tons/24 hours

[c] will be expanded to 340 tons/8 hours

SOURCE: Saudi Arabia, Grain Silos and Flour Mills Organization, Annual Report 1401/02 A.H., (1981/82 A.D.), (Riyadh: Sahar Printing Press), pp.22-25.

5.3 Trends in Wheat Production from 1978 to 1983

As mentioned in Chapters Three and Four, wheat production after 1970 fluctuated up and down until 1978, when production began increasing very rapidly. The wheat crop increased by about 14 percent, 28 percent, 57 percent, 105 percent and 297 percent, respectively, in the years 1979 through 1983 (Table 5.4). This indicates a very positive response to the current wheat production program, which indicates a fixed wholesale price of SR 3.5 per kilogram, in addition to an assured market (Grain Silos and Flour Mills Organization). This wheat price is the highest in the world. According to the USDA "Government procurement rose to about 670,000 tons, and debates arose about continuing the world's highest farm price for wheat. Some farmers in the Qassim area were able to gross over $2,000 per acre from wheat."[130] Given the world's highest farm price retail wheat and bread prices can be examined by calculating the real prices of wheat.

5.4 Wheat Real Prices

Because there is no data available about wholesale prices for wheat in Saudi Arabia, the average retail prices

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[130] U.S.D.A. "Middle East and North Africa: Outlook and Situation Report," (Economic Research Services, AS-84-3, April 1984), p.10.

TABLE 5.4: Trends in Wheat Production (1978-83)

Year	Quantity 1,000 MT	Percent Change	Change in Production (The basic year is 1978)	Trend
1978	175	---	100.00	1
1979	200	14.29	114.28	2
1980	225	28.57	128.57	3
1981	275	57.14	157.14	4
1982	360	105.71	205.71	5
1983	695[a]	297.14	397.14	6

[a]U.S.D.A. "Middle East and North Africa: Outlook and Situation Report," (Economic Research Services, RS-84-3, April 1984), p.33.

SOURCE: Alyamamah Weekly Magazine, (Riyadh), 772, October 12, 1983

is assumed to be parallel to the wholesale prices. The real prices are derived from the retail prices divided by the cost of living index and multiplied by 100. Table 5.5 shows the average retail prices, cost of living index and real prices of wheat for the period from 1964 to 1980. Real prices have fluctuated from one year to another, due to the changes in the market situation, especially the supply side. They have not, however, kept up with the rising cost of living. This is due to the fact that the wheat subsidy is in two forms: (1) a wheat output subsidy and (2) a wheat consumption subsidy.

> Al-Kharj, Saudi Arabia--This desert country has what is unarguably the world's expensive bread to produce. Yet that isn't reflected in the retail cost of bread: under 30 cents for four flat loaves, far less than what a similar amount would cost in the U.S. and Europe. 131

To examine the disparity between wheat farm prices and retail prices requires investigation of the cost/benefit relationship of wheat production.

5.5 Cost and Benefit of Wheat Production in Saudi Arabia

Cost/benefit data for wheat production was difficult to find inside Saudi Arabia or outside it. Given the scarcity

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[131]Brad Heller, "Saudi Wheat Farms Tap Subsidies," p.30.

TABLE 5.5: Trends in Wheat Prices in Saudi Arabia, 1964 to 1980

Year	Average Retail Prices of Wheat SR/kg	Cost of Living[b] Index, Base Year 1963 = 100	Real Prices[a]
1964	.55	102.8	.54
1965	.60	103.2	.58
1966	.50	104.8	.48
1967	.81	107.0	.76
1968	.81	108.7	.75
1969	.72	112.5	.64
1970	.76	112.7	.67
1971	.72	118.2	.61
1972	.70	123.2	.57
1973	1.04	143.1	.73
1974	1.38	173.8	.79
1975	1.38	233.9	.59
1976	1.26	307.7	.41
1977	1.97	343.6	.57
1978	1.84	381.3	.48
1979	2.16	388.1	.56
1980	1.99	400.5	.50

[a]Real Prices = Retail prices/cost of living index x 100

[b]Derived from Duwais, A.M., Factors Affecting Rice Consumption in Saudi Arabia, Unpublished M.S. Research, M.S.U., 1983,p.52.

of such data, it was necessary to use the results of a few limited studies, as indicators for the costs and benefits of wheat production in Saudi Arabia. The most recent study was done in 1981 by the Saudi Arabian Agricultural Bank (SAAB). This study focused on six wheat projects financed by the SAAB and selected because they specialized in wheat farming and had good wheat production records. Three of the projects consisted of more than 150 hectares each, while the remaining three contained less than 150 hectares each. The results of this study covered costs of production, average returns, net profits and average yield (See Table 5.6).

1. Average cost of production: Total cost of production for the three projects of less than 150 hectares was SR 2,042,375 with an average of SR 680,791 for a project with an average area of 99.7 hectares. This yields an average cost of production of SR 6,830.6 for one hectare.

For the projects of more than 150 hectares, the total cost of production was SR 9,003,310 which yielded average costs of SR 3,001,103 for a project with an average area of 459.3 hectares, and an average cost of SR. 6,533.6 for one hectare of wheat. This indicates a savings of SR 297 in average costs for the larger projects (more than 150 hectares). The correlation coefficient was -0.887, indicating a negative relationship between cultivated area and costs of production. The combined average cost of production for the six projects studied was SR 6,586.6.

TABLE 5.6: Costs and Benefits of Wheat Production in Saudi Arabia, (1981)

Project Number	Cultivated Area (H)	Total Annual Cost (SR)	Total Annual Production (tons)	Total Annual Return (SR)	Total Net Profit (SR)	Average Cost of Production (SR/H)	Average Return (SR/H)	Average Profit (SR/H)	Yield (Ton/H)	Average Cost of Production (SR/kg)
A. Range: Less than 150 Hectares										
1	60	611,425	219	797,250	185,825	10,190.4	13,287.5	3,097.1	3.65	2.79
2	109	738,770	347	1,244,500	505,730	6,777.7	11,417.4	4,639.7	3.18	2.13
3	130	692,180	400	1,510,000	817,820	5,324.5	11,615.4	6,290.9	3.08	1.73
Average	99.7	680,791	322	1,183,916	503,125	6,830.6	11,878.8	5,048.1	3.23	2.11
B. Range: More than 150 Hectares										
4	232	1,702,850	832	3,002,000	1,299,150	7,339.9	12,939.7	5,599.8	3.59	2.04
5	381	2,530,180	1,426	5,021,000	2,490,815	6,640.9	13,178.4	6,537.5	3.74	1.77
6	765	4,770,280	3,080	10,575,250	5,804,970	6,235.7	13,823.9	7,588.2	4.10	1.55
Average	459.3	3,001,103	1,779.3	6,199,416	3,198,313	6,533.6	13,496.6	6,963.0	3.87	1.69
General Average	----	----	-----	-----	------	6,586.6	13,208.1	6,621.5	3.75	1.75

SOURCE: Translated and Derived from: SAAB, Cost of Production and Future of Growing Wheat in Saudi Arabia, (Riyadh: Safir Press: 1401 A.H.)(1981 A.D.), p.43. (In Arabic)

2. The average return to one hectare was SR 11,878.8 for the projects less than 150 hectares and SR 13,496.6 for projects larger than 150 hectares, or an increment of SR 1,617.8 per hectare. This indicates that financial return can be increased by increasing the area under wheat cultivation. The combined average financial return for the six projects was SR 13,208.1 per hectare.

3. The net profit from farming one hectare of wheat was found to be greater in the large projects than in the small ones. The net profit from one hectare was SR 5,048 for a farm with an area of 100 hectares; it was SR 6,963.0 for a farm with an area of 450 hectares.

4. Average Yield (productivity): For the three projects of less than 150 hectares each, the average yield was 3.23 tons per hectare; while the three projects of more than 150 hectares each, the average productivity was 3.87 tons per hectare. The combined average yield for these six projects was 3.75 tons per hectare.

5. The average cost of one unit of product, for those projects less than 150 hectares each, was an average cost for producing one kilogram of wheat of SR 2.11. In the projects with more than 150 hectares, the average cost of producing one kilogram of wheat was found to be SR 1.69,

which means that the combined average cost of producing one kilogram of wheat was SR 1.75 in these six projects.[132]

From this study, it is clear that growing wheat in Saudi Arabia is very profitable farming--particularly for the large projects or farms (an average 106.5 percent profit for the six projects in the study). This explains the high increment in wheat production during recent years. Also, this study indicates that wheat productivity (yield) was very high in these six projects (3.75 tons per hectare as an average), which does not conform to the analysis of wheat productivity in Chapter Three of this thesis. This is due to the fact that the analysis of wheat productivity was based on total wheat farming in Saudi Arabia including small farms--which are in the majority--while this study was based on six relatively large farms or projects--which are rare. The difference between the productivity of the large farms and the small farms can be explained by three advantages: (1) farmers on larger farms have more access to financial firms; (2) farmers on large farms have more acces to extension services and other specialized agencies; and (3) farmers on large farms have more access to new technology and production

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[132]Translated from Saudi Arabian Agricultural Bank (SAAB), Cost of Production and Future of Growing Wheat in Saudi Arabia, (Riyadh: Safir Press, 1401 A.H.) (1981 A.D.), pp. 19-21 (In Arabic).

techniques. Accordingly, the writer feels that these two important issues, (1) costs and benefits of growing wheat and (2) wheat productivity need to be studied further and on a wider scale before any results can be generalized. However, these results can be used as an indicator for the economics of wheat production in Saudi Arabia under optimum conditions.

5.6 · Trade in Wheat

As mentioned earlier in this thesis, the increasing demand for wheat as well as other commodities requires one of three steps: either (1) increasing imported goods or (2) increasing domestic production or (3) a combination of the two. In fact, this is the method that has been adopted in Saudi Arabia. In addition to examining production, then, it is necessary to investigate trade in this commodity in Saudi Arabia.

Table 5.7 shows the imports of wheat and flour, barley and grapes by quantity (MT) and by value ($1,000). Wheat and flour imports reached their peak in 1979 (888,237 MT.), declined to 707,893 MT in 1981 and were estimated at 741,291 MT for 1982. In contrast, barley imports increased rapidly from 36,933 MT in 1970 to 2,275,299 MT in 1981 and were estimated at 3,530,000 MT for 1982, recording the highest increases in imported quantities and value among these three

TABLE 5.7: Imports of Selected Agricultural Commodities to Saudi Arabia (1970-82)

Year	Wheat & Flour (Wheat Equivalent) MT	Value	Barley MT	Value[a]	Grapes MT	Value
1970	326,823	26,653	36,993	2,247	1,067	218
1971	294,009	24,693	47,589	4,349	2,850	453
1972	352,616	29,553	14,338	1,432	4,210	589
1973	257,660	33,838	22,829	2,638	2,281	421
1974[b]	423,360	78,000	22,800	4,000	2,300	460
1975[b]	489,700	91,000	22,800	4,100	2,300	520
1976	494,318	108,613	23,477	3,787	5,293	1,019
1977	463,867	103,113	118,991	19,006	3,776	787
1978	610,252	141,932	53,389	8,710	9,716	3,284
1979	888,237	242,848	544,485	111,353	17,835	6,913
1980	780,003	242,071	1,229,309	336,344	25,648	12,982
1981	707,893	190,010	2,275,299	713,374	28,313	18,732
1982	741,291	165,437	3,530,000	965,286	29,000	19,855

[a]Value = $1,000

[b]Statistics derived from FAO estimate for these years

SOURCE: United Nations, FAO, Trade Yearbook, Issues from 1975 to 1982, Rome.

crops. Grapes were the smallest imported crop among them, but also increased rapidly from 1,065 MT in 1970 to 28,313 MT in 1981, and need was estimated at 29,000 MT for 1982. On the export side, these three crops did not record any export quantity; if there was any, it was a very small quantity.

More recent data shows that the amount of wheat Saudi Arabia imported in 1983 was 400,000 tons, a decline of about 50 percent from estimated 1982 wheat imports.[133] Thus, the import data records consistently declining needs for imported wheat which may be attributed, at best in large part, to the government's emphasis on encouraging productivity in this commodity.

5.7 Production Effects of the New Wheat Subsidy Program

As T.W. Schultz explains in "Transforming Traditional Agriculture," farmers are not perverse economic men in responding to economic incentives whenever such incentives are available to them. The results achieved in this study indicate that agricultural production in Saudi Arabia has increased rapidly, particularly during the 1970s and early 1980s (See Chapter Four). In terms of wheat production,

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[133] U.S.D.A., "Middle East and North Africa: Outlook and Situation Report, Economic Research Services," RS-84-3, Washington, D.C., April 1984.

increments have been achieved to the point that the country is expected to produce about 400 to 500 thousand tons over its need in 1984. This result is a response to the wheat subsidy program which consists of buying wheat from farmers for SR 3.5 per one kilogram, which has been termed the "highest wheat price in the world." This program achieved its positive effects on wheat production in particular and on agricultural practices in general in Saudi Arabia, through a variety of improvements in farming practices.

5.7.1 Adoption of High-Yield Wheat Varieties

As mentioned earlier in this chapter, the earlier wheat output subsidy was not concerned with the wheat variety that farmers produced. In other words, each farmer was paid the subsidy for any variety of wheat crop. Because of this unconditional subsidy, farmers grew local wheat varieties such as Hentta, Maeia, Halba, Samaa, and Logaimy that were not good for bread-flour industries and not disease resistant.[134]

In the current wheat subsidy program, the subsidy is limited to the varieties of wheat which are permitted and recognized by the Grain Silos and Flour Mills Organization and by the Ministry of Agriculture and Water. This conditional subsidy encourages the Saudi farmers to plant new, disease resistant wheat varieties--which are also considered

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[134] Alyamamah Magazine, Issue 772 (Oct. 12, 1983),p.15

high-yielding varieties--such as Maxiback, Jory, and Dirab (locally developed variety).[135] As a result, as seen in Table 5.6, the average yield has increased (3.75 tons per hectare), particularly on the larger farms.

5.7.2 Adoption of New Technology (Machinery)

As mentioned in Tables 4.1 and 4.2, most agricultural machines are subsidized at a high rate, ranging from 30 percent to 50 percent of their cost. These subsidies result in adoption of new mechanized technology in farming. In addition to the subsidy incentives, evidence of this adoption may be derived from the fact that in 1974/75 about 695,000 persons of the civil labor force were engaged in agriculture. By 1979/80, agricultural employment had declined sharply, by about 96,000 persons.[136] At the same time, from Chapters 3 and 4, we know that agricultural production had been increasingly rapidly. From this information it can be concluded that new agricultural technologies--particularly machines have been substituted for the labor force formerly engaged in agriculture. In a country such as Saudi Arabia, where the labor shortage is acute, and where the machine technology is available at a low subsizided cost, it is a

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[135] Saudi Arabian Monetary Agency, Annual Report: 1980, (Riyadh: Saudi Arabian Printing Company, Ltd., 1980). Also, Alyamamah Weekly Magazine, Issue 772, (October 12, 1983),pp 15-16.

[136] Ministry of Planning (S.A.), Third Development Plan: 1980-1985, (Riyadh: Ministry of Planning Press, 1980), p.137.

rationale for farmers to use such technology wherever it is available to them.

5.7.3 Other Effects of Wheat Subsidies

If adoption of high-yielding wheat varieties and new machine technology can be considered advantages of the wheat subsidy program, there are some other effects of this subsidy that must be considered disadvantageous.

For one, the wheat subsidy appears to have caused some farmers to grow wheat at the expense of other crops, such as millet, barley, onions, and sorghum.

> The response to wheat appears to have crowded out expansion of feed grains and some vegetables. Millet output has tumbled as farmers in Tihama switched to wheat. Sorghum output remained at about 120,000 tons. Onion output fell from 91,000 tons in 1980 to only 11,000 tons in 1982 and little recovery was reported in 1983. 137

Additionally, the opportunity costs of producing wheat at a very high price appears to be very high. The Saudi government is buying wheat at about $1,000 a ton, while this commodity is available in the U.S. for less than $140 a ton.

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[137] U.S.D.A., "Middle East and North Africa: Outlook and Situation Report." Economic Research Services, RS-84-3, April 1984, p.10.

> This year alone the Saudi government will spend about $1.3 billion buying wheat grown on irrigated Saudi desert land. It could have imported the wheat for only about $225 million. It will pay $1,000 a ton for any Saudi farmer's wheat, a commodity currently available in the U.S. for less than $140 a ton. 138

From this, it is clear that the Saudi government could save money by importing wheat instead of growing it. The rationale for not doing so is both politically and future oriented. First, for security reasons, the Saudis believe it is necessary to keep their country from being vulnerable to a grain embargo. "The Saudis say they fear a grain embargo might be imposed by wheat growing nations in retaliation for the oil-producer's cartel Saudi Arabia helped start."[139] Second, the current spending on wheat production is not only the cost of growing wheat, but the cost of gaining new technology and experience.

> The U.S. spends something like $40 billion for farmers not to grow crops and we spend 1 billion, "says Abdulrahman al-Khorayef, --"We're paying that price not just for wheat. We are getting technology and experience and the basic structure for our future food supply. 140

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[138] Brad Heller, "Saudi Wheat Farms Tap Subsidies," p.30.

[139] Ibid

[140] Ibid

Overall, it is clear that the decision to subsidize wheat production and to achieve self-sufficiency in this commodity is political rather than economic. As a political decision, it looks toward a future of efficient and productive agriculture in Saudi Arabia--despite the inhospitable conditions extant in most of the country for most agricultural products.

CHAPTER SIX

SUMMARY, CONCLUSION AND RECOMMENDATIONS

6.1 Summary

The agricultural sector in Saudi Arabia was and still is the largest labor-employing sector, which gives agriculture high priority in the Saudi Development Plans. Another factor of its importance is food self-sufficient. Saudi Arabia was a food self-sufficient country in the early 1930s, but gradually became a food deficient country and is now considered the leading agricultural importer among all Third World countries. Much of this happened while the Saudi development plans were emphasizing agricultural development as one of the country's important development objectives.

In investigating agricultural productivity and trends from 1950-1980, information used as a basis for this study was obtained through written material (secondary data). Specific quantitative data as well as descriptive data were used.

In Chapter Two, some general information about Saudi Arabia--such as location and size, population, climate, soil, land classification, and water resources--was given to

facilitate understanding the conditions that exist and affect Saudi agriculture.

In Chapter Three, the agricultural situation was discussed. Information in this chapter indicated that there is a large variety of agricultural products in Saudi Arabia. The most important groups of these agricultural products are:

1. Dates, which is the major crop being grown in the country.

2. Wheat and other cereal crops, such as barley sorghum, millet and maize.

3. Vegetable crops which have gained importance during the last two decades and consist of tomatoes, watermelons, pumpkins, melons, onions, eggplant, squash, okra, green beans, dry beans, potatoes, cucumbers and others.

4. Fruits other than dates, which constitutes the smallest of the agricultural groups. The major fruits in this group are citrus, grapes and others.

5. Fodder crops, in which alfalfa is the major crop.

6. Stock raising, which was almost entirely done by bedouins who used to raise camels, sheep and goats by nomaic herding through the country. In recent years, poultry, dairy and sheep have been raised on specialized farms.

Data shows that about 15 to 20 million donums were under actual cultivation in 1979/80. Of this figure about 51 percent was rainfed and the rest was irrigated. Farm size per holding is about 14.6 donums in the Asir region, 563.6 donums in Qassim, and 67.0 donums as a national average.

In Chapter Three, also, trends in output and area under cultivation were analyzed for the period 1950 to 1979/80, this analysis yielded the following results.

1. Total crop output was increased from 335,657 tons in 1950 ot 1,402,861 tons in 1979/80, which meant that all crop outputs were multiplied almost four times over a period of three decades. Vegetable outputs ranked first in total increment, followed by field crops (cereals) and then by dates.

2. Area under cultivation has increased from 95,316 hectares in 1950 to 579,645.7 hectares in 1979/80, which meant that areas under actual cultivation for all crops was multiplied almost six times in three decades. Expansion in areas under vegetable cultivation ranked number one among other agricultural activities, followed by area under cereal crop and areas under date cultivation, respectively. This analysis of agricultural outputs and areas under cultivation indicated that agricultural patterns in Saudi Arabia are undergoing some important changes, in which vegetable cultivation is growing very rapidly at the expense of date cultivation.

3. Agricultural productivity was found to have fluctuated in all farming activities, and in wheat, barley, tomatoes and eggplant in particular. The declines in agricultural productivity were a result of one or a combination of the following factors:

(a) Land (soil) fertility which decline through extensive use over time without replacing fertility by adding sufficient fertilizers, or as a result of not following a good rotation cycle or other farming practices.

(b) Physiological factors, such as using the same crop variety for a long period of time which makes the plant more vulnerable to plant diseases.

(c) Failure of Agricultural Extension Services to improve farmers' production skills and knowledge.

In addition to these factors, drought is an important factor that plays a significant role in increasing or decreasing agricultural productivity.

Since agricultural productivities in Saudi Arabia did not increase very rapidly (fluctuating), while total agricultural outputs and areas under actual cultivation were increasing very rapidly, the increment in agricultural outputs were brought about by expansion of areas under actual cultivation, rather than increasing agricultural productivity. This means that a lot of agricultural resources, i.e., land resources, water resources, labor, money, etc., were used to bring about this increment. This kind of development is inefficient in a country such as Saudi Arabia where there is a shortage in water and labor resources.

By examining change in agricultural patterns as a percentage change of the total area under actual cultivation, it was found that some farming activities were increasing

while others were decreasing. Vegetables achieved the highest increase while others were decreasing. Vegetables achieved the highest increase followed by the field crops (cereals) and fruits. Dates had the highest relative decline among the other groups, followed by fodder crops.

In terms of livestock and poultry, it was found that all livestock and poultry populations had increased during the period 1960 to 1979/80. The largest increases were in goats, cattle, sheep, camels, and poultry, from highest to lowest percentage rate of increase, respectively.

Also, it was found that: (1) change in administrative structure; (2) technological change; and (3) economic factors, such as providing agricultural subsidies and credits, were the most important contributions to increasing agricultural outputs. High demand levels for agricultural products was another important factor and likely contributed to government subsidy decisions. This high demand for agricultural products derives from the fact that, in addition to its domestic agricultural production, Saudi Arabia is one of the leading importers among all Third World countries, particularly in agricultural products.

By analyzing imports of agricultural commodities for the period 1950 to 1980, it was found that total agricultural imports had increased dramatically during three periods: the first was between 1963 and 1967, the second from 1973

to 1977, and the third was during the period 1979 and 1980. Imports of cereals ranked highest while imports of vegetables ranked the lowest, among all agricultural commodities imported. Imports of goats ranked the highest, followed by eggs, cattle and buffalo, sheep, poultry, and camels, respectively.

By comparing domestic production with imported agricultural commodities, it was found that: (1) domestic cereals production was increasing, but imported quantities of this group were increasing more rapidly; (2) quantities of fresh vegetables imports were increasing, but domestic production of fresh vegetables was increasing even more rapidly; (3) total domestic agricultural production was increasing, but imports of agricultural commodities were increasing more rapidly; and (4) both domestic production and imports of livestock and poultry were increasing. This indicated that demand for agricultural products was both very high and increasing with time as income trended upward.

It was found that import subsidies, developments in food marketing and ports, some international events, and high demand for agricultural products caused by more people and moreincome were the most important factors contributing to increased imports of agricultural commodities.

In terms of this high demand for agricultural products, some factors have been identified as important factors

that contributed to increased demand. Those factors are: (1) the improvement in the standard of living for the majority of the people (per capita income rose from SR to SR); (2) government efforts to reduce inflation and the cost of living, such as abolishing the road tax, reducing custom tariffs, and increasing public employee's wages; (3) population increase at an annual rate of growth of 3.0 percent among Saudis and increment in the non-Saudi population to over three million; and (4) a high economic growth rate supported by oil production and revenues.

In 1970, Saudi Arabia launched a five-year development plan approach to modernization. The First Development Plan covered 1970-75; the Second Development Plan covered 1975-80; and the Third Development Plan is in effect from 1980-85. In all these development plans, the Saudi government has given considerable attention to diversifying productive sectors and reducing dependence on the export of oil. Among the productive sectors, agricultural development has been given a high priority. During the First Development Plan, agriculture failed to reach its target of 4.6 percent increase in yearly production, and reached only 3.6 percent. The achievements under the Second Development Plan in agriculture was better. The annual agricultural growth rate during the Second Development Plan was 5.4 percent. The Third Development Plan, now in progress, is intended to shift emphasis away from infrastructure projects

onto the productive sectors, with particular emphasis on agriculture.

In keeping with the agricultural goals of the development plans, a large agricultural subsidies program was started in 1973 and adjusted in 1978. In addition to this, a non-profit agricultural credit program has been provided through the Saudi Arabian Agricultural Bank since 1964, which has been extended and developed throughout the three development plans.

As in any development efforts, these development plans faced, and will continue to face in the near future, some problems and difficulties. Among these problems are: (1) water resource scarcity, which is a crucial problem; (2) undeveloped agricultural marketing with a high proportion of consumer prices going to the middle men; (3) the role of comparative advantage which is, in most cases, against agricultural activities, i.e., poor soil, water scarcity, labor shortage, and undeveloped market, while the advantage of agriculture is the support by the Saudi government of this sector; and (4) low farming efficiency and inefficient Agricultural Extension Services.

Regardless of these problems, the contributions of the agricultural sector to the GDP in Saudi Arabia is estimated to have increased by 10 percent annually during 1982/83; when most agricultural products showed high production increments. As a result, Saudi Arabia is nearly

self-sufficient in milk and produces about one-third of its red meat needs and much of its poultry, while eggs are being exported and wheat production is expected to be above domestic needs in 1984. As a result of improvements under the three development plans, it is apparent that Saudi Arabia is capable of achieving self-sufficiency in some of its agricultural products. In general, however, it is still far away from achieving self-sufficiency in all agricultural products and the food needed to feed the nation.

As one of the basic foods, wheat has received high priority from the Saudi government. The first wheat subsidy program, which consisted of SR. 0.25 per one kilogram, was not successful in increasing wheat production. Thus, the Saudi government increased this subsidy to a complete fixed price of SR 3.5 per one kilogram through the Grain Silos and Flour Mills Organization which became the agency responsible for buying wheat production from farmers. This new program has been in effect since 1978 and the amount of wheat production has increaesd dramatically since that time, to the point that Saudi Arabia is expected to produce about 400 to 500 thousand tons over its needs in 1984.

In terms of wheat prices, the wholesale (farm) prices have been fixed at SR 3.5 per one kilogram since 1978, but retail prices fluctuate and are very low. Wheat retail prices do not reflect the wholesale prices because of the wheat subsidy.

From a study of six agricultural projects, the average cost of wheat production was found to be SR 6,586.6 per hectare, or SR 1.75 per one kilogram, while the average profit was found to be SR 6,621.5 per hectare, or 106.5 percent. The average yield (productivity) was found to be 3.75 tons per hectare. These results cannot be generalized, however, because the results reflect large scale farming rather than the small farms that are more common in the country. Such results can be used as an indicator of the economics of wheat production under optimum conditions.

Although further studies are recommended for: (1) recent costs and benefits of growing wheat across Saudi Arabia; and (2) recent wheat productivity country-wide, it is apparent some definite gains have come from the new subsidy program.

Imports of wheat and flour have declined since 1980 and expected to reach their minimum in 1983. In 1984, Saudi Arabia is expected to produce more than it needs for wheat self-sufficiency. The new wheat production program has also had some effects on agricultural patterns in Saudi Arabia. Among these effects are:

(1) Adoption of high-yield wheat varieties;

(2) Adoption of new technology (machinery);

(3) Other side effects in which some agricultural products are declining such as barley, millet, and onion, while other products remain constant, such as sorghum.

Increased wheat production is an expensive undertaking in Saudi Arabia, which has the world's highest wheat price, but there are reasons why the Saudi government is willing to pay the price. Among the reasons are: (1) the country's security from grain embargo, and current spending on wheat production is not only the cost of growing wheat, but the cost of gaining new technology and experience.

6.2 Conclusions

As a result of the three development plans--as well as other factors--Saudi Arabia has demonstrated that it is capable of achieving self-sufficiency in some of its agricultural production such as wheat, eggs, milk and red meat, but, in general, it is still far away from achieving self-sufficiency in all agricultural products and food needs.

In terms of wheat production, Saudi Arabia has achieved high increments in domestic wheat production. This increment is due to the high wheat prices (subsidized) that the Saudi government is paying for this commodity--as well as other factors. This high wheat price has had some impacts on agricultural patterns in Saudi Arabia. Some impacts are positive such as achieving self-sufficiency in wheat production and encouraging Saudi farmers to adopt new technology in farming activities. Other impacts

are negative such as exhausting water resources which are very scarce in Saudi Arabia--and encouraging Saudi farmers to shift from other agricultural activities to wheat production, which results in reduction of other agricultural commodities. It appears that millet, onions, barley and others have been reduced as a result of expanding wheat production.

6.3 Recommendations for Further Study

The researcher recommends further studies in the general areas that follow.

1. Factors affecting supply of and demand for agricultural products in Saudi Arabia;
2. Income elasticity and the resulting impacts on food consumption in Saudi Arabia;
3. The possibility of achieving self-sufficiency in other food products and the role of the Saudi Development Plans in doing so.
4. The capability of water resources to support agricultural development in Saudi Arabia; and
5. Trends in agricultural productivity.

In particular, further studies are recommended in the following areas.

1. Recent costs and benefits of growing wheat in Saudi Arabia;
2. Recent trends in wheat productivity; and
3. The impacts of subsidizing wheat production on other farming activities in Saudi Arabia.

APPENDICES

Table A1

Estimated Production of All Crops
in Saudi Arabia: Tons (1971/72 to 1977/78)

Winter Crops	71/72	72/73	73/74	74/75	75/76	76/77	77/78
Field Crops							
Sesame	408	85	909	460	812	1,067	507
Barley	9,318	11,077	15,391	16,710	12,049	13,524	14,845
Millet	3,315	7,915	9,199	6,868	6,971	6.700	6,425
Sorghum	11,612	18,930	67,347	55,680	67,318	60,384	58,884
Maize	1,482	830	2,514	845	3,489	3,212	342
Wheat	38,954	63,719	153,385	132,038	92,540	124,610	119,928
Others	---	---	---	---	---	---	---
•Total Field Crops	65,089	102,556	248,745	212,601	183,179	209,497	200,931
Fodder Crops							
Alfalfa	---	---	---	---	---	---	---
Other	28,067	---	---	---	---	---	---
•Total Fodder Crops							
Vegetable Crops							
Potatoes	810	422	1,526	478	1,007	---	4,625
Tomatoes	43,422	65,982	112,920	108,380	43,926	48,131	100,232
Okra	3,703	9,352	19,992	14,842	4,630	11,623	2,618
Carrots	3,787	1,236	961	5,403	1,404	2,853	3,923
Squash	3,963	13,707	30,827	7,463	6,074	12,318	12,552
Eggplant	4,122	10,424	12,160	19,572	2,230	6,649	13,838
Cabbages	635	522	8,341	1,048	---	---	---
Dry Onion	14,566	42,940	152,003	50,489	74,449	106,082	95,032
Others	26,357	---	---	---	---	---	---
•Total Vegetable Crops	101,365	144,585	338,730	207,675	133,720	187,656	232,820
•Total Winter Production	194,521	247,141	587,475	420,276	316,899	397,153	433,751

Table A1--continued

Estimated Production of All Crops
in Saudi Arabia: Tons (1971/72 to 1977/78)

Summer Crops	71/72	72/73	73/74	74/75	75/76	76/77	77/78
Field Crops							
Maize	---	88	1,325	929	3,729	793	977
Sorghum	40,748	8,394	48,561	72,186	86,116	78,647	93,180
Millet	13,929	1,969	2,334	3,729	9,608	5,941	6,553
Sesame	---	---	---	---	802	1,146	822
Others	68	---	---	---	---	---	---
·Total Field Crops	54,745	10,451	52,220	76,844	100,255	86,527	101,532
Fodder Crops							
Alfalfa	---	867,776	1,202,727	101,846	541,470	473,818	604,571
Others	---	---	---	---	---	---	---
·Total Fodder Crops	---	867,776	1,202,727	101,846	541,470	473,881	604,571
Vegetable Crops							
Tomatoes	67,528	115,660	88,112	193,034	120,924	148,465	66,293
Eggplant	4,134	11,108	10,530	19,626	18,300	18,666	7,437
Squash	---	---	---	---	9,016	21,248	10,034
Watermelons	431,365	63,716	120,488	271,417	248,430	282,631	140,091
Melons	4,710	888	53,036	26,308	9,004	23,069	16,388
Other Vegetables	4,669	---	---	---	---	---	---
·Total Vegetable Crops	512,405	191,372	272,166	510,385	405,674	494,079	240,243
·Total Summer Crops	567,150	1,069,599	1,527,113	689,075	1,047,399	1,054,424	946,346

Table A1--continued

Estimated Production of All Crops
in Saudi Arabia: Tons (1971/72 to 1977/78)

Perennial Crops	71/72	72/73	73/74	74/75	75/76	76/77	77/78
Perennial Crops							
Dates	187,846	363,911	360,095	337,283	256,903	382,297	411,388
Citrus	7,953	13,094	18,932	19,516	20,597	25,436	28,867
Grapes	28,795	34,973	30,682	61,262	41,665	42,329	55,877
Others	15,583	---	---	---	---	---	---
·Total Perennial Crops	240,177	412,788	409,709	418,061	319,165	450,062	496,132
·Total Annual Crops	1,001,848	1,729,528	2,524,297	1,527,412	1,683,463	1,901,693	1,876,229

Source: Derived and calculated by the writer from: Saudi Arabia, Ministry of Finance and National Economy, Statistical Year Book, Central Department of Statistics, Issues 10-19, 1974-1979.

Table A2

Estimated Areas of All Crops in Saudi Arabia: Donums
(1971/72 to 1977/78)

Winter Crops	71/72	72/73	73/74	74/75	75/76	76/77	77/78
Field Crops							
Sesame	16,722	6,560	31,600	17,496	24,707	16,333	4,111
Barley	152,843	58,047	104,335	70,580	96,302	81,333	80,215
Millet	66,782	146,875	306,420	289,572	194,819	217,170	240,112
Sorghum	228,317	1,051,504	1,857,609	1,600,975	1,796,400	1,576,228	1,820,681
Maize	35,617	12,367	29,826	13,530	72,246	56,824	3,513
Wheat	383,210	311,646	832,570	621,011	737,457	715,991	599,123
Others	---	---	---	---	---	---	---
•Total Field Crops	883,491	1,586,999	3,162,360	2,613,164	2,921,931	2,663,879	2,747,755
Fodder Crops							
Alfalfa	---	---	---	---	---	---	---
Other	228,697	118,436	197,634	153,668	210,389	155,612	175,707
•Total Fodder Crops	228,697	118,436	197,634	153,669	210,389	155,612	175,707
Vegetable Crops							
Potatoes	1,004	521	2,126	1,815	2,011	---	4,100
Tomatoes	51,248	37,054	84,797	81,769	65,745	65,345	82,949
Okra	11,530	6,750	30,127	17,504	12,825	17,049	6,363
Carrots	1,907	933	1,379	4,684	3,267	3,437	3,905
Squash	3,756	8,983	37,967	9,189	17,424	16,282	15,537
Eggplant	4,210	8,061	21,745	19,599	6,018	9,411	11,397
Cabbages	1,485	505	7,026	1,652	---	---	---
Dry Onion	16,626	24,197	79,719	24,965	44,745	50,796	36,559
Others	48,219	18,686	32,572	53,894	26,928	14,412	26,110
•Total Vegetable	139,985	105,690	297,458	215,071	178,963	176,732	186,920
•Total Winter Area	1,252,173	1,811,119	3,657,452	2,981,903	3,311,283	2,996,433	3,122,059

Table A2--continued

Estimated Area of All Crops
in Saudi Arabia: Donums (1971/72 to 1977/78)

Summer Crops	71/72	72/73	73/74	74/75	75/76	76/77	77/78
Field Crops							
Maize	---	887	27,499	11,331	73,856	5,421	4,606
Sorghum	583,751	396,503	900,684	768,681	1,222,861	1,155,616	1,203,993
Millet	301,149	27,512	50,898	73,856	133,938	102,673	95,399
Sesame	---	---	---	---	13,384	15,516	7,636
Others	129,207	---	---	---	---	---	---
•Total Field Crops	1,014,107	424,912	979,081	853,868	1,444,039	1,279,226	1,311,634
Fodder Crops							
Alfalfa	---	158,640	278,854	189,153	94,734	191,002	164,395
Others	---	10,173	156,220	103,866	38,502	117,435	72,498
•Total Fodder Crops	---	168,813	435,074	293,019	133,236	308,437	236,893
Vegetable Crops							
Tomatoes	58,338	30,508	87,546	126,930	93,266	113,213	73,028
Eggplant	3,437	9,924	10,624	19,552	25,812	24,992	10,634
Squash	---	---	---	---	9,235	25,813	17,089
Watermelons	75,676	23,250	100,767	129,978	124,597	144,003	104,942
Melons	3,111	376	18,846	14,031	8,331	12,696	9,346
Others	2,202	15,039	34,784	68,306	42,342	20,805	24,495
•Total Vegetable Crops	142,764	79,097	252,567	358,797	303,583	341,527	239,534
•Total Summer Area	1,156,871	672,812	1,666,722	1,505,684	1,831,418	1,941,813	1,795,547

Table A2--continued

Estimated Area of All Crops
in Saudi Arabia: Donums (1971/72 to 1977/78)

Perennial Crops	71/72	72/73	73/74	74/75	75/76	76/77	77/78
Dates	329,557	345,660	608,365	531,213	604,131	535,993	583,689
Citrus	13,679	13,548	23,409	35,583	34,496	41,884	38,606
Grapes	8,340	8,273	32,328	42,147	44,681	49,804	43,786
Others	12,654	11,312	20,318	32,541	32,614	11,151	26,173
•Total Perennial Crops	364,230	378,793	641,484	684,420	715,922	638,832	692,254
•Total Agricultural Areas	2,773,274	2,862,724	6,008,594	5,129,071	5,858,623	5,577,078	5,609,860

Source: Saudi Arabia, Ministry of Finance and National Economy, Statistical Year Book, Central Department of Statistics, Issues 10-19, 1974-1979.

Table A3

Estimated Production and Areas in Saudi Arabia
1979/80 (Production in Tons, Areas in Donums)

Winter Crops	Production	Area
Field Crops		
Sesame	990	8,676
Barley	5,461	44,027
Millet	4,841	178,352
Sorghum	66,517	2,320,290
Maize	262	6,142
Wheat	141,732	672,260
Others	---	---
•Total Field Crops	219,803	3,229,747
Fodder Crops		
Alfalfa	--	--
Other	--	8,427
•Total Fodder Crops	--	8,427
Vegetable Crops		
Potatoes	2,567	3,259
Tomatoes	101,137	87,352
Okra	9,379	16,315
Carrots	5,444	4,280
Squash	23,141	22,080
Eggplant	10,016	8,600
Cabbages	--	--
Dry Onion	59,478	32,806
Others	--	27,229
•Total Vegetables	211,162	201,921
•Total Winter Production	430,965	3,440,095

Table A3--continued

Estimated Production and Areas in Saudi Arabia
1979/80 (Production in Tons, Areas in Donums)

Summer Crops	Production	Area
Field Crops		
Maize	729	13,028
Sorghum	42,824	1,176,714
Millet	3,784	119,305
Sesame	149	8,365
Others	--	--
•Total Field Crops	47,486	1,317,412
Fodder Crops		
Alfalfa	--	269,155
Others	--	12,486
•Total Fodder Crops	--	281,641
Vegetable Crops		
Tomatoes	98,984	88,813
Eggplant	14,669	17,202
Squash	12,500	17,323
Water melons	332,063	164,869
Melons	27,498	14,980
Others	--	24,429
•Total Vegetable Crops	485,714	327,616
•Total Summer Crops	533,200	1,926,669
Perennial Crops		
Dates	342,286	603,530
Citrus	39,711	50,312
Grapes	56,699	41,934
Others	--	23,985
•Total Perennial Crops	438,696	719,761
•Total Annual Production and Area	1,402,861	6,086,525

Source: Saudi Arabia, Ministry of Finance and National Economy, Statistical Year Book, Central Department of Statistics, Issue 20, 1980.

Table A4

Estimated Production of All Crops
(Tons) in Saudi Arabia (1971/72 to 1979/80)

		71/72	72/73	73/74	74/75	75/76	76/77	77/78	79/80
Field Crops	Winter	65,089	102,556	248,745	212,601	183,179	209,497	200,931	219,803
	Summer	54,745	10,451	52,220	76,844	100,255	86,527	101,532	47,486
	Total	119,834	113,007	300,965	289,445	283,434	296,024	302,463	267,289
Vegetable Crops	Winter	101,365	144,585	338,730	207,675	133,720	187,656	232,820	211,162
	Summer	512,405	191,372	272,166	510,385	405,674	494,079	240,243	485,714
	Total	613,770	335,957	610,896	718,060	539,394	681,735	473,063	396,876
Fodder Crops	Winter	28,067	---	---	---	---	---	---	---
	Summer	---	867,776	1,202,727	101,846	541,470	473,818	604,571	---
	Total	28,067	867,776	1,202,727	101,846	541,470	473,818	604,571	---
Perennial Crops		240,177	412,788	409,709	418,061	319,165	450,062	496,132	438,696
Total Annual Crops		1,001,848	1,729,528	2,524,297	1,527,412	1,683,463	1,901,639	1,876,229	1,402,861

Source: Calculated by the writer from Tables A1 and A3.

Table A5

Estimated Areas (in hectares) of All Crops
in Saudi Arabia (1971/72 to 1979/80)

		71/72	72/73	73/74	74/75	75/76	76/77	77/78	79/80
Field Crops	Winter	88,349.1	158,699.9	316,236.0	261,316.4	292,191.1	266,387.9	274,775.5	322.974.7
	Summer	101,410.7	43,490.2	97,908.1	85,386.8	144,403.9	127,922.6	131,163.4	131,741.2
	Total	189,759.8	201,190.1	414,144.1	346,703.2	436,597.0	394,310.5	405,938.9	454,715.9
Vegetable Crops	Winter	13,998.5	10,569.0	29,745.8	21,507.1	17,896.3	17,673.2	18,692.0	20,192.1
	Summer	14,276.4	7,909.7	25,256.7	38,879.7	30,358.3	34,152.7	23,953.4	32,761.6
	Total	28,274.9	18,478.7	55,002.5	57,386.8	48,254.6	51,825.9	42,645.4	52,953.7
Fodder Crops	Winter	22,869.7	11,843.6	19,763.4	18,366.8	21,038.9	15,561.2	17,570.7	842.7
	Summer	----	16,881.3	43,507.4	29,301.9	13,323.6	30,843.7	23,689.3	28,164.1
	Total	22,869.7	28,724.9	63,270.8	47,668.7	34,362.5	46,404.9	41,260.0	29,006.8
	Perennial Crops	36,423.0	37,879.3	64,148.4	68,442.0	71,592.2	63,883.2	69,225.4	71,976.1
	Total Agricultural Area	277,327.4	286,272.4	600,859.4	520,200.7	585,862.3	557,707.8	560,986.0	608,652.5

SOURCE: Calculated by the writer from Tables A2 and A3

Table A6

Areas Under Actual Cultivation of Different Agricultural Activities in S.A.
(Areas in Hectares: one hectare = 3.953 Donum)
1971/72 to 1979/80

Items	1971/72	1972/73	1973/74	1974/75	1975/76	1976/77	1977/78	1979/80
Field Crops (Cereals)	480,161.4	509,084.3	1,047,935.5	877,285.4	1,104,749.5	997,749.2	1,027,173.1	1,150,596.9
Vege-tables	71,545.8	46,757.8	139,176.4	145,209.5	122,101.7	131,138.4	107,908.4	133,992.2
Dates	83,389.9	87,464.6	153,938.5	134,416.2	152,867.2	135,625.8	147,694.6	152,715.0
Other Fruits (Perennials)	8,773.6	8,382.3	19,244.6	20,311.6	15,777.1	29,269.2	32,319.9	29,410.7
Fodder Crops	57,868.7	72,684.5	160,098.2	120,619.2	86,949.6	117,421.3	104,402.8	73,397.8
Total Area	701,739.4	724,373.5	1,520,393.2	1,297,841.9	1,482,445.1	1,411,203.9	1,419,498.0	1,540,112.6

Note: hectare = 10 Donum

Source: Calculated by the author from Tables A2 and A5.

Table A7

Trends of Output and Area Under Cultivation in Saudi Arabia
(area in hectares, output in tons)

Crop	1950		1957		1963	
	Area	Output	Area	Output	Area	Output
All field crop	67,838	71,300	155,400	168,815	175,929	236,235
Wheat	21,800	20,200	43,800	42,836	89,890	129,201
Barley	17,163	15,268	23,800	23,800	29,182	48,244
Vegetables	4,128	29,226	3,000	21,240	33,132	345,485
Dates	21,752	150,000	43,900	23,500	22,281	257,606
All Crops*	95,316	355,657	207,400	547,805	242,829	925,326

*Excluding alfalfa and other fodder crops.

Source: G. S. Medawar, A Report to the Ministry of Agriculture on Agriculture in Saudi Arabia. (Unpublished report January 1965); Adopted from:
Al Turki, M. I., Accelerating Agricultural Development in Saudi Arabia, Ph.D. dissertation, 1971, p. 19.

Table A8

Estimate of Annual Agricultural Production in Saudi Arabia 1380-1383 A.H. (1960-1963 A.D.)

Crop	Cropped Area (in ha)	Average Yield (Kgms/ha)	Output (tons)	Average Farm Price (SR/ton)	Value (SRooo's)	Percent of Total Value	Percent of Total value Excluding Barley & Barsim
Wheat	89,890	1,437	129,210	460	59,482	9.8	14.2
Barley	29,182	1,653	48,245	380	18,349	3.0	--
Rice	1,789	2,354	4,211	360	1,516	0.3	0.4
Dukhun (sorghum)	15,200	1,022	15,528	330	5,124	0.8	1.2
Dura (millet)	34,578	1,007	34,818	260	9,053	1.5	2.1
Barsim (alfalfa)	25,086	80,200	2,011,551	84	169,157	27.9	--
Others	5,290	800	4,232	300	1,270	0.2	0.3
Total Field Crops	201,015		2,247,786		263,951	43.5	18.2
Onions	2,161	10,301	22,260	400	8.904	1.5	2.1
Watermelons	12,206	14,047	171,455	448	76,806	12.6	18.3
Tomatoes	3,692	11,778	43,487	812	35,313	5.8	8.4
Eggplant	1,067	6,000	6,402	540	3,457	0.6	0.8
Squash	1,614	6,000	9,684	540	5,229	0.9	1.2
Okra	1,133	6,000	6,798	540	3,671	0.6	0.9
Pumpkins	5,419	6,000	32,514	400	13,005	2.1	3.1
Green beans	345	6,000	2,070	400	828	0.1	0.2
Dry beans	286	6,000	1,716	400	686	0.1	0.2
Melons	2,465	13,239	32,635	400	13,054	2.2	3.1
Cucumbers	335	6,000	2,010	540	1,085	0.2	0.3
Snake cucumbers	309	6,000	1,854	540	1,001	0.2	0.2
Other vegetables	2,100	6,000	12,600	400	5,040	0.8	1.2
Total vegetables	33,132		345,485		168,079	27.7	40.0
Dates	22,281		257,606	360	92,738	15.3	22.1
Fruits	11,487		86,000	960	82,560	13.6	19.7
TOTAL	267,915		2,932,645		607,328	100.0	100.0

Source: Adapted from: Asfour, E., Saudi Arabia--Long Term Projection of Supply of and Demand for Agricultural Products, 1965, p. 60.

Table A9

Estimated Numbers of Livestock and Poultry
in Saudi Arabia (1972-1979/80)

	1972	1973	1974/75	1975/76	1976/77	1977/78	1979/80
Camels	58,652	---	104,922	106,590	121,743	155,956	164,367
Cattle	185,920	---	281,753	320,704	316,428	352,669	398,726
Sheep	1,237,770	---	2,147,850	2,243,336	2,271,317	2,699,182	2,948,587
Goats	755,210	---	1,242,216	1,577,426	1,730,617	2,077,535	2,240,468
Poultry	331,313	---	826,302	741,595	636,414	472,554	606,191

Source: Derived from Ministry of Finance and National Economy--Central Department of Statistics; Statistical Year Book, Issues 10 to 17, 1974 to 1981.

Table A10

Number of Poultry & Livestock Population in the Surveyed Agricultural Areas in Saudi Arabia (1380-1382 A.H.)

Livestock	North (1382 H)	East (1380 H)	Qassim (1381 H)	West (1382 H)	Jedda & Mecca (1382 H)	Medina (1382 H)	Total
Cattle	2,270	8,296	17,870	9,460	510	2,230	40,636
Camels	13,280	1,565	17,650	2,290	1,510	7,080	43,375
Sheep	54,240	18,257	114,750	75,680	16,100	24,700	303,727
Goats	49,620	20,169	39,110	18,790	8,030	57,470	193,189
Horses & Asses	3,870	1,715	17,550	3,200	660	1,800	28,795
Poultry	22,840	96,105	38,730	8,900	7,000	12,610	186,185

Source: Adapted from: Asfour, E., Saudi Arabia--Long Term Projection of Supply of and Demand for Agricultural Products, 1965, p. 119.

Table A11

Trend in Agricultural Production in Saudi Arabia:
1950 to 1979/80 (Tons)

Year	All Field Crops	Vegetables	Dates	All Crops*
1950	71,300	29,226	150,000	355,657
1957	168,815	21,240	23,500	547,805
1963	236,235	345,485	257,606	925,326
1971/72	119,834	613,770	187,846	973,781
1972/73	113,007	335,957	363,911	861,752
1973/74	300,965	610,896	360,095	1,321,570
1974/75	289,445	718,060	337,283	1,425,566
1975/76	283,434	539,394	256,903	1,141,993
1976/77	296,024	681,735	382,297	1,427,821
1977/78	302,463	473,063	411,388	1,271,658
1979/80	267,289	696,876	342,286	1,402,861

* Excluding alfalfa and other fodder crops.

Source: Calculated by the writer from Tables A1 and A3.

Table A12

Indexes of Total Agricultural Output in Saudi Arabia

1950 to 1979/80 (1950 = 100)

Years	Field Crops	Vegetables	Dates	All Crops
1950	100	100	100	100
1957	236.8	72.7	15.7	154.0
1963	331.3	1,182.1	171.7	260.2
1971/72	168.1	2,100.1	125.2	273.8
72/73	158.5	1,149.5	242.6	242.3
73/74	422.1	2,090.3	240.1	371.6
74/75	405.0	2,456.9	224.9	400.8
75/76	397.5	1,845.6	171.3	321.1
76/77	415.2	2,332.6	254.9	401.5
77/78	424.2	1,618.6	274.3	357.6
79/80	374.9	2,384.4	228.2	394.4

Source: Calculated by the writer from Table A11.

Table B-1

Quantity of Imported Principal Livestock, Poultry and Eggs (Numbers) in S.A.
(Page 1; 1963-1971)

	1963	1964	1965	1966	1967	1968	1969	1970	1971
Cattle and Buffaloes	14,838	16,483	26,808	28,529	9,247	71,678	87,556	46,464	47,495
Sheep	593,683	638,286	716,151	935,900	335,308	1,905,847	713,270	554,448	1,076,053
Goats	16,508	15,996	12,824	61,622	36,038	24,471	540,058	485,398	85,337
Camels	11,450	16,436	24,103	30,163	11,641	35,047	29,900	23,279	26,630
Live Poultry	---	980,396	1,535,182	2,377,707	1,477,663	1,186,760	1,602,254	1,637,700	2,716,611
Eggs in Shells	19,000	25,000	35,000	44,000	61,148	61,431	81,202	83,639	90,925

Table B-1 (continued)

Quantity of Imported Principal Livestock, Poultry and Eggs (Numbers) in S. A.
(Page 2; 1972-1980)

	1972	1973	1974	1975	1976	1977	1978	1979	1980
Cattle and Buffaloes	71,738	52	37,457	46,622	59,704	23,721	112,956	85,653	125,744
Sheep	1,449,179	548	1,036,998	956,292	1,122,837	1,653,389	3,021,233	3,332,576	4,162,011
Goats	14,588	698	62,369	348,254	172,982	201,820	728,577	328,408	244,597
Camels	22,293	20	19,865	35,405	38,988	20,626	28,985	15,366	17,856
Live Poultry	2,587,541	283	4,279,616	2,373,896	8,825,886	5,993,673	6,243,681	7,102,819	5,685,199
Eggs in Shells	80,341	88,547	109,792	119,964	170,845	233,910	282,739	278,715	270,355

Source: Adapted and calculated by the writer from: Ministry of Finance and National Economy, Statistical Year Book, Central Department of Statistics, 1965 to 1980.

Table B-2

Quantity of Imported Animal Products (tons), in S.A.
(page 1; 1963-1971)

	1963	1964	1965	1966	1967	1968	1969	1970	1971
Meat and edible offals	20	--	--	--	200	551	154	939	888
Dead Poultry	350	174	1,035	2,356	3,678	6,181	7,238	7,257	7,777
Fresh milk	--	--	--	--	--	1,901	2,107	3,612	1,011
Fresh cream	--	475	257	--	752	766	626	764	832
Powdered milk	6,061	6,977	7,997	10,158	10,324	7,824	7,837	7,681	8,560
Milk-- semi-solid						4,283	3,717	2,844	7,521
Cream-- concentrated	--			--			--	694	460
Butter	393	514	761	1,121	1,536	1,317	1,778	2,050	1,991
Ghee	400	--	394	619	722	1,260	1,207	663	1,087
Cheese--white	926	937	1,245	1,835	1,768	2,354	2,380	2,561	2,913
Cheese-- balcon	1,108	1,170	1,535	1,625	2,198	2,383	2,787	3,697	3,241
Cheese-- others	--	--	--	--	--		316	--	454
Other items	--	--	--	437	--		--	--	--
Total	9,258	10,847	13,224	18,151	21,178	28,820	30,147	32,762	36,735

Table B-2 (continued)

Quantity of Imported Animal Products
(page 2; 1972-1980)

	1972	1973	1974	1975	1976	1977	1978	1979	1980
Meat and edible offals	1,502	1,489	1,722	4,010	8,410	21,272	37,259	56,789	70,946
Dead Poultry	10,107	11,974	17,990	36,542	69,778	100,839	109,367	140,364	193,338
Fresh milk	3,027	2,799	3,419	9,574	9,091	16,028	18,178	33,437	27,810
Fresh cream	362	649	17	78	693	386	606	3,005	6,607
Powdered milk	11,339	4,040	8,169	6,355	11,684	23,970	11,218	41,993	53,977
Milk-- semi-solid	1,875	14,266	117	20	10,210	17,546	16,829	18,955	23,837
Cream-- concentrated	583	1,788	1,156	1,348	2,737	4,485	7,099	4,382	4,933
Butter	2,238	1,911	1,787	2,908	2,678	4,897	8,308	10,853	13,326
Ghee	1,009	2,366	2,667	9,264	3,910	3,996	7,889	6,269	10,144
Cheese--white	3,414	3,545	4,123	6,034	9,975	9,256	16,302	15,019	17,829
Cheese-- balcon	1,242	1,647	669	1,155	580	783	1,142	1,095	1,925
Cheese-- others	2,582	4,703	3,718	5,094	6,078	8,890	14,996	23,509	19,380
Other items									
Total	39,280	51,177	45,554	82,382	135,824	212,348	259,193	355,620	444,052

Source: Adapted and calculated by the writer from: Ministry of Finance and National Economy, Statistical Year Book, Central Department of Statistics, 1965 to 1980.

Table B-3

Quantities of Imported Fresh Vegetables (tons), S.A.
(Page 1; 1963-1971)

	1963	1964	1965	1966	1967	1968	1969	1970	1971
Tomatoes	--	3,138	3,127	4,173	3,673	3,764	2,912	--	2,445
Onion and Leeks	11,455	12,961	13,927	17,026	15,458	13,146	12,735	5,466	8,846
Potatoes	7,372	7,615	8,939	10,105	11,666	12,047	13,512	13,240	14,973
Beans	4,542	4,480	6,194	5,491	4,876	5,010	5,512	5,835	9,171
Lentils	1,505	--	--	2,054	--	1,853	2,563	1,043	1,719
Chick Peas	1,664	1,583	2,228	1,484	2,599	2,975	2,733	2,638	1,783
Melons	--	--	--	--	5,505	--		--	--
Vegetables, fresh or chilled	--	--	--	--	--	1,219	1,633	7,892	1,525
Pepper	--	--	450	806	1,267	663	--	516	729
Others	--	--	--	--	1,110	--	--	--	--
Total	26,538	29,777	34,865	41,139	46,154	40,677	41,600	36,630	41,191

Table B-3 (continued)

Quantities of Imported Fresh Vegetables (tons), S.A.
(Page 2; 1972-1980)

	1972	1973	1974	1975	1976	1977	1978	1979	1980
Tomatoes	5,647	4,636	8,009	5,872	5,657	5,463	7,001	11,760	60,053
Onion and Leeks	13,669	8,332	13,837	21,010	25,145	38,530	52,467	65,635	88,109
Potatoes	16,006	13,602	19,912	6,970	27,397	45,550	49,781	59,811	70,361
Beans	8,831	5,921	7,861	5,772	8,639	6,329	5,836	7,301	7,167
Lentils	1,605	1,607	1,667	1,152	2,586	3,402	3,369	5,911	7,210
Chick Peas	1,888	2,049	2,967	2,183	3,142	1,785	2,028	3,155	4,155
Melons	--	--	--	--	--	--	--	--	--
Vegetables, fresh or chilled	4,149	25,068	244	518	8,927	32,406	61,199	113,375	89,941
Pepper	725	928	693	757	1,493	2,446	3,266	3,572	5,247
Others	--	--	--	--	--	--	--	--	--
Total	52,520	62,143	55,280	44,234	82,986	135,911	184,947	270,520	332,203

Source: Adapted and calculated by the writer from: Ministry of Finance and National Economy, Statistical Year Book, Central Department of Statistics, 1965 to 1980.

Table B-4

Quantity of Imported Fresh Fruits (tons); S.A.
(Page 1; 1963-1971)

	1963	1964	1965	1966	1967	1968	1969	1970	1971
Bananas	8,115	9,468	11,798	14,540	15,529	14,142	21,788	22,372	32,716
Oranges	12,493	15,600	18,716	21,375	22,261	27,821	32,072	33,844	40,492
Mandarines	--	--	--	--	1,389	--	--	--	--
Sour Lemon	--	--	1,489	2,310	2,550	3,097	--	--	--
Grapes	--	--	1,686	1,794	2,154	2,478	2,386	--	2,850
Apples	7,355	10,388	12,912	14,329	19,269	20,930	18,844	12,341	19,028
Pears	--	--	--	--	--	1,156	--	--	525
Others	--	2,031	41,129	--	2,198	2,206	--	--	3,748
Total	27,963	35,456	87,730	54,348	65,350	71,830	75,090	68,557	99,359

Table B-4 (continued)

Quantity of Imported Fresh Fruits (tons), S.A.
(Page 2; 1972-1980)

	1972	1973	1974	1975	1976	1977	1978	1979	1980
Bananas	19,040	35,862	27,253	36,573	44,897	68,066	66,048	91,816	135,323
Oranges	42,204	47,859	47,372	48,068	64,834	69,018	81,036	114,470	138,829
Mandarines	---	---	---	---	---	---	---	---	---
Sour Lemon	---	---	---	---	---	---	---	---	---
Grapes	4,210	2,281	3,925	6,085	5,293	3,776	9,716	17,835	25,646
Apples	28,315	26,449	23,305	31,093	39,772	67,130	66,974	76,377	74,549
Pears	790	472	1,338	1,097	1,815	2,513	1,962	5,843	8,861
Others	1,891	193	752	660	2,876	5,554	11,277	11,736	19,385
Total	96,450	113,116	103,945	123,576	159,487	216,057	237,013	318,077	402,593

Source: Adapted and calculated by the writer from: Ministry of Finance and National Economy, Statistical Year Book, Central Department of Statistics, 1965 to 1980.

Table B-5

Quantity of Imported Cereals (tons), S.A.
(Page 1; 1963-1971)

	1963	1964	1965	1966	1967	1968	1969	1970	1971
Wheat	50,627	48,854	81,617	74,172	164,660	32,718	67,580	131,557	79,187
Barley	25,451	42,705	27,954	57,303	58,347	9,539	13,332	36,933	47,589
Maize	22,165	30,483	31,744	26,674	26,799	15,292	13,706	17,896	53,411
Rice	120,348	98,876	140,510	142,349	125,394	153,211	150,730	202,027	200,341
Millet	---	6,402	5,608	3,090	---	2,799	---	---	3,199
Black Wheat	---	---	---	---	---	---	2,095	---	3,211
Wheat Flour	10,142	13,835	15,638	24,592	12,493	26,027	58,428	22,524	51,276
Maize Flour	---	---	---	---	---	---	2,840	---	539
White Flour	68,153	70,928	101,604	84,847	104,293	86,520	77,215	117,518	101,072
Sesame Seeds	1,655	2,016	2,597	2,150	2,590	2,169	2,714	2,668	3,768
Total	298,541	314,099	407,272	415,177	494,576	328,275	388,640	531,123	543,593

Table B-5 (continued)

Quantity of Imported Cereals (tons), S.A.
(Page 2; 1972-1980)

	1972	1973	1974	1975	1976	1977	1978	1979	1980
Wheat	101,699	77,108	68,252	12,649	26,446	36,940	29,307	289,657	172,249
Barley	14,338	2,287	16,006	11,260	23,477	118,991	53,389	544,485	1,229,309
Maize	66,972	58,767	56,773	57,702	116,764	196,487	304,732	463,399	662,856
Rice	125,349	111,694	137,350	91,365	243,983	161,476	404,070	340,907	356,152
Millet	1,544	5,273	3,757	2,979	10,299	1,148	4,082	1,050	834
Black Wheat	2,321	2,448	2,528	7,304	13,540	5,469	1,189	11,408	31,872
Wheat Flour	61,825	128,949	139,810	243,780	336,770	281,402	380,311	430,943	434,072
Maize Flour	1,647	448	1,446	1,672	4,472	498	1,287	16,435	27,241
White Flour	117,774	4,892	5,101	19,116	31,891	13,057	10,480	4,256	9,754
Sesame Seeds	3,084	3,045	3,918	5,016	4,963	3,504	5,337	7,358	6,745
Total	496,553	394,911	434,941	452,843	812,605	818,972	1,194,184	2,109,898	2,931,084

Source: Adapted and calculated by the writer from: Ministry of Finance and National Economy, Statistical Year Book, Central Department of Statistics, 1965 to 1980.

Table B-6

Quantities of Imported Other Agricultural Commodities (tons), S.A.
(Page 1; 1963-1971)

	1963	1964	1965	1966	1967	1968	1969	1970	1971
Coffee (beans)	3,618	5,778	5,368	6,831	5,213	7,480	8,247	5,839	6,644
Coffee (powder)	253	--	222	145	660	302	--	--	146
Tea	3,504	4,000	3,757	6,092	4,199	5,375	6,760	5,617	4,687
Cardamom seeds	678	490	590	494	711	445	597	649	934
Ginger	757	--	1,093	1,474	1,248	1,072	1,059	1,194	1,801
Watermelon seeds	--	2,287	1,862	2,668	--	--	--	--	--
Cereal Straw and Husks, or Hemp seed	--	3,760	3,130	--	--	2,885	5,120	--	3,392
Other Commodities	--	--	--	--	--	--	--	--	--
Total	8,810	16,315	15,941	17,704	12,031	17,559	21,783	13,299	17,604

Table B-6 (continued)

Quantities of Imported Other Agricultural Commodities (tons), S.A.
(Page 2; 1972-1980)

	1972	1973	1974	1975	1976	1977	1978	1979	1980
Coffee (beans)	6,626	7,081	7,113	6,863	5,487	12,392	7,323	6,173	7,576
Coffee (powder)	370	563	83	359	850	1,250	4,814	3,756	2,752
Tea	7,125	8,604	5,121	5,791	12,403	7,441	16,744	14,301	15,732
Cardamom Seeds	1,128	1,268	1,290	1,929	1,549	1,792	2,245	2,711	3,237
Ginger	2,050	1,078	1,626	1,529	1,805	1,700	2,340	3,949	1,594
Watermelon seeds	--	--	--	--	--	--	--	--	--
Cereal Straw and Husks, or Hemp seed	2,107	505	181	276	62	3,504	5,337	5,532	1,528
Other Commodities	--	--	--	--	--	--	--	--	--
Total	19,406	19,099	15,414	16,747	22,156	28,079	38,803	36,422	32,419

Source: Adapted and calculated by the writer from: Ministry of Finance and National Economy, Statistical Year Book, Central Department of Statistics, 1965 to 1980.

Table B-7

Quantity of Imported Fats and Oils and Their Products (Tons); S.A.
(Page 1; 1963-1971)

	1963	1964	1965	1966	1967	1968	1969	1970	1971
Cotton seed oil	1,333	1,432	2,029	2,014	2,508	1,690	2,225	1,177	2,199
Olive oil	340	572	492	463	734	783	868	667	1,411
Maize oil	--	--	--	333	--	889	1,099	1,195	2,907
Colza oil	--	--	--	--	--	--	946	--	30
Animal and Vegetable oils	--	--	--	--	--	2,126	865	9,485	19,933
Vegetable waxes	--	--	--	--	--	--	13,494	8,552	2,780
Vegetable ghee	9,251	12,233	17,181	14,413	19,643	14,359	--	--	--
Other Commodities	--	--	--	1,344	--	--	--	--	--
Total	10,924	14,237	19,702	18,567	22,885	19,847	19,497	21,076	29,260

Table B-7 (continued)

Quantity of Imported Fats and Oils and Their Products (Tons); S.A.
(Page 2; 1972-1980)

	1972	1973	1974	1975	1976	1977	1978	1979	1980
Cotton seed oil	882	568	400	830	994	2,878	481	2,910	2,508
Olive oil	1,230	1,109	1,079	882	1,469	1,343	2,123	3,007	6,875
Maize oil	1,857	2,691	4,005	5,630	6,178	14,139	26,321	42,943	42,080
Colza oil	183	--	17	--	92	--	--	23	72
Animal and Vegetable oils	20,590	5,274	3,437	5,166	2,135	1,472	891	660	1,713
Vegetable waxes	2,476	13,081	3,254	2,434	5,839	4,004	4,101	2,141	4,032
Vegetable ghee	--	--	--	--	--	--	--	--	--
Other Commodities	--	--	--	--	--	--	--	--	--
Total	27,218	22,723	12,192	14,942	16,707	23,836	33,917	51,684	57,280

Source: Adapted and calculated from: Ministry of Finance and National Economy, Statistical Year Book, Central Department of Statistics, 1965 to 1980.

Table B-8

Quantities of Imported Beverages, Prepared Foodstuffs (tons), S.A.
(Page 1; 1963-1971)

	1963	1964	1965	1966	1967	1968	1969	1970	1971
Prepared/ preserved beef or mutton	--	--	--	366	377	480	--	--	230
Preserved Fish	844	795	817	1,312	120,037	966	1,067	1,217	810
Sugar	18,740	76,400	56,030	120,393	25,362	90,987	68,742	69,120	80,467
Sugar Products	2,455	2,768	3,209	3,434	3,111	3,319	2,978	2,234	3,264
Other items of sugar	--	--	--	--	--	--	1,341	--	1,474
Chocolates or other food preparations containing cocoa	--	273	421	348	442	397	427	280	534
Macaroni & spaghetti	1,032	1,776	1,944	2,177	2,371	2,996	2,266	2,372	3,448
Biscuits	1,872	2,051	2,892	3,148	3,186	3,766	4,064	5,304	5,273
Olives and capers, preserved in vinegar	--	--	--	--	--	--	597	--	343
Olives and capers without vinegar	--	--	--	--	--	--	723	1,028	1,953

Table B-8 (continued)

Quantities of Imported Beverages, Prepared Foodstuffs (tons); S.A.
(Page 2; 1972-1980)

	1972	1973	1974	1975	1976	1977	1978	1979	1980
Prepared/ preserved beef or mutton	83	346	27	755	342	5,346	1,882	3,098	3,857
Preserved Fish	1,296	3,602	3,569	4,557	7,050	12,406	10,819	14,207	19,377
Sugar	114,892	104,946	41,056	15,776	65,364	141,929	83,112	168,249	272,562
Sugar Products	3,144	4,493	3,111	3,524	5,003	12,003	14,193	20,745	19,185
Other items of sugar	1,372	2,832	7,775	1,160	1,857	1,909	3,879	3,100	8,636
Chocolates or other food preparations containing cocoa	996	864	870	1,146	22,787	3,266	7,139	7,292	7,398
Macaroni & spaghetti	3,020	3,229	2,230	2,419	2,544	6,036	8,750	10,717	12,247
Biscuits	4,578	5,995	6,280	8,666	11,531	24,197	31,479	50,922	37,371
Olives and capers, preserved in vinegar	280	236	347	854	1,417	2,982	4,006	3,630	4,846
Olives and capers without vinegar	2,124	2,506	1,581	1,892	775	468	858	2,960	1,691

Table B-8 (continued)

Quantities of Imported Beverages, Prepared Foodstuffs (tons); S.A.
(Page 3; 1963-1971)

	1963	1964	1965	1966	1967	1968	1969	1970	1971
Tomato Paste	7,824	8,119	8,884	16,069	12,164	9,491	11,783	8,971	12,523
Other preserved vegetables, without vinegar	1,315	1,482	1,898	2,869	2,510	4,100	3,040	3,014	3,711
Jams or fruit juices	--	736	--	1,446	1,074	1,389	1,206	957	1,371
Other preserved fruits with sugar	1,254	1,258	2,001	2,103	2,573	1,884	2,198	1,880	2,105
Fruit juices	2,201	3,181	3,519	4,449	5,514	7,028	9,236	10,728	6,419
Tomato Juice	--	1,976	1,105	1,099	1,046	1,505	1,358	2,059	1,447
Vegetable Juice	--	--	--	--	--	--	494	--	972
Other food preparations, etc.	190	753	371	444	788	1,498	1,944	2,378	2,399
Mineral and acidated water	--	--	--	--	--	--	1,305	1,543	1,334

Table B-8 (continued)

Quantities of Imported Beverages, Prepared Foodstuffs (tons); S.A.
(Page 4; 1972-1980)

	1972	1973	1974	1975	1976	1977	1978	1979	1980
Tomato Paste	10,232	6,344	6,077	5,997	7,567	11,435	1,352	23,313	20,416
Other preserved vegetables, without vinegar	4,253	4,255	8,841	1,036	7,069	32,131	67,250	50,766	66,566
Jams or fruit juices	1,966	1,372	2,869	3,590	3,625	10,106	10,692	9,404	12,712
Other preserved fruits with sugar	1,756	3,886	2,325	1,785	2,664	9,833	10,684	12,962	14,881
Fruit juices	12,495	12,783	18,075	32,599	42,246	134,653	218,691	223,830	225,012
Tomato Juice	2,140	2,800	2,897	2,688	5,434	12,568	8,331	13,315	9,714
Vegetable Juice	1,292	4,763	2,943	1,833	2,833	478	4,031	4,817	6,058
Other food preparations, etc.	2,713	686	1,888	1,728	3,465	6,816	12,761	10,688	42,873
Mineral and acidated water	1,098	2,548	3,655	11,671	17,940	41,461	100,404	128,646	151,647

Table B-8 (continued)

Quantities of Imported Beverages, Prepared Foodstuffs (tons); S.A.
(Page 5; 1963-1971)

	1963	1964	1965	1966	1967	1968	1969	1970	1971
Lemonade	747	1,141	1,820	2,668	1,817	3,142	2,986	2,301	1,705
Vegetable products animal for feed	--	--	2,056	3,254	5,305	2,541	--	--	154
Other animal feeds	--	--	2,415	2,118	1,930	2,444	3,176	5,905	9,467
Tobacco	--	--	--	--	--	120	168	614	894
Cigarettes	366	322	210	158	219	2,419	3,201	4,551	3,807
Cigars	--	--	--	--	--	--	62	--	105
Jarak	--	--	--	--	--	981	1,091	1,614	1,617
Soups and broths, liquid, solid powder	--	--	--	416	516	313	--	--	--
Total	38,840	103,031	89,592	168,271	190,342	141,796	125,453	128,070	147,826

Table B-8 (continued)

Quantities of Imported Beverages, Prepared Foodstuffs (tons); S.A.
(Page 6; 1972-1980)

	1972	1973	1974	1975	1976	1977	1978	1979	1980
Lemonade	506	619	2,055	1,110	203	3,674	6,491	4,071	3,537
Vegetable products animal for feed	2,289	297	129	18	113	923	1,210	---	143
Other animal feeds	11,722	15,083	13,471	484	32,992	44,534	56,813	82,217	81,258
Tobacco	779	821	571	758	1,078	1,651	2,562	2,543	4,112
Cigarettes	3,832	8,572	5,173	5,056	7,733	11,997	15,288	15,126	17,720
Cigars	503	421	84	482	256	240	298	569	335
Jarak	1,906	2,733	1,005	2,279	2,880	18,233	3,539	9,222	7,611
Soups and broths, liquid, solid, powder	---	---	---	---	---	---	---	---	---
Total	191,267	197,032	138,904	113,863	256,768	551,275	686,514	876,409	1,051,765

Source: Adapted and calculated by the writer from: Ministry of Finance and National Economy, Statistical Year Book, Central Department of Statistics, 1965 to 1980.

Table B-9

Total Agricultural Imports (tons); S.A.
(Page 1; 1963-1971)

	1963	1964	1965	1966	1967	1968	1969	1970	1971
Cereals	298,541	314,099	407,272	415,177	494,576	328,275	388,640	531,123	543,593
Fresh Vegetables	26,538	29,777	34,865	41,139	46,154	40,677	41,600	36,630	41,191
Fresh Fruit	27,963	35,456	87,730	54,378	65,350	71,830	75,090	68,557	99,359
Animal Products	9,258	10,847	13,224	18,151	21,178	28,820	30,147	32,762	36,735
Fats, oil, and their Products	10,924	14,237	19,702	18,567	22,885	19,847	19,497	21,076	29,260
Beverages & Prepared Foodstuffs	38,840	103,031	89,592	168,271	190,342	141,796	125,453	128,070	147,826
Other Agricultural Commodities	8,810	16,315	15,941	17,704	12,031	17,559	21,783	13,299	17,604
Total	420,874	523,762	668,326	733,357	852,516	648,804	702,210	831,517	915,568

Table B-9 (continued)

Total Agricultural Imports (Tons); S.A.
(Page 2; 1972-1980)

	1972	1973	1974	1975	1976	1977	1978	1979	1980
Cereals	496,553	394,911	434,941	452,843	812,605	818,972	1,194,184	2,109,898	2,931,084
Fresh Vegetables	52,520	62,143	55,280	44,234	82,986	135,911	184,947	270,520	332,203
Fresh Fruit	96,450	113,116	103,945	123,576	159,487	216,057	237,013	318,077	402,593
Animal Products	39,280	51,177	45,554	82,382	135,824	212,348	259,193	355,620	444,052
Fats, oil, and their Products	27,218	22,723	12,192	14,942	16,707	23,836	33,917	51,684	57,280
Beverages & Prepared Foodstuffs	191,267	197,032	138,904	113,863	256,768	551,275	686,514	876,409	1,051,765
Other Agricultural Commodities	19,406	19,099	15,414	16,747	22,156	28,079	38,803	36,422	32,419
Total	922,694	860,201	806,230	848,587	1,486,533	1,986,478	2,634,571	4,018,630	5,251,396

Source: Adapted and calculated by the writer from: Ministry of Finance and National Economy, Statistical Year Book, Central Department of Statistics, 1965 to 1980.

Table B-10

Imports of Cereals and Cereals Preparations; S.A.
(Quantities in Tons)
1367 to 1381 A.H.

Hijra Year	Wheat & Wheat Flour	Rice	Coarse Grains (Maize, Millet)	Other	Total
1367	10,028	6,538	2,176	293	19,035
1368	64,608	29,266	6,092	735	100,171
1369	22,954	40,498	2,326	521	66,299
1370	30,967	54,082	265	708	86,022
1371	36,252	41,997	6,532	1,340	86,121
1372	53,769	44,695	15,450	1,475	115,389
1373	48,848	52,828	13,850	1,724	117,250
1374	65,999	60,020	4,005	2,780	132,804
1375	60,420	84,460	2,903	2,471	150,254
1376	112,292	71,338	25,737	5,227	214,594
1377	86,368	64,108	8,709	3,403	162,588
1378	88,596	101,554	17,840	11,878	219,868
1379	110,934	116,596	24,482	6,051	258,063
1380	113,239	77,828	36,666	3,119	230,862
1381	92,135	79,725	22,974	2,929	197,763

Source: Asfour, E., Saudi Arabia--Long Term Projection of Supply of and Demand for Agricultural Products, 1965, p. 112.

Table B-11

Imports of Animal Feed, S.A.
(Quantities in Tons)
1367 to 1381 A.H.

Hijra Year	Barley	Other	Total
1367	147	88	235
1368	2,299	369	2,668
1369	1,258	660	1,918
1370	1,119	1,755	2,874
1371	2,751	370	3,121
1372	5,310	973	6,283
1373	5,911	511	6,422
1374	5,254	598	5,852
1375	16,280	935	17,215
1376	14,581	1,037	15,618
1377	11,410	2,065	14,015
1378	21,044	3,373	24,417
1379	27,879	4,280	32,159
1380	38,584	5,716	44,300
1381	16,057	5,642	21,699

Source: Asfour, E., Saudi Arabia--Long Term Projection of Supply of and Demand for Agricultural Products, 1965, p. 115.

Table B-12

Imports of Fruits and Vegetables, S.A.
(Quantities in Tons)
1367 to 1381 A.H.

Hijra Year	Fresh Fruits	Dried Fruits & Nuts	Canned Fruits	Fresh Vegetables	Canned Vegetables	Total Fresh Fruits and Vegetables	Total Canned Fruits and Vegetables	Total
1367	1,735	359	268	2,569	161	4,304	429	5,092
1368	4,861	506	587	4,356	601	9,217	1,188	10,911
1369	2,444	440	1,224	5,289	1,437	7,733	2,661	10,834
1370	5,488	748	1,634	5,560	1,801	11,048	3,435	15,231
1371	5,977	820	1,201	8,275	1,573	14,252	2,774	17,846
1372	16,344	1,309	2,238	12,311	2,286	28,655	4,524	34,488
1373	21,049	1,416	2,264	15,770	2,865	36,819	5,129	43,364
1374	13,551	2,107	2,481	16,402	3,474	29,953	5,955	38,015
1375	22,905	1,354	5,629	17,079	5,406	39,984	1,035	52,373
1376	23,416	7,261	4,820	18,223	8,428	41,639	13,248	62,148
1377	24,126	1,057	4,460	19,079	7,632	43,205	12,092	56,354
1378	33,872	1,172	5,661	25,433	8,629	59,305	14,290	74,767
1379	36,872	621	3,645	30,710	8,791	67,582	12,436	80,639
1380	32,064	339	3,533	26,944	8,045	59,008	11,578	70,925
1381	34,171	699	3,872	28,014	11,881	62,185	15,753	78,637

Source: Asfour, E. Saudi Arabia--Long Term Projection of Supply of and Demand for Agricultural Products, 1965, p. 113.

Table B-13

Imports of Animal Products in Saudi Arabia
(Quantities in Tons); 1367 to 1381 A.H.

Hijra Year	Live Animals, Meat and Meat Preparations	Milk & Cream Fresh & Prepared	Fats	Other Dairy Products (Cheese, Honey)	Fish: Fresh, Dried & Canned & Preparations	Total
1367	21	na	45	59	1,273	1,398
1368	300	na	658	127	1,621	2,706
1369	959	na	4,232	205	1,107	6,503
1370	(900)	na	1,583	228	1,180	3,891
1371	846		4,178	249	1,552	6,825
1372	2,117	709	4,094	556	2,219	9,695
1373	2,896	2,349	3,718	537	1,820	11,320
1374	3,219	9,804	5,474	1,281	2,045	21,823
1375	4,513	4,795	5,244	1,355	2,512	18,419
1376	7,565	4,383	7,238	814	1,564	21,564
1377	5,094	3,820	4,618	1,207	2,108	16,847
1378	6,395	4,017	7,560	934	1,356	20,262
1379	7,358	4,356	11,840	925	1,457	25,936
1380	8,321	4,553	9,022	954	1,383	24,233
1381	10,853	4,934	8,547	1,135	1,290	26,759

Source: Asfour, E. Saudi Arabia--Long Term Projection of Supply of and Demand For Agricultural Products, 1965, p. 111.

Table B-14

Imports of Sugar, Sugar Preparations, Coffee, Tea, Chocolate and Preparations, Spices; S.A. (Quantities in Tons); 1367 to 1381 A.H.

Hijra Year	Beet and Cane Sugar	Other Sugars, Molasses, Confectionary	Coffee	Tea	Cocoa, Chocolate & Preparations	Spices	Total
1367	9,160	329	3,057	891	16	973	14,426
1368	21,439	477	3,040	923	33	936	26,848
1369	19,478	712	2,968	1,206	56	1,058	25,478
1370	19,984	899	3,507	1,479	16	1,567	27,452
1371	20,510	826	3,212	1,472	33	1,683	27,736
1372	22,551	984	3,289	1,480	70	1,596	29,970
1373	28,849	984	3,439	1,447	84	1,680	36,483
1374	38,471	1,197	4,209	2,483	48	1,664	48,072
1375	36,105	1,571	3,637	3,025	75	2,906	47,319
1376	38,487	2,159	4,831	2,751	74	4,090	52,392
1377	51,467	1,868	4,253	2,304	59	2,836	62,787
1378	48,418	2,000	5,356	3,941	79	2,133	61,927
1379	46,267	2,752	5,001	2,555	210	2,019	58,804
1380	63,182	2,423	4,362	2,683	125	2,509	75,284
1381	71,761	2,416	5,608	3,214	134	2,385	85,518

Source: Asfour, E., Saudi Arabia--Long Term Projection of Supply of and Demand for Agricultural Products, 1965, p. 114.

Table B-15

Imports of Cereals and Cereals Preparations (tons); S.A. 1367 to 1381 A.H.

Hijra Year	Wheat & Wheat Flour	Rice	Maize & Millet	Barley	Others	Total
1367	10,028	6,538	2,176	147	293	19,182
1368	64,608	29,266	6,092	2,299	735	103,000
1369	22,954	40,498	2,326	1,258	521	67,557
1370	30,967	54,082	265	1,119	708	87,141
1371	36,252	41,997	6,532	2,751	1,340	88,872
1372	53,769	44,695	15,450	5,310	1,475	120,699
1373	48,848	52,828	13,850	5,911	1,724	123,161
1374	65,999	60,020	4,005	5,254	2,780	138,058
1375	60,420	84,460	2,903	16,280	2,471	166,534
1376	112,292	71,338	25,737	14,581	5,227	229,175
1377	36,368	64,108	8,709	11,410	3,403	123,998
1378	88,596	101,554	17,840	21,044	11,878	240,912
1379	110,934	116,596	24,482	27,879	6,051	285,942
1380	113,239	77,828	36,666	38,584	3,119	269,436
1381	92,135	79,725	22,974	16,057	2.929	213,820

Source: Calculated by the writer from Tables B-10 and B-11.

Table B-16

Imports of Agricultural Commodities (tons)
(1367-1381 A.H.; 1947-1961 A.D.)

Hijra Year	Cereals	Animal Feed	Fruits & Vegetables	Animal Products	Other Commodities	Total
1367	19,035	235	5,092	1,398	14,426	40,186
1368	100,071	2,668	10,911	2,706	26,848	143,204
1369	66,299	1,918	10,834	6,503	25,478	111,032
1370	86,022	2,874	15,231	3,891	27,452	135,470
1371	86,121	3,121	17,846	6,825	27,736	141,649
1372	115,389	6,283	34,488	9,695	29,970	195,825
1373	117,250	6,422	43,364	11,320	36,483	214,839
1374	132,804	5,852	38,015	21,823	48,072	246,566
1375	150,254	17,215	52,373	18,419	47,319	285,580
1376	214,594	15,618	62,148	21,564	52,392	366,316
1377	162,588	14,015	56,354	16,847	62,787	312,591
1378	219,868	24,417	74,767	20,262	61,927	401,241
1379	258,063	32,159	80,639	25,936	58,804	455,601
1380	230,862	44,300	70,925	24,233	75,284	445,604
1381	197,763	21,699	78,637	26,759	85,518	410,376

Source: Calculated by the writer from Tables B-10 through B-14.

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