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The Importance of Farm Management in the Under-Developed Economics

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THE IMPORTANCE OF FARM MANAGEMENT IN THE UNDER-DEVELOPED ECONOMIES

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INTRODUCTION

Throughout the history of mankind there always have been famines, disease, and poverty in some parts of the world, and this has been because of economic under-development to a great extent. For nearly a century after the publication of Adam Smith's "Wealth of Nations" in 1776, economic development was the main interest of economists. In the late nineteenth century, Europe, America, and Australia were developing rapidly and few people were interested in raising the incomes of Africans, Arabs, and Asians. Most of the countries in Africa and Asia were under European colonial rule, and being so, these countries were kept as sources of raw materials and markets for manufactuered goods by the mother country. Even then, however, there were economists and statesmen whose major concern was economic development.

It is probable that never before have the differences in the per capita gross national product (GNP) in different countries been as great as today. Although it may be impossible to prove this hypothesis because of lack of accurate statistical information for many historical periods, there can be little doubt the disparities that exist between the inhabitants of the highly developed countries and those that live in the under-developed economies[1] (countries) that comprise over two-thirds of the world population.

A glance at recent comparisons of per capita GNP among different countries suggest the magnitude of the gap. For example, the United

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[1]The term under-developed economies will be used for under-developed countries, although one could very well find some areas of highly industrialized countries still under-developed.

States had a per capita GNP[2] of $2,800 in 1960 while that of South Asia was only $80 and $52 in Afganistan and Nepal (Table 3-5).

Population is not the same in relation to other resources in the under-developed countries. There are countries in Africa and Latin America where there is shortage of male labor and there are countries like India, Egypt, and Jamaica where there is an abundance of male labor. According to W. Arthur Lewis, the marginal productivity of labor is negligible, zero, or even negative in these countries. (14) There is also great disparity within the individual countries because of differences in capital, technology, and pressure of population on land. Many people in the so-called backward or under-developed[3] countries are living perpetually on the brink of starvation.

Since the end of World War II, the problem of economic development of under-developed countries has received world-wide attention. Governments in countries of Latin America, Africa, the Middle East, and Asia have become increasingly "development minded." For the economic development of these countries much technical and capital aid is being given by industrially developed countries.

For purposes of this paper, under-developed countries are those with per capita incomes of less than $500 per year.

Most countries in Asia and Africa which are considered as under-developed acquire their independence from colonial powers after 1944. In a majority, if not in all of these newly liberated countries as

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[2] See Table 7.

[3] Backward, under-developed, or developing are synonymous terms.

well as countries in the Middle East and Latin America, agricultural growth[4] and development[5] are fundamental for over-all economic development because a majority of the population in these countries is directly involved in agriculture.

Industrial development is necessary for balanced growth and development of a country because it raises the standards of living of the people as well as complements agricultural development and growth, but agricultural development is essential in the initial stages of development of a traditional economy.

Frequently in under-developed countries, industrial development is viewed as the only means of a country's progress and agriculture gets little attention, sometimes it is even resented as an effort to maintain a peasant economy. The productivity in agriculture in these under-developed countries is so low that with changes in the methods of production there is great possibility of stimulating the economic development of the country.

Productivity depends upon the technical know how, forms of government, attitudes toward work, social relations, and kinds, qualities and quantities of physical resources.

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[4]Economic growth refers to a rising per capita level of national output within a given stage of development.

[5]Economic development refers to the process by which an economy passes from a less advanced stage to a more advanced one.

OBJECTIVES OF THE STUDY

The objectives of this study are: (1) to point out the cultural, economic, and institutional aspects of under-developed countries; (2) to analyze the role of agriculture in the economic development of under-developed countries; (3) to show the importance of farm management in under-developed countries.

General hypothesis in this report is that in the first stages of development of under-developed countries increased agricultural production makes substantial contributions. In under-developed countries 70 to 80 percent of the families are engaged in agricultural production, because of cultural, economic, and institutional factors development is very slow. By improving the quality of farm management agricultural productivity can be increased in the under-developed countries.

CULTURAL, ECONOMIC, AND INSTITUTIONAL ASPECTS OF UNDER-DEVELOPED COUNTRIES

Besides the natural resources available to the people in a particular country or region, there are cultural, social, and institutional aspects which are important in stimulating the economic activity. At present many economists, sociologists, and anthropologists are interested in how these factors affect the economy of a society.

Cultural Aspects

Progress is associated with change. Without change there can be no progress. Change is associated with cultural patterns of the society as Thomas C. Cochran wrote, "Growth or change is a cultural process in which it is difficult to segregate the economic factors." (4 p. 515) Professors Buchanan and Ellis have said, "The really fundamental problems of economic growth are non-economic," or as Irving Siegel recently put it, "Man's ends are overwhelmingly cultural." (3, p. 405) Change is an accepted fact in the western or economically developed societies whereas it is not so in under-developed countries.

In Latin America, for example, John Gillin has described Latin American culture as, "Characterized by logic and dialectics, rather than empiricism and pragmatics; the word is valued more highly than the thing." (6, p. 127) Another characteristic of Latin America is the too confident or optimistic attitude about the decision in mind. John Fayerweather, on the basis of studies made in Mexico, wrote about Latin culture, "It consists essentially of constructing plans without

much critical analysis and then assuming the plans to be an accomplished fact." (5, p. 65) The family conditioning in Latin America is such that more emphasis is placed on manners of politeness and obedience, and the child rearing is more family oriented as in under-developed countries of Asia, Africa, or the Middle East.

Another way of impressing the attitudes of Latin Americans, compared with that of North Americans, is that Latin Americans have an ego-focused image of a situation whereas North Americans have an objective approach based on empiricism and pragmatism.

Similar examples can be cited from Asia, Africa, and the Middle East. In Africa, for instance, people live in tribal factions and the people's attitudes are tribe-oriented rather than based on the individual's own convictions.

In all of these countries, leisure is considered more prestigious than work. Albert Hirschman has argued that, "The fundamental problem of development consists in generating and energizing human action in a certain direction." (10, p. 25) Probably, he had "toward economic pursuits" in his mind.

Traditional patterns are so deep-rooted in the minds, habits, and the whole philosophy of the people in the under-developed countries that they fear change. They have reached the present methods of doing things through generations of trial and error. Most of the people in these countries are so poverty stricken that they don't want to adopt new methods because they consider these a risk. Dr. Alvin Hansen wrote about the experience in India that the villagers in India generally are hostile to innovations. They are fearful that these untried methods might end up in failure and failure could mean starvation. (8)

People have rigid and static aspirations in the so-called under-developed countries. This results in a backward, sloping supply curve of effort. Kusum Nair wrote about her Indian experience,"In a situation of limited and static aspirations, if a man should feel that his requirements are just two bags of paddy per year, he works for two bags but not for more." (15, p. 36)

These attitudes are prevalent not only in Asia and Latin America but also in Africa and the Middle East. In the Middle East, for instance, to the rich people the universe is so little in which one competes that he does not pay much attention to his neighbors. That is a different world to him, but he cares intensely whether he has good or better car than his brother-in-law. Essentially those who are in a position to invest prefer to enjoy the luxuries of life rather than putting wealth into productive use and enjoying the fruits of it.

Institutional Aspects

Religious and social

If we classify the under-developed countries according to religions, we can very well see that these countries are predominantly Hindu, Buddhist, Moslem, or Catholic. Any religion has a great influence upon the economic activity of the people. W. Arthur Lewis argues that:

> Work is a means of acquiring goods and services, but it is also a way of life, and as such, it is more attractive to some men than to others. . . . These differences of attitude correspond often to differences of religion. Some religions teach that salvation, or spiritual fulfillment, is found mainly in meditation or in prayer. Others teach that it is found also or alternatively in work, both because work disciplines the soul, and also because we have a moral duty to make the best use of the talents and resources with which God has endowed us, and to serve our fellowmen thereby. (14, p. 173)

In some religions all living beings are considered sacred and working with one's hands is meanial, which certainly is not consonant with economic betterment.

Max Weber and R. H. Tawney reasoned that the rise of capitalism in the sixteenth century was a result of the reformation which provided the proper philosophical and ethical setting for the "capitalistic spirit" to flourish. Previous to that time the Catholic religion held in check the pursuit of profit and the accumulation of wealth which characterizes capitalism. (22, 24)

When the Mormon pioneers settled in the West, there was hardly any development, but because of cooperative effort, the right spirit and philosophy, they contributed the greatest to the growth and development of the Northwest. This spirit is reflected by Joseph F. Smith, nephew of Joseph Smith (the founder of the Mormon Church) when he said, "A religion which has not the power to save people temporally and make them prosperous and happy here (on earth) cannot be depended upon to save them spiritually and exalt them in the life to come." (20, p. 242) If we compare eastern religions, they seem to be quite opposite - social values are placed above economic gains which is a deterrent to economic development.

In some of the countries, assets are destroyed at death, or on other occasions, because of social customs and religious rituals. For instance, in Melanesia, agricultural produce is still often destroyed at death, and some small personal items as well.

Traditionalism in under-developed countries is built up to such an extent that there is cultural shock because of imported industrial

culture and great tension results. Everett E. Hagen argues that, "When social tensions appear in traditional societies and make the social structure of the traditional society seem undesirable and inequitable to some groups, these tensions seem not only to create new values in individuals from generation to generation but also to raise the level of creativity." (7, p. 18-19)

In every society people justify what they are. In traditional society, the position for this justification is acquired through inheritance whereas in an advanced or modern society it is acquired mostly because of one's own endeavors and this gives him a justification for his position.

Economic and political

In almost all the under-developed countries the ruling class is very small compared to the whole population. The elite are the rich people who can afford education and in most cases these people are educated in foreign countries and have enjoyed the luxuries of life. These are the people who rule the under-developed countries and have much of the wealth of the country which can be invested for productive purposes. But because of "international demonstration effect" these people seek to adopt technical, social, and educational standards which are inappropriate and wasteful in under-developed countries. There is also the stultifying effect of the white-collar tradition, which equates clean hands with high social status.

Keynes wrote that, "If human nature felt no temptation to make a chance, no satisfaction (profit apart) in constructing a factory, a railway, a mine, or a farm, there might not be much investment merely

as a result of cold calculation." (12) In the under-developed countries, either the elite spend most of the money on luxuries of life or the politicians make big investments in spectacular ventures such as building big highways and buildings or monuments, etc. without the knowledge of whether it is going to be productive or not.

Another thing which is generally found in the under-developed countries at present is the civil order and the attitudes of the people toward their governments. In these countries, people have become very conscious about their rights but not of their obligations. Pertaining to civil order, Louis J. Walinsky writes from his experiences in Burma that, "A common practice in the towns is to toss one's refuse over the fence into the yard of one's neighbor, whence it is frequently returned with interest." (25, p. 350)

The idea of cooperation in under-developed countries is entirely different than is found in industrial or western nations. John H. Provinse argues that:

> The concept of western cooperatives is a sophisticated, disciplined, highly-order code of behavior. It individualizes voting power, it de-emphasizes familial loyalties and personal favoritism, it employs rigid business principles, it demands a high degree of rationalized behavior. . . for most peoples not nurtured in the western world of contract and legal sanctions, the concept of cooperation is a complex of behavior and attitudes almost the exact opposite of the western cooperative idea. . . . The cultural root system of familial or neighbor "cooperation" as developed in a strongly oriented folk society may be more than just a limiting or delaying factor in establishing a cooperative venture of the modern type. It may be an insurmountable handicap, as difficult in fact as trying to introduce rice, coffee, or tobacco in a field of cogan grass. (17, p. 2-3)

In most of the under-developed countries, there is great disparity in the distribution of wealth. There are land tenure problems. Monopoly

and monposony are prevalent at the village level which is a misallocation of resources.

The Effects of Population Growth on Economic Development

The classical economic theory of population growth held that any rise in incomes tended to increase birth rates and decrease death rates. But according to sociologists, the theory of demographic transition explains the sequence as follows: The agrarian low income economy is characterized by high birth and death rates. The birth rates being relatively stable, whereas the death rates fluctuate in response to varying conditions. Then, as the economy changes to a more interdependent and specialized market dominated economy, the average death rate declines. It continues to decline under the impact of better organization and improved medical knowledge and care. Somewhat later the birth rate begins to fall. The two rates pursue a more or less parallel downward course with the decline in the birth rate lagging behind. Mortality rates are now stable from year to year and birth rates respond to individual decision making rather than to deeply imbedded customs and may fluctuate from year to year.

From the economic point of view, for rapid development in countries where there is a greater population in comparison with resources available, there is need of a check on population. The optimum population theory indicates that if a population is large, a negative growth or decline is advantageous for economic development.

When the supply of capital is small and inelastic as it is in the under-developed economies, a higher rate of population growth forces the diversion of capital to that of duplicate existing facilities: housing,

medical care, etc., and preventing investment in capital goods.

Keynesian analysis shows that in an under-developed economy, a higher schedule of saving rather than of consumption would help to generate higher incomes in the future by making possible a more rapid rate of investment. Rapid population growth tends to diminish the amount of capital available for increasing the average productivity of the work force and increasing the average per capita income.

Characteristics of Under-developed Countries

No specific description is applicable to all under-developed countries. Generally, they are characterized by:

1. Low per capita real income.
2. The economy is predominantly agricultural - 70 to 80 percent of the population in agriculture. A largely traditional agriculture at low levels of technology that does not stimulate innovation, does not see practical economic value in knowledge, and in which decision making is limited to a relatively few choices in production and consumption.
3. An "unbalanced" economy - that is, in a country, one sector of the economy, for instance agriculture, fairly well developed, and the other sector or sectors of the economy under-developed, for instance industry, mining, etc. Even in one sector of the economy, the development is not proportionate such as the well developed tea plantations in India and Africa but the common peasant still operating on traditional basis.
4. Unutilized natural resources.

5. Small amounts of capital equipment in relation to the labor forces.
6. The social structure is dominanted by the extended family (or caste, or tribe) with its traditional social and economic responsibilities that diffuse among many the benefits of above average performance by any individual, while at the same time, providing a kind of social security which individuals are reluctant to abandon.
7. Poor educational facilities, a general lack of modern medical facilities, and effective measures of environmental sanitation. A rural population living largely in a pre-literate, tradition-dominated folk culture.
8. Extensive prevalence of child labor. Inferiority of women's status and position.
9. General weakness or absence of the middle class. Few rich who control most of the productive resources, a large number of poor mostly laboring class and very few in between, tenants, middlemen, etc. The ruling class sharply distinct from the farmer or peasant of the village.

THE ROLE OF AGRICULTURE IN THE ECONOMIC DEVELOPMENT OF UNDER-DEVELOPED ECONOMIES

Although the ideas of Smith, Ricardo, Malthus, Marx, Keynes, and the neoclassical economists are important in the evolution of theories of economic development, they did not reveal the full significance of agriculture in the process of development.

The current interest in policies to foster economic development in under-developed countries has resulted in an enormous theorizing and investigation. First, there have been attempts to develop general theories and these usually stress the importance of a continued increase in capital accumulation in order for an economy to develop. Second, theories have been developed for specific influences such as the role of population, agriculture, and technical innovations on economic development of a country. Third, there have been historical studies which indicate that every economy has to pass through certain distinct stages. Fourth, there are studies which indicate the non-economic factor, such as human factor (cultural values, etc.) in economic development. Finally, there have been case studies made to identify specific problems which stimulate or inhibit economic development.

There has not emerged any single analytic framework or definite theory of economic development. However, our knowledge about some of the principles and relative importance of different factors at different stages has been advanced.

One aspect of the current interest in economic development is the importance of agriculture in the development of under-developed countries

since 70 to 80 percent of the population is dependent upon agriculture in these countries.

The importance of agriculture in economic development was emphasized by an English Economist, W. Arthur Lewis, in 1954, in an article where he wrote that it is not profitable or economically sound to put more emphasis on manufacturing and ignore agriculture, because agriculture and industry grow simultaneously. In case agriculture is stagnant, industrial development cannot be seen. (14)

Many other outstanding economists have since given special attention to the relation of agriculture to economic development. These efforts point to the necessity of a balance between agricultural and industrial development and growth, and correct the widely held notion that the economic expansion of under-developed countries must come through a "big push" on the industrial side alone.

Robert J. Alexander argues that agricultural development is necessary for four fundamental reasons: 1) to provide raw materials and food stuffs for urban industries and their workers, 2) to help in importing necessary capital equipment from abroad, 3) to free labor from other sectors of the economy, and 4) to provide a market for products of industry. (1)

A subsistance type of agriculture does not and cannot provide a market for industrial goods because people don't usually have the purchasing power. Under-developed agriculture does not have the potential of providing food stuffs and other raw materials for industries.

D. Gale Johnson points out the importance of agriculture as a source of national income in the first stages of economic development which also has been emphasized by other economists. He further emphasized that as

economic development proceeds the relative importance of agriculture as a source of national income declines. (11)

As real income of the people increase, the share of this income spent on food products declines and more and more of this real income's share is spent on goods and services which are produced outside the agricultural sector. Essentially what happens is that the industry begins to complement agriculture. Supply of land increases because of technological advancement and thereby agricultural production is increased.

W. W. Rostow in his stages of economic growth has emphasized the critical importance of agriculture at certain stages. Specifically, he identified five stages of historical growth: 1) traditional society, 2) precondition for take off, 3) take off, 4) drive to maturity, and 5) the age of high mass consumption. (18) Agriculture has a greater role to play in the second and third stages, the understanding of which is very useful.

In the precondition for take off, the insights of modern science are beginning to be translated into increased agricultural and industrial output. People begin to think about economic development. In this stage, agriculture makes a massive contribution to the economic development. According to Rostow, "Agriculture must supply expanded food, expanded markets, and an expanded supply of loanable funds to the modern sector." (18, p. 24) Historically, this stage is represented by Western Europe in the late 17th and early 18th centuries. At present, it is represented by under-developed countries of Africa, Middle East, Asia, and Latin America.

In the take off stage, "the forces making for economic progress, which yielded limited bursts and enclaves of modern activity, expand and come to dominate the society. Growth becomes its normal condition. . . . New techniques spread in agriculture as well as industry, as agriculture is commercialized, and increasing numbers of farmers are prepared to accept the new methods and the deep changes they bring to ways of life." (18, p. 7) This is Great Britian from 1783 to 1802, the United States from 1843 to 1860, and Japan from 1878 to 1900. Many of the under-developed countries such as India and China may be entering this stage.

There is general agreement that the technological possibilities for increasing food output in under-developed economies are good. Many of the under-developed areas have room for expansion of the cultivable land. D. Gale Johnson pointed out that Japan, even though it did not increase in cultivated land area substantially, yet increased production a great deal. In the half century from 1881-90 to 1931-40, the cultivated area of six major crops in Japan increased by only 18 percent. However, yields increased by 66 percent and production by 95 percent. (11)

THE IMPORTANCE OF FARM MANAGEMENT IN UNDER-DEVELOPED ECONOMIES

There is great support for the thesis that the decision-making process is the heart of farm management. The decisions of farm operators about what they will grow, the production practices used, and for whom they will produce, involves consideration of physiological, biological, and economic processes. This is true whether costs are monetary or psychic, and whether utility in consumption or market value is a measure of output.

In defining farm management, Heady and Jensen point out that farm management, as a sub-division of economics which considers the allocation of limited resources within the individual farm, is a science of choice and decision making and thus is a field requiring studied judgment. (9)

Decision making is an inescapable responsibility of every person and group in our present-day society. Generally a good decision maker either has educational background or sometimes many years of personal experience in the profession or enterprise in which he is involved. In under-developed countries, the literacy rate is very low (see appendix tables). Because of the low level of education, biological, technological, and economic processes and their interrelationship are not understood and do not influence to a significant extent the decisions made.

From the various studies made in rice growing countries, it was found that the differences in rice yields correspond closely with the differences in the schooling of rice growers. In countries where the level of this schooling is high, rice yields are also high. The new

combination of inputs that accounts for the large increases in rice yields in particular countries, notably in Japan, have not been adopted by rice growers in those countries where the farm people who grow rice are predominantly illiterate.

Lack of adequate or good farm management is reflected in various studies made by professional people. For example, Dr. Pasto concluded on the basis of his studies with FAO that the top 10 percent of the farmers in India and Pakistan obtain at least seven times as high crop and livestock production as the average of all farmers. Further he points out that in Pennsylvania, the ratio between the best rates and average rates is less than two. (16) In this study he indicated that this type of variability in the case of India and Pakistan was because of quality of farm management.

Lack of good decision-making results in low returns to the farmers, and as a consequence subsistence or low levels of living. Generally everything the farmer produces is for a market. In a subsistance economy, the major market is the immediate family of the farmer. A small part of the produce is exchanged or sold for the barest necessities of life such as salt, cloth, thread, needles, and shoes. In contrast, in a developed economy the market is basically commercial and very little of the products are consumed on the farm.

In under-developed countries, 80 percent or more of the family units reside in villages and work on individual farms. Their low level of education does not permit them to read and understand reports of the results of scientific and social studies. In spite of this characteristic, the aggregate of decisions made by these families is responsible for some of the most important decisions for the economic

development of the country, because their decisions affect the gross national product since much of the income in these countries comes from agriculture.

In under-developed countries, the agricultural land acres per capita is very small (see appendix tables). Therefore, the land holdings of most of the farms are small, sometimes less than an acre; also they have but small amounts of capital in the form of crooked plough, two or three bullocks or a horse and a wooden cart. Operating capital is limited to a great extent and is very hard to obtain because in very few of these countries facilities for agricultural credit exist. (Generally, family labor is employed on these small land holdings which, in many of the cases, do not take a great deal of interest and have any incentives.) But the farmers in these countries decide the kinds and amount of each crop planted, method of preparing seedbed, the time of planting seed, combination of other enterprises such as dairying, poultry and livestock, quality of labor and its use, cultivation and irrigation practices, selection and use of seeds and fertilizer, and the use of capital equipment.

Another result of poor decision making in the under-developed countries is the relatively low productivity per man year in the agricultural sector which is reflected by the proportion of population employed in agriculture that does not produce enough food and fiber for the whole population. In the United States, one farmer typically supports 27 or more non-food producing citizens. Compare this with the situation in Africa. According to Dr. Kimble, the productivity of African agriculture is so low that it takes anywhere from two to ten people; men, women, and children to raise enough food to supply their

own needs and those of one additional non-food growing adult. (13) This kind of variability was found in Iran by Dr. George T. Blanch of Utah State University where he concluded that in 1957 one United States laborer produced as much as 40 Iranian laborers. (2) Under such circumstances, there can be few purchases from industrial segments of the economy and also little savings. There can be little changes or improvements made in the farming operation as purchases of new equipment, seeds, and fertilizer.

Farm practices are changed by persons. New fertilizers do not occur by spontaneous generation; they are developed and used by persons. Crop and livestock enterprises do not arrange themselves; they are arranged by persons. That is where good decision making plays its vital role.

Demand for agricultural products and supply function of resources utilized in farm production are ever changing as we know from the developed countries, but in under-developed countries these functions are static. For proper utilization of these functions for growth and development, pragmatic decisions rather than traditional practices are necessary. With the advanced knowledge of farm management production of agricultural commodities will increase with minimum costs because of complementarity and supplementarity of enterprises and comparative and absolute advantages. New innovations, such as improved implements, better seeds, use of fertilizer, use of pesticides and insecticides, better breeds of cattle, proper enterprise combinations, need to be adopted by farmers in under-developed countries. We have various examples where with little reorganization the farmers increased their

total yield with little extra cost. For instance, a United Nation study made in Tiawan showed increases in agricultural production. The comparison was made between 1958 yields from the use of improved seed and fertilizer with the 1953 yields when these practices were not used. In percentage terms, the gains registered over this period were: barley 2, rice 15, peanuts 27, sweet potatoes 35, soy beans 41, wheat 66, and cotton 92. (23)

The modernization of Danish agriculture is a classic demonstration of the fact that new farm skills and new knowledge about agriculture can be a major source of agricultural growth in under-developed countries. The rapid growth of the agricultural sector in Israel during the 1950's, especially in dairy and poultry, required a high level of skill and knowledge with extensive use of labor. The success of Japan under Asian conditions is most telling. Despite the severe limitations imposed by the small areas of land that is suited for farming, the increases in agricultural production, including increases in labor productivity, have been remarkable because of better management practices. A high level of skill has been achieved in using new knowledge and modern material inputs not only in double cropping but in growing in some areas even three crops a year, and at the same time, increasing yields of each crop and producing more per farm worker.

The key to agricultural growth is in acquiring and using effectively some modern factors of production. Farmers in their role as demanders of the new factors accept them when they are truly profitable. But typically, farmers in traditional agriculture do not search for them.

From these studies, it can very well be concluded that there is

great need of good decision making in the under-developed countries. To achieve this goal, investment in farmers and dissemination of scientific knowledge are necessary. An example of the favorable effects of schooling of farm people upon agricultural growth under Asian conditions, the success of Japan is most telling. As Tang points out, Japan began to invest in rural education at a time when traditional agriculture could well justify the outlays even if the government had thought of education as an investment. His study shows that for the period 1880 to 1938, the investment that Japan made in rural education and research, development, and extension in agriculture produced a rate of return of 35 percent per year. (21)

Theodore W. Schultz also reached a similar conclusion. He points out that to command farmers to increase production is doomed to failure even though they have access to knowledge. Instead, an approach that provides incentives and rewards to farmers is required. The knowledge that makes the transformation possible is a form of capital, which entails investment--investment not only in material inputs in which a part of this knowledge is embedded but importantly also investment in farm people. (19)

As far as adequacy of sufficient capital is concerned, many U. S. and other international agencies are contributing a great deal towards financing projects which concern farmers such as extension, research, and community development programs. An example of such a case is the program carried out by Ford and Rockefeller foundations in various nations of Asia and Latin America. Inadequacy of sufficient foreign exchange in many of the under-developed countries to cover both the

needed imports of food and the imports required for investment for increasing domestic production is met by U. S. Public Law 480 to a great extent. Continuation and improvement measures in this area seem likely to be important.

SUMMARY AND CONCLUSIONS

In this report many of the causes which affect the economic growth of under-developed countries have been pointed out. The main one is the decision making of the farmer. Many economists and government officials have dealt with farm problems in the under-developed countries at the macro level, but the need is to deal at micro as well as the macro level. It is known that there is low productivity, low incomes, little savings, and very little investment. It is also known that cultural, institutional resources and technical know-how are factors affecting development and growth of these countries.

It is shown that quality of farm management is fundamental to the growth and development of any under-developed country. It has also been pointed out that the contributions of agriculture to the national growth and development are: increased food supplies, transfer of manpower to industry, capital formation, increased purchases from abroad, and increased demand for industrial products. These, in fact, are the result of improved farm management.

It is necessary, therefore, that the farmers in these countries make the right kind of decisions because they constitute about 70-80 percent of the population of the under-developed countries. Much of the GNP in the under-developed countries is from the agricultural sector of the economy. Farmers are the ones who change the economic destiny of these under-developed nations.

To see them make the right kind of decisions, it is necessary that educational facilities are provided and improvement in quality of labor

and other resources are realized. This is where farm management can make a great contribution to economic growth and development of the under-developed countries.

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APPENDIX

Table 1. Latin America population, area, GNP, and education

Country	Population (1961)			Area			GNP and Power			Power/ capita, kwhr/ year	Education
				Agriculture Land			GNP (1960)[a]				
	Total	Rate of growth	Density	Total	Total area	Per capita	Total dols.	Per capita	Invest. of GNP		Literacy
	mils.	percent	sq. mi.	1,000 sq. mi.	percent	acres	mils.	dols.	percent		percent
20 Republics - Total	204.1	2.7	25	7,754	24	6	58,842	295	--	330	55
Argentina	21.4	2.0	20	1,084	52	18	9,239	441	NA	463	86
Bolivia	3.5	1.4	8	424	2	2	216	62	NA	144	31
Brazil	67.4	2.5	21	3,280	15	5	12,916	196	15	352	50
Chile	7.8	2.6	27	286	18	5	4,465	585	9	590	80
Colombia	15.2	2.8	35	440	36	7	3,850	261	23	230	62
Costa Rica	1.2	4.2	62	20	19	2	402	343	18	350	88
Cuba	6.9	2.2	156	44	51	2	2,602	383	NA	414	76
Dominican Republic	3.1	3.7	165	19	26	1	700	232	NA	128	43
Ecuador	4.4	3.4	40	112	12	2	757	175	16	81	60
El Salvador	2.7	3.8	331	8	58	1	490	188	16	115	43
Guatemala	3.9	3.1	92	42	19	2	679	180	12	98	30
Haiti	3.5	1.2	331	11	31	1	250	71	NA	19	10
Honduras	2.0	3.3	47	43	25	4	384	197	14	54	35
Mexico	35.7	3.1	47	760	44	6	10,750	310	17	310	56
Nicaragua	1.5	3.7	27	57	10	3	310	210	5	125	40
Panama	1.1	3.0	37	29	13	2	418	396	17	247	70
Paraguay	1.8	2.6	12	157	3	2	200	113	10	85	68
Peru	11.2	2.8	22	514	11	3	1,790	165	19	286	50
Uruguay	2.9	1.7	40	72	83	14	1,272	450	NA	460	88
Venezuela	6.9	3.2	20	352	17	6	7,152	1066	NA	671	51
Other											
British Guiana	0.6	2.9	7	83	7	6	156	260	NA	133	80
British Honduras	0.1	2.7	10	9	5	1	27	300	NA	44	70
Jamaica	1.6	1.9	371	4	30	1	694	430	NA	295	72
Surinam	0.3	4.5	6	55	0.3	1	73	270	NA	294	75
Trinidad & Tobago	0.9	2.8	429	2	35	1	474	562	28	546	74

[a] GNP data unadjusted for inequalities in purchasing power among countries. NA, not available.

Source: The Planning and Execution of Economic Development by Louis J. Walinsky, pp. 190-200.

Table 2. Far East population, area, GNP, and education

Country	Population (1961)			Area			GNP and Power			Power/ capita, kwhr/ year	Education
				Agriculture Land			GNP (1960)[a]				
	Total	Rate of growth	Density	Total	Total area	Per capita	Total dols.	Per capita	Invest. of GNP		Literacy
	mils.	percent	sq. mi.	1,000 sq. mi.	percent	acres	mils.	dols.	percent		percent
Far East:[b]											
Including Japan	332.7	2.1	210	1,620	15	0.5	59,552	185	--	410	72
Excluding Japan	238.3	2.5	160	1,477	15	0.6	20,877	90	--	60	65
Burma	22.6	1.8	90	262	13	0.9	1,257	57	18	18	60
Cambodia	5.0	2.2	70	67	11	1.0	518	106	14	12	50
China (Taiwan)	11.5	3.5	830	14	26	0.2	1,487	133	20	350	90
Indonesia	95.2	2.3	160	576	12	0.5	6,347	69	NA	22	60
Japan	94.4	1.0	660	143	17	0.2	38,675	413	37	1,290	95
Korea, South	25.3	2.5	680	37	21	0.2	1,622	66	13	70	85
Laos	2.3	1.5	20	91	8	2.2	133	60	NA	5	15
Malaya, Fed.	7.1	3.2	140	51	17	0.8	1,930	280	NA	170	51
Philippines	28.7	3.2	250	116	28	0.7	3,996	144	10	90	75
Thailand	26.2	3.0	198	198	15	0.7	2,389	94	15	24	60
Vietnam, South	14.4	2.4	220	66	35	1.0	1,198	85	10	21	20-40

[a] GNP data unadjusted for inequalities in purchasing power among countries.

[b] Total for countries listed.

NA = Not available

Source: The Planning and Execution of Economic Development by Louis J. Walinsky.

Table 3. Near East and South Asia population, area, GNP, and education

Country	Population (1961)			Area			GNP and Power			Power/ capita,	Education
				Agriculture Land			GNP (1960)[a]				
	Total	Rate of growth	Density	Total	Total area	Per capita	Total dols.	Per capita	Invest. of GNP	kwhr/ year	Literacy
	mils.	percent	sq. mi.	1,000 sq. mil.	percent	acres	mils.	dols.	percent		percent
Near East Total[b]	112.8	2.6	50	2,355	35	4.7	23,465	215	--	120	30
Cyprus	0.6	2.0	159	4	57	2.3	225	402	15.6	382	65
Greece	8.4	0.9	165	51	68	2.6	3,193	384	25.2	264	77
Iran	21.1	2.5	34	629	16	3.1	4,190	203	18.4	21	10-15
Iraq	7.3	2.5	43	172	14	2.1	1,380	195	NA	106	20
Israel	2.2	3.5	275	8	60	1.4	2,448	1,158	24.1	1,096	90
Jordan	1.7	3.0	46	37	17	2.4	260	153	NA	NA	25-30
Lebanon	1.7	2.3	423	4	27	0.4	656	399	17.4	213	80
Saudi Arabia	6.0	NA	10	618	58	38.3	1,000	167	NA	NA	5 -15
Syria	4.7	3.5	66	71	59	5.7	702	154	NA	49	30-35
Turkey	28.4	2.9	95	300	70	4.7	5,372	195	11.0	104	30
U.A.R. (Egypt)	26.7	2.5	69	386	3	0.2	3,679	141	16.9	98	25
Yemen	4.0	NA	53	75	NA	NA	360	90	NA	NA	25
South Asia Total[b]	568.2	2.3	290	1,965	42	0.9	43,992	80	--	40	25
Afghanistan	13.6	1.0	55	251	19	2.2	700	52	NA	3	5
Ceylon	10.2	2.8	403	25	23	0.4	1,325	134	14.1	32	70
India	440.0	2.3	347	1,270	52	1.0	35,300	81	16.4	38	24
Nepal	9.7	1.9	179	54	28	1.0	477	52	NA	NA	5
Pakistan	94.7	2.2	259	365	26	0.6	6,190	68	10.3	38	15

[a] GNP data unadjusted for inequalities in purchasing power among countries.

[b] Totals for countries listed.

NA = Not available.

Source: The Planning and Execution of Economic Development by Louis J. Walinsky.

Table 4. Africa population, area, GNP, and education

Country	Population (1961)			Area			GNP and Power			Power/ capita,	Education
				Agriculture Land			GNP (1960)[a]				
	Total	Rate of growth	Density	Total	Total area	Per capita	Total dols.	Per capita	Invest. of GNP	kwhr/ year	Literacy
	mils.	percent	sq. mi.	1,000 sq. mi.	percent	acres	mils.	dols.	percent		percent
Africa Total[b]	231.5	2.2	20	11,356	31	8	28,670	130	--	170	15
Algeria	11.3	2.5	12	920	19	10	3,430	312	NA	119	NA
Angola	4.7	1.1	10	481	24	16	NA	NA	NA	31	5
Basuteland	0.7	1.6	59	12	94	10	NA	NA	NA	NA	NA
Bechuanaland	0.3	1.0	1	275	58	297	NA	NA	NA	NA	NA
Cameroon	4.1	1.0	23	183	35	10	285	70	NA	272	5 - 10
Central African Rep.	1.2	1.2	5	238	NA	NA	48	40	NA	7	5 - 10
Chad	2.7	2.0	5	496	47	53	108	40	NA	2	5
Congon (Brazzaville)	0.8	2.2	6	132	NA	NA	32	40	NA	33	10
Congo (Leopoldville)	14.5	2.6	16	906	22	9	1,245	90	NA	186	40
Dahomey	2.0	2.8	44	45	NA	NA	76	40	NA	4	NA
Ethiopia	19.1	1.4	42	457	60	9	823	44	7	6	4
Gabon	0.4	0.3	4	103	NA	NA	54	135	NA	45	5 - 10
Gambia	0.3	0.6	76	4	21	2	NA	NA	NA	15	NA
Ghama	7.0	3.0	76	92	22	2	1,492	223	21	59	25
Guinea	2.9	3.0	30	95	NA	NA	162	58	NA	8	10
Ivory Coast	3.4	2.3	27	125	NA	NA	520	160	NA	21	5 - 10
Kenya	7.0	2.2	31	225	28	2	655	NA	NA	54	20 - 25
Liberia	0.9	1.0	21	43	20	6	160	175	39[c]	152	5
Libya	1.2	1.5	2	680	6	23	194	162	111[c]	90	NA
Malagasy Republic	5.6	2.7	25	228	65	17	405	75	NA	17	30 - 35
Mali	4.2	2.0	9	465	NA	NA	218	53	NA	3	2 - 3
Mauritania	0.8	3.5	2	419	NA	NA	NA	NA	NA	1	NA
Mauritius	0.7	3.3	917	1	69	1	NA	NA	NA	90	50
Morocco	12.0	3.0	70	171	40	4	1,800	155	NA	85	15
Mozanbique	6.5	1.2	22	298	60	18	NA	NA	NA	21	2
Niger	3.1	2.7	7	459	11	10	116	40	NA	3	5
Nigeria	35.8	1.9	100	357	23	2	3,094	88	15	16	20

Table 4. Continued

Country	Population (1961)			Area			GNP and Power			Power/ capita,	Education
				Agriculture Land			GNP (1960)[a]				
	Total	Rate of growth	Density	Total	Total area	Per capita	Total dols.	Per capita	Invest. of GNP	kwhr/ year	Literacy
	mils.	percent	sq. mi.	1,000 sq. mi.	percent	acres	mils.	dols.	percent		percent
Fed. Rhod. Nyasaland	8.5	2.6	17	487	32[d]	12[d]	1,509	181	24	390	15-20
Northern Rhodesia	2.5	2.8	9	288	41[d]	30[d]	509	244	NA	671	20-25
Southern Rhodesia	3.1	2.9	21	150	17	5	765	249	NA	517	20-25
Nyasaland	2.9	2.2	59	49	28	3	154	54	NA	10	5-10
Ruanda-Urundi	5.0	3.1	240	21	74	2	NA	NA	NA	3	NA
Senegal	3.2	3.0	42	76	40	6	550	177	NA	45	10
Sierra Leone	2.5	1.9	89	28	81	6	172	70	NA	19	10
Somali Republic	2.0	1.8	8	246	28	24	56	42	16	7	5
Rep. of South Africa	16.2	2.6	34	472	80	15	7,240	409	21	1,474	35
Sudan	11.9	2.8	12	968	12	6	1,097	95	10	7	5
Swaziland	0.3	3.2	40	7	94	15	NA	NA	NA	NA	25
Tanganyika	9.4	1.8	26	362	18	4	519	56	NA	16	5-10
Togo	1.5	3.0	67	22	41	4	102	73	NA	3	5-10
Tunisia	4.3	2.2	90	48	40	3	648	155	15	66	25
Uganda	6.8	2.5	71	94	12	1	450	67	NA	59	25-30
Upper Volta	4.0	1.8	38	106	NA	NA	145	40	NA	2	5
Zanziber	0.3	1.2	304	1	59	1	NA	NA	NA	31	5-10

[a] GNP data unadjusted for inequalities in purchasing power among countries.

[b] Excludes Egypt. Totals on population, area, and GNP include countries not listed.

[c] Mainly foreign oil company investments.

[d] Arable land only.

NA = Not available.

Source: The Planning and Execution of Economic Development by Louis J. Walinsky.

Table 5. Regional comparisons between developed and less developed areas

Areas	GNP[a] per capita (1960)	Population growth per year	Power/ capita, kwhr/ year	Improved roads/ 1,000 sq. mil.	Literacy	Life expectancy	Daily caloric intake calories/ capita	People per physician
	dols.	percent		miles	percent	years		no.
Developed areas[b]	1,555	1.4	2,900	550	96	69	2,950	830
United States	2,800	1.7	4,725	1,000	98	70	3,220	740
Less Developed Areas	140	2.4	80	70	35	40	2,240	7,000
Africa (Excl. South Africa)	105	2.2	70	40	15	NA	2,460	17,800
Far East (Excl. Japan)	90	2.5	60	100	65	40	2,160	5,800
Latin American Republics	295	2.7	330	70	55	50	2,640	1,800
Near East and South Asia	100	2.3	50	130	25	40	2,100	4,700
Near East	215	2.6	120	40	30	45	2,360	2,400
South Asia	80	2.3	40	210	25	40	2,050	5,800

[a] GNP data unadjusted for inequalities in purchasing power among countries.

[b] Western Europe (excluding Greece, Portugal, Spain, Turkey, and Yugoslavia), Australia, Canada, Japan, New Zealand, Republic of South Africa, and the United States.

NA = Not available.

Source: The Planning and Execution of Economic Development by Louis J. Walinsky.

FACTORS AFFECTING THE DECLINE OF SHEEP NUMBERS IN UTAH

by

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INTRODUCTION

In the history of mankind and especially in pastoral societies, sheep have played a very unique and important part as a source of meat, milk, skins, and fiber. They have been a source of income to many people in the world. In the modern world as well, they have become adapted to nearly every kind of husbandry from nomadic types to intensively managed flocks on small farms and have thrived under almost every type of climatic conditions.

Domesticated sheep were introduced on the American Continent by the Spanish discoverers and conquerors in 1493. (7) They were also brought from England in 1607. (2)

Natural Resources and Sheep in Utah

Utah is located near the center of the 11 Western States. The area of the state is 84,916 square miles including 2,577 square miles of inland water surface.

Utah has a dry, continental climate with warm summers and cold winters. The average annual temperature is about 48 degrees. The growing season varies from more than 200 days a year along parts of the southern border to only about 60 days a year high in the Rocky Mountains. The average precipitation (rain and snow) each year is only about 13 inches. The high northcentral region receives the most moisture, about 40 inches a year. Northwest and southwest receive only 6 inches of moisture.

Much of Utah's land is barren and unproductive because of soil, topography, and lack of water. According to land use, the land of Utah may be classified as in Table 1. (8)

Table 1. Major land uses in Utah, 1949

Use	Acres	Percent
Cropland (including irrigated pastureland)	1,747,300	3.3
Rangeland open for grazing	46,286,500	87.8
Special use areas	3,205,900	6.1
Barren land	815,500	1.6
Not accounted for	646,240	1.2
Totals	52,701,440	100.0

Source: L. A. Reuss and G. T. Blanch. Special Report No. 4, 1951. Agricultural Experiment Station, Utah State University.

According to the figures in Table 1, about 88 percent of the land area of Utah is rangeland grazed by sheep and cattle during a large part of the year. In the summer these animals graze on the high mountain ranges, in the spring and fall on the foothills. In the winter many sheep graze on the semi-desert ranges.

Because most of the land areas being under range or forest and virtually no industry at the time of the settlement of the state, raising of livestock was and still is the only feasible use of much of the land. The first recorded account of sheep being maintained in

the area pertained to a dozen head of sheep which belonged to Miles Goodyear, who operated a trading post on the Weber River in 1847. In November of that year, these were sold to the Mormons of the Salt Lake Valley. (13) Thus began the sheep industry as an important commercial and distinct industry in the state.

Because of improved breeding methods and careful stock selection, Utah wool growers gained high prominence in the field of sheep and wool production. In 1878, Utah sheep were shearing 5.67 pounds of wool per head as compared to 1.5 pounds per head for sheep from New Mexico. (13) The establishment of several woolen mills in Utah about 1870 created a demand for finer wool.

Utah's sheep population increased rapidly between 1850 and 1890. The census of 1850 listed only 3,262 sheep; by 1860 the number had reached 37,332 head, and in 1870, 59,672 head were reported in Utah. By 1890, the million mark was officially passed.

The number of sheep has fluctuated in the State of Utah since 1890. The industry had a steady growth up to 1931 at which time a peak number of 2,935,000 head of sheep was reached and 2,692,000 head of sheep were shorn.

Types of Sheep Production in Utah

There are three main types of sheep production in Utah: range operation, feed lot enterprises, and farm flocks. Range operations are located generally throughout the state and utilize mountain and desert ranges of the State. Feed lot enterprises are located primarily along the Wasatch Front and in the Sevier Valley of Central Utah. Farm flocks are located in nearly every section of the state. Of all these

operations, the range operations account for the major portion of the sheep numbers in Utah.

Breeds of Sheep in Utah

About 5,500 sheep of eastern origin were in Utah by 1851. In 1853, Elisha Van Etten introduced 226 Spanish Merino rams which dominated the bloodlines of the state until the French Merinos began to appear around 1860. (13)

Breeders in Central Utah have favored Rambouillets since 1890. By 1920, Utah had nearly one-fourth of all purebreed Rambouillets in the United States. Rambouillet and Merino breeds have continued to dominate the sheep bloodlines in Utah to the present time. However, there has been cross-breeding to a great extent. The main reason for these breeds is that Utah, being endowed with large range areas, is most suitable for these sheep. These breeds flock together and in big herds they are easy to manage and control on the range. These breeds also are hardy, can tolerate the snowy winters, and use course unpalatable vegetation that predominate on much of the rangeland.

OBJECTIVES OF THE STUDY

The objectives of the study are:

1. To determine the trend in numbers of sheep in Utah in comparison with the Western States and the Nation.
2. To determine and analyze the factors influencing the decline in numbers of sheep in Utah.

The general hypothesis in this study is that the main reasons for the decline in sheep numbers are two.

1. Production factors - It will be shown in the study that the production resources for sheep are being shifted to other livestock because of comparative advantage.
2. Consumption factors - In the study it will be shown that consumption of sheep products has been declining; whereas, there has been an increase in consumption of other meats, fibers, and real income of the people.

TRENDS IN STOCK SHEEP NUMBERS AND POUNDS OF WOOL IN UTAH

The livestock and meat situation for January, 1964, reported 1,200,000 stock sheep in Utah which places Utah as seventh in stock sheep in the United States. Utah has held this position since 1959 when there were 1,301,000 head. In 1957, Utah's position was fifth and in 1958, sixth in the nation. Since the peak of 2,775,000 in 1931, the number had been on a fairly constant decline until 1950 when there were 1,269,000. There was a slight increase from 1950 to 1953 in sheep numbers which could be accounted for by the Korean War. The 20-year decline from 1930 to 1950 was 54 percent, an average of about 2.7 percent per year and from 1950 to 1960, 1.6 percent or about .16 percent per year in numbers of sheep in Utah. The decline from 1960 to 1964 is almost 4 percent. The trend from 1930 to 1964 computed with the equation $\hat{y} = a + bx$, which is a least squares line; "a" being the y-intercept and "b" the slope of the line, was $\hat{y} = 1775.14 + (-.50.06)x$. In percentage terms, on the average the trend could be stated as about -1.6 each year, (Figure 1, Appendix Table 6). The factors affecting the numbers will be explained in the later sections of this paper. However, it is of importance to see the trends in Utah and also in other states.

The decline in sheep numbers in Utah compared with the Western States and United States has been shown in Figure 2. In Figure 2, the relationship has been shown keeping 1930 as the base year. The decline in sheep numbers in Utah was more than in the Western States until 1950 and from 1950 to 1964, the numbers have gone up until 1957 and again down since then, (Figure 2, Table 1). On the whole, the

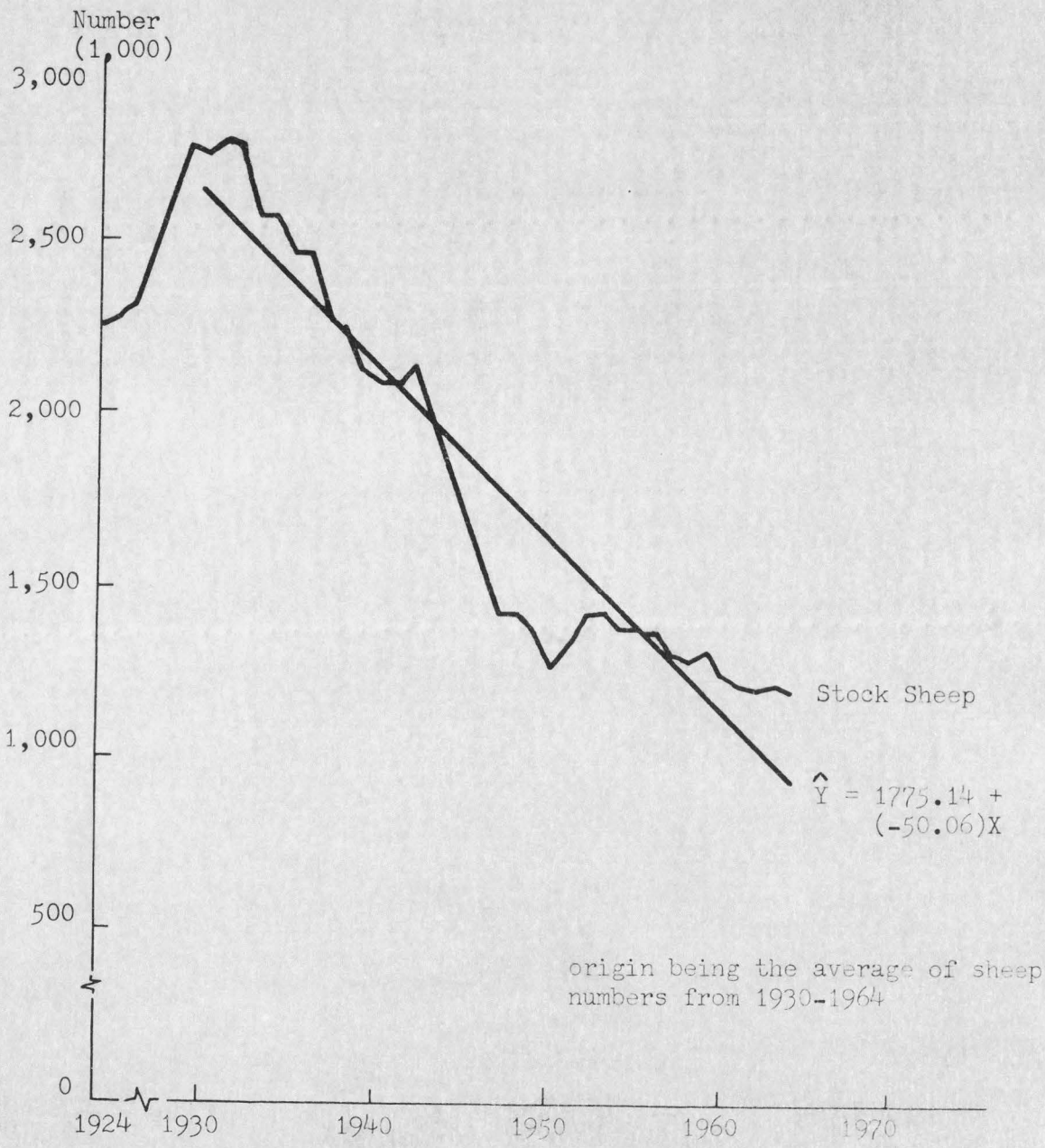

Figure 1. Stock sheep numbers in Utah, 1924-1964.

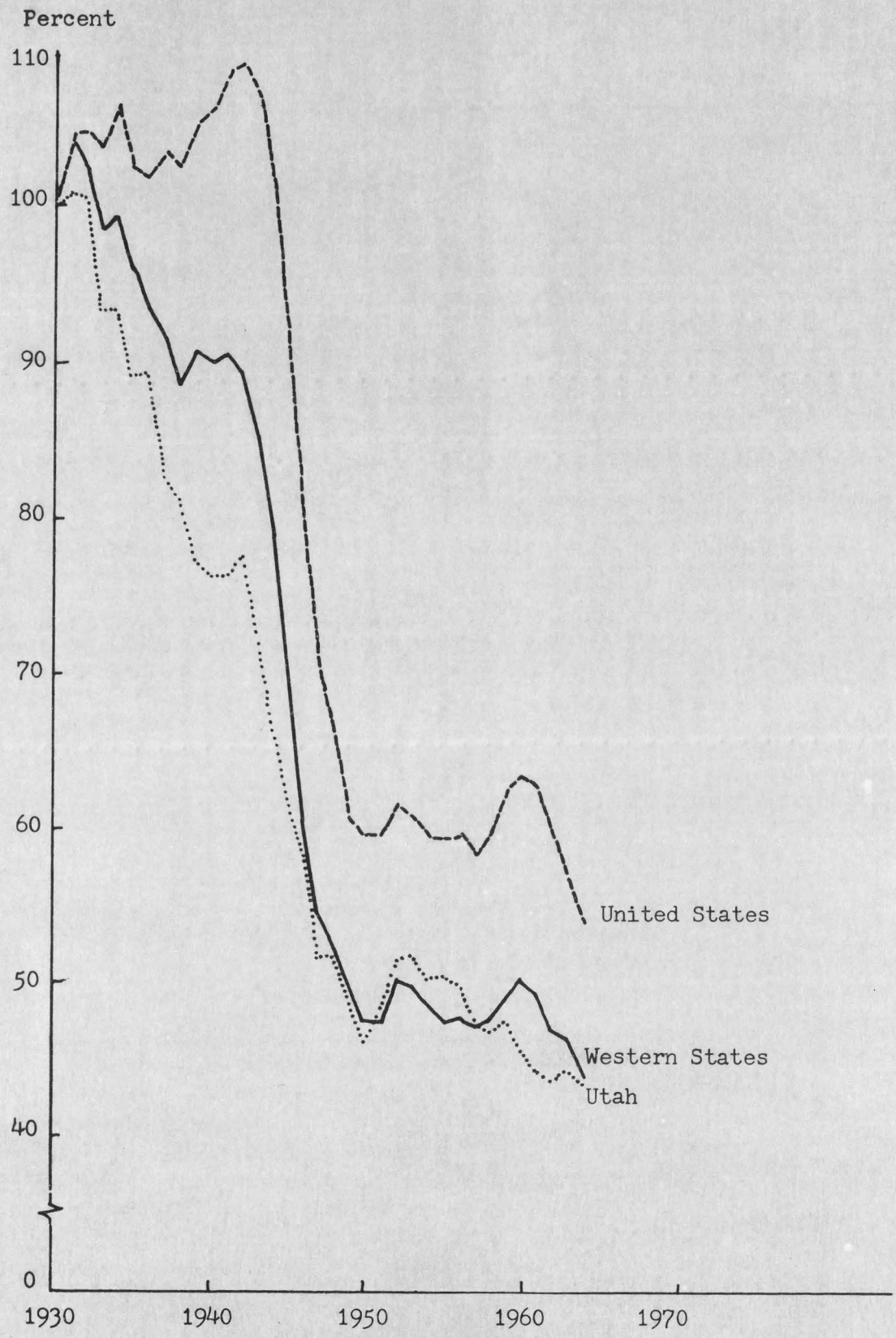

Figure 2. Percent of total number of stock sheep for specified geographic areas on January, 1930-1964 (base period = 1930).

decline in sheep in Utah is nearly the same as in the United States.

The number of sheep shorn in Utah also declined from a peak in 1931 of 2,692,000 head to 1,139,000 head in 1963. The trend line in this case was $\hat{y} = 1643.8 + (-45.6)x$ from 1931 to 1963. In percentage terms, the decline from 1931 to 1963 was 58 percent which could be explained on the average to be 1.76 percent each year, (Figure 3, Appendix Table 7). Moreover, the decline in pounds of wool in Utah from 1931 to 1963 was 54.2 percent or about 1.7 percent per year which is shown by the trend line or the least squares line $\hat{y} = 14971.88 + (-341.28)x$, (Table 2, Figure 4).

Although the number of sheep in Utah has been declining since the peak of 1931, in the case of other livestock the picture is different. The number of cattle and calves which supposedly is the main competitor of sheep for resources as well as at consumption levels has increased from 461,000 head in 1930 to 705,000 head in 1963, an increase of 52.9 percent or about 1.6 percent per year increase on the average. This trend has been shown by the least squares line $\hat{y} = 568.33 + (10.82)x$. At the same time, the number of hogs in Utah has declined slightly from 70,000 head in 1930 to 64,000 head in 1963 which is a decline of 8.6 percent or about .26 percent per year on the average and is shown by the trend line $\hat{y} = 83.18 + (-.466)x$, (Table 2, Figure 5).

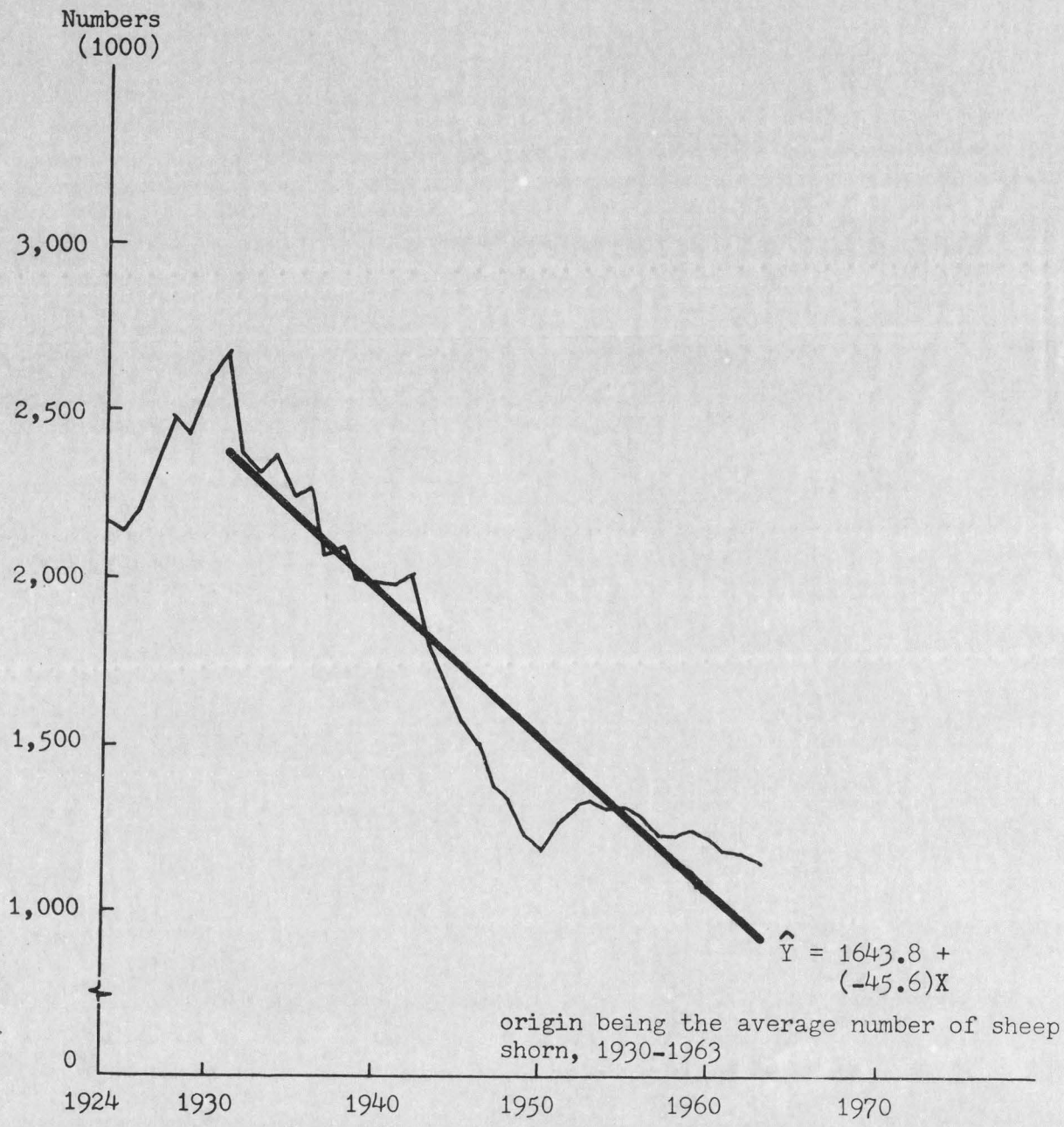

Figure 3. Number of sheep shorn in Utah (1,000 head), 1924-1963.

Table 2. Number of cattle, horses, and sheep permitted and permitted animal unit months grazing on the national forests (for selected years)

Year	Permitted Number*		Permitted Animal Months*	
	Cattle & horses	Sheep	Cattle & horses	Sheep
1940	118,192	713,331	596,536	2,315,809
1950	119,380	545,662	535,175	1,624,917
1955	118,052	508,047	502,050	1,453,882
1960	108,845	465,605	443,431	1,313,070
1961	107,398	455,891	439,216	1,289,471
1962	106,729	449,753	431,285	1,264,526

* Includes only animals over six months of age at time they enter the forest. Includes permits in non-use.

Source: Utah Agricultural Statistics, Revised, 1920-1962.

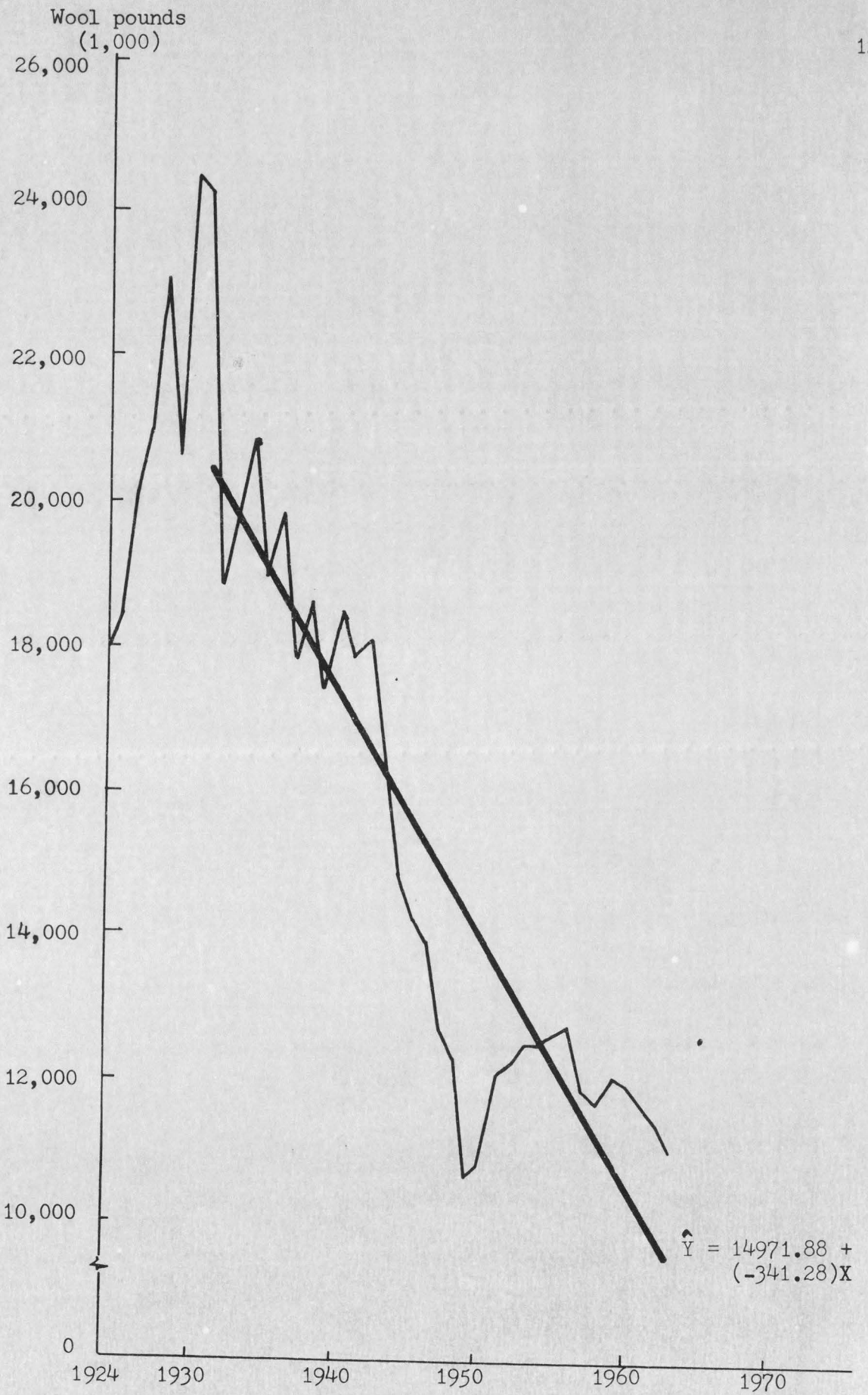

Figure 4. Total pounds of wool shorn in Utah, 1924-1960.

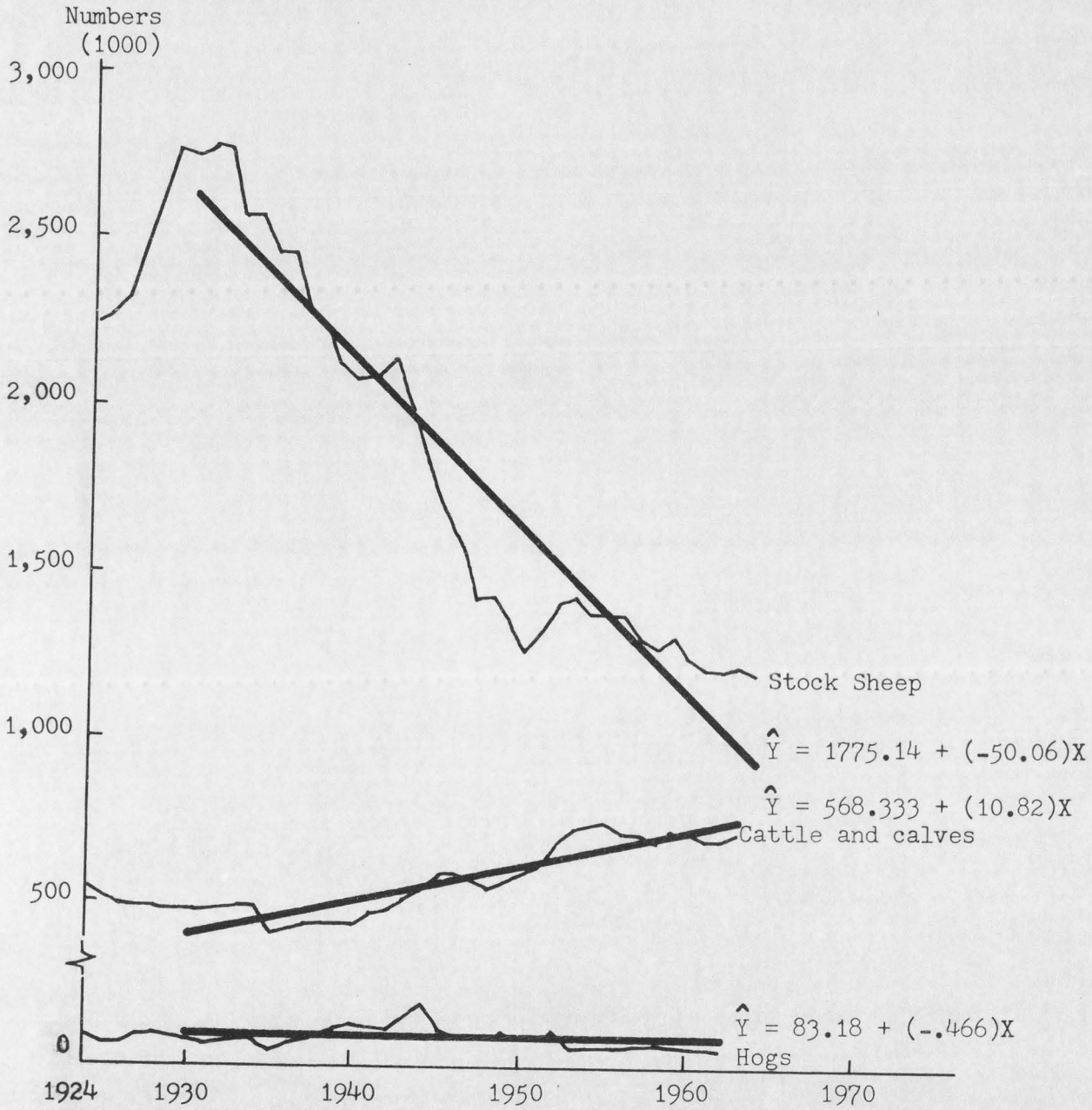

Figure 5. Stock sheep, cattle and calves, and hog numbers in Utah, January 1, 1924-1963.

FACTORS INFLUENCING THE NUMBER OF STOCK SHEEP IN UTAH

There are several factors influencing the decline in sheep numbers. These factors could be analyzed under two major headings: the factors that influence the production of sheep, and the factors that influence the consumption of sheep products.

Some Factors that Influence the Production of Sheep

The factors that influence the production of sheep in Utah in general are: grazing land use and the efficiency with which sheep products are produced. Any changes in grazing land use and efficiency of sheep production would explain the change in sheep numbers to some extent. Because the grazing land used for sheep has shifted to some other enterprise, then it probably would mean that sheep are not as profitable to produce as in some other enterprise. However, the assumption here is not being made that there is free competition for the land resource use; the reason being that some of the grazing land is better adapted for sheep and some better for cattle. Also, there might be restrictions imposed by government and private agencies on the number of animals grazing and on any shift between enterprises. But, it is assumed that there is some competition for the public land use.

If the efficiency of sheep production is improving such as higher wool production per sheep and higher lamb crop, lower death losses of sheep and lamb would tend to reduce costs and increase revenues. (Actual money costs and revenues, however, would depend on

prices and also would be related to competitive position of sheep.) The total revenue increase, in fact, would tend to give incentives to farmers to increase the numbers of sheep.

Changes in use of Utah grazing land

Out of 41 million acres of rangeland in Utah, 73 percent is federally owned and 5 percent state owned. The rest, 22 percent, is privately owned. Federally owned land is administered by the Bureau of Land Management (BLM) and the Forest Service (FS). These rangelands are of multiple use and there is a considerable pressure from competing uses. The major competing enterprise which the sheep industry faces in Utah is cattle. Also involved are use of the lands for recreational purposes such as hunting, fishing, camping, hiking, and preservation of native vegetation and also watersheds and erosion control, etc. However, grazing has been reduced in time and numbers of livestock on many acres of public land. Also, grazing has been discontinued on many acres of public land for several reasons. Some ranges have been overgrazed and grazing has been terminated until the range improves. Certain kinds of foliage are dangerous for livestock; such as larkspur, etc. Other areas may be devoted to recreational uses or watershed protection. Owing to these reasons also, livestock as a whole has decreased on public rangelands over the years.

The number of sheep grazing on national forests in Utah decreased from 713,331 head in 1940 to 449,753 head in 1962. This is 37 percent or an average of 1.6 percent decrease each year in numbers permitted. At the same time, there has been a decline of 45.4 percent in permitted animal unit months. This indicates that there is not only a decline in numbers of sheep, but also a decline in the amount of time they are

permitted to graze on these lands. There was a decline in numbers of cattle and horses grazed on Forest Service lands. The decline from 118,192 head in 1940 to 106,729 head in 1962 was 9.7 percent. At the same time, there was a 27.7 percent decline in permitted animal unit months (Table 2). This shows that besides a decline in numbers of cattle and horses, there was almost three-fold decline in the time they were allowed to graze. It is evident from the statistics that the time allowed for cattle and horses to graze has been limited more than sheep on Forest Service lands.

The number of sheep and goats on BLM lands in Utah declined from 2,647,638 head in 1939 to 1,089,808 head in 1962. This is a decrease of 58.8 percent. In the same period of time, the animal unit months declined 54.8 percent. This shows that though the sheep and goat numbers declined from 1939 to 1962, the length of the grazing period increased. The number of cattle and horses also has declined. The decline from 202,777 head in 1939 to 160,539 head in 1961 was 20.8 percent. In the same period of time, there was 17.5 percent decline in animal unit months, (Table 3). This again shows that though the number of cattle and horses has decreased, the time for grazing has increased. From the figures it can be explained that on BLM lands the number of livestock has been decreased but the time of grazing has been increased to some extent.

In case of BLM grazing lands, the number of big game has increased since 1944. The number of big game in 1944 was 95,675 head and increased to 284,425 head in 1961. This is an increase of 197 percent, (Table 4). The increase in numbers of big game shows that the sheep industry not only faces competition from the cattle industry but also from the

Table 3. Number of permitted livestock and animal unit months grazed on U. S. Bureau of Land Management lands in Utah (for selected years)

Year	Number of Head		Animal Unit Months	
	Cattle & horses	Sheep & goats	Cattle & horses	Sheep & goats
1939	202,777	2,647,638	1,005,233	2,051,490
1940	192,333	2,084,175	890,617	1,857,653
1950	196,171	1,313,296	1,085,229	1,275,715
1955	187,851	1,072,516	1,046,839	1,055,451
1960	165,133,	1,136,799	810,569	948,897
1961	106,539	1,089,808	829,174	927,925

Source: Utah Agricultural Statistics, Revised, 1920-1962.

Table 4. Number of big game and animal unit months using U. S. Bureau of Land Management land, Utah (for selected years)

Year	Number of Head	Animal Unit Months
1944	95,675	159,854
1945	116,108	184,255
1950	128,461	201,808
1955	124,208	201,622
1960	280,049	398,434
1961	284,425	403,038

Source: Utah Agricultural Statistics, Revised, 1920-1962.

recreational aspect. Clearly, the increased numbers of big game signify that people have begun to place more value on recreation in recent years.

Percent death losses

A decrease in percent death losses in sheep and lambs would indicate increased efficiency in production. This will decrease costs and thereby increase revenues assuming the prices and costs remain the same.

Death losses are caused by various factors. In Utah, death losses of sheep and lambs are caused by wild animals such as bear, cougar, coyote, and dogs. In Utah from 1930 to 1963, the average death loss of lambs varied between 2.8 and 7.1 percent per year; whereas, the average death loss among sheep varied between 8.3 and 17.6 percent, (Appendix Table 8).

Death losses in sheep also are affected by droughts, severe winters, and various diseases to which sheep are susceptible. From the data in Table 8, it is evident that there has been no decrease in death losses of lambs during 1930-1963, but death losses in sheep have decreased over time.

Wool production per fleece

The increase in wool production per fleece in Utah is remarkable. Generally, by the increase in wool production per fleece, the total revenue increases with little extra costs. The only costs involved would be of improving the breed through cross-breeding or selection and improved forage, which further is assumed that these costs will not be high enough to offset the gains from increased wool.

Sheep in central and northern Utah tend to produce a heavier fleece

because the sheep are larger than some of the herds in the more desert areas of the state; therefore, sheep in central and northern Utah bring greater revenues. The average production of wool per sheep shorn in Utah has shown an increase over the Western Station and the nation. The wool clip per fleece ranged from 8 to 10 pounds in Utah. In recent years, it has been 10 pounds per fleece, (Figure 6, Appendix Tables 8 and 10).

Percent lamb crop

The percent lamb crop, which is the number of lambs born as a percentage of breeding ewes, is one of the important keys to the success of sheep industry. As a general rule, as the percent lamb crop increases, net income increases. The average percent lamb crop for sheep in Utah varied from 65 percent to 90 percent, (Appendix Table 8). Weather, droughts, and economic factors undoubtedly influence these extremes. In comparison to the Western Station and the nation, the lamb crop in Utah remained at low levels and specifically from 1949-1963 (Figure 7, Appendix Table 9). The increase in lamb crop is remarkable in the Western States and was greater than in Utah or the nation. These relationships indicate that percent of lamb crop in Utah is not as efficient as in the case in the Western States or the nation. Therefore, lambs born as a percentage of breeding ewes need to be increased in Utah.

To summarize the factors that influence the production of sheep and their affect on the total numbers of sheep, it can be concluded that though increase in the pounds of wool per fleece create some degree of incentive in farmers to increase the number of sheep, shifts in grazing land use for sheep, percent death losses in sheep, and low

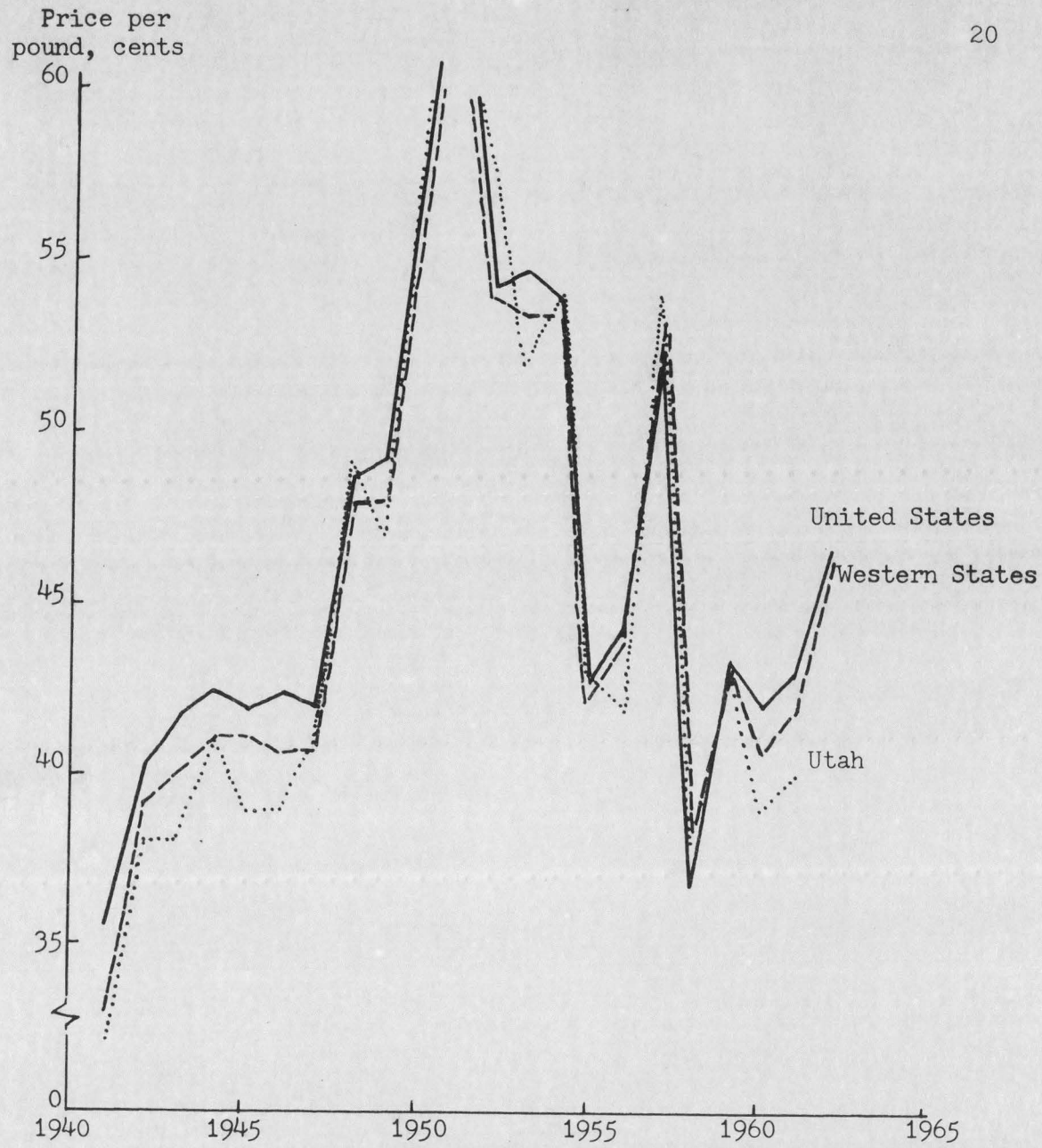

Figure 5a. Average prices received by farmers of wool per pound finer content (1940-1963)

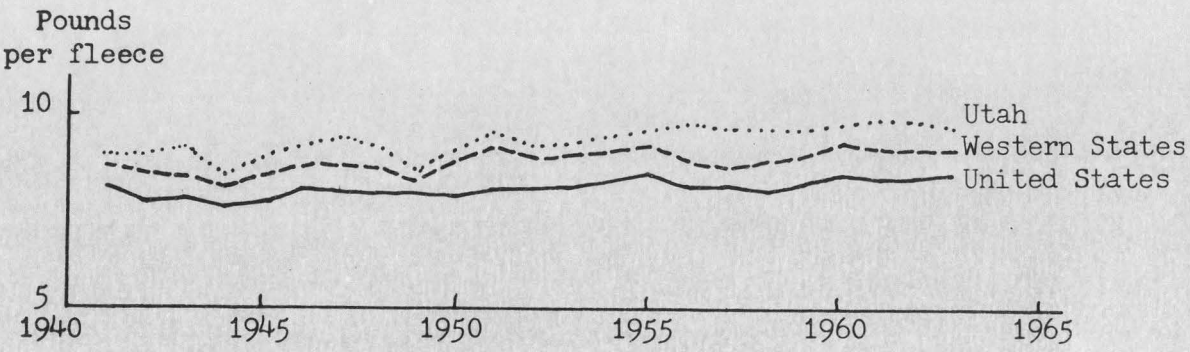

Figure 6. Pounds of wool per fleece in Utah, the Western States, and the United States.

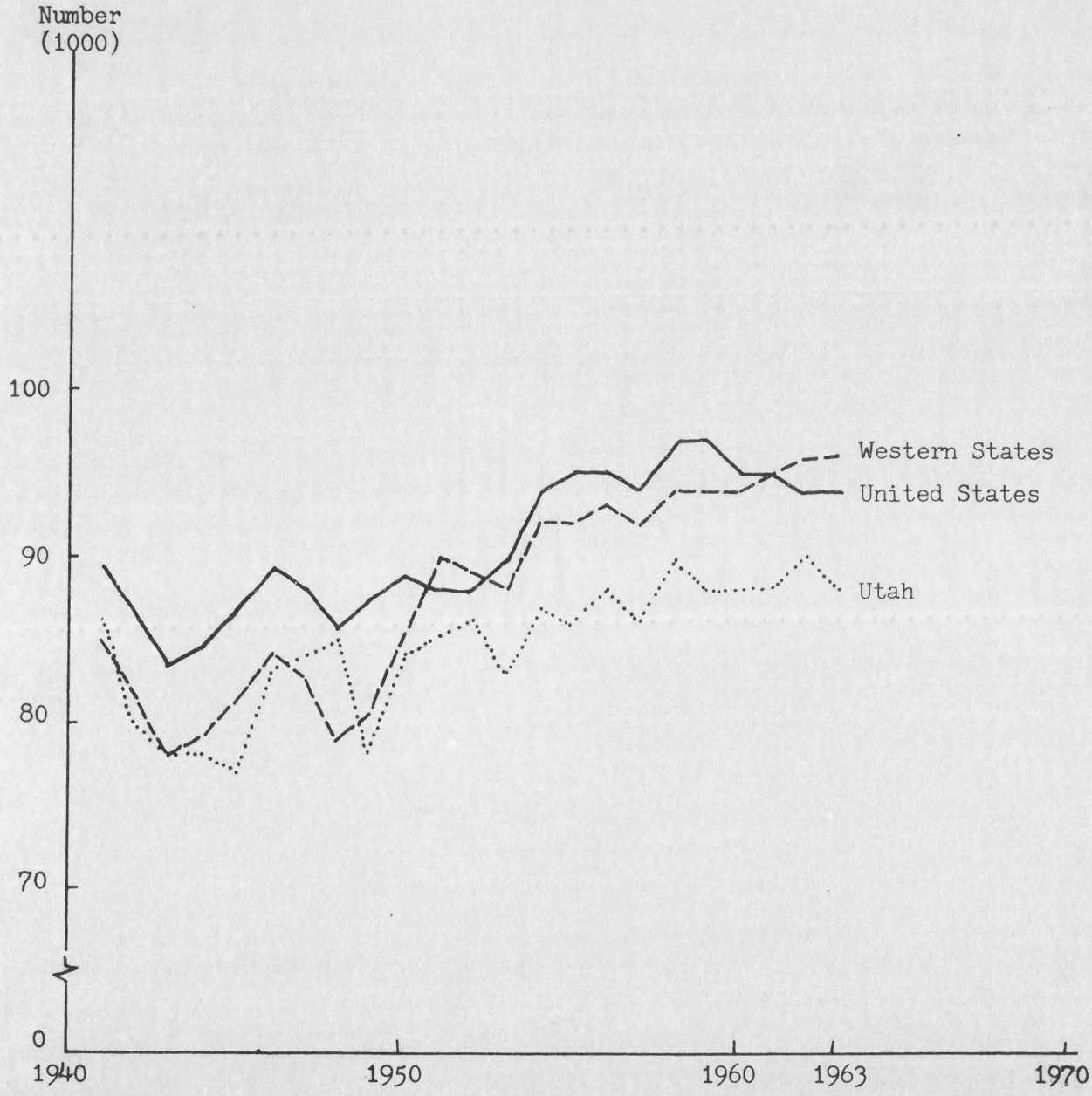

Figure 7. Lamb crop in Utah, the Western States, and the United States, 1941-1963.

percent lamb crop tend to decrease the number of sheep in Utah.

Some Factors Influencing the Consumption of Sheep Products

In general, demand of sheep products is influenced by various factors, such as competition with other meat products and fibers, consumer preferences, prices, and real income. Consumption of sheep products determines the number of sheep to a certain extent. If in general the consumption of sheep products is rising, the number of sheep will increase and vice versa, assuming prices of sheep products remain at the same level and other things being equal. However, consumption is not the only factor which will influnce the numbers; factors influencing the production are also of major consideration and have already been pointed out. Here, however, imports and exports of sheep products will also be considered as a factor influencing the consumption.

Competition with other meat products

Higher lamb and mutton consumption by the population has a direct effect on the numbers of sheep. In a country where there are no mores against beef and pork consumption, mutton and lamb face direct competition in consumption being a substitute product for beef and pork. Measures of increase or decrease in the consumption of lamb and mutton are the average per capita consumption over a long period of time.

In the United States, the average per capita consumption of mutton and lamb has declined over a period of time. The average consumption per capita of lamb and mutton from 1930-1939 was 6.8 pounds; whereas,

it was 5.1 pounds during 1962. During the same period of time, the consumption of other meats showed increases. Consumption of beef rose from 61.5 pounds to 94.6 pounds, pork from 62.3 to 64.0 pounds, and poultry from 15.9 to 37.2 pounds, (Figure 8, Table 5).

In recent years, deer and elk meat consumption in Utah has increased. The consumption of deer and elk in Utah might not have any significant effect on the sheep production in the United States, but it certainly has some effect in Utah sheep numbers because of the competition for resources utilized. There has been an increase from the average 1.27 pounds of 1930-1939 consumption of deer and elk to 13.52 pounds in 1962 in Utah. The data were used from big game harvest figures of Utah and computations were made according to Russell D. Lloyd that 56 percent of the live weight of deer and elk is eatable and also the number of deer and elk taken out of state was considered to be equivalent to the number brought in from out of state. (6) For computing per capita consumption, total pounds were divided by Utah population figures of each year, (Appendix Table 12). All this analysis substantiates the fact that Utah sheep industry faces competition from big game.

However, average per capita consumption figures of the past five or six years, especially from 1957, show some optimism because of the fact that consumption has increased from 4.2 pounds in 1957 to 5.1 pounds in 1962. It is unlikely, though, that sheep numbers in Utah will reach the previous levels, but it is possible that sheep numbers may stay at present levels or rise a little.

Competition with other fibers

Wool is used for several purposes. In recent years, it has been

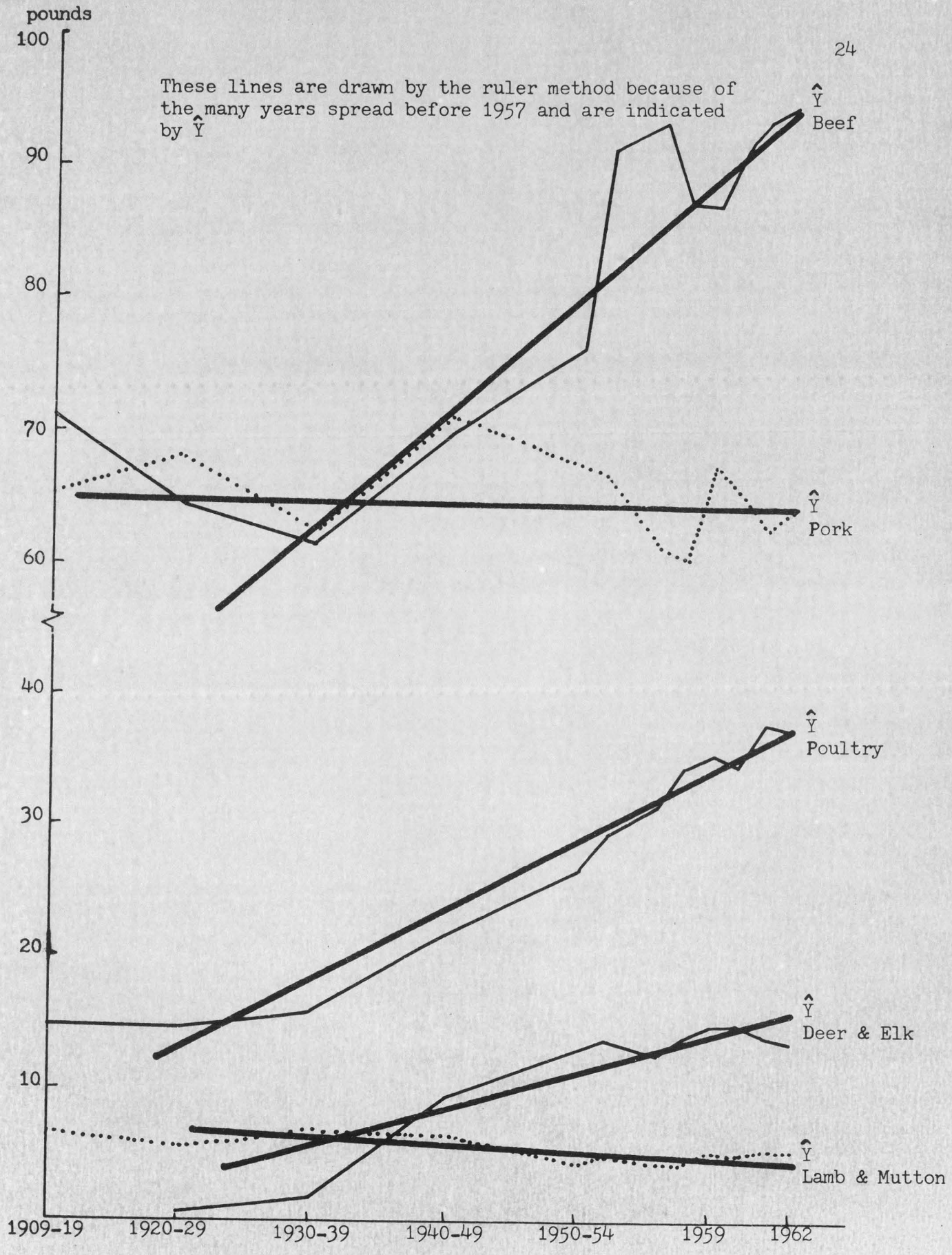

Figure 8. Annual United States per capita consumption of selected meats, 1909-1962.

Table 5. Per capita real income, per capita meat consumption in United States (selected years)

Period	Real income per capita[a]	Beef and veal	Pork	Poultry	Deer and elk[b]	Lamb and mutton	Total meat consumption	Mutton and lamb
								percent
1909-19	NA	71.6	65.1	14.4	NA	6.3	157.4	4.00
1920-29	453.35[c]	64.2	68.1	14.2	.27[d]	5.4	152.2	3.55
1930-39	393.15	61.5	62.3	15.9	1.74[e]	6.8	148.3	4.59
1940-49	733.00	69.9	71.3	21.8	9.26	6.2	178.5	3.47
1950-54	775.02	76.1	67.4	26.5	12.83	4.1	186.9	2.19
1955	807.56	91.4	66.8	29.0	13.83	4.6	205.6	2.24
1957	861.04	93.4	61.1	31.4	12.50	4.2	202.6	2.07
1958	849.45	87.2	60.2	34.1	13.61	4.2	199.3	2.11
1959	886.74	87.1	67.6	35.2	14.34	4.8	209.0	2.29
1960	895.79	91.4	65.2	34.4	14.42	4.8	210.2	2.28
1961	910.37	93.7	62.2	37.8	13.93	5.1	212.7	2.40
1962	956.56	94.6	64.0	37.2	13.52	5.1	214.4	2.38

[a]Purchasing power of the dollar computed according to value in 1939 = $1.00.

[b]Per capita consumption of deer and elk meat is for Utah only and is computed from the big game harvest data, (Appendix Table 12).

[c]1929 only.

[d]1925 only.

[e]Average of 1930 and 1935 only.

facing a tremendous amount of competition from artificial fibers in the United States. Consumption of wool indirectly influences the number of sheep in a country. If there were no substitutes available, it would mean that a considerable amount would be consumed. However, consumption is determined by various other factors such as climate, incomes, tastes, etc.

United States domestic wool production is mainly used for apparel consumption. Cloth making use in industry, factories and military purposes are the major wool-consuming areas in the United States. Wool of finer content per capita consumption has delined over the years in the states, except for the war years when consumption rose because of military purposes. The decline in per capita wool consumption was from 3.4 pounds in 1935 to 3 pounds in 1963, (Appendix Table 13). In percentage terms, the decline was about 12 percent in wool consumption, whereas the consumption of all fibers rose 45.9 percent in the same period. The share of wool has declined from 12.7 in 1935 to 7.6 percent in 1963, (Figure 9, Appendix Table 13). The main reason for the over-all decline is the general use of central heating in homes and office buildings in the United States. Before the central heating was in vogue, woolen clothes were used to keep the human body warm. The development of synthetic fibers in recent years poses great competition to wool products especially clothing. People in the United States have shifted to man-made fibers in recent years because it does not require as much care as woolen cloth and also is less expensive.

This decline in per capita consumption of wool in the United States, like lamb and mutton consumption, has a significant effect on sheep numbers in the country and in Utah.

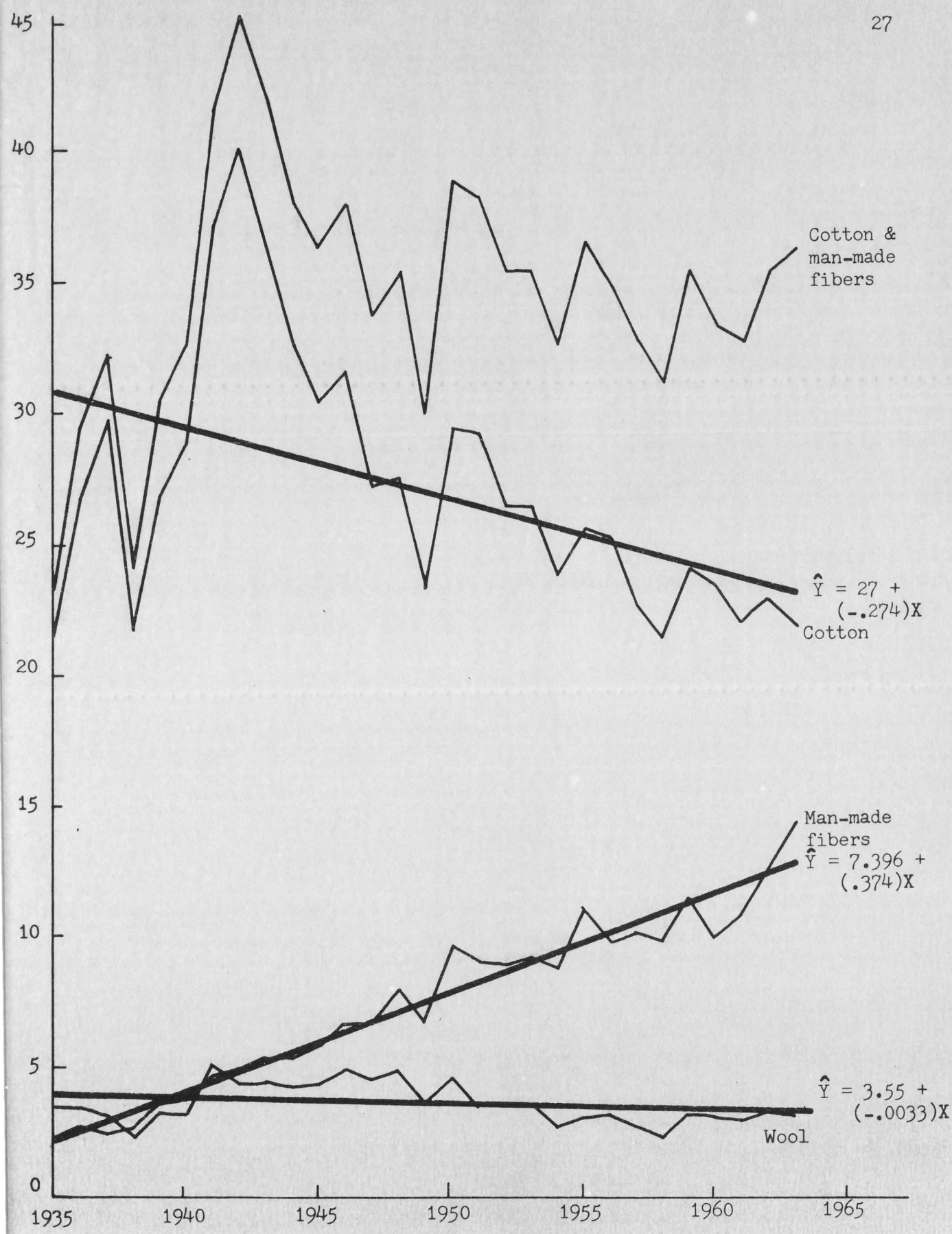

Figure 9. Annual United States per capita consumption of wool and man-made fibers, 1935-1963.

Consumer preferences and prices

In general, if consumers have special preferences for a particular good, they acquire it even if they have to pay a little extra for it. Consumer preferences are associated with the real income of the people. Real income makes differentiations in superior goods and inferior goods. In the case of sheep products, the same phenomenon applies and in case there is more and more demand for sheep products, it will tend to affect the sheep numbers in such a way that the total number of sheep increases.

As the real income of the people in the United States increased over a period of time, the consumption of lamb, mutton, and wool has decreased; whereas, the consumption of beef, poultry, deer and elk meats, and man-made fibers has increased in the same period of time. The relationship was made between 1930-1939 averages with that of 1962 figures. These relationships indicated, according to the concept of income elasticity, that sheep products are inferior products; whereas, beef, poultry, elk and deer meat, and man-made fibers are superior products. In cases of sheep products there were inverse relationships between per capita incomes and per capita consumption of lamb, mutton, and wool; whereas, in the case of other meat and fibers, the relationship was positive, (Table 5). The relationship in the case of meats indicates that perhaps lamb and mutton are not palatable enough in order to induce consumption.

Price is an important factor in determining the increases or decreases in the supply of a product. In Utah, as in the United States as a whole, the price of sheep and lamb per hundred-weight has not been able to keep up with other livestock, especially with cattle and calves. The general increase in prices per 100 pounds from 1924 to 1963 was

115.49 percent in hogs, 39.3 percent in sheep and lambs, and 200.0 percent in cattle and calves. These price trends pertinently show that sheep and lambs over the years have commanded less and less prices compared with cattle and calves and hogs. In 1924, cattle and calves prices were much lower than that of sheep and lambs; whereas, in 1963, cattle and calves prices were more than sheep and lambs and had a wider gap. In 1924, cattle and calves prices were $13.80 per 100 pounds, and sheep and lambs prices per hundred pounds were $17.30; whereas, in 1963, they were $41.40 and $24.10, respectively, (Figure 10, Appendix Table 14). These price variations have tremendous influence upon the number of sheep in Utah. Because in any economic-oriented society the farmers will shift to enterprises where they have the greater economic gains, and in Utah because the farmers have greater gains in shifting to cattle, the sheep numbers have declined.

United States imports and exports of lamb and mutton

The imports and exports have a great influence on the domestic industry of a country. If there is a great volume of exports, it would mean that the exporting country has a comparative economic advantage over the importing country and vice versa. United States' imports of lamb and mutton have increased from 2,820,000 pounds in 1948 to 78,128,000 pounds in 1962. Exports have decreased from 5,000,000 pounds to 2,188,000 pounds in the same years, (Appendix Table 11). United States' imports and exports of mutton and lamb affect Utah's sheep industry in the same way as they affect the other sheep producing states in the nation, i.e. the supply of sheep products.

Imports of lamb and mutton have fluctuated from 1930-1962. The

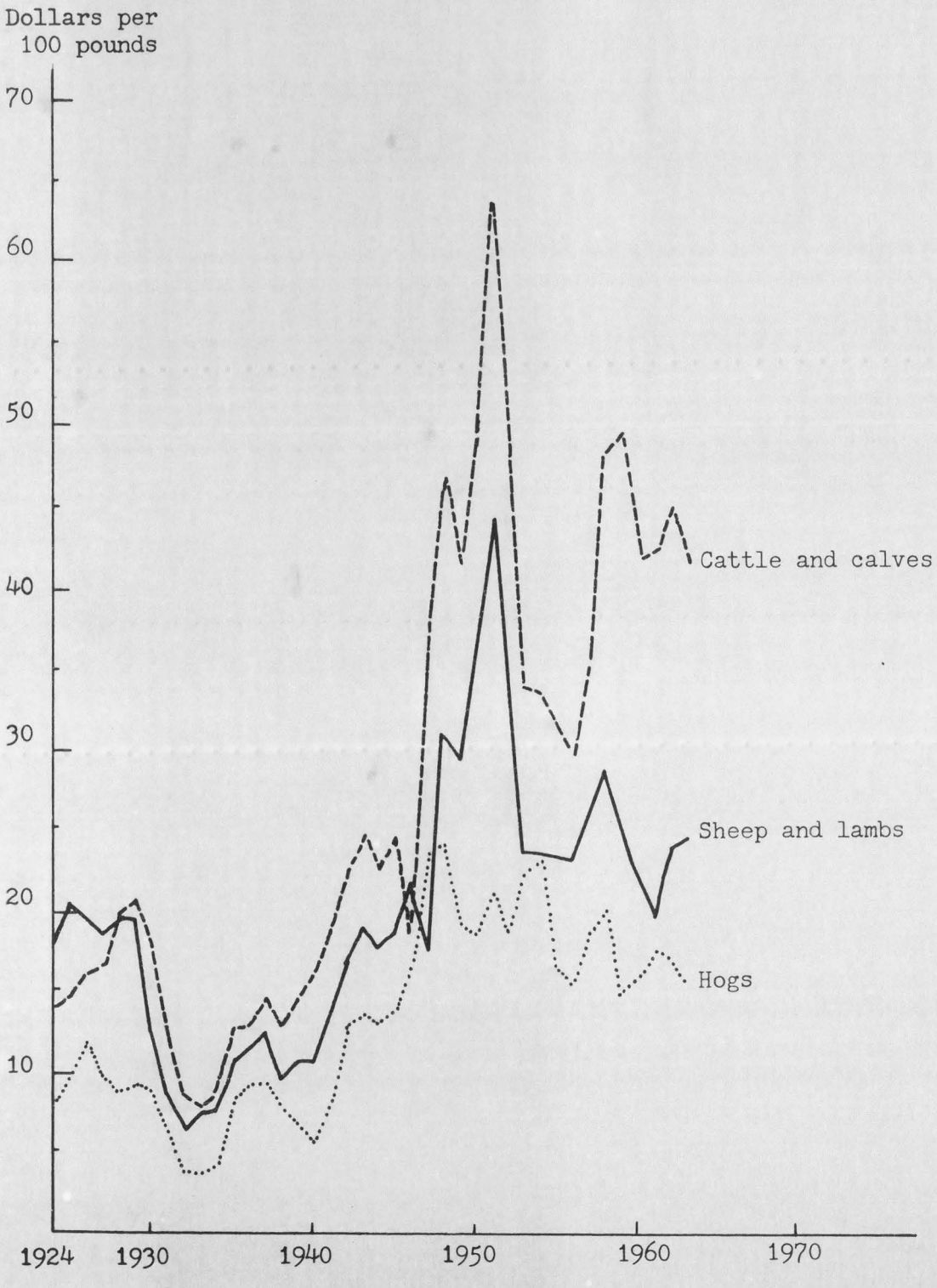

Figure 10. Wholesale prices of sheep, cattle, and hogs in Utah, 1924-1963.

imports of lamb and mutton went down in 1941 and stayed at low levels through 1947, but from 1948 through 1957 the imports remained nearly at a constant level around 3 million pounds. However, imports have increased from 23,976,000 pounds in 1958 to 78,128,000 pounds in 1962 which was the all-time high since 1941, (Appendix Table 11). The explanation of the rise in imports from 1957 to 1958 could be a relaxation in tariffs. The low levels of imports between 1941 and 1947 were mainly because of World War II. These import figures certainly explain that foreign countries have comparative economic advantage in shipping mutton and lamb for the United States' market. Does this large volume of imports affect the sheep numbers in the United States and in Utah? And to what extent? The answers partly lay in the comparative advantage in producing at home and partly in comparative advantage over the exporting countries. It seems from the facts that imports of mutton and lamb from other countries do not affect the sheep numbers in the United States. There are imports of mutton and lamb just to meet the domestic demand. If the imports of mutton and lamb are discouraged by imposing tariffs, it is likely that people will shift more and more to beef, pork, and poultry products. Here the contention is that in order to encourage the sheep industry, prices of lamb and mutton will be increased. This increase in prices will discourage the consumers because the price of choice lamb is already high enough.

United States also exports lamb and mutton. Exports of lamb and mutton from the United States remained constant around 2 million pounds from 1930 until 1940. In the war years and a little after, from 1941 until 1947, the exports of mutton and lamb increased and since 1948,

the exports have decreased from 5 million pounds to 2,188,000 pounds in 1962, (Appendix Table 11). However, these exports do not have any significant affect on the numbers of sheep in the United States and specifically Utah because they affect the supply side and not directly the demand function.

United States imports and exports of wool

The main competition for United States' wool is from the imports of apparel wool since United States' wool is mainly of finer content which is used for apparel. There is very little carpet wool production in the United States. Nearly all the carpet wool consumption is out of imports from other countries. Carpet wool is of low quality and commands lower prices than the apparel wool. Carpet wool imports increased by 58.3 percent from 1930 to 1962. The imports of carpet wool were constantly low for a four-year period during the World War II from 1942-1945, (Appendix Table 11).

Imports and exports of apparel wool in the United States have fluctuated since 1930. On the whole, the apparel wool imports in the United States from 1930 to 1962 increased from 70,135,000 pounds to 125,996,000 pounds, which is a 79.6 percent increase. The exports decreased from 162,000 pounds in 1930 to 124,000 pounds in 1962, which is a 23.46 percent decrease. In the same years, the United States population increased from 123.2 million to 186.6 million, an increase of 51.5 percent, (Appendix Table 11). During the war years and after, 1943 to 1950, the exports of apparel wool were high and then again during the Korean War, specifically in 1953 and 1954. Also, the imports of apparel wool were at a higher level during war years. Dr. Thomas and

others have described these changes and concluded that the price was depressed throughout most of the war years. This was partially a result of governmental price control and since price control was eliminated, it increased available supplies in the major foreign producing centers. In 1949, the price of wool was further depressed by devaluation of the British pound which reduced world wool prices by almost 20 percent. (10)

SUMMARY AND CONCLUSIONS

Much of Utah's land is barren and unproductive because of soil, topography, and lack of water. According to land use, about 88 percent of the land area of Utah is rangeland grazed by sheep and cattle during a large part of the year. Because of availability of this rangeland, sheep production is an important segment of Utah's agriculture. It is important as an income producer and as a user of much of Utah's rangelands. However, sheep numbers have declined greatly since the early 1930's. But for the last two or three years they have remained fairly constant. Some of the reasons for this decline has already been pointed out in the previous sections of this report. However, it is necessary to emphasize them again. Much of the public lands formerly used by sheep are now permitted to cattle because they have a comparative economic advantage over sheep. No doubt there is a certain percentage of the rangeland which is suited only for grazing sheep, and which is very likely to stay under sheep grazing in the future.

For the use of resources, cattle is the big competitor to the sheep industry. Numbers of cattle are on the increase since 1935 when the numbers were lower than previous years. It also could be said that cattle ranching seems to be not as hazardous as is the case with sheep ranching. Moreover, the cattle operations can be started on a smaller scale, whereas sheep operations need big investments. The decline of stock sheep in Utah in comparison to other western states and the United States can be attributed to the size of the operation which needs to be studied.

Another source of competition for the use of resources in Utah is the big game. The resources are being transferred to big game and the number of deer and elk harvested per capita has increased since 1944. From the study it seems that recreational use of much of the lands have commanded more and more attention and value from the public in recent years.

On the consumption side, sheep products face significant competition from cattle, hogs, and poultry. Per capita consumption of mutton and lamb has declined from 1930 but shows some increases since 1960, which may be attributed to improved quality of mutton and lamb. However, consumption of beef, poultry, and big game per capita consumption has increased significantly since 1930. Beef and big game are worthy of notice in this case since they compete both in resource use and on the consumption side. Pork also is a competitor for sheep products in consumption. However, per capita consumption of pork has not increased to any significant amount.

Per capita wool consumption has declined from 1941 but is at fairly constant levels from 1959 and is likely to remain at constant levels. The major competitors of the consumption of wool are the man-made fibers which have been on the increase since 1935.

The farmers' share of the total revenue from sheep has declined since 1945 and the farmers' share of the total revenue from cattle has increased. In recent years, net farm prices from lamb are less than the net farm prices from choice beef.

From the study it also has been concluded that the United States is a deficit sheep-product producing country. The exports and imports

of sheep products do not seem to have any significant affect on the local sheep industry, but rather help in fulfilling the domestic demand for sheep products.

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APPENDIX

Table 6. Stock sheep numbers in Utah, the Western States, and the United States, January 1, 1930-1964

Year	Utah	Percent of United States	Western States	Percent of West	United States	1930 as base year: Utah	Western States	United States
	1,000		1,000		1,000		percent	
1930	2,750	6.0	25,045	10.9	45,577	100.0	100.0	100.0
1931	2,775	5.8	26,155	10.6	47,720	100.9	104.4	104.7
1932	2,770	5.8	25,567	10.8	47,754	100.7	102.1	104.8
1933	2,560	5.4	24,647	10.4	47,324	93.1	98.4	103.8
1934	2,560	5.3	24,841	10.3	48,454	93.1	99.1	106.3
1935	2,452	5.3	24,030	10.2	46,640	89.1	95.9	102.3
1936	2,452	5.3	23,423	10.5	46,391	89.1	93.5	101.8
1937	2,280	4.9	22,993	9.9	46,952	82.9	91.8	103.1
1938	2,230	4.8	22,236	10.0	46,685	81.1	88.8	102.4
1939	2,130	4.4	22,783	9.3	47,960	77.5	90.9	105.2
1940	2,095	4.3	22,584	9.3	48,473	76.2	90.2	106.3
1941	2,095	4.2	22,667	9.2	49,656	76.2	90.5	108.9
1942	2,137	4.3	22,448	9.5	49,807	77.7	89.6	109.2
1943	1,990	4.1	21,399	9.3	48,766	72.4	85.4	107.0
1944	1,820	4.0	19,733	9.2	45,232	66.2	78.8	99.2
1945	1,700	4.2	17,693	9.6	40,922	61.8	70.6	89.9
1946	1,598	4.5	15,236	10.4	35,599	58.1	60.8	78.1
1947	1,422	4.4	13,653	10.4	32,125	51.7	54.5	70.5
1948	1,422	4.7	13,035	10.9	29,976	51.7	52.1	65.8
1949	1,365	4.9	12,417	11.0	27,651	49.6	49.6	60.7
1950	1,269	4.7	11,863	10.7	27,099	46.1	47.4	59.5
1951	1,322	4.9	11,848	11.1	27,253	48.1	47.3	59.8
1952	1,412	5.0	12,547	11.3	28,050	51.3	50.1	61.5
1953	1,426	5.1	12,492	11.4	27,700	51.9	49.9	60.8
1954	1,383	5.1	12,192	11.3	27,101	50.3	48.7	59.5
1955	1,383	5.1	11,866	11.6	26,979	50.3	47.4	59.2
1956	1,369	5.1	11,948	11.5	27,012	49.8	47.7	59.3
1957	1,301	4.9	11,772	11.1	26,538	47.3	47.0	58.2
1958	1,288	4.7	11,957	10.8	27,327	46.8	47.7	59.9
1959	1,301	4.6	12,269	10.6	28,364	47.3	48.9	62.2
1960	1,249	4.3	12,555	9.9	28,849	45.4	50.1	63.3
1961	1,212	4.2	12,293	9.9	28,556	44.1	49.1	62.7
1962	1,200	4.4	11,712	10.2	27,065	43.6	46.8	59.4
1963	1,212	4.7	11,586	10.5	25,731	44.1	46.3	56.5
1964	1,200	4.9	10,958	10.9	24,533	43.6	43.8	53.8
$\bar{X}$ =	177.1428		$\bar{X}$ = 19,752.229		$\bar{X}$ = 36,794.88			

Source: Agricultural Statistics, USDA, 1931-1964.

Table 7. Stock sheep, hogs, cattle, and calve numbers, Utah, January 1, 1924-1963

Year	Stock sheep	Hogs	Cattle and calves	Number of sheep shorn	Pounds of wool shorn
	1,000	1,000	1,000 head	1,000 head	1,000 lbs.
1924	2,249	90	540	2,165	17,970
1925	2,255	64	507	2,144	18,438
1926	2,312	60	490	2,208	20,093
1927	2,485	75	480	2,350	20,915
1928	2,625	90	475	2,480	23,064
1929	2,752	74	475	2,430	20,655
1930	2,750	70	461	2,600	24,440
1931	2,775	64	475	2,692	24,228
1932	2,770	67	475	2,355	18,840
1933	2,560	70	480	2,315	19,919
1934	2,560	68	484	2,370	20,856
1935	2,452	47	411	2,250	19,125
1936	2,452	56	419	2,280	19,836
1937	2,280	70	432	2,075	17,845
1938	2,230	90	432	2,096	18,654
1939	2,130	102	428	2,002	17,417
1940	2,095	125	432	1,990	18,507
1941	2,095	105	454	1,990	17,910
1942	2,137	115	477	2,009	18,081
1943	1,990	150	506	1,831	16,845
1944	1,820	196	546	1,729	14,869
1945	1,700	108	584	1,581	14,229
1946	1,598	92	572	1,502	13,969
1947	1,422	77	555	1,337	12,702
1948	1,422	85	544	1,322	12,295
1949	1,365	98	571	1,228	10,684
1950	1,269	88	588	1,180	10,856
1951	1,332	84	612	1,252	12,019
1952	1,412	92	679	1,313	12,211
1953	1,426	59	727	1,326	12,464
1954	1,383	52	734	1,300	12,480
1955	1,383	56	749	1,300	12,610
1956	1,369	61	712	1,287	12,741
1957	1,301	65	705	1,223	11,863
1958	1,288	70	691	1,211	11,747

Table 7. Continued

Year	Stock sheep	Hogs	Cattle and calves	Number of sheep shorn	Pounds of wool shorn
	1,000	1,000	1,000 head	1,000 head	1,000 lbs.
1959	1,301	64	705	1,238	12,045
1960	1,249	68	719	1,203	11,950
1961	1,212	66	698	1,176	11,706
1962	1,200	65	698	1,151	11,460
1963	1,212	NA	705	1,139	11,109
1964	1,212	NA	712	NA	NA

NA = Not available.

Source: Utah Agricultural Statistics, Revised, 1920-1962; Agricultural Statistics, USDA, 1963, 1964.

Table 8. Sheep production rates in Utah, 1930-1963

Year	Ewes Jan. 1	Lamb crop	Death Loss		Marketing weight of sheep and lambs/head	Wool clipped per head
			Lambs	Sheep		
	number 1,000	percent	percent	percent	pounds	pounds
1930	2,170	80	6.4	9.5	75	9.4
1931	2,230	70	5.9	10.2	75	9.0
1932	2,285	52	2.8	17.6	72	8.0
1933	2,127	62	3.9	14.9	72	8.6
1934	2,043	72	4.7	12.3	73	8.8
1935	1,921	65	5.3	12.2	73	8.5
1936	2,000	74	4.9	10.8	79	8.7
1937	1,835	76	4.7	12.9	72	8.6
1938	1,839	80	5.3	10.5	75	8.9
1939	1,740	81	5.3	10.9	74	8.7
1940	1,706	80	4.9	10.5	75	9.3
1941	1,672	86	5.1	10.8	75	9.0
1942	1,705	80	4.8	10.8	78	9.0
1943	1,689	78	5.8	11.5	77	9.2
1944	1,561	78	6.8	12.9	75	8.6
1945	1,470	77	5.1	9.5	78	9.0
1946	1,395	83	6.8	11.3	80	9.3
1947	1,229	84	7.1	10.6	77	9.5
1948	1,193	85	5.8	9.6	81	9.3
1949	1,145	78	6.3	16.9	81	8.7
1950	1,066	84	5.3	9.4	80	9.2
1951	1,077	85	5.3	10.0	81	9.6
1952	1,130	86	5.2	9.1	83	9.3
1953	1,187	83	5.9	10.9	82	9.4
1954	1,187	87	5.7	8.3	84	9.6
1955	1,187	86	5.4	8.8	85	9.7
1956	1,179	88	5.9	9.3	85	9.9
1957	1,120	86	5.5	9.9	85	9.7
1958	1,098	90	6.1	9.6	83	9.7
1959	1,109	88	5.4	8.4	86	9.7
1960	1,065	88	5.8	9.4	87	9.9
1961	1,044	88	7.1	9.3	86	10.0
1962	1,034	90	7.2	9.6	NA	10.0
1963	1,034	88	6.9	10.2	NA	10.0

Source: Utah Agricultural Statistics, Revised, 1920-1962; Agricultural Statistics, USDA, 1964.

Table 9. Lamb crop and death losses in Utah and selected areas in the United States, 1930-1963

Year	Lamb Crop			Total Death Losses			
				Utah		United States	
	Utah	Western States	United States	Sheep	Lamb	Sheep	Lamb
	percent	percent	percent				
1930	80	NA	NA	275	185	NA	NA
1931	70	NA	NA	300	174	NA	NA
1932	52	NA	NA	500	80	NA	NA
1933	62	NA	NA	395	104	NA	NA
1934	72	NA	NA	325	125	NA	NA
1935	65	NA	NA	310	133	NA	NA
1936	74	NA	NA	278	127	NA	NA
1937	76	NA	NA	334	122	NA	NA
1938	80	NA	NA	260	130	NA	NA
1939	81	NA	NA	248	120	NA	NA
1940	80	NA	NA	236	110	3,910	2,804
1941	86	85	85.9	243	115	4,191	3,178
1942	80	81	86.4	250	110	4,029	2,954
1943	78	78	83.3	244	123	4,350	3,306
1944	78	79	84.4	252	132	4,095	2,956
1945	77	81.4	86.7	174	100	3,418	2,490
1946	83	84.0	89.5	200	120	3,125	2,283
1947	84	82.8	88.3	163	93	2,845	2,076
1948	85	78.9	85.5	150	90	2,916	1,936
1949	78	80.5	87.4	245	91	2,898	1,816
1950	84	86	89	125	70	2,558	1,717
1951	85	90	88	140	74	2,495	1,725
1952	86	89	88	135	77	2,533	1,736
1953	83	88	90	165	90	2,494	1,778
1954	87	92	94	123	85	2,365	1,742
1955	86	92	95	130	80	2,455	1,788
1956	88	93	95	135	86	2,472	1,850
1957	86	92	94	138	77	2,493	1,860
1958	90	94	97	130	82	2,434	1,916
1959	88	94	97	116	75	2,529	2,010
1960	88	94	95	125	77	2,472	2,139
1961	88	95	95	121	91	2,486	2,092
1962	90	96	94	121	79	2,479	2,033
1963	88	96.1	94	130	80	NA	NA

Source: Agricultural Statistics, USDA, 1930-1964.

Table 10. Wool production per fleece and average prices received by farmers per pound in Utah, the Western States, and the United States, 1930-1963

Year	Utah		Western States		United States	
	Lbs./ fleece	Price/ pound	Lbs./ fleece	Price/ pound	Lbs./ fleece	Price/ pound
		cents		cents		cents
1930	9.4	19	NA	NA	NA	19.5
1931	9.0	13	NA	NA	NA	13.6
1932	8.0	7	NA	NA	NA	8.7
1933	8.6	19	8.4	NA	8.13	20.6
1934	8.8	20	8.3	NA	7.94	21.9
1935	8.5	17	8.4	NA	8.02	19.2
1936	8.7	25	8.3	NA	7.89	26.9
1937	8.6	31	8.3	NA	7.98	32.0
1938	8.9	19	8.5	NA	7.98	19.2
1939	8.7	21	8.4	NA	7.96	NA
1940	9.3	27	8.6	NA	8.00	NA
1941	9.0	32	8.8	33	8.11	35.5
1942	9.0	38	8.6	39	7.88	40.1
1943	9.2	38	8.5	40	7.91	41.6
1944	8.6	41	8.3	41	7.83	42.4
1945	9.0	39	8.5	41	7.96	41.9
1946	9.3	39	8.8	40.5	8.08	42.3
1947	9.5	41	8.8	40.7	8.09	42.0
1948	9.3	49	8.8	47.9	8.05	48.8
1949	8.7	47	8.5	48.1	8.04	49.3
1950	9.2	58	8.9	56.0	8.11	57.3
1951	9.6	91	9.2	1.00	8.24	99.5
1952	9.3	58	9.0	54.1	8.25	54.1
1953	9.4	52	9.0	53.5	8.30	54.9
1954	9.6	54	9.1	53.6	8.48	53.9
1955	9.7	43	9.3	42.4	8.55	42.6
1956	9.9	42	8.9	44.0	8.37	44.2
1957	9.7	54	8.8	53.5	8.25	53.4
1958	9.7	38	8.9	38.6	8.15	36.9
1959	9.7	43	9.0	43.2	8.45	43.2
1960	9.9	39	9.4	40.7	8.55	42.0
1961	10.0	40	9.2	41.9	8.50	43.0
1962	10.0	47	9.2	46.2	8.43	46.5
1963	9.8	NA	9.2	NA	8.50	NA

Source: Utah Agricultural Statistics, Revised, 1920-1962; Agricultural Statistics, USDA, 1931-1964.

Table 11. United States population, imports and exports of mutton, lamb, and wool of clean content, 1930-1962

Year	United States population	Wool			Lamb and Mutton (except canned)	
		Imports		Exports		
		Apparel	Carpet	Apparel	Imports	Exports
	mils.	1,000 lbs.	1,000 lbs.	1,000 lbs.	1,000 lbs.	1,000 lbs.
1930	123.2	70,135	90,621	162	107,314	2,000
1931	124.1	42,915	113,795	274	163,500	2,000
1932	125.0	13,522	39,195	179	67,598	1,000
1933	125.7	59,341	114,468	19	8,605	2,000
1934	126.5	29,258	79,084	119	10,232	2,000
1935	127.2	41,984	158,477	20	45,456	2,000
1936	128.1	110,712	143,276	16	44,453	2,000
1937	128.8	150,160	172,091	68	95,332	2,000
1938	129.8	30,812	71,908	1,343	9,283	2,000
1939	130.9	98,194	144,875	179	240,586	2,000
1940	132.1	222,983	134,691	456	54,398	2,000
1941	133.4	613,566	203,249	38	349	6,000
1942	134.9	782,647	72,017	111	449	11,000
1943	136.7	642,887	33,489	27,924	778	130,000
1944	138.4	581,848	34,775	7,476	5	71,000
1945	139.9	725,237	79,521	28,797	NA	29,000
1946	141.4	924,015	125,807	16,008	10	19,000
1947	144.1	528,171	112,119	12,720	NA	12,000
1948	146.6	596,466	160,634	1,154	2,820	5,000
1949	149.2	347,964	86,621	15,775	3,697	3,000[a]
1950	151.7	250,112	216,736	6,648	2,855	334
1951	154.4	272,017	89,199	75	6,736	207
1952	157.0	248,450	118,619	5	6,156	374
1953	159.6	165,692	128,610	1,375	3,123	1,313
1954	162.4	103,921	102,083	1,025	2,067	827
1955	165.3	112,764	135,979	83	2,252	426
1956	168.2	103,828	143,053	214	1,372	583
1957	171.2	78,207	120,996	2,225	3,543	1,313
1958	174.1	67,081	122,587	5,039	23,976	744
1959	177.1	100,517	191,642	9	56,804	804
1960	180.7	74,266	153,904	60	49,739	1,494
1961	183.7	90,318	157,335	316	55,844[b]	1,616
1962	186.6	125,996	143,490	124	78,128	2,188

[a] Exports include shipments for military-civilian feeding in United States occupied areas.

[b] Includes mutton, mostly boneless, which amounted to 64,990,327 pounds.

Source: Agricultural Statistics, USDA, 1958 and 1963.

Table 12. Utah population and harvest of selected big game in Utah, selected years, 1925-1962

Year	Utah[a] population	Deer	At 170 pounds per head	Elk	At 800 pounds per head	Deer and elk total pounds of meat	Dressed weight at 56 percent
	1,000	no.	1,000 pounds	no.	1,000 pounds	1,000 pounds	1,000 pounds
1925	487	1,400	238	NA	NA	238	132
1930	509	6,400	1,088	NA	NA	1,088	609
1935	526	11,648	1,980	205	164	2,144	1,201
1940	552	44,000	7,480	838	670	8,150	4,564
1941	551	50,000	8,500	781	625	9,125	5,110
1942	575	63,609	10,814	759	607	11,421	6,395
1943	631	55,696	9,468	564	451	9,919	5,555
1944	605	51,777	8,802	432	346	9,148	5,123
1945	591	49,890	8,481	562	450	8,931	5,001
1946	638	53,309	9,063	845	676	9,739	5,454
1947	636	60,813	10,338	1,065	852	11,190	6,267
1948	653	68,800	11,696	788	630	12,326	6,903
1949	671	60,478	10,281	717	574	10,855	6,079
1950	696	73,478	12,477	1,403	1,122	13,599	7,615
1951	710	101,494	17,254	1,507	1,206	18,460	10,337
1952	730	90,161	15,327	1,323	1,058	16,385	9,176
1953	749	95,003	16,151	967	774	16,925	9,478
1954	762	103,764	17,640	848	678	18,318	10,258
1955	798	111,917	19,026	850	680	19,706	11,035
1956	823	122,585	20,839	817	654	21,493	12,036
1957	838	105,599	17,952	932	746	18,697	10,471
1958	855	117,241	19,931	1,075	860	20,791	11,643
1959	877	126,315	21,474	1,220	976	22,450	12,572
1960	901	130,945	22,261	1,173	938	23,199	12,991
1961	940	132,278	22,487	1,118	894	23,382	13,904
1962	958	130,556	22,195	1,173	938	23,133	12,954

[a]Population estimates from reports of the U. S. Bureau of the Census prepared by Utah Foundation.

Source: Utah Agricultural Statistics, Revised 1920-1962, June, 1963.

Table 13. Domestic consumption of fibers, per capita, and each percent of total, 1935-1963

Year beginning Jan. 1	Cotton		Wool		Rayon & Acetate man-made		Non-Cellulosic		All fibers
	Per capita	Percent of fibers	Per capita	Percent of fibers	Per capita	Percent of fibers	Per capita	Percent of fibers	Per capita
	pounds	percent	pounds	percent	pounds	percent	pounds	percent	pounds
1935	21.2	79.3	3.4	12.7	2.1	8.0	--	--	26.8
1936	26.8	81.6	3.4	10.3	2.7	8.1	--	--	32.8
1937	29.7	83.1	3.1	9.4	2.5	7.5	--	--	33.6
1938	21.6	81.6	2.3	8.6	2.6	9.8	--	--	26.5
1939	26.8	79.9	3.2	9.5	3.6	10.6	--	--	33.6
1940	28.9	80.9	3.2	8.8	3.7	10.2	less than .05	0.1	35.8
1941	37.0	79.7	5.0	10.7	4.4	9.4	0.1	0.2	46.4
1942	40.2	81.3	4.5	9.1	4.6	9.3	0.2	0.3	49.5
1943	36.7	79.4	4.4	9.6	4.9	10.5	0.3	0.5	46.2
1944	32.6	77.4	4.1	9.6	5.1	12.2	0.3	0.8	42.1
1945	30.4	75.0	4.3	10.7	5.5	13.5	0.3	0.8	40.5
1946	31.5	73.6	4.9	11.6	6.0	14.0	0.4	0.8	42.8
1947	27.2	70.8	4.6	12.1	6.3	16.3	0.3	0.8	38.4
1948	27.5	68.4	4.9	12.1	7.4	18.4	0.5	1.1	40.2
1949	23.3	69.4	3.6	10.7	6.1	18.2	0.6	1.7	33.5
1950	29.4	67.7	4.6	10.5	8.6	19.8	0.9	2.0	43.5
1951	29.2	70.1	3.5	8.3	7.8	18.7	1.2	2.9	41.7
1952	26.5	68.2	3.5	9.0	7.4	19.0	1.5	3.8	38.9
1953	26.4	67.9	3.5	8.9	7.3	18.9	1.7	4.3	38.8
1954	23.9	67.6	2.7	7.7	6.8	19.3	1.9	5.4	35.4
1955	25.5	64.5	3.0	7.5	8.4	21.4	2.6	6.6	39.4
1956	25.1	66.0	3.1	8.2	6.9	18.3	2.8	7.5	38.0
1957	22.7	64.3	2.6	7.5	6.7	18.9	3.3	9.3	35.2
1958	21.4	63.9	2.4	7.1	6.4	19.1	3.3	9.9	33.5
1959	24.1	62.6	3.1	8.1	7.1	18.4	4.2	10.9	38.6
1960	23.4	64.6	3.0	8.2	5.7	15.7	4.2	11.5	36.3
1961	22.0	61.8	2.9	8.1	6.0	16.9	4.7	13.1	35.7
1962	22.9	59.7	3.1	7.9	6.6	17.3	5.8	15.0	38.4
1963	21.9	56.0	3.0	7.6	7.5	19.2	6.7	17.2	39.1

Source: Cotton Situation. Economic Research Service, USDA, March, 1964.

Table 14. Wholesale prices of sheep, lambs, hogs, cattle, and calves in Utah, 1924-1963

Year	Price Per 100 Pounds				
	Sheep	Lambs	Hogs	Cattle	Calves
	dollars	dollars	dollars	dollars	dollars
1924	7.00	10.30	7.10	5.40	8.40
1925	8.60	11.80	9.80	5.60	8.70
1926	8.10	11.30	11.70	6.30	9.60
1927	7.90	10.60	9.80	6.80	9.70
1928	8.40	11.20	8.90	8.70	11.20
1929	8.40	11.20	9.10	8.50	12.00
1930	5.20	6.90	8.70	7.30	10.00
1931	3.55	5.10	6.20	5.00	7.20
1932	2.50	3.95	3.90	3.75	5.00
1933	2.65	4.75	3.75	3.25	4.70
1934	2.85	4.95	4.10	3.40	5.10
1935	3.90	6.90	8.10	5.20	7.40
1936	3.75	7.40	9.40	5.30	7.50
1937	3.95	8.20	9.40	6.20	8.30
1938	3.30	6.40	7.80	5.50	7.30
1939	3.60	7.30	6.70	6.50	8.00
1940	3.35	7.50	5.70	6.80	8.90
1941	4.25	9.40	8.60	8.10	10.50
1942	5.30	11.20	12.90	9.80	12.40
1943	6.50	12.50	13.40	11.20	13.30
1944	5.50	12.20	12.80	10.60	11.80
1945	5.70	12.80	13.80	11.60	12.50
1946	6.80	15.00	16.70	14.00	14.20
1947	7.80	19.60	23.20	18.00	19.40
1948	8.60	22.20	23.90	22.20	24.60
1949	8.40	21.20	19.00	19.00	22.30
1950	10.60	24.90	18.60	23.20	26.80
1951	13.90	30.20	21.00	29.50	33.70
1952	9.70	23.30	18.60	25.00	24.60
1953	6.50	17.10	22.10	16.10	17.80
1954	5.90	17.50	22.80	15.20	18.00
1955	5.30	18.00	16.30	14.10	17.60
1956	4.60	18.20	15.00	13.20	16.50
1957	6.30	19.30	18.60	16.10	19.80
1958	7.30	20.90	20.00	21.10	27.20

Table 14. Continued

Year	Price Per 100 Pounds				
	Sheep	Lambs	Hogs	Cattle	Calves
	dollars	dollars	dollars	dollars	dollars
1959	6.20	18.10	14.90	21.20	28.00
1960	5.30	17.00	15.70	17.40	23.40
1961	4.30	15.40	17.30	18.20	24.00
1962	5.30	18.60	16.80	19.00	26.00
1963	5.20	18.90	15.30	17.60	23.80
1924-63	-25.72	+83.49	+115.49	+225.92	+183.33
1931-63	+46.48	+270.59	+146.77	+252.00	+230.56
1950-63	-50.95	-24.10	-17.25	-24.14	-11.20

Source: Utah Agricultural Statistics, Revised 1920-1962, June, 1963; Agricultural Statistics, USDA, 1964.