" PROBLEMS OF DEMAND FOR AND SUPPLY OF MEAT IN GREECE "

by

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PROBLEMS OF DEMAND FOR AND SUPPLY OF MEAT IN GREECE

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I N T R O D U C T I O N

PURPOSES AND PLAN OF THIS STUDY

The object of this thesis is to investigate the patterns of behaviour of the producers and the consumers of meat in Greece, and to suggest policy measures for future expansion of meat production. The problem of meat production in this country is characterised by difficulties in its rate of development to meet the rapidly expanding demand, with the result that the imports of meat have begun to constitute an important element in total imports and therefore in the rapidly expanding deficit of current international transactions. Consequently, inefficient or slowly effective policies for expansion of this industry may entail a relatively high burden on the balance of payments constraint of economic development of this country[1].

The statistical data available is the primary limitation on the method used in this study in both the supply and the demand for meat in Greece. For instance, these permit the use of regression analysis in the case of demand for meat but not in the case of supply. Similarly, the data describe the level of aggregation used throughout this study. Thus, the commodity disaggregation goes as far as eight meat varieties in both the supply and the demand for meat. There is also a regional disaggregation of the supply of meat by division of the country into nine geographic regions.

Most of the data refers to the period since 1950 until the latest information available at the time of this study (in most cases 1966-68). It is not supposed that all the data used is equally reliable and, since not enough direct information is available about the degree of reliability, some reference is made, on the way, to the methods and the sources of data collection. Certain evident limitations upon the conclusions drawn, related to possible bias of the data, are also noticed occasionally.

Part One is devoted to final demand for meat in Greece, particularly the problems involved in isolating the various factors influencing this demand and the attempts made to measure the particular effects.

Chapter I deals with the level and the post-war trends in final demand for meat. Also an international comparison is made of the per capita demand for meat and per/

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1. Supposing, of course, that the imports of meat cannot be reduced in favour of imports of 'durable' goods, since meat is considered by policy makers as a necessity.

per capita Gross Domestic Product in various selected countries.

The main economic, social and psychdogical factors are referred to in Chapter II, allowing for possible changes in their effects through time as the tastes and preferences of consumers change. In this Chapter the problems of isolating and measuring the effect of the different variables used are faced, i.e. the specification of the model of the demand for meat in Greece and mainly at what level the demand of meat function will be estimated, given that between stock-farmer and final consumer many agents intervene (wholesaler, processors of meat, etc.). As a second problem, the identifiability of the relationships and the necessary and sufficient conditions for identifiability of demand equation for meat in Greece are examined there. Furthermore, the tested forms of the demand for meat function are presented and the data used as well. Attempts to find the substitution possibilities among the different meat species are analysed by two alternative empirical methods.

Chapter III discusses the obtained results of the demand on the basis of the three criteria prescribing at the beginning of this Chapter. A comparison of these results with the results of other studies carried out in different countries is given.

In Chapter IV an attempt is made to give a picture of the internal and external trade of meat and the likely behaviour of the intermediate agents. The main problems which refer to the organisation of marketing of meat in Greece are briefly discussed in this context.

Part Two deals with the expansion of meat production in recent years, the methods of meat production and the main factors, which have been most probably attributed to the possible technological progress in recent years.

Chapter V discusses first how the realised increase in final demand since 1950 was satisfied by expansion of domestic production and by imports (section 1). Then it examines the relative position of meat production in the Greek agricultural sector (Section 2) and the interindustry relationships of the livestock sector and meat production (Section 3) on the basis of an input-output table constructed by the Centre of Planning and Economic Research of Athens, for the year 1960.

Chapters VI-VIII examine the various factors which have attributed to expansion of/

of meat production in Greece in the last two decades, while the livestock population was held fairly steady. This phenomenon is investigated in terms of three major groups of factors, i.e. physical impediments of meat production (Chapter VI) institutional factors (Chapter VII) and government intervention (Chapter VIII). Under the heading of physical impediments (Chapter VI) the nature of land and of animal feeds are considered as constraints to the realised size and form of expansion of meat production in the last two decades.

The institutional factors (Chapter VII) include here the traditions and the education status of the Greek farmers, the size of livestock holdings, the land tenure system and the hiring of labour in this sector. The government intervention in the field of meat production (Chapter VIII) refers restrictively to those measures which have seemingly important direct or indirect effects on the expansion of meat production and the form it took place. Such measures include subsidies to the factors of meat production, support measures for producer prices, efforts to orientate production and measures of technical character (health control and advice). Finally, the projections of the national economic development plan 1968-1972 on meat production are presented.

Chapter IX examines the expansion of meat production by type of meat and region of country and the differential rates of change of livestock population by animal and geographic region. The growth and the changes in composition of meat production and population is attempted to be interpreted in terms of the discussed constraints in Chapters VI-VIII.

Chapter X makes a preliminary attempt to specify the form of technological progress associated with stability of livestock population and expansion of meat production in terms of capital-output ratio, average weight of slaughtered animals and other factors of quality changes in livestock breeds. No attempt is made with statistical experimentation to attribute technological change as a residual factor to main causes because of data limitations.

Chapter XI carries out projections of final demand and domestic production of meat for the periods 1970-1975 and 1975-1980 on the basis of the empirical results of this study. More specifically, forecasting of future final demand is made (Section 1) on the assumption of certain alternative average rates of growth of per capita income by use of certain values of income elasticities estimated (Chapter III). This forecast is considered as production targets for 1975 and 1980 and is compared with the subsequently carried out independent forecast of the potentialities of domestic production by type of meat in 1975 and 1980; the latter are based on certain assumptions about irrigation works

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and production of animal feeds in accordance with the ten year sectoral plan of the Ministry of Agriculture from which the future production of fodder with no rise in marginal cost is derived.

Finally, Section (2) presents a series of policy measures for the achievement of the fixed production targets. These measures have institutional and non-institutional nature. These are referred to as measures for factors and methods of meat production, measures for expansion particularly of cattle sector, measures for production of animal feeds and measures for marketing of meat in Greece.

The main conclusions of this study are summarised as follows: There has been in the last two decades a relatively rapid average annual rate of increase of final demand for meat with differential rates by type of meat.

Production has grown to a somewhat lower rate with parallel expansion of imports of meat. The main feature of the domestic production of meat is that its increase was realised with relatively low rate of change or fairly stable size of livestock population in most animals. This, as well as the differential rates of expansion of population and meat production by region seem to be attributed largely to relatively low rate of expansion of production of animal feeds which is associated with the differential protection of other crops (i.e. mainly wheat, and in part cotton and tobacco) by the government. Under unfavourable conditions in the production and trade of animal feeds the realised expansion in production of meat was due largely to gradual rise of the weight of animals of the existing small holdings and to a much lesser extent to establishment of new big holdings which had to rely on a continuing and not uncertain market of feeds to purchase under relatively low cost.

There seem to be possibilities for an expansion of the domestic production of meat of about 6 percent annually in the period 1970-1980. Whether this target will be achieved depends likely heavily on reorientation of government policy mainly in the field of the production and marketing of animal feeds.

P A R T O N E

DEMAND FOR MEAT IN GREECE

FINAL DEMAND FOR MEAT

This part consists of an empirical investigation of the final demand for meat in Greece with emphasis on forecasting future demands of particular meat items and of the substitutability among them. This is done at the beginning of this study and afterwards the section dealing with the problems of expansion of the domestic production of those types of meat which are mainly demanded follows.

This part includes four chapters. The first one argues briefly the level of per capita consumption in Greece, its post-war trends and its relative position to other countries of various levels of per capita incomes (average 1963-65). The second chapter makes a short reference to the multivariety of factors that probably affect the demand for meat and deals with the problems, which were faced in an attempt to isolate the net effect of each of the main factors in the demand for 8 meat items in Greece during the period 1950-1966. The third chapter presents and makes an assessment of the statistical results in terms of comparison with studies in other countries. Finally, the fourth chapter refers to problems of marketing and trade of meat in Greece.

Special attention is given to the factors determining the demand for meat at the stage of final consumer. In fact, the final demand is realised not exclusively in households, but also in restaurants, hotels, public institutions, ships, self-consumption, etc. Consequently, the analysis would be more complete if explicit consideration was given to possible differential factors of all these types of demand for meat. Separate models of demand should be more accurately tested for each of these sources of final demand, if the demand analysis is going to claim reflection of all the structural relationships in the economy concerned. Testing these models might shed particular light on the relative price elasticity and the role of changes in the stocks of ships and restaurants. Data limitations do not permit this claim to arise in Greece, as in many other countries of the world. However, the involved aggregation of the final demand is not likely to have significant bias, in so far as, given the social structure of Greece, the consumption of restaurants rises correspondingly with household demand, while Greek owned ships are usually supplied with meat abroad. Moreover, the consumption of meat in the agricultural sector in Greece does not seem to indicate that self consumption follows very different patterns from the consumption in the rest of the country.

CHAPTER I

LEVEL AND POST-WAR GROWTH IN FINAL DEMAND FOR MEAT

The total quantity of demand for meat in annual terms has increased over four times between 1950 and 1967 as Table I.1 shows, i.e. from 86.1 thousand tons in 1950 to 353.2 thousand tons in 1967. This represents an average annual rate of increase of 8.7 percent during the period 1950-1967. This average annual rate does not vary between the fifties and the period since 1960 up to date. Thus, the consumption of meat has increased by 8.3 percent annually during the period 1951-60 and 9.1 percent during the period 1961-67.

The annual percentage increase in per capita consumption of meat, 7.8 percent during the period 1950-67, keeps pace with the rate of increase in the total consumption in view of the relatively low rate of population growth (.8 percent between 1950 and 1967). In particular, during the period 1961-67, per capita meat consumption rose by an average annual rate of 8.4 percent, which is higher than that of the period 1951-60, 7.4 percent, while the rate of growth of population has been slightly lower in the sixties (.67) than in the fifties (.99).

As Table I.2 shows, the kind of meat with the highest per capita consumption in recent years is veal (7.18 kgs. in 1967), and is followed by lamb-kidgoat (7.10 kgs. in 1967), poultry (6.73 kgs. in 1967), pork (4.35 kgs. in 1967), mutton-goat (3.69 kgs. in 1967), etc. A comparison with 1950 shows a more or less systematic change in the relative order of the above per capita consumption of various kinds of meat, particularly against the mutton and goat and pork and in favour of tender carcass (lamb-kidgoat, veal and poultry). The same conclusions come from a comparison of the percentage shares of the various kinds of meat to the total consumption presented in Table I.3.

The above change in the absolute per capita consumption of meat in Greece during the period under review, as well as the indicated change in the structure of meat consumption among the various meat items, are going to be investigated in this part of the study. To what extent these changes were initiated by changes in supply - which as concluded from Part two, seems to have happened in the case of poultry and secondarily of pork - or by changes in demand and public preferences, satisfied to some extent through imports, which seems to be the case with beef, veal and entirely in the case of frozen meat, is obviously of great importance for policy makers. Whether the contribution of various factors to these changes can be isolated through the following analysis is not indeed an easy job, nor can it be carried out very satisfactorily for various reasons.

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TABLE I.1

TOTAL AND PER CAPITA CONSUMPTION OF MEAT IN GREECE (1950-1967)

ABSOLUTE NUMBERS

	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967
TOTAL MEAT CONSUMPTION (IN TH. TONS)	86.1	89.2	102.6	110.2	121.9	136.0	153.3	170.5	171.9	178.7	192.4	215.8	231.9	259.4	274.0	318.8	328.9	353.2
PER CAPITA MEAT CONS. (in kgs.)	11.4	11.7	13.3	14.1	15.4	17.1	19.1	21.1	21.0	21.6	23.1	25.7	27.4	30.6	32.4	37.3	38.2	40.5

ANNUAL PERCENTAGE INCREASES

	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	51-55	56-60	61-67
TOTAL MEAT CONSUMPTION		3.6	15.0	7.4	10.5	11.5	12.7	11.2	.08	4.0	7.6	12.1	7.5	11.9	5.6	16.3	3.1	7.4	9.6	7.1	9.1
PER CAPITA MEAT CONS.		2.7	13.6	6.1	9.2	11.1	11.7	10.5	-	2.9	6.9	11.3	6.6	11.6	5.9	15.2	2.4	6.1	8.5	6.4	8.4

1950 = 100

TOTAL MEAT CONSUMPTION	100.0	103.5	119.2	127.9	141.6	157.9	178.1	197.9	199.6	207.4	223.4	250.6	269.3	301.2	318.2	370.2	381.9	410.1
PER CAPITA MEAT CONS.	100.0	102.7	116.7	123.9	135.9	150.2	167.9	185.2	184.9	190.3	203.2	226.3	241.3	269.0	285.2	327.8	335.8	356.4

Source: Ministry of Co-ordination, National Accounts Service.

TABLE I.2

PER CAPITA CONSUMPTION OF VARIOUS KINDS OF MEAT (In Kgs.)

KIND OF MEAT	1950	1955	1960	1965	1966	1967(1)
VEAL	.45	1.22	2.37	4.84	5.41	7.18
BEEF	1.22	1.23	1.47	3.39	3.03	3.33
LAMB AND KIDGOAT	2.31	5.35	5.99	7.75	7.28	7.10
MUTTON AND GOAT	3.10	3.69	4.72	4.25	4.22	3.69
PORK	2.35	2.69	3.01	4.32	4.40	4.35
POULTRY	1.20	1.84	2.27	5.26	5.50	6.73
FROZEN BEEF	.37	.45	.95	1.73	2.45	2.14
FROZEN MUTTON	-	.08	1.16	3.46	3.71	3.76
RABBITS	.15	.12	.15	.24	.24	.25
GAME	.08	.13	.13	.12	.09	.11
SALAMI, SAUSAGES HOME PRODUCED	.08	.22	.68	.90	.81	.80
SALAMI, SAUSAGES IMPORTED	.01	.01	.02	.03	.03	.03
CANNED MEAT	-	-	.17	.76	.75	.78
OTHER	.06	.06	.01	.21	.22	.27
TOTAL MEAT	11.38	17.08	23.10	37.29	38.18	40.52

(1) Provisional data

Source: Ministry of Co-ordination, National Accounts Division

TABLE I.3

COMPOSITION OF CONSUMPTION OF MEAT IN GREECE 1950-1967

KINDS OF MEAT	1950	1955	1960	1965	1966	1967	AVERAGES 1950-1954	AVERAGES 1955-1959	AVERAGES 1960-1967
VEAL	3.94	7.14	10.25	12.97	14.18	17.72	4.23	8.82	13.91
BEEF	10.73	7.18	6.35	9.11	7.94	8.22	10.99	6.81	7.25
LAMB AND KIDGOAT	20.34	31.32	25.91	20.79	19.06	17.52	23.12	28.01	21.68
MUTTON AND GOAT	27.26	21.61	20.42	11.40	11.07	9.11	25.72	21.99	13.76
PORK	20.61	15.73	13.05	11.59	11.52	10.74	19.71	14.22	11.76
POULTRY	10.57	10.76	9.82	14.11	14.51	16.62	10.34	10.21	12.84
FROZEN BEEF	3.23	2.64	4.11	4.64	6.43	5.28	2.60	3.35	6.22
FROZEN MUTTON	-	.47	5.05	9.28	9.73	9.28	-	2.80	7.29
RABBITS	1.28	.73	.68	.65	.64	.61	1.04	.67	.64
GAME	.69	.74	.57	.34	.26	.27	.78	.66	.38
SALAMI, SAUSAGES HOME PRODUCED	.69	1.26	2.96	2.42	2.13	1.97	.92	1.93	2.39
SALAMI, SAUSAGES IMPORTED	.09	.07	.09	.08	.09	.07	.07	.08	.09
CANNED MEAT	-	-	.71	2.06	1.96	1.92	-	-	1.46
OTHER	.57	.35	.03	.56	.58	.67	.48	.45	.33
TOTAL	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Source: Ministry of Co-ordination, National Accounts Division.

What can be said now is that these relatively rapid rates of expansion in the per capita consumption of meat were partly due to relatively low original levels, associated with the fact that 1950 was the first year after the restoration of normal conditions in the country and, therefore, there were still many unsatisfied needs among the mass of population. This is apparent by the fact that the per capita consumption has been increased all over the country between 1951 and 1961, as Table I.4 shows. However, the increase in Athens area has been twice as much as in provincial towns and villages. The per capita consumption in Athens in 1961 (37.2 kgs.) continued to be, as in 1951, nearly twice as much as in other towns (18.9 kgs.) and almost 50 percent higher than that in villages (25.3 kgs.), although their consumption levels in 1951 were equal with Athens. It may indicate, that in so far as Athens consists of an area leading the country's habits and preferences, one can expect relatively rapid rates of increase in meat consumption in the rest of the country in the future.

Despite the mentioned improvements in the level of per capita consumption, Greece is still somewhat half-way behind the United Kingdom and one-third of that of the main meat producing countries of the World (Argentina, Australia, New Zealand, U.S.A.), as Table I.5 shows (average 1963-65). The per capita consumption of meat in Greece approaches that of Italy and is almost twice as much as that of Portugal, and even higher than other countries of the World included in Table I.5, which, for religious reasons, do not represent comparative cases.

The relative position of the per capita consumption of meat in Greece seems roughly to correspond to its relative position in terms of per capita income. Actually, as the diagram I.1 shows, the per capita consumption of meat in Greece lies within the area of the scatter cloud.

TABLE I.4

PER CAPITA CONSUMPTION OF MEAT IN MAJOR REGIONS (in kgs.)

	ATHENS AREA	OTHER TOWNS	VILLAGES	WHOLE COUNTRY
1951	13.54	7.83	13.77	11.16
1961	37.19	18.86	25.30	25.70
1961 with 1951 = 100	274.66	240.87	183.73	230.28

Sources: Ministry of Co-ordination, National Accounts Service, National Statistical Service, Statistical Year Book 1967, tables II 7, III 9, pp.18, 21, 23.

TABLE I.5

PER CAPITA GROSS DOMESTIC PRODUCT AND PER CAPITA CONSUMPTION OF MEAT IN SELECTED COUNTRIES

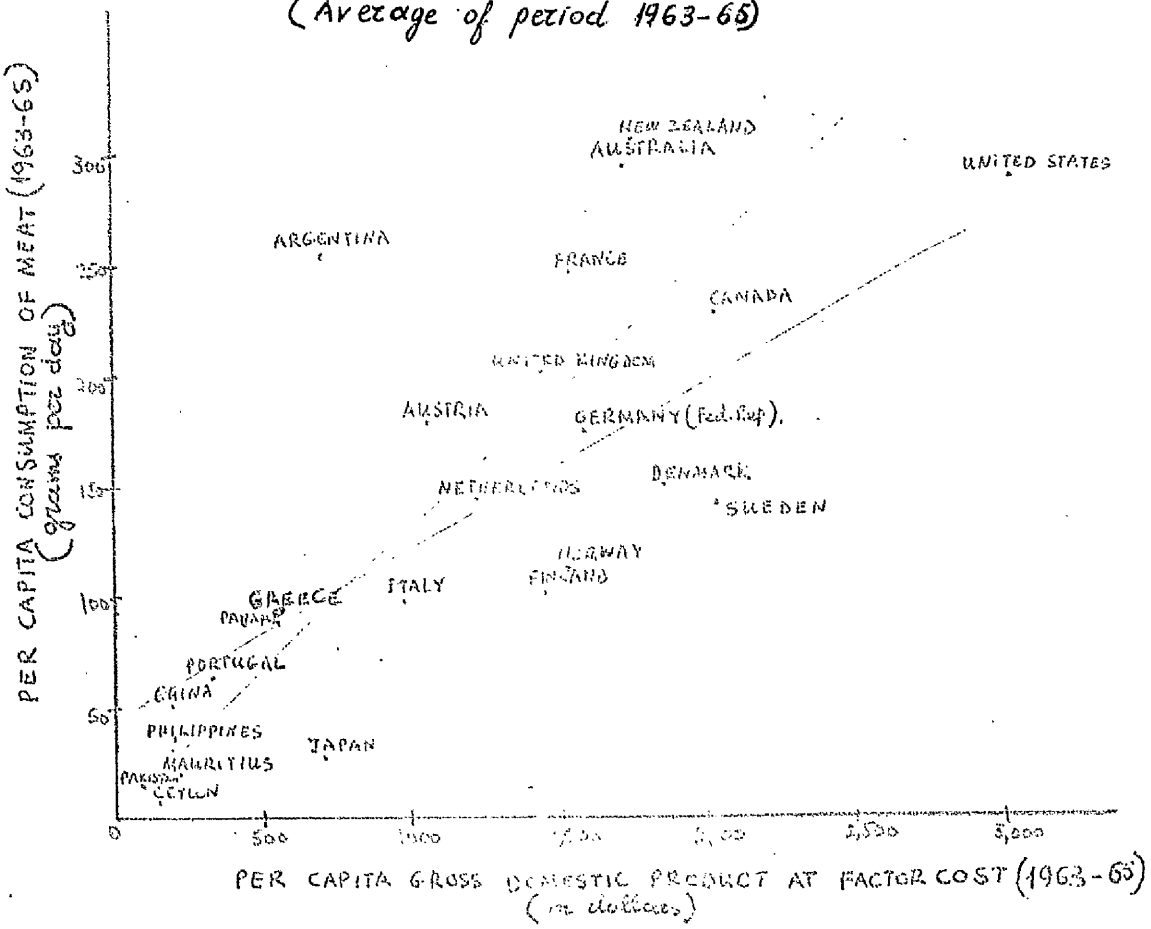
(1963-65)

COUNTRIES	PER CAPITA GNP AT FACTOR COSTS (IN DOLLARS)	PER CAPITA CONSUMPTION OF MEAT (GRAMS PER DAY)
NEW ZEALAND	1,769	311
AUSTRALIA	1,748	294
ARGENTINA	670	256
UNITED STATES	3,026	278
CANADA	2,016	230
UNITED KINGDOM	1,476	203
FRANCE	1,523	249
GERMANY (FED. REP.)	1,537	179
DENMARK	1,848	153
AUSTRIA	1,030	173
NETHERLANDS	1,248	143
ITALY	909	98
GREECE	534	93
PORTUGAL	343	59
PANAMA	454	85
JAPAN	730	28
PHILIPPINES	230	36
CHINA (TAIWAN)	184	51

Source: U.N., Statistical Yearbook 1967, Table 164, pp.498-502, U.N., Yearbook of National Accounts Statistics 1966, Part D, 7A, pp.725-29.

DIAGRAM I.1

PER CAPITA CONSUMPTION OF MEAT AND PER CAPITA INCOME IN VARIOUS COUNTRIES (Average of period 1963-65)



Sources: U.N, Statistical Yearbook 1967, Table 164, pp 498-502, U.N, Yearbook of National Accounts Statistics 1966, Part D, Tables pp 725-29.

It is clear that different countries have different "population", in the sense of their behaviour patterns, and there may be no need that Greece should follow the international pattern of meat consumption, as its per capita income increases in the near future. It seems obvious from the above diagram that income is not the only factor of meat consumption among countries but it is likely the main common factor with available data in many countries of the world.

Assuming the relevance of the theory of "demonstration effect" on an international/

international level[1], one can justify oneself in regressing the per capita meat consumption with the per capita income internationally, on the expectation that the state of preferences may have a tendency in the long-run to coincide rather than to diverse among the nations. Such a line was estimated on the basis of the data of Table I.5 and has explained in double log form 77.2 per cent of the variation of the per capita consumption of meat with an income elasticity of .721[2]. This elasticity with various reservations might be used as a complementary means of long-run forecasting of the demand for meat in Greece. It does not seem, however, to be a too effective tool for inter mediate forecasting for planning in a five year period, where we may have changes in relative price structure to affect the demand for meat, while the tastes or preferences cannot be expected to vary appreciably, even if they differ from any international pattern.

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1. R. Nurkse, "Problems of Capital Formation in Underdeveloped Countries", Oxford, 1953.

2. This relationship is $\ln(Q/N)_i = .027 + \underset{(.097)}{.721} \ln(Y/N)_i$ $\quad \bar{R}^2 = .772$, $DW = 1.582$

   where, $(Q/N)_i$ = per capita consumption of meat in the country i (in grams per day)

   $(Y/N)_i$ = per capita income in country i in U.S.$

CHAPTER II

PROBLEMS OF MEASUREMENT OF MAIN FACTORS OF DEMAND FOR MEAT IN GREECE.

1. Various Possible Factors-Variables

The starting point for statistical analysis of demand for meat should be, in accordance with the theory, the individual "spending unit". Briefly speaking, each spending unit enters a time period with a certain set of attributes, which are or seem to be important in relation to its consumption of meat. These attributes are its basic habits and propensities and measurable attributes such as income, assets, financial commitments and the initial pattern of expenditures, the kind of occupation and the total number of persons in the spending unit, their ages, sex, etc.

Strictly economic attributes change during a given time period. The income of each working member may change in his job through changes in basic wage rates or average hours worked per week. His salary, professional, entrepreneurial, interest or rental incomes may change. He may change his occupation in a way which influences his food consumption pattern, including pattern of meat. Or he may shift to retirement status with changes both in income and in way of life, which influence his own food consumption pattern and that of the larger spending unit to which he belongs.

Among the other economic factors, the spending unit may take on new financial obligations or liquidate old ones, given capital market imperfections. New obligations tend to decrease current expenditures for total food, including meat. The decision to take on new obligations is probably affected by strictly economic considerations (i.e. anticipated increases in personal income). In a free economy, the expenditure and consumption pattern of each unit will be influenced to some extent by changes in relative prices, apart from anticipations as to the future price movements of durable commodities, whatever defined.

Under these conditions, the demand function of a spending unit for a particular meat commodity seems to include roughly the following variables: (a) price of this commodity, (b) prices of a limited number of closely competing meat commodities, (c) retail prices of other consumer goods and services, (d) income of the spending unit, (e) fixed commitments of the spending unit and (f) various other attributes of the spending unit such as number, age, sex, occupations of working member and so on.

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A demand function containing all the above variables may still be subject to minor random disturbances (errors) in normal times (due to more remote variables) and to irregular major or episodic disturbances in times of unrest. But even th inclusion of these main variables is usually constrained by data limitations and statistical reasons.

Most of these factors have frequently available data only in terms of national totals and averages, and therefore are inevitably used as such by researchers. An "aggregation" problem is present therefore from the use of totals or averages, which supress some information possibly obtained from data for individual spending units. Consequently, whatever information exists on the distribution of income, consumption etc., and other variables is going to be used along with the aggregates. Thus, the aggregation here applies only to individuals, since commodities and prices are investigated separately for each of 8 main kinds of meat, besides the total meat consumption.

Along with the consumption and price data for each kind of meat for the whole country, there are also available corresponding meat consumption data for the Athens area, other towns with over 10,000 residents and for villages (see above Table I.4). But lack of income data and price data on a regional basis have impeded us in regressing consumption for meat for these three groups of regions.

As is known, the partial equilibrium theory of demand relates changes in quantities of meat taken by consumers to changes in prices, assuming that consume incomes, tastes and preferences, prices and substitute goods or services and all other factors are held constant[1].

Most economists now rely on the cardinal utility theory, assuming that the consumer can rank alternative commodities in relation to his preferences. Being rational, he will select from all possible alternatives within his budget constraint, the combination of goods and services which will provide the greatest total utility, by equating marginal utilities per unit of income spent for all goods.

The/

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1. R.H. Strotz, "The Empirical Implications of Utility tree", Econometrica, Vol.25, April 1957, pp.270-80 - H.S. Houthakker, "The present State of Consumption Theory", Econometrica, Vol.29, October 1961, pp.708-713 - P.A. Samuelson, "Foundations of Economic Analysis", Cambridge, Harvard University Press, 1947 - H. Uzawa, "Preference and Rational Choice in the theory of Consumption", Mathematical Methods in the Social Science 1959, Proceedings of the First Stanford Symposium, ed. K. Arrow and others, Stanford University Press, 1960, Ch.9.

The above theoretical explanations, when applied in practice, tend usually to ignore the procedure, supposed by the theory of forming and changing of consumer tastes and preferences. Socio-economic factors other than income and price are included principally through a ceteris paribus assumption. In the post-war period empirical researchers have paid an increasing attention to this assumption[2]. They have clarified between stocks of goods and flows into distribution and consumption as a step towards dynamic planning and have considered the effects of experience and habit formation on consumer's choice[3].

In view of the variety of the factors, possibly influencing the demand for meat it is, needless to say, that its simple association with income alone might have limited predicting ability, depending on whether all the multivariety of the briefly mentioned factors are held constant, and the income distribution as well. Not that statistical research can easily isolate the net effects of these factors, even if all were measured and data were available. The minor target of the following attempts is to indicate and separate the effects of income and prices on demand for meat in Greece, with certain reference to the type of possible influences of other demographic and social factors.

The evolution of the annual per capita consumption of meat (in kgs.) during the period 1950-67 and the per capita disposable income in 1958 prices and of the average price of meat in drs. deflated by the price index of the total consumption is given in the diagram I.2. Two observations on the relative overall trends of the main factors of demand for meat may be made; one is that meat consumption is steadily increasing at relatively higher ratio than the per capita income. Thus, the average annual rate of increase of per capita meat consumption in 1950-67 was 7.8 percent, against 5.2 percent, a corresponding rate of increase of per capita income. The other thing is that meat prices increase as well with the increase of the meat consumption over time. A similar time pattern prevails for the consumption of individual meat varieties.

However, income and substitution effects in demand for meat make difficult the simple comparison of the percentage changes to any conclusion about elasticities of demand for meat in Greece. Not that we can preclude the possible influence of other factors on the demand for meat. Price elasticity can be actually negative/

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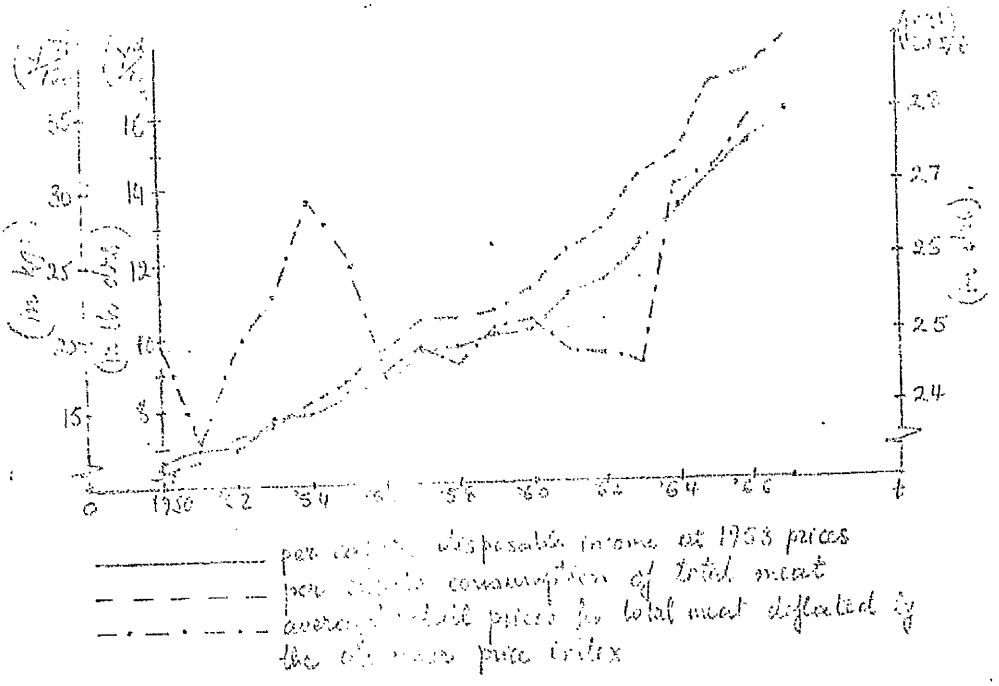
2. M.C. Burk, "Survey of Interpretations of Consumer Behaviour by Social Scientists in the Post-war Period", J.F.E., Vol.49, Feb. 1967.

3. H.S. Houthakker and L.D. Taylor, "Consumer Demand in the U.S. 1929-70. Analyses and Projections", Cambridge, Harvard University Press, 1966.

DIAGRAM I.2

PER CAPITA CONSUMPTION OF TOTAL MEAT WITH AVERAGE RETAIL PRICE AND PER CAPITA DISPOSABLE INCOME (1950 - 1967)



negative, as theory suggests despite the fact that the effect of meat prices on meat consumption can be thought from the diagram I.2 to be positive. The net effect of income and prices and the possible influence of supply factors cannot be isolated or at least refined without resort to some statistical testing. However, given the various pitfalls in this type of analysis, one has to proceed with caution in order to avoid misleading conclusions and have a net benefit from this experimentation. Thus, we make a preliminary investigation of the main problems that arise in the statistical testing of demand for meat and afterwards we proceed in estimating the relationships.

2. Specification of the model of demand for meat in Greece

In an empirical investigation of a commodity in any country there are at least three major problems to be faced[4]:

(1) specifying the model, i.e. the system of the relationships which are believed to be responsible for generating the observed data.

(2) determining the identifiability of the relationships we intend to deal with, and then as a third stage

(3) calculating statistical estimates of the parameters of the identifiable relationships and making assessments of them.

Regarding the first problem, an empirical model consists of a set of relationships of observed variables and a set of assumptions regarding the nature of variations in the data, which are explained by systematic relationships. The relationships between the various variables are often called "structural equations". These equations can be behavioural equations, describing economic decisions by a certain category of economic agents. Allowing for the aggregation problem for the time being, we may say that these relationships include the demand and supply function, that is two "structural equations" for each type of meat, i.e. one for the demand of meat item i (Q_i^d) and one for the supply of this quantity (Q_i^s),

$$Q_i^d = f(Y, Pi, Pj, Ui) \qquad (1)$$

$$Q_i^s = f(Pi, Pj, Ci, Vi) \qquad (2)$$

where: Y = per capita disposable income,

P_i, P_j = the prices of each type of meat and of its close substitutes respectively,

C_i = production costs

and U_i, V_i = the disturbance terms due to omitted variables.

There is also one equilibrium condition representing market clearance

$$Q_i^s = Q_i^d \qquad (3)$$

Furthermore, some of the structural equations can be identities deriving directly/

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4. See J. Johnston, "Econometric Methods", McGraw Hill Co., Inc., New York, 1963, pp.231-252.

directly from definitions of the variables[5] as for example total supply of meat equals domestic production (Q_i^{hs}) plus net imports (m_i) plus any change in stocks i.e. ($Q_i^s = Q_i^{hs} + m_i \pm Ds_i$). (4)

Inafurther specification of the model of demand for meat in Greece there are many elements to be cleared up. Thus, there must be a set of two behaviour equations of the noted type, wherever meat is exchanged between two categories of economic agents in the successive stages from production to the final demand. The variables involved in the demand curves of consumers, retailers, wholesalers and processors of meat are not generally identical and therefore the structural coefficients relating similar variables are likely numerically different. If all agencies, lying between farmers and consumers, are represented by a single behaviour equation, this equation does not accurately describe the behaviour of any one intermediate marketing agency. This is simply one of the several types of aggregation problem involved in specifying a model.

Time series data, as usual, exist only for a few of the more important market channels and we have to decide how to elaborate on hypotheses concerning the behaviour of the marketing system, which can be tested with our data. Empirical researchers are seldom able to quantify all the important relationships.

The problem of including a multi-system of behavioural models of all stages can find some possibly tolerable solution in Greece on the assumption that the limits of independent action of the intermediate agents in the case of meat are not likely to be relatively too high, compared with other commodities[6]. Therefore, it was decided, in view of the lack of data, to concentrate only on the stage of final meat demand along with the meat supply conditions to be investigated.

A further problem of specification of the meat model is whether in (1) income variable is predetermined or has to be taken as an endogenous one and, therefore has to be estimated by an additional relationship. Disposable personal income is/

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5. T.C. Koopmans,"Statistical Inference in Dynamic Economic Models", 1950, Cowels Commission Research Staff Members and Guests, John-Wiley & Sons, Inc. N.Y., pp.54-55. - C.F. Christ,"Econometric Models & Methods", John Wiley & Sons, Inc. N.Y., 1966, pp.21-23.

6. See for a more detailed discussion on this problem in Chapter IV.

is affected by prices and consumption of all goods and services in the economy - directly or indirectly. In a complete model of the entire economic system disposable income should therefore be regarded as an endogenous variable. However, the immediate question is, to what extent is disposable income influenced by back-effects from the consumption and price of the commodity in question - namely the various species of meat?

During 1950-66 the retail value of meat consumption in Greece averaged 4.6 billion dollars equivalent to 5.5 percent of disposable income. The value of consumption of various types of meat as percentage to disposable income appears in the following Table I.6. Thus, it suggests that variations in meat production could not account for more than 5.5 percent of the total variation in disposable income and in fact this percentage is accounted for much less by the imports of meat[7].

As far as the variable price is concerned it comes, strictly speaking, from (3) solved for P_i which gives

$$P_i = f(q_i, p_j, y, u, v) \qquad (5)$$

However, in a simple model of demand of the type (1) as applied to conditions of an "open economy" P_i is taken as an "exogenous" variable. In particular, the relationship (1) is supposed to correspond to the institutional and market conditions in Greece as is attempted to be shown in the following.

A lot of ink has been spent of course on the quantity-price demand equations to deal with the problems of its estimation. Thus, suppose that (1) takes the form of (5)

$$Q_{it} = f(P_{it}, Z_t) \qquad (6)$$

where Z_t all the other variables of e.g. (1)

The above form of causal relationship assumes that the meat market is highly competitive and that meat consumption has to adjust to price already predetermined rather than the opposite. This functional form seems, on the other hand, to be close to the behaviour of the individual consumer because he has the prices in front of him and he adjusts his consumption to these prices. The relationship seems to be justified in the Greek meat market by the fact that the prices of meat are not exclusively determined by the market forces, but partly by the government. An additional factor in the Greek case is that domestic/

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7. However, we have no exact data on the value of the meat production, in order to find how much less this percentage would be.

TABLE I.6

CONSUMPTION OF DIFFERENT KINDS OF MEAT AS PERCENTAGE OF THE AVERAGE DISPOSABLE INCOME (1950-66)

Veal	:	0.63	
Beef	:	0.40	
Lamb and Kidgoat	:	1.53	
Mutton and Goat	:	0.84	
Pork	:	0.71	
Poultry	:	0.65	
Frozen Beef	:	0.25	
Frozen Mutton	:	0.28	(1955-66)
Rabbit	:	0.04	
Game	:	0.05	
Total Meat	:	5.53	

Source: National Accounts Service, National Accounts of Greece 1948-1959 and 1960-66. For consumption of particular meat types : Unpublished data.

domestic meat prices are largely affected by the international meat market, given the imports of meat and that the import demand of Greece for meat consists of a small proportion of the total international demand.

For many items of consumer expenditure there is a good case for regarding the price as fixed exogenously and for the quantity being the dependent variable[8]. The common case is where the price is determined by demand and supply conditions in the world market and by transport costs to the country of consumption.

The alternative treatment would be that price is an endogenous variable and has to adjust to the consumption which is considered predetermined,

$$Pit = f(Qit, Ut) \qquad (7)$$

Function (7) seems more appropriate for the whole economy than for the individual demand. This causal relationship may happen if the supply reaching consumer is exactly equal to that marketed by farmers supply except for normal wastes and losses in the marketing process (unusual high or low temperature, etc.)[9] Structural coefficients that are statistically consistent for certain agricultural commodities - i.e. those that are independent (have no close substitutes and no close complements) and for which consumption is essentially predetermined - may be obtained directly by fitting a least-squares regression equation to (7) and by making a direct algebraic transformation to derive the coefficients of elasticities.[10]

On another view[11] the terms "dependent" and "independent" which are traditional in correlation analysis with meat are somewhat misleading since they do not have generally speaking any significance as to which variable is causally independent, or dependent.

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8. A.A. Walters, "An Introduction to Econometrics", Macmillan and Co. Ltd., London, 1968, p.222.

9. K.A. Fox, "Econometric Analysis for Public Policy", Ames, Iowa State University Press, 1958, p.47.

10. K.A. Fox "The Analysis of Demand for Farm Products", U.S.D.A., Technical Bulletin 1081, 1953, pp.9-12.

11. E.J. Working "Demand for Meat", Institute of Meat Packing, The University of Chicago Press, Chicago, Illinois, 1954, p.39.

3. Identifiability of the relationships involved

The second problem in an empirical model of demand for meat is the identifiability of the relationships involved. The identifiability problem[12] is inherent in the nature of economic data. A set of simultaneous price-quantity observations describes the points of intersection of a supply curve and a demand curve. Unless additional information is available (on the variables causing shifts in each curve), we do not know whether a curve fitted to the observations is a demand curve, a supply curve or some uninterpretable combination of the two.

The necessary and sufficient conditions for indentifiability of a given equation in a set of simultaneous equations is summed up in three propositions:

(a) A necessary condition is that m-1 of the total number of variables in the system (lagged endogenous variables taken as separate variables) must be absent from the given equation.

(b) A second necessary condition is that each of the other m-1 equations in the system must contain at least one variable which does not appear in the given equation. If another equation contains exactly the same variables as the given equation, neither is identifiable.

(c) A necessary and sufficient condition for the identifiability of the j^{th} equation in the system of m equations is,

$$\sum_{i=1}^{n} A_{ij} X_i = Z_j \qquad j = 1,2.....m \qquad (8)$$

where X_i = n variables

A_{ij} = constant parameters to be estimated

Z_j = random disturbances.

A matrix A of the coefficients in the other m-1 equations of the variables, which are absent from the j^{th} equation, can be formed. If this matrix is of rank m-1 (if it contains at least one set of m-1 columns and rows, which form a non-zero determinant) the j^{th} equation is identifiable. If there is only one non-zero determinant of order m-1, equation j is said to be "just identified", /

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12. J. Johnston, "Econometric Methods", McGraw Hill Co. Inc., N.Y. 1963, pp.231-52 - C.F. Christ, "Econometric Models and Methods", John Wiley & Sons, Inc., N.Y. 1966, pp.298-343 - K.A. Fox (1958) op.cit. pp.26-29.

identified", if there are two or more such determinants equation j is said to be "over identified",. In the latter case equation j derives by using maximum likelihood estimate of the equation, which reconciles or averages the two or more possible individual estimates.

If the last condition (c) is not satisfied there exists another equation or some linear combination of two or more equations which is not distinguishable from equation j. If one other equation excludes exactly the same variables as equation j, there is a row of zeros in matrix A and its rank will be m-2 rather than m-1.

Fortunately the identification problem does not seem so intensive in the case of meat in Greece. Thus, the demand equation (1) seems to fulfil the mentioned identifiability condition (a) because the production cost variable (c_i) of (2) is absent from it. It seems also consistent with the condition (b), because the income variable is not present in the supply of meat function. It can be further argued that the supply of meat is determined by economic factors existing at the beginning of the farm decision to breed animals and the early stages of production (such as prices and non-economic factors, like weather, and moreover the increase in productivity). Therefore, equation (2) may take the form,

$$Q^{s}_{it} = f\ (P_{i,\ t-h},\ P_{j,t-h},\ v) \qquad (9)$$

where h = the time in terms of periods required for breeding.

Under these conditions, the market supply curve is a vertical line as to the current price and therefore it does not affect the identifiability of the demand function. Consequently, the relation between quantity and price can be expected to approximate the demand function for meat. In this case the single equation method seems to be justified.

Of course, there are further objections regarding the use of single equation in demand analysis of meat.[13] While the total supply of live animals may be fully predetermined, the producer has the option as to what proportion of it he will slaughter/

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13. Simultaneous equation techniques have so far, however, rarely led to convincing results in demand analysis. This seems to be due to a larger extent to the failure of economic theory to formulate an adequate supply equation. In the absence of such an equation, simultaneous estimation is virtually impossible and the use of single-equation estimation is thought unavoidable in demand analysis, H.S. Houthakker and L. Taylor "Consumer Demand in U.S. 1929-70", Harvard Econ. Studies, 1965, pp.6-7 - K.A. Fox "Intermediate Economic Statistics", 1968, p.405, K.A. Fox (1958), op.cit. pp.33-34.

and sell. He can sell slaughter/most of the livestock, when the prices of meat are very high on an inventory management basis. However, these objections seem to consist of exceptional cases for abandoning the assumption that total supply and not only the production of each kind of meat is predetermined. In fact, the demand for meat seems to satisfy the single equation assuming that total production of this is marketed and is not stored in the stage of trade i.e. it is largely consumed within a short period time after slaughtering. In that case, the total production of a given period reaches final consumers, so that the problem of processor demand and storage does not seem to arise to the extent of other commodities.

There is a further problem of course, since a portion of the total supply of meat in Greece (less than one fifth on average since 1950) is imports from abroad. The question how imports of meat have to be incorporated in the demand analysis has focussed the attention of researchers so far. One approach to the problem suggests that, to the extent that imports are competing with home production, estimation of an import demand function is necessary, since it should not be thought of purely in terms of consumers choice[14]. We have, in that case, to treat import demand as a residual - as the difference between a total demand curve and a supply curve of competing meat. Once this approach is taken, it becomes clear that the import demand function is likely to be highly unstable. For, fairly small percentage shifts in demand (either for import commodity or the domestically produced import substitutes) will get magnified into fairly large shifts in the import demand rather than in domestic production.

The/

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14. Since the imports of meat are competitive to domestic supply, the import demand function will depend on determinants which influence the demand function (income and prices) and the domestic production of meat,

$$M_{it} = f(Y, P_{it}, Q^{h}_{it})$$

where Q^{h}_{it} = domestic production of meat item i

This scheme has been supposed to have more general validity. See "The United States Demand for Imports" Discussion, John H. Holler, American Economic Review, P.P. Vol.43, No.2, 1953 pp.160-161. Eventually the changes in stocks in the hands of importers has been supported to stand in the place of Q^{h}_{it}. This view has been suggested H.K. Zassehaus and F.C. Dirks (Recent Developments in U.S. Balance of Payments, I.M.F. Staff Papers, Vol.II p.228) to be applied to raw materials and has been generalised to all commodities after the proposal of T.H. Adler, op.cit.

The relationship between the demand for imports and the volume and composition of domestic production seems to be a problem of acute practical significance particularly in underdeveloped areas,. There the relative importance of shifts in the demand for imports through increased domestic consumption and of movements along the import-income functions resulting from a rise in income, is of vital importance for the formulation of economic policy.

In Harberger's[15] exposition of the above approach, imports play a marginal role. They are called for assistance in cases where total demand cannot be readily satisfied by domestic output. The starting point is the Pareto principle that this demand of imports at any price or income level is the residual between total domestic demand and domestic supply. The major reason for shifts in the import-price function is taken by him to be shifts of domestic competing supply. These shifts are related to both changes in domestic income and the changes of the level of domestic employment.

The formula for the price elasticity of import demand, according to Harberger is,

$$em = ked + (k-1)\, es \qquad (10)$$

where k = the reciprocal of the share of imports in total home demand, and all elasticities e are in absolute values.

The Equation (10) shows that the price elasticity of demand of imports (em), is a multiple of the price elasticity of domestic demand (ed) augmented by a smaller multiple of price elasticity of domestic supply (es), assuming it here not predetermined. This formula refers of course to the price elasticity of import demand from all export countries taken together.[16]

The approach of Harberger seems not apparently to contradict the Greek conditions of import demand for fresh meat, but we have not estimated supply elasticities so as to calculate import demand elasticities. On the other hand, frozen meat (largely beef and mutton) is entirely imported and therefore the demand functions to be estimated for these two species are interpreted as import demand functions. If/

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15. A.C. Harberger, "A structural approach to the problems of import demand", American Economic Review, P.P. May, 1953, pp.146-166.

16. It may be extended to cover the price elasticity of import demand from a single country, on the assumption that there are a number of foreign producers competing in the import country's market. See C.E. Ferguson and M. Polasek, "The elasticity of import demand for raw apparel wool in the U.S", Econometrica, Vol.30, October 1962.

If data was available on changes in stocks of imported items in the hands of distributors, allowance should be made for their possible influence on price formation or more accurately a separate behavioural model might be formulated for these agents as well.

4. Forms tested and Data used

A number of mathematical forms of demand for meat function are tested in order to find which form fits better to Greek data in terms of explained proportion of variance. As is known,[17] each formula has its own advantages and defects; therefore, taking into account different formulas and comparing the obtained results is necessary, in view of the fact that theory is only qualitative.

In particular, we are taking, computing and evaluating the results, of regressions with per capita consumption of various meats, and in addition the relation of consumption ratios to price ratios of two items on an indifference surface, which is not a very common practice.[18]

Briefly speaking, testing separately the demand function of each kind of meat (with as dependent variable the per capita consumption of either item), various combinations of the main independent variables, i.e. relative prices P_i/P_j (where P_i the own price of a kind of meat and P_j the price of a supposed substitute,) and the personal per capita disposable income at 1958 prices, as well as net income splitting into per capita non-farm and farm income, have been used.

Certain other variables, such as lagged habit formation[19] represented by a 3 years' average of past consumption and the share of meat expenditure to total expenditure on food were incorporated, in the purpose of measuring the intertemporal meat consumption pattern. Unfortunately, although we have consumption data disaggregated into three groups - the Athens area, Towns with over 10,000 inhabitants and Villages (See Table I.4) - the lack of data on the corresponding per capita disposable income and reliable prices has impeded the estimations of separate demand functions for meat by region.

The primary purpose of this study is to specify the substitution possibilities of various kinds of meat in Greece. This might have been by derivation of a partial indifference surface for any pair of meat items using data on quantities, prices and income. By this means the separate effects of the thousands of individual/

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17. Archibald G. and Lipsey R.G., "An Introduction to a Mathematical Treatment of Economics", Weidenfeld and Nicolson Ltd., London 1967.

18. K.W. Meinken, A.S. Pojko and C.A. King, "Measurement of substitution in demand from time series data - A Synthesis of three approaches", Journal of Farm Economics, Aug. 1956, p.711

19. L.R. Klein, J. Ball, A. Hazlewood and P. Vaudome, "An Econometric Model of the U.K.", Oxford, Basil Blackwell, 1961, pp.58.

individual goods (other than meat), that compete for a consumer's income are left aside, in accordance with the indifference curves theory, as it has been developed by J.R. Hicks[20].

Some experimentation with the substitutability among two commodities, in terms of analysis directly referred to indifference curve, has been carried out so far.[21] In Greece, the constant increasing trend of income adds difficulties to the attempt to isolate and subtract the "income effect". On the other hand, it has been remarked that, although the investigation of the family of indifference curves for every two kinds of meat gives the substitution possibilities of them it is possible to measure the exact degree of competitiveness of two meat items. The exact degree of substitution of two commodities is measured by the elasticity of substitution[22], which is not a simple concept, but it depends on the direct price and cross price elasticities of two meat items[23].

We estimate the equation (1) in terms of ln for two meat items i and j respectively as

$$\ln(Q^i/N)t = \ln a + b \ln(Pi)_t + c \ln(Pj)_t + d \ln(Y/N)_t \qquad (1a)$$
$$\ln(Q^j/N)_t = \ln a^1 + b^1 \ln(Pi)_t + c^1 \ln(Pj)_t + d^1 \ln(Y/N)_t$$

Now/

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20. J.R. Hicks, "Value and Capital", Oxford at the Clarendon Press, Second Edition, 1946, pp.26-35.

21. F. Waugh, "A partial Indifference curve surface for Beef and Pork", Journal of Farm Economics, Feb. 1956, pp.102-112.

22. The elasticity of substitution relates the rate of change of ratio of quantities of two commodities to the rate of change of the ratio of their own prices as

$$es = \frac{d(Q1/Q2) \,/\, Q1/Q2}{d(P1/P2) \,/\, P1/P2} = \frac{d(Q1/Q2)}{d(P1/P2)} \cdot \frac{P1/P2}{Q1/Q2}$$

This consists the "empirical" definition of es as it was defined by I. Morrisett "Some Recent Uses of Elasticity of Substitution - A Survey", Econometrica, June 1953 pp.41-62. This "empirical" definition is coming from the "basic" definition suggested by Hicks

$$es = \frac{d(Q1/Q2) \,/\, Q1/Q2}{d(dQ1/dQ2) \,/\, dQ1/dQ2} = \frac{d(Q1/Q2)}{d(dQ1/dQ2)} \cdot \frac{dQ1/dQ2}{Q1/Q2},$$

assuming that in competitive equilibrium the ratio of marginal utilities equals the ratio of prices of two commodities $\partial U/\partial Q1 \,/\, \partial U/\partial Q2 = P1/P2$ and the slope of the indifference curve (if movement is restricted to an indifference curve) equals the ratio of marginal utilities.
$\partial Q1/\partial Q2 = -\partial U/\partial Q1 \,/\, \partial U/\partial Q2 = -P1/P2$

23. K.W. Meinken, A.S. Rojko and C.A. King, op.cit., p.711 and following.

Now subtracting equation (1b) from (1a), we have,

$$\ln(Q^i/N) - \ln(Q^j/N)_t = b \ln(Pi)_t - b^1 \ln(Pi)_t + c \ln(Pj)_t - c^1 \ln(Pj)_t + d \ln(Y^d/N)_t - d^1 \ln(Y^d/N)_t$$

$$\text{or} \quad = (b-b^1) \ln(Pi)_t - (c^1-c) \ln(Pj)_t + (d-d^1) \ln(Y^d/N)_t \qquad (1c)$$

The coefficients b, b^1, c, c^1, d, d^1 are the partial derivatives of the equations (1a) and (1b). The elasticity of substitution of i for j can be derived as:

$$(b-b^1) = \frac{\partial \ln(Q^i/N)_t}{\partial \ln(Pi)_t} - \frac{\partial \ln(Qj/N)_t}{\partial \ln(Pi)_t} = ed_{ii} - ec_{ji} = e_{sij}$$

(direct price elasticity of i) − (cross price elasticity of j for i) = elasticity of substitution of i for j

Similarly, the elasticity of substitution of j for i can be derived as:

$$(c^1-c) = \frac{\partial \ln(Q^j/N)_t}{\partial \ln(Pj)_t} - \frac{\partial \ln(Q^i/N)_t}{\partial \ln(Pj)_t} = ed_{jj} - ec_{ij} = e_{sji}$$

(direct price elasticity of j) − (cross price elasticity of i for j) = elasticity of substitution of j for i

Another method tested in this study to find the elasticity of substitution between two kinds of meat is the following in linear form or in terms of logs:

$$\frac{(Qi/N)t}{(Qj/N)t} = a + b \left(Pi/Pj\right)_t + c \left(Y^d/N\right)_t \qquad (11)$$

The testing of both methods for estimation of the elasticity of substitution between any two meat items if gives acceptable results will mean that the consumer taking decisions to buy one kind of meat takes into close consideration the prices of other meat items.

The data regarding the dependent variable in all forms tested, is the volume of private consumption in tons i.e. demanded quantities in the market by the final consumer, plus the self consumption of meat by producers, the consumption of meat by hotels, restaurants, etc., divided by the mid-year population. Unfortunately, there is no breakdown of consumption of meat into the above components, with the consequence of possible excessive aggregation error in the estimated/

estimated function.

Time series data on prices paid by consumers are almost invariably retail store prices. The prices, of course, paid by other sources of meat consumption, i.e. restaurants and public institutions are probably lower than the retail prices.[24] Also, for the quantities of meat, which are consumed by the stock-farmers themselves, who do not pay any price, they certainly in fact loose a part of potential income. It is not, on the other hand, a direct consequence that because of different prices paid by restaurants, their patterns of meat consumption will be different from the pattern of household demand. The only thing is that because of lack of data these patterns of behaviour are not usually tested separately.

The average retail prices for every kind of meat is taken by the Ministry of Co-ordination, Division of National Accounts. It takes the retail meat prices from the National Statistical Service of Greece from the material collected for the consumer price index.[25] The average retail price for each kind of meat (Pi) is here deflated by the consumer price index (CPI), consisting in the ratio of private consumption expenditure at current prices to that at constant prices 1958. Retail meat prices have been also alternatively deflated by the food price index (FPI) and meat price index (MPI). The purpose of these deflations is to examine if the foodstuffs or other commodities may be more close substitutes to each kind of meat than any other kind of meat. Thus, we have so far three price variables: Pi/P_{CPI}, Pi/P_{FPI}, Pi/P_{MPI}. In addition, we use seven Pi/Pj ratios of each kind of meat with the prices of the rest.[26]

The price elasticities with the variable Pi/Pj in regressions with the level of per capita consumption of a meat item as dependent variable, give something more than the direct price elasticity of each meat item. This is approximately shown (for two kinds of meat $i = 1$, $j = 2$)[27] as :

-es /

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24. This qualification may be of some importance, since we have passed a period of relatively rapid increase of total meat consumed in restaurants or hotels, because of increase in tourism. The error is not changing, of course if the restaurant consumption has held its proportion to the total consumption in logarithmic regressions.

25. National Statistical Service of Greece, Consumer Price Index, Athens 1960.

26. Also the ratio Pi/CPI and all Pj/CPI by two, i.e. another 7 combinations for each kind of meat have been used.

27. Actually, this treatment is mathematically wrong, because derivatives do not break, but it seems necessary to have a rough idea of the relevance of our testing in terms of the well known concept of elasticities.

$\bar{e}s$ (estimated elasticity) =

$$= \frac{dQ1}{d(P1/P2)} \cdot \frac{(P1/P2)}{Q1} = \frac{dQ1}{dP1} \cdot dP2 \cdot \frac{P1}{P2 \cdot Q1} = \frac{dQ1}{dP1} \cdot \frac{P1}{Q1} \cdot \frac{dP2}{P2} = \bar{e}d \cdot \frac{dP2}{P2}$$

The part over the direct price elasticity $\bar{e}d$ (its own price elasticity) consists of the rate of change of the price of the substitute commodity $(\frac{dP2}{P2})$.

As a determining variable the per capita disposable income at 1958 prices is taken into account. It expresses the purchasing power of the consumer after the net direct taxes reduction (taxes less transfers) and it is affected by prices and production of all goods and services in the economy, directly or indirectly.

The influence of income is exerted on both the volume and the structure of each kind of meat consumption. Therefore, it is necessary to investigate the role of the income distribution in an empirical study of demand for meat. Broadly speaking, such a necessity is relatively higher in underdeveloped countries in so far as important distributional changes may follow the real income expansion by development process. Given that theory is not strict about the functional relationship between the process of economic development - or even cyclical fluctuations - and income distribution, we have to assume that these changes depend on the particular conditions of the country.

Data on income distribution is relatively rare particularly in underdeveloped countries and their reliability, if any, is also seldom very high[28]. As for Greece, data on income distribution is available by major professional classes (farmers - workers - incomes from property and entrepreneurship) since 1950, while the distribution by income level is still unknown. Such a distribution has been used by Klein and Goldberger (U.S.A.)[29] and Klein, Ball and others (U.K.)[30] in their consumption functions estimation.

The share of workers income in real terms in Greece follows a slightly upward trend/

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28. Budget data, also rare, is not necessarily more reliable. On the other hand, the role of the demographic factors is mixed up with income in cross-section studies, while budget surveys do not either provide the income distribution often in detail.

29. L.R. Klein and A.S. Goldberger, "An econometric model of the U.S. 1929-52", North Holland Publishing Co., Amsterdam, Holland, 1955.

30. L.R. Klein, J. Ball, A. Hazlewood and P. Vaudome, "op.cit" pp.12-14 21-22, 26.

trend and the farmers income a downward trend, while the share of profit and property income has rather an upward trend. The problem of the influence of changes in income distribution on meat consumption in Greece is faced in two alternative ways:

First, we test the meat consumption by the two components, i.e. the agricultural income Y_t^f and non-farm income Y_t^{nf} on a per capita basis. The test, of course, reduces by one the degrees of freedom but it was considered a necessary path. Comparison of the relevant income elasticities may be particularly interesting for the development plan as securing forecasting of meat consumption consistent with the planned class income distribution and consequently on adjusting the production plans for each kind of meat.

Second, the consumption of meat is tested by the ratio of total meat expenditure (Em) to total food expenditure (Ef) in real terms, as an indication of the living standard of the population as a whole. This variable $(\frac{Em}{Ef})$ has been inserted in the place of income to incorporate the effect of changes in tastes and preferences in the demand for meat as well. We have chosen this variable by the fact that the share of meat expenditure to total food expenditure has been significantly increased between 1950-1966 (from 8.83 percent in 1950 to 19.02 percent in 1966 at constant 1958 prices). However, the obtained results do not justify the incorporation of this variable in the place of income as a constraint in expenditure (even in the case where the results have been more satisfactory) rather than those with income variable, given the capital market imperfections (no possibility of borrowing to buy foodstuffs). So, the income variable is the major constraint for meat purchase, which is consistent with consumer theory. The using of the variable (Em/Ef), however, besides the per capita disposable income to express just habit formation has absorbed the effect of the income variable with the result that income variable had a negative significance. This shows the great degree of multicollinearity between the two variables, which indicates that meat may be considered in Greece as a superior commodity.

CHAPTER III

STATISTICAL RESULTS OF THE DEMAND FOR MEAT FUNCTIONS

A brief summary and assessment of the statistical results of demand for meat functions is carried out in the following. A more detailed picture of the results for each meat variety and for total meat is given at the end of this Chapter, in the form of separate sections. The discussion here consists basically of a comparative analysis of the results of total meat and the included meat varieties. Comparisons are also made with the results of similar studies in other countries and with two studies in Greece, which include demand functions for total meat and/or for different types of meat.

The "best" estimated functions on demand for meat in Greece have been selected on the basis of the following criteria:

- the $\bar{R}^2$ to explain as much part of the total variance of the dependent variables as possible.
- the Durbin-Watson ratio of residuals to be above the upper limit in any level of significance, because then the null hypothesis is sustained that there is no serial correlation in the residuals and no other systematic factors in the demand for meat.
- the standard errors of the coefficients of the particular variables to be as small as possible to and statistically accepted. Comparison of t-ratio of our estimates is made with t-Student because the number of observations is less than 30.

1. Estimated Income and Price Elasticities

An overall observation on the 'best' obtained demand for meat functions 1950-66 is that they explained 72.6 - 98.7 percent of the variance of consumption of the 8 kinds of meat in the period 1950-66. Diagram III.1 presents more clearly the actual and the estimated by these regressions quantities consumed of the various kinds of meat. Arithmetic results are summarised in Table III.1. These results indicate that in most cases the Durbin-Watson ratio of residuals shows not autocorrelation, which means that there may not be significant variables left out, and the residuals are likely due to random factors.

The estimated income and price elasticities, which are included in Table III.1, are not, of course, easily comparable to one another, since they were not all estimated from the same mathematical formula. Certain income elasticities are weighted averages of agricultural and non-agricultural income, and price elasticities do not all come from the same relative price variables, while the intercorrelation/

TABLE III.1

INCOME AND PRICE ELASTICITIES OF THE VARIOUS KINDS OF MEAT IN GREECE (1950 - 1966)

KIND OF MEAT	Share to Total Meat Consumption 1967	Income Elasticity	Price Elasticity(3)	Explained Part of Variance %	Durbin-Watson Ratio of Residuals
LAMB AND KID-GOAT	18	1.32	- .56	80.2	.68
MUTTON AND GOAT	9	.79(2)	- .67	76.4	2.18
FROZEN MUTTON	9	2.46	- 3.80	97.3	2.46
VEAL	18	3.77	- 1.81	94.8	1.73
BEEF	8	1.88(2)	- 1.19	72.6	1.68
FROZEN BEEF	5	2.72	- 1.69	79.5	1.59
PORK	11	.90(2)	- .69	96.5	2.08
POULTRY	17	1.34	- .82	97.6	1.36
TOTAL MEAT CONSUMPTION(1)	100	1.53	- .38	98.7	2.33

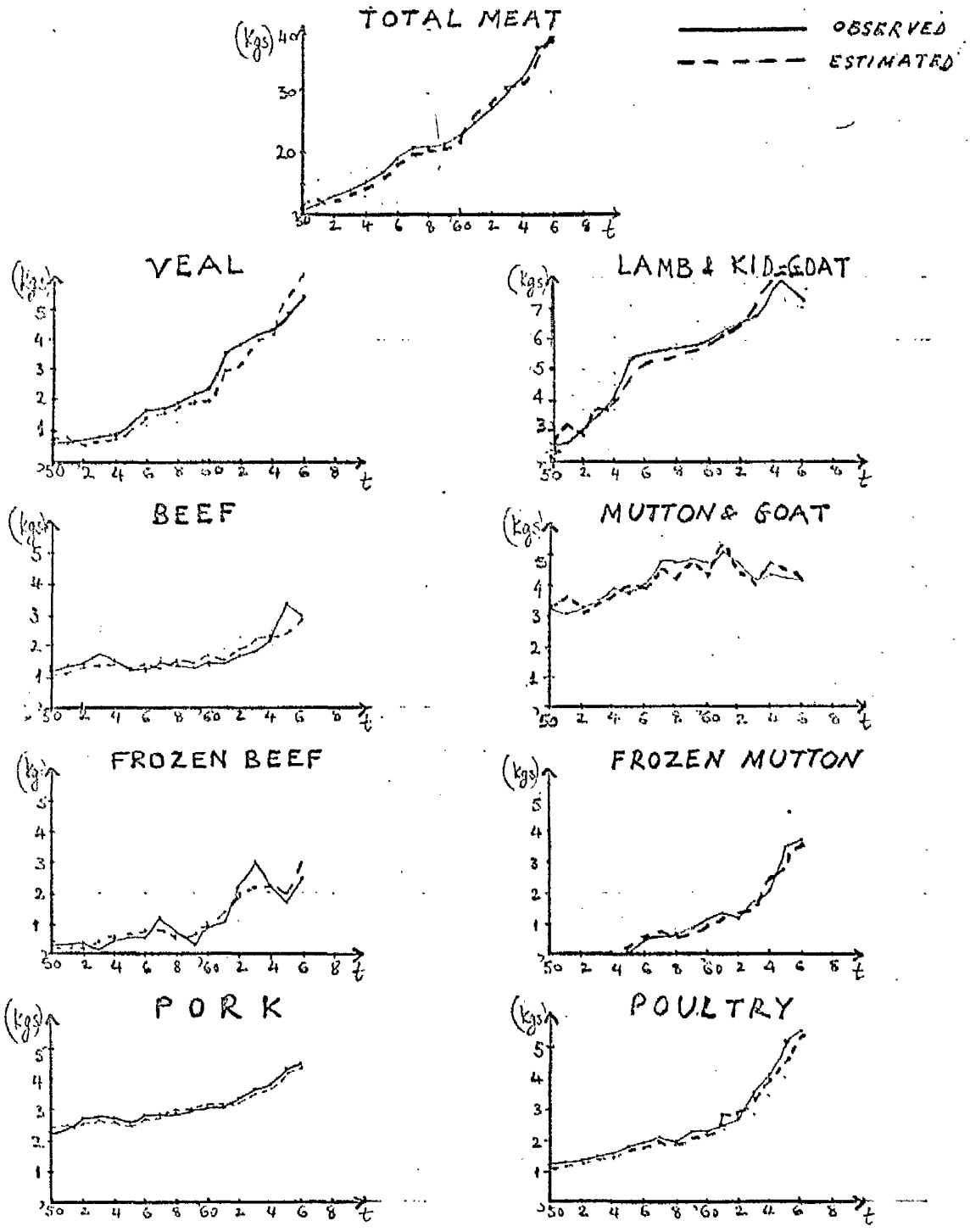
(1) Directly from estimated function of total meat and not as weighted average elasticities.

(2) Weighted average of non-farm income elasticities and farm income elasticities with weights the relative shares to total income 1950-66 (non-farm 71.87 percent and farm 28.13 percent).

(3) With price variables used as follows: in case of mutton its price divided by the price of frozen beef, of beef by the price of mutton, of frozen beef by the price of pork, of pork by the MPI (Meat Price Index) and of poultry by the price of veal. Only in cases of veal, lamb, frozen mutton and total meat their price variable of the best regression is deflated by the consumer price index.

DIAGRAM III.1

OBSERVED AND ESTIMATED PER CAPITA CONSUMPTION OF VARIOUS KINDS OF MEAT (1950-1966)



intercorrelation between income and price variables is not exactly the same in all uses. Therefore, the estimates presented in Table III.1 are only indicative and aim at a crude comparison of our overall results. The estimated price and income elasticities are near to unit and in some cases significantly higher than unit (in absolute values).

The income elasticity of total meat is 1.53, which is significantly different from unit at the five percent level. The Centre for Planning has estimated in a semi-log regression for the period 1952-1965, an income elasticity of demand for meat 1.14[1]. Obviously, a part of the difference from our estimate is due to exclusive use of semilog and exclusion of the price level variable in that estimation.

The results of Table III.1 seem also comparable in a more broad international basis. Thus, the income elasticities of the demand for meat (or more accurately the expenditure elasticity of meat to total expenditure) has been found by L. Goreux[2] to fluctuate among 1.75 in Portugal and .35 in the U.S.A. and .40 in the U.K. The indicated international pattern of decreasing income demand elasticity for meat as the standard of living is improved, is strengthened by the comparison of the elasticities of South Italy (1.04) and Central and North Italy (.68) and of the agricultural sector in W. Germany (.69) and of the urban sector of the same country (.54). This tends to suggest that our elasticity of demand for meat in Greece has limited predicting ability in the very long-run.

The fact that income elasticity of meat consumption is significantly higher than unit in Greece might be considered as raising doubts to the well-known Engel's Law on the reduction of the proportion of income spent on food, as income increases (i.e. the income elasticities of food is lower than unit), allowing for the fact that Engel's Law is tested with cross-section data.[3] The per capita consumption of meat is still relatively low in Greece compared with the European standards, a fact which means that the income elasticity of demand for meat may be expected to remain over unit in the near future.

The price elasticity of demand for total meat with average weighted price of total meat (total expenditure over total quantity consumed) deflated by the price index of total consumption is relatively low (-.38). This means that meat as a whole is/

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1. Centre of Planning and Economic Research, "Possibilities of Meat Production in Greece", Athens, 1967.

2. L. Goreux, "Elasticité de la dépense alimentaire par rapport au revenu", F.A.O., Rome, 1959.

3. The view that cross-section income elasticity may approach the long-run one obtained from time series may be less true in a developing economy.

is considered as an item of major importance by the Greek consumer.

However, it seems likely that this elasticity of total meat gives a misleading picture of the existing substitutability among the various kinds of meat. Thus, only in two out of the eight meat varieties i.e. lamb and veal, the estimated regressions, with their own price deflated by the consumer price index, has been the "best" selected ones, while in the six other meat varieties the best regression was found with the relative price over some other meat variety. Moreover, these latter elasticities were in the five meat items out of six (except for frozen beef) higher than the corresponding ones in the regressions with own price deflated by the consumer price index. These findings combined seem to suggest the view on a possible higher substitutability between various kinds of meat/rather than between meat as a whole and other consumer commodities.

Substitutability Among Various Meats.

The indicated substitutability among various types of meat was attempted to be further examined by testing ratios of each quantity of meat over all others with alternative price ratios of each overall other types of meat.[4] Table III.2 which summarises the results of this attempt, shows that all kinds of meat except veal and poultry have common substitutability with mutton-goat, the most traditionally consumed meat. This may be an indication that, people being accustomed to mutton, compare it still with other meat varieties, as their preferences may gradually go away from mutton. This is particularly true in the case of beef, which is a rapidly increasingly demanded meat item (income elasticity 2.8) and has given the best equation for the relative price with mutton (substitution elasticity -1.8). Frozen beef seems also to be a close substitute for mutton with an elasticity of substitution -1.5.

Income and Price Elasticities of Veal and Beef

In comparative terms, the income and price elasticities of cattle meat (beef, veal, frozen beef) exceed significantly the elasticities of other kinds of meat and in absolute terms the unit (Table III.1). The explained part of the variance of cattle meat is ranging between 73-95 percent, while the D-W ratio of residuals (1.6-1.7) is above the upper limit at the five percent level, which indicates absence of serial correlation of the residuals.

The/

4. There were alternatively tested absolute quantities of all meat varieties with income, own prices and prices of other meat varieties deflated by the consumer price index. Due to the inter-correlation of meat prices, the results of this experimentation were not satisfactory in statistical terms.

The Dependent variables and the price variables are ratios over the corresponding variables of the kind of meat referred to in the last column.

The denominators in the price ratios show the kind of meat, which is a close substitute for the kind of meat written on the left side.

TABLE III.2

SUBSTITUTION ELASTICITIES OF VARIOUS KINDS OF MEAT IN GREECE (1950-66)

KIND OF MEAT(1)	Elasticity of Substitution(2)	Income Elasticity	Explained Part of Variance %	D-W ratio of Residuals	Denominators of Price
LAMB AND KID-GOAT	$-.69\left(\frac{PL}{PM}\right)$	.98	80.8	1.55	MUTTON AND GOAT
LAMB AND KID-GOAT	$-1.71\left(\frac{PL}{PFB}\right)$	2.35	40.3	1.29	FROZEN BEEF
MUTTON-GOAT	$-.75\left(\frac{PM}{PL}\right)$	1.00	81.2	1.58	LAMB
FROZEN MUTTON	$-.72\left(\frac{PFM}{PB}\right)$	3.70	94.4	1.70	BEEF
VEAL	$-3.13\left(\frac{PH}{PM}\right)$	3.35	73.3	.98	POULTRY
VEAL	$-1.13\left(\frac{PH}{PB}\right)$	3.00	95.0	1.48	GAME
BEEF	$-1.85\left(\frac{PB}{PM}\right)$	2.79	36.2	1.29	MUTTON AND GOAT
FROZEN BEEF	$-1.53\left(\frac{PFB}{PM}\right)$	3.00	69.3	1.28	MUTTON AND GOAT
FROZEN BEEF	$-1.59\left(\frac{PFB}{PL}\right)$	2.09	39.7	1.08	LAMB
FROZEN BEEF	$-1.78\left(\frac{PFB}{PP}\right)$	2.56	74.6	1.41	PORK
PORK	$-.66\left(\frac{PP}{PM}\right)$	2.28	50.1	1.27	MUTTON-GOAT
POULTRY	$-.26\left(\frac{P7}{PP}\right)$	.96	97.1	1.39	PORK

The share of three cattle meats to total meat consumption was increased from 17.9 percent in 1950 to almost one-third of total meat consumption (31.2 per cent in 1967). Allowing for errors in estimates, particularly favourable seem to be the preferences for veal, the demand of which is increasing at almost four times higher rates than the per capita income and also is increasing in percentages almost twice as much as its price decreases, if any.

The elasticities of demand for frozen meat, mostly imported, are high in absolute values. The income elasticity of frozen beef (2.7) is partly due to the relatively low level of per capita consumption at the original period and partly to the fact that frozen beef is two meat species, one, frozen beef used as such, and the other used for ground beef; the consumption of the latter has increased at relatively higher rates in the centre and in provincial towns, partly because of the improvement of means of fridge transport. It seems, therefore, that even with the same income increases in the future, the needs for frozen beef imports may be somewhat smaller than the estimated elasticity of demand would give, even with stagnant domestic production of fresh meat. Actually, this conclusion can be strengthened from the relatively high (in absolute terms) price elasticity of frozen beef and in view of the unlikely prospect of a fall in the world prices, if not the opposite. The relative price of frozen beef, which had given satisfactory statistical results, was not the relative price of fresh beef but the consumer price index; this indicates that the substitutability of frozen for fresh beef is not expected to be significant.

Our obtained results for beef-sector are closer to those obtained by L. Langemeir and R.G. Thompson,[5] who have estimated a simultaneous model for beef sector for fed-beef and non-fed beef using the TSLS (two-stage least-squares method) for the 1947-63 period on U.S.A. data in retail and farm level. Their price elasticity has been -.98 and the income elasticity 2.2 for retail level, and for the farm level -.89 and 2.2 the price and income elasticities respectively. (In fact the results of the estimates of demand for meat at farm level were not significantly different from those of final demand for meat in U.S.A.)

The differences are relatively high compared with those of the study of K. Fox[6] in U.S.A. This study has estimated demand equations for total beef for the period/

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5. L. Langemeir and R.G. Thompson, "Demand, Supply and Price relationships for the Beef-Sector, Post World War II Period", Journal of Farm Economics, Vol.49, Feb.1967, pp.169-183.

6. K.A. Fox, "The Analysis of Demand for Farm Products", U.S.D.A., Technical Bulletin 1081, Sept., 1953.
   K.A. Fox (1958) op.cit., p.116.

period 1922-41 by least-squares method in terms of Δ logs. The price elasticity has been -.79 and the income elasticity .73. These elasticities are significantly lower than the above of Langemeir and Thompson in U.S.A. and ours in Greece. The main difference seems to be attributed to the elimination of any trend factor in the method used, which of course might be attributed to incom variable.

J. Working[7] in his demand estimates for total beef consumption per capita for the 1922-41 period in U.S.A. data has found, using linear in terms of logs regression forms, price elasticity -1.035 and income elasticity .67. The price elasticity in this study as well as in other American studies has been closer to our estimates.

The ABG[8] of Greece in her estimates of demand functions for beef (including veal) for 1953-1964 period has found income elasticity 2.61 and price elasticity -1.30. These estimates are lower than our estimates for veal but closer to beef elasticities.

Center of Planning and Economic Research[9] using semilogarithmic forms in estimation of demand functions for beef as a whole (including veal) for the period 1952-65 has found income elasticity 1.32 and for the period 1960-65, 1.02. The only independent variable used was the personal per capita disposable income, while the period 1960-1965 does not seem to fulfil the prerequisite of a large sample, so that to be useful for forecasting purposes. It is recalled that the semilogarithmic function of demand for meat with 'income' and 'prices' as in dependent variables for the period 1950-1966 has not given to us statistically acceptable results.

R. Stone,[10] in his estimates of demand functions for home produced beef and veal and imported beef and veal for 1920-1938 period working on U.K. data, has found the following results for home produced beef and veal. Stone had estimated an income elasticity from cross-section data (.34) and has used it to find from time-series a price elasticity of -.11. When the price of imported mutton and lamb/

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7. J. Working, (1954) op.cit., p.126
8. Agricultural Bank of Greece, Analysis of Demand of Agricultural Products and Projections for 1966-70, Athens, 1966.
9. Center of Planning and Economic Research, "Possibilities of Meat Production in Greece", Athens, 1967, Table 9, p.12.
10. R. Stone, "The Measurement of Consumers' Expenditure and Behaviour in the U.K., 1920-38", Vol.I, Cambridge University Press, Cambridge, 1954, pp.322, 331-2.

lamb has been inserted, the own price elasticity of beef increased to -.41 and the substitution elasticity for imported mutton and lamb was .50. The R^2 was .43 and R^{*2} = .64 in the function with the price of substitute product and the D-W ratio of residuals was 2.21.

On the contrary, in the demand function of all home produced veal with only their own price, income and all other prices taken together as independent variables, the R^2 was only .03 and R^{*2} was .39. The D-W ratio of residuals was 1.56.

The same income elasticity was used for imported beef and veal. The own price elasticity of about the same size as in the home produced beef and veal was obtained but it was not significant. There appeared to be a strong relationship of substitution with home produced beef and veal 1.67 and then both R^2 and R^{*2} were significant .56 and .43 correspondingly.

Income and Price Elasticities for Poultry

One other meat kind which has higher than unit income elasticity, is poultry (1.337). The relatively rapid expansion of its production was accompanied by an expansion of demand through some fall in the absolute domestic price of poultry and a 20-40 percent decrease in the relative price of poultry in terms of ratio of its price to prices of other meat varieties. Under these conditions, and given the existence of some interaction of income and price variables and that the effect of the income is relatively stronger than the effect of the price variable, it may be said that poultry income elasticity is possibly overstated. This must be kept in mind when it is going to be used for predicting purposes.

Professor R. Stone [11] in his estimates of demand functions for poultry (1920-38 period for U.K. data) has taken the income elasticity from the budget data equal to 1.17 very close to our estimates for Greece. By Professor Stone's view, the relationship was not satisfactory, given that the poultry consumption included rabbits and game. Its own price elasticity was-.9 and the substitution elasticity with respect to home produced mutton and lamb was .86. The R^2 was .03, but by inserting the price of home produced mutton and lamb the R^2 was increased to .33. The D-W ratio of residuals was .99.

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11. R. Stone (1954) op.cit. pp.322,332.

K. Fox[12] in his study has estimated demand functions for poultry for the period 1922-41, working on U.S.A. data. He has used least-squares method in terms of Δ logs and only price as an independent variable. He found that price elasticity for poultry was -.72 and pointed out that this coefficient probably understated the true effect of price upon consumption of poultry.

The Agricultural Bank of Greece (ABG)[13] has estimated demand functions for poultry for the period 1953-64. The best obtained demand function for poultry gave income elasticity 1.66 which was higher than our income elasticity 1.34. The ABG has used only income as an independent variable and has failed to combine satisfactorily price variables into regression. The coefficient of determination was .83, i.e. lower than the percentage explained of total variance of poultry consumption by this study (97.6 percent). The D-W ratio of residuals of the ABG's function is 1.39 similar to our estimates 1.36.

The Centre of Planning and Economic Research[14] has estimated demand functions for poultry in terms of semilogs on Greek data with income the only independent variable. The obtained income elasticity for 1952-65 period was found 1.61 higher than ours for period (1950-66) and for the period 1960-65, 1.20.

Income and Price Elasticities for Lamb and Mutton

It is to be stressed that the mutton-goat varieties probably have lower than unity elasticity of income, except for lamb, and frozen mutton which has higher than one income and price elasticities for similar reasons, as in the case of frozen beef. This is reflected in the fall of their share in the total consumption of meat from 47 percent in 1950 to 35 percent in 1967. Indeed, the share of lamb was held fairly constant (1957-61), while the share of mutton was relatively rapidly decreasing. This took place at the expense of relatively rapid increase in imports of frozen mutton from non appreciable levels in the early fifties to around 7 percent of total meat consumption in 1967. On the other hand, the relatively high increase in the proportion of lamb and kid-goats to total demand for meat in the fifties is attributed to a gradual expansion of the consumption of milked lambs and kid-goats, which are considered by Greek consumers as superior 'quality' compared with mutton, or equivalently as different commodity.

The/

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12. K.A. Fox (1958) op.cit. p.116. This price elasticity is referred to chicken and not in the poultry as a whole.
13. Agricultural Bank of Greece, (1966) op.cit., p.62.
14. Center of Planning and Economic Research, "Possibilities of Meat Production in Greece", Athens 1967, p.12.

The best regression of lamb consumption was the one with income and own price deflated by the consumer price index and not prices of any other meat varieties. It is repeated here the same conclusion of a probable lack of substitutability with other meats as in the case of veal. It must be noted, however, that there is no certainty about the conclusion of no substitutability of lamb for veal or vice versa with other meat varieties in view of the fact that the ratios of quantities regressed on ratios of corresponding prices have indicated some possible substitutability of lamb for mutton and of veal for pork (Table III.2).

Professor Karl Fox[15] has obtained a price elasticity for lamb -.91 which is close to our estimate. He has estimated demand function for lamb using the first Δlogs for the 1922-41 period in U.S.A. His income elasticity .65 was considered by him as dubious, because it did not show the total real effect of income on the consumption of lamb. Also, for his price elasticity he noticed that it probably understated true effect of price upon consumption.

Professor Richard Stone[16] has estimated separate demand functions for home-produced mutton and lamb and for the imported one for the period 1920-38 working on the U.K. data. His estimations on the effect of income were again from budget data (elasticity .70) and the variables entering the equations connecting the time series were the first differences of consumption per equivalent adult to reduce the serial correlation in the disturbances, without time being introduced explicitly and to satisfy the proportionality condition.

The dependent variable of his demand functions was not the consumption itself, but the consumption adjusted to changes in time series income multiplied by the cross-section consumption-income elasticity. The price elasticity of home-produced mutton and lamb was -1.74 and the cross elasticity with respect to price of home produced beef and veal was 1.61. The $R^2 = .55$ and $R^{*2} = .38$. The D-W ratio of residuals was 1.63.

Comparing these results with ours, they are close to those of demand for lamb-kidgoats, more close to our price than income elasticity, although the relative prices used in this study differ from the R. Stone ones, and we estimate the income and price elasticities from time series in a multiple regression procedure.

Regarding/

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15. K.A. Fox (1958), op.cit., pp.115-116.

16. R. Stone (1954), op.cit., pp.320-321.

Regarding the estimates of ABG[17] of demand functions for mutton-goats, includin lamb-kidgoats, for the period 1953-64, using single-equations in least-squares method, the obtained income elasticity .87 and the price elasticity -.61. The D-W ratio of residuals 1.10 and the multiple coefficient of determination was 91 percent. Of course exact comparisons of our estimations with those of ABG is not easy to make, given that we have separate demand functions for lamb-kidgoats and mutton-goats. The income elasticity of ABG (.87) seems to have been mainly affected by the consumption of lamb included in the dependent variable.

The Center of Planning and Economic Research[18] has also estimated one demand function for mutton-goat including lamb-kidgoats, in terms of semilogs in Greek data for the period 1952-65 and 1960-65. For the first period the estimated income elasticity was 1.02 and for the second .84. The only independent variable inserted in these functions was the per capita disposable income.

Income and Price Elasticities for Pork

Pork per capita consumption regression has given a multiple correlation coefficient 96 percent, i.e. the independent variables used explain almost entirely the total variance of the per capita consumption for pork. The income elasticity is .903 and is estimated as a weighted average of non-farm income elasticity of 1.174 and farm elasticity of -.316. This means that in towns pork is likely considered to be a superior meat item, while in villages, its consumption may be decreasing today because it was highly consumed in the countryside during winter time in the past.[19]

The value of price elasticity was found to be -.69. The relative price in this regression was its own price of pork deflated by the meat price index. This seems to indicate that pork may be substitute for all non-pork meats, which compete for the consumer's expenditure on meat. The D-W ratio of residuals was 2.081, which at five percent level of significance, was above the upper limit and it meant that null hypothesis was satisfied and so there was no serial correlation in the residuals.

Professor/

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17. Agricultural Bank of Greece, 1966, op.cit., p.61.

18. Center of Planning and Economic Research, op.cit., Table 9, p.12.

19. For other meat varieties - except for beef and mutton - the use of farm and non-farm incomes in place of the income variable has given insignificant regression coefficients or with opposite significance than was expected.

Professor Stone[20] in his estimates of the demand functions for pork had found, for the period 1920-38 in U.K. data, income elasticity (.58) and own price elasticity of the order (-.70). Mutton and lamb appeared to be a substitute with a considerable but not significant coefficient for substitution elasticity (.85). The R^2 was .55, R^* .46, and the D-W ratio of residuals 1.66.

Professor Fox[21] has found, in American data for the period 1922-41, price elasticity for pork (-.81) and income elasticity (.72) using least-squares method in the Δlogs. Comparing these elasticities with ours, we see that his price elasticity is higher than our own price elasticity for pork (-.69) but his income elasticity is lower than ours (.903).

J. Working[22], for the 1922-41 period in U.S.A., using single equation least-squares method, found price elasticity for pork (-.98) and income elasticity (.57) i.e. lower income elasticity than ours but higher price elasticity than ours. He has used as independent variables besides the deflated price of pork, disposable income, deflated by prices of non-pork meats and time. The use of time, in his view, as a linear independent variable assumes a gradual change of demand extending over the entire period of the analysis.

The Agricultural Bank of Greece[23] has found for the period 1953-64 income elasticity for pork .81, $\bar{R}^2$.93 percent and D-W ratio of residuals 1.88. ABG has not used any price variable in the demand for pork regression testings.

The Center of Planning and Economic Research[24] has found income demand elasticity for pork, using semilogarithmic forms, .75 for 1952-65 period and .65 for 1960-65 period with only independent variable/the per capita disposable income.

2. Income and Price Elasticities of Demand for Meat in Greece, 1958-1966

The consumption of meat was, in the early fifties, at abnormally low levels as has/

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20. R. Stone (1954), op.cit., pp.322,332.
21. K.A. Fox (1958), op.cit., p.116
22. J. Working (1954), op.cit., pp.68-79, 121.
23. Agricultural Bank of Greece, 1966, op.cit.,
24. Center of Planning and Economic Research, op.cit., Table 9, p.12.

has been already said. Under these circumstances, there can be a suspicion that the subsequent relatively rapid increase in meat consumption may not express simply the effect of its structural relationship with the independent variables (income, prices, etc.) but also the process of satisfaction of basic needs. In so far as the influence of this factor was systematic rather than random, it could be attributed to income and prices with result in upward error in the estimated elasticities (in absolute values) for the period 1950-1966.

Thus, we have decided to test also our demand for meat model for period enough after this unrest and as such was selected the period 1958-1966. The choice was of course, arbitrary although it was partly based on the empirical observation that for most meat items the year 1958 seems to be one of change in their time path (see Chart II.1). The shortening of the time period reduced, of course, the degrees of freedom, but it was believed to be offset by the improvement of the results in terms of finding out the underlying structural relationships.

As can be seen in Table III.3, the price variable has not given statistically significant coefficient in four meat varieties compared with the results of the period 1950-1966. Income elasticities were smaller in most cases than those of the entire period 1950-66, the difference not being statistically significant (i.e. income elasticity of total meat fell from 1.53 in the period 1950-66 to 1.47 in the period 1958-66). Differences in income elasticities however appeared significant in the case of particular meat varieties.

TABLE III.3

INCOME AND PRICE ELASTICITIES BY TYPE OF MEAT DURING 1958 - 1966

KIND OF MEAT	Income Elasticity	Price Elasticity	Explained Part of Variance %	Durbin-Watson Ratio of Residuals
LAMB(1)	.770	- .645(3)	96.2	2.464
MUTTON(2)	-.302	- .429(4)	81.9	1.916
FROZEN MUTTON(5)	3.340		94.5	2.264
VEAL	2.300	-2.642(3)	92.8	1.148
BEEF(5)	2.000		87.5	2.193
FROZEN BEEF	3.548	-3.389(3)	64.4	1.406
PORK(5)	.966		96.3	2.753
POULTRY(5)	2.269		97.2	1.822
TOTAL MEAT	1.471	- .552(3)	99.0	3.094

(1) Including Kid-goats

(2) Including Goats

(3) Their price is deflated by Consumer Price Index

(4) Mutton price is divided by price of frozen beef.

(5) With price as independent variables did not give significant results, so that we take regressions with income only.

3. Cross-Section Expenditure Elasticities

The Published Results of the Household Budget Survey carried out in urban areas of Greece during 1957/58 are average expenditures of six groups of a relatively wide range. Therefore, they were used in derivation of some crude estimates of the long-run expenditure elasticities by type of meat. Under these circumstances the role of household composition by age, sex, etc. in the demand for meat are left aside of this experimentation.

Expenditure is used as an independent variable in place of income as in most empirical studies of this type[25]. Total expenditure is usually considered more directly related with particular expenditures, while income data are often highly unreliable.

The general form of the functions estimated[26] is:

$$Ei = f(E) \qquad (12)$$

where Ei, total expenditure of commodity i and
E, total consumption expenditure.

The results of this testing are shown in Table III.4. The best statistical results were taken in all cases by linear in terms of logs regressions. As was expected the expenditure elasticities of total meat and each type of meat of cross-section were below the corresponding quantity elasticities of time series with respect to income. This is due in part to definition of the expenditure elasticity as the sum of quantity and price elasticities (See footnote 26 below). Moreover, the cross-section elasticities of demand for meat represent differences between income and social strata. In accordance with Engel's Law, the higher strata spend relatively low proportion of their total expenditure for food and on extention for meat.

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25. S.J. Prais and H.S. Houthakker, "The Analysis of Family Budgets, with an Application to two British Surveys Conducted in 1937-39 and their Detailed Results", Cambridge University Press, 1955, p.100.

26. By definition $Ei = PiQi$. Moreover $e_{Ei} = \frac{\partial Ei}{\partial Y} \cdot \frac{Y}{Ei}$. Similarly, $eQi = \frac{\partial Qi}{\partial Y} \cdot \frac{Y}{Qi}$ and $ePi = \frac{\partial Pi}{\partial Y} \cdot \frac{Y}{Pi}$. It is approved that $e_{Ei} = eQ_i + ePi$.

See S.J. Prais and H.S. Houthakker, op.cit., p.112 - H. Theil, "Qualities, Prices and Budget Enquiries", Review of Economic Studies, Vol. XIX, 1951-52, p.129.

TABLE III.4

CROSS-SECTION EXPENDITURE ELASTICITIES BY TYPE OF MEAT IN URBAN AREAS 1957/58

KIND OF MEAT	Expenditure Elasticity	Explained Part of Variance %	Durbin-Watson Ratio of Residuals
LAMB and KID-GOAT	1.068	97.1	1.044
MUTTON and GOAT	-.349	34.4	1.945
VEAL	1.086	99.5	1.959
BEEF	.586	84.2	1.357
PORK(1)	.263	.3	2.221
POULTRY	1.123	87.0	1.374
FROZEN MEAT	.458	36.5	1.645
OTHER	1.123	95.2	2.360
TOTAL MEAT	.944	99.8	1.548

(1) In case of pork, the explained part of variance is insignificant, fact which may reveal that factors other than total expenditure affect its consumption.

CHAPTER IV

TRADE OF MEAT IN GREECE

1. Marketing Practices

A brief consideration of the marketing and trade of meat in Greece is expected to shed light on the mechanism through which final demand is satisfied and supply responds to demand changes[1]. As a connecting link between producer and consumer, the trader constitutes an intermediate decision maker, who may hold stocks and through their changes to affect the meat price structure, not necessarily in response to changes in demand for or production of meat.

The organisation of the meat trade and the methods used will also affect the total charges of the trade sector, given the state of transport and communication system and transport costs. It seems, therefore, useful to look at the trade of meat not simply as a matter of transport but as a question of a separate decision making stage. In fact, most empirical researchers on demand do not distinguish the stage they refer to, or frequently analyses of final demand disregard the intermediate stage and propose policy measures far from reality.

It is implied that the investigation of marketing and trade in Greece have a complementary function. Two main questions will focus attention on the following; firstly, whether or not traders of meat act as separate decision makers and secondly, what are the total costs of the intermediation.

The trade of meat is carried out in Greece by private businessmen and there is an almost complete absence of co-operatives of either consumers or producers with trade functions. The government appears in the sector of distribution of meat regularly only through health regulations and price control, for the benefit of the consumer, as we will see later on. This state of affairs is associated with the fact that the organizing of the meat trade sector is considered by the government as a sector performing its function more or less effectively.

The marketing channels are considerably varied. They range from direct sale from the farmer to the butcher, to the much longer circuits passing through a dealer, one or more wholesalers, sometimes with resale on two or three different markets, the slaughterhouse, and finally the commission agent who sells the meat to the butcher. When the farm is at some distance from the market and transport facili-

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1. F.A.O. "Marketing Livestock and Meat", by R.F. Burdette and J.C. Abbott, No.3., 1965.

facilities are lacking, the farmer sells his animals to a dealer who brings them to market. Another type of middleman plays the farmer himself, buying the animals when the prices are low and selling them two or three months later at a profit. Some agents also operate on a commission basis, selling the cattle for the farmer or for another middleman. These middlemen are not professional businessmen so that their charges are not included in the invoices of the wholesalers, on which the final price is fixed. As a result, the role of middleman is gradually being limited in Greece[2].

The producer is generally in a weak position vis-a-vis the buyer, and may not therefore obtain a fair price for his animals: The chief reasons are - the poor bargaining power of the stock farmer who has to play a lone hand against purchasers with larger financial resources than his own. Moreover, the farmers are often forced to sell because their fodder supplies are exhausted and the buyer knows it. The remedy lies in co-operation of stock-farmers which, as is referred to above, does not exist.

Another reason is the method of price determination. The price is still often fixed without weighing the animals. This practice is gradually falling into disuse, and the tendency is to base the price increasingly on live-weight. This method is suggested by the Greek Ministry of Agriculture, since it gives flexibility in the supply of fresh meat to changing demand conditions. In some cases, the animals are even valued at the meat price. The animals are sold by the producer to the above agents on the farm or in the local animal market.

There is also lack of standardisation. The animals are usually classified by age without reference to quality. Any indication of quality supplied is usually inaccurate. The only quality variation is coming from the final consumers as reflected in the relative prices of meat.

The lack of information about prices is also a reason for the weak position of the stock farmer. This is partly due to the absence of standardsation, and, as usual, harms the producer much more than the dealer, who is generally more conversant with price levels.

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2. Thus, given a relatively high degree of competition in retail trade of meat, the addition of mediating services are hardly transferred to consumer. This tends also to reduce even the wholesalers' services, if possible, because the additional charges reduce the mark-up of the butchers.

There is a great number of local animal markets, but they do not seem to be well organised. They cover an area near the weekly mobile markets and the number of animals transacted there is limited. Once a year and for about three to ten days local livestock auctions are, in addition, organised, where a large number of animals is gathered for sale. However, there is little information about the prices formulated there.

The two greatest wholesale markets for meat are one in Athens with fifty wholesale shops and one in Salonica with twenty wholesale shops. These markets are not fully equipped with modern means. The same happens to a larger extent in the wholesale markets of other smaller towns of Greece. The butchers in the big cities buy meat from the wholesale market and in smaller towns more frequently direct from the producer. The meat is sold by the wholesalers to butchers, either as a whole or in grades. Of course, there is price differentiation depending on the part of animal the meat is coming from (differences in prices in retail are usually up to 15 percent).

In each big town and almost in every provincial town there is a slaighterhouse. The slaughterhouses belong exclusively to municipalities or communes, which have the right to build new slaughterhouses. The basic purpose of a municipal slaughterhouse is to provide a slaughtering service for a fee which provides the municipality with an income. Municipal slaughterhouses generally are the responsibility of a person, who collects the fees and broadly oversees the operation but has no direct responsibility for the actual operation. It must be said that the cost of slaughter is sometimes fairly high and the communes regard the slaughterhouses rather as a source of income than as a public service.

The present slaughter facilities are an adaptation of the old village-type slaughterhouse. Inedible by-products are not utilized. There is virtually no specialisation in these slaughterhouses, on the merchandising of the meat. Refrigeration facilities are lacking. Sanitation often is questionable. The slaughter operation, therefore, under above conditions lacks the qualified continual direction to produce the results needed to meet modern packeting of meat and meat distribution standards. There is lack of interest in the total operation of the meat packing business including the purchase of livestock, distribution and sale of meat to trade outlets and recovery of by-products.

The slaughterhouses, even operating under above conditions, are still not a generalised practice of slaughtering in Greece. Thus, in 1964, the following quantities of meat were slaughtered in all slaughterhouses in the country:

Up/

Up to	100	tons meat	45 slaughterhouses
from	100 - 500	"	73 "
"	500 - 1,000	"	24 "
"	1,000 - 1,500	"	15 "
"	1,500 - 2,000	"	4 "
more than	2,000	"	4 "
		Total	165 "

In recent years there has been a tendency towards a decline of slaughterhouses in large towns and an increase in the slaughterhouses in the countryside, where the animals are increasingly slaughtered. This tendency is due to (1) the higher transportation cost of live animals than that of meat to large urban centres, (2) the higher cost of slaughtering and removing the skin of animals in the slaughterhouses of large towns and (3) to the improving fridge-transport facilities at reasonable costs.

The five year economic development Plan 1968-72 suggests the construction of a few new small private packing plants of modern design, properly managed and manned and located near the source of livestock; moreover, it suggests the construction of modern slaughterhouses near the livestock centres with modern sanitary conditions.

Another health provision was taken in 1950 by the obligation of the professional butchers to acquire a health book to be signed regularly after doctor's examination of the health conditions of the butcher. This rule is not yet applicable in a great number of small villages of the Greek countryside for obvious reasons.

2. Treatment of Trading Behaviour

It is clear from the above argument that the traders of meat in Greece are more or less at a separate decision making stage and so they should be investigated as such in a complete analysis of the sector. In particular, we should formulate a "stock adjustment model" for the traders of meat to investigate their own behavioural patterns in terms of their reactions to changes in stocks in their hands according to changing conditions. This model should have, of course, a number of complications in addition to the common stock adjustment models (of Stone-Rowe type), because holding of livestock or meat is associated with a number of problems, such as change in the "quality" of meat through age (livestock) or freezing (slaughtered) etc. Actually, we have no data on stocks of meat in the trade stage, and, therefore, any confrontation of these problems can be only a matter of future research, when data will appear.

It is mentioned anyway here that changes in the stocks of meat held as an inventory for speculative purposes cannot be as high as it is the case with other agricultural products (e.g. wheat) for the following reasons:

(1) it involves feeding costs for animals, which may require also labour costs more than the usual ones which the distributors may have in the case of other commodities.

(2) the prices of most meat species are considerably a decreasing function of age in Greece.

(3) the retention for a long time of the slaughtered animals in fridges has, besides costs, decreases in price in the case where the wholesaler reveals to the butcher that the meat is frozen. Butchers have no space, on the other hand, to keep large amounts of inventories.

Meat can be stocked, of course, in public freezers. Such freezers operate in Athens, Salonica and most provincial towns of over 20,000 inhabitants. Even in bigger towns, however, the public freezers are mainly used for dairy products and for imported frozen meat, the price of which is frequently one-half to one-third that of fresh meat. No problem then remains for leaving the freezing of meat, even home-produced, in the hands of wholesalers, since they cannot easily deceive the skilful butchers that this meat is not frozen. Butchers can keep more easily some amount of meat in their own fridges for future sale, if they have reason to expect considerable demand, say, next week. But usually there are not often random or irregular variations in the final demand for meat (given the lack of fridge facilities for stocking in Greek households), except

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at Christmas and Easter periods. In the latter case, the retailers and wholesalers of meat respond to these changes through offsetting serious fluctuations in their stocks.[3]

We may make here certain qualifications without impairing the whole analysis. Thus, the meat even after the attained price stability in the mid-fifties, continues to be on the list of the Ministry of Commerce of commodities of the "necessities in scarcity". It means, that there is a "legal" maximum percentage mark-up for traders operating as recognised businessmen. These maxima are 6 percent for wholesalers and 15 to 30 percent for retailers and are varied according to circumstances. The effective mark-ups are also relatively low and have small variations compared with those of other perishable farm commodities (fruits, vegetables, etc.). It may be due partly to a relatively more satisfactory organisation in sector trading in meat (and other livestock products) but not entirely to this factor. Thus, prolonging the maintenance of animals (and to some extent of dairy products), if market conditions are currently unfavourable, does not involve so high cost or deterioration as in perishable farm crops. It is accompanied by some cost due to the fall in price because of the age of the animal. However, if the maintenance is relatively long the female may produce, a fact which can overcompensate the loss from the fall in price of the female-mother.

The above seems to explain why the inventories are largely kept by stock-farmers rather than by traders (acting as purely intermediate means). However, the maintenance of animals by the farmers cannot exceed certain limits in the short-run without further expansion of the size of holding.

In fact, the actual percentage mark-ups exceed frequently the legal ones, especially in retail trade, given certain inefficiencies of the market police and the rapid expansion of the demand for meat. In this way, there is actually a profit variability, within certain limits, which still attracts the interest of traders as a stimulating factor to adjust the supply of meat to changing demand conditions. On the other hand, given that all the stock farmers are virtually exempted from income tax[4], the traders can, without serious difficulty, increase the purchase price on the invoice they issue, on which their mark-up is fixed.[5] It must be said that this flexibility has declined since 1955, after the imposition of a transaction tax of 2 percent on the value of slaughtered animals/

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3. K.A. Fox, "Intermediate Economic Statistics", John Wiley & Sons, Inc. 1968, p.332.

4. Center of Planning and Economic Research, "Studies in Greek Taxation", by G.F. Break and R. Turvey, Athens, 1964, Ch.6.

5. By this way they could avoid income tax if the demand was paying the increased price.

animals paid by the producer and deducted from the price paid by the trader.

Assuming that the sum of these two percentage mark-ups is c_i, then the retail price will be,

$$P^r_{it} = (1 + ci)P^f_{it} \qquad (13)$$

where $ci = \sum cj$, the fixed percentage mark-ups including roughly two stages of trade.

This simplification may eliminate the need for simultaneous determination of demand functions at both farm and retail levels.[6] We might, therefore, say that dealer demand at the farm price level is equal to consumer demand curve at retail level minus the supply curve for marketing services that is, as if traders were not working on their own account. So the domestic demand at farm level is strictly a derived demand. Given explicit functions for consumer demand and for supply of marketing services, we can calculate the corresponding derived demand function at the farm level. The equation (13) represents the marketing system as transmitting consumer demand to the farm price level by charging for costs actually incurred. This means that on an annual average basis all marketing margins change with marketing costs. If prices rise sharply relative to marketing costs a fixed percentage mark-up will bring substantial profits to farm distributors. The chances, however, for such an event are not so great because of the freedom of imports.

The imports of meat in Greece have no quantitative restrictions and are carried out by the importers - sometime through intermediate agents. The importers in most cases are themselves wholesalers, supplying meat directly to butchers or to wholesalers of small turnover in provincial towns.

The government to protect the domestic production of meat has imposed import duties. The prevailing import duties on value cif in 1960 have been as follows

Duty on the imported live cattle and sheep-goats for breeding or for slaughtering is accounted to 15% on their c.i.f. value; on live pigs, poultry 20 percent; on fresh beef, mutton-goat 25 percent; on frozen or fresh pork 25 percent and on dead poultry 30 percent.

Duty on sausages is accounted to drachmas12.60 per kg., on salami drachmas 25.20 per kg., and on ham 60 percent of its value.

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6. See for a similar treatment in K.A. Fox (1958).

The above duties are "legal". In most cases only a percentage of them is imposed or they are abolished, as in the case of frozen beef and mutton, if world prices increase and cause great burden to the Greek consumer. Most of the duties are imposed as a percentage on the price of meat. This has, as a consequence that when world prices (P_i^w) are increasing, the imposed duties raise the domestic price of meat more than if they were imposed as a fixed amount on its price, as in the case of sausages and salami.

It is clear that the above ad valorem tax on imported meat has destabilising effects upon the meat prices in the domestic market, in the sense that so much percentage of increase in the world price of meat is further increased by the percentage of the duty (say d_i) and secondly, by a mark-up on both above increases (which is the same as for the domestically produced meat c_i) i.e.

$$P_{it}^r = P_{it}^w(1 + d_i)(1 + c_i) \qquad (14)$$

where, P_{it}^w = the purchase price of meat c.i.f. Piraeus.

Now, supposing that there is no quality differential between imported meat and domestically produced one, P_{it}^f can be substituted for P_{it}^w in equation (13) and take the form

$$P_{it}^f \simeq P_{it}^w (1 + d_i) \qquad (15)$$

where P_{it}^f = price paid to farmer

Although the equation (15) is not strictly true, because of quality differentiation of the domestic from the foreign meat, it shows the way of transforming the changes in the meat world prices on to the farm prices, which will affect future domestic production. It is mentioned here that the quality differentiation of imported meat is relatively low in the case of fresh meat and is virtually reduced to the imported frozen meat.

The indicated influence of foreign meat prices on post-war expansion of the Greek livestock sector is not, however, left to work beyond certain limits because of the government's determination to secure domestic price stability and to protect the consumer's interests. Thus, in the periods where foreign prices were rapidly increasing the Greek Government abolished entirely some of these duties, with resulting loss of revenue, with the intention to return later on gradually to the above levels again. Domestic meat prices will be, however, more directly connected with the foreign ones by the association of Greece with E.E.C. Up to 1970 the barriers on the following import duties are expected to be dismantled according to the purposes of the association.

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The duties on live cattle, beef, mutton and goats, pork and poultry are expected to be reduced by 20 percent. The same reduction will prevail for sausages and salami as well. The duties on ham will be reduced by 60 per cent and duties on sheep and goats will remain as they are. Of course, the above mentioned duties will be entirely abolished after the full association of Greece with the E.E.C.

P A R T T W O

SUPPLY OF MEAT IN GREECE

SUPPLY OF MEAT IN GREECE

It is known that the demand for meat was expanded by a relatively high rate of increase in the last two decades in Greece without proportional rise in the demand for particular meat items, i.e. it was relatively rapid for veal, lamb, poultry and beef.

The question now arises to what extent this increase in the volume of demand for meat was satisfied by expansion of domestic production and by imports. The fact is that it was met in part by imports and this creates the problem why domestic supply was not expanded proportionally to final demand. The first thing which will be argued in this context is under what broad conditions the realised expansion in domestic production of meat took place (Chapter V). The position of the livestock and meat production sector in the Greek economy and the technological change and expansion of meat production are also considered in this context.

Subsequently, we turn attention to a special feature of the expansion of domestic production of meat in Greece in the last two decades, that it accrued without appreciable increase in the livestock population.

Two main questions arise on this special form of sectoral expansion, why Greek stock-farmers have selected this alternative form of output expansion by keeping almost stable their animal population and what were the main constraints which hampered domestic production to be in pace with final demand.

Both the way Greek farmers have selected in the expansion of meat production and the size of this expansion were affected by certain constraints of physical, policy, and institutional nature. There are not, of course, discrete boundaries of these constraints because of lack of an objective criterion to where each particular factor belongs. However, this grouping is useful to specify the role of the main factors in the realised changes and the future problems for further expansion of meat production in Greece. Thus, each of these three sets of constraints is examined separately.

Chapter VI deals with the physical impediments of expansion of the meat sector in Greece. More specifically, it includes examination of the land by geographic region (Section 1). Section 2 is devoted to the conditions of production of animal feeds (pastures, fodders, and concentrates) and the main factors associated/

associated with the relative low rate of their expansion. Section 3 refers to particular problems of methods of cattle feeding, the biggest animal and mostly demanded in Greece in recent years, as we have seen already.

Examination of the relevance of institutional factors in meat production in Greece is carried out in Chapter VII. Section 1 refers briefly to culture, traditions, and education of stock-farmers in Greece as constraints to the expansion of meat production. Section 2 discusses the problems associated with the relatively small size of the livestock holdings in that country. The decision to include this section in this chapter rather than in the previous chapter was based on the assumption that stressing attitudinal factors may help to better understanding the problems of the small unit size, without overlooking the relevance of land structure. Section 3 refers to the main characteristics of land tenure system and the main practices of fixation of rural rent in Greece. The main problems associated with hiring labour on a payment basis, namely of persons outside the family, are discussed briefly in Section 4.

Chapter VIII outlines the main forms of government interference in the meat production sector and concentrates on the possible effectiveness of each form in the light of the realized evolution in this sector. The next Chapter IX attempts to provide an interpretation of the growth of meat production and of animal population through time by geographic region. Particular attention is given there on the possible relevance of each of the discussed already constraint to the change in the level and composition of meat production in Greece in the last two decades.

A brief discussion of the main forms which the growth of meat production took place (i.e. increase in the average weight, the fertility rate and the improved breeds) under relative constancy of the livestock population is made in Chapter X. The possibilities for both movement along with the production function and/or shift of it due to technological change are also examined in this context. Finally Chapter XI contains forecasts on meat production and final demand in 1975 and 1980 on the basis of experimentation of this study and certain assumptions about future rate of income growth, irrigation works, etc. A series of policy measures are then presented for the achievement of the forecasted production targets. These refer to problems of production and marketing of meat and of animal feeds in Greece.

CHAPTER V

MEAT AND LIVESTOCK SECTOR IN THE GREEK ECONOMY

1. Domestic Production and Imports of Meat

The domestic production of meat covered aboveb two thirds of the increase in the total supply of meat during the period 1950-67 compared with 30 percent attributed to imports of meat. However, the annual average rate of increase of domestic production during the period 1950-67 was 7.1 percent as against 17.0 percent of imports. The latter was due to the relatively small size of imports in 1950. The imports of meat represented 17.6 percent of the total supply of meat in 1950. This share increased to 30 percent in 1966 and fell slightly to 26 percent in 1967, (Table V.1).

There are, of course, certain reservations as to the above percentagesdue to the definition of supply of meat and of changes in stocks. The definition of meat supply differs from the total volume of production of meat or the value added concept of national accounting. Specifically, the meat supply is defined as production by the Ministry of Agriculture and includes animals slaughtered in their breeding commune and the corresponding weight after removing the skin, entrails, etc., and animals slaughtered or sold for slaughter outside their breeding commune. The meat weight of the latter is estimated on the basis of the average weight of the animals slaughtered in their breeding commune. It becomes therefore evident that the given figure for meat production is the one obtained from the slaughtering of indigenous animals. Evidently, this definition affects the content of the changes in stocks of Table V.1, in the sense that they include changes in stocks of meat as a final commodity in the hands of distributors and not in the hands of stock-farmers. The same also happens in the imports of meat including only meat as a final commodity. However, imports and domestic supply are referred as percentages of total supply and not of final demand to which they are directed, since, as is generally the case, there is lack of knowledge as to where the changes in stocks come from.[2]

Apart from this kind of reservations the increase of imports of meat in absolute numbers and in their share to the total supply has been quite sharp since 1964 due to a relatively rapid rate of expansion of demand for meat, followed/

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1. O.E.C.D., op.cit. (1969), pp.19-20.
2. See W. Leontief, "The Structure of American Economy 1929, Oxford University Press, 1951.

TABLE V.1

DEMAND AND SUPPLY OF TOTAL MEAT IN GREECE

(Thousand Tons)

	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967
1. Domestic Supply	74.2	77.1	90.5	98.5	108.5	122.7	133.6	139.6	145.8	153.6	158.8	169.3	196.6	211.8	214.6	231.2	235.2	255.8
2. Imports	15.8	17.2	7.3	13.6	10.9	14.0	23.9	27.1	27.4	27.3	37.2	50.7	47.3	62.9	61.1	96.3	100.6	88.2
3. Total Supply	90.0	94.3	97.8	112.1	119.4	136.7	157.5	166.7	173.2	180.9	196.0	220.0	243.9	274.7	275.7	327.5	335.8	344.0
4. Consumption	86.1	89.2	102.6	110.2	122.0	136.0	153.0	170.5	171.9	178.7	192.4	215.8	231.9	259.4	274.0	318.8	328.9	353.0
(4.-3.) Changes in Stocks	3.9	5.1	-4.8	1.9	-2.6	0.7	4.5	-3.8	1.3	2.2	3.6	4.2	12.0	15.7	1.7	8.7	6.9	-9.0
	1950 = 100																	
Domestic Supply		103.9	122.0	132.7	146.2	165.4	180.1	188.1	196.5	207.0	214.0	228.2	265.0	285.4	289.2	311.6	317.0	344.7
Imports		108.9	46.2	86.1	69.0	88.6	151.3	171.5	173.4	172.8	235.4	320.9	299.4	398.4	386.7	609.5	636.7	558.2
Total Supply		104.8	108.7	124.6	132.7	151.9	175.0	185.2	192.4	201.0	217.8	244.4	280.0	305.2	306.3	363.8	373.1	382.2
Consumption		103.6	119.2	127.9	141.7	158.0	177.7	198.0	199.7	207.5	223.5	250.6	219.3	301.3	318.2	370.3	382.0	410.0
	Total Supply = 100																	
Domestic Supply	82.4	81.8	92.5	87.9	90.9	89.8	84.8	83.7	84.2	84.9	81.0	76.9	80.6	77.1	77.8	70.6	70.0	74.0
Imports	17.6	18.2	7.5	12.1	9.1	10.2	15.2	16.3	15.8	15.1	19.0	23.1	19.4	22.9	22.2	29.4	30.0	26.0
TOTAL SUPPLY	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Sources: Ministry of Agriculture, Division of Agricultural Research and Programming,
Ministry of Co-ordination, Division of National Accounts,
National Statistical Service of Greece,
Monthly Bulletin of External Trade Statistics, December 1950-1967.

followed by no corresponding adjustment of the domestic production. This has made more acute the existing long-run problem of the sector, which can be expressed in terms of reduction of the share of domestic supply of meat to the total supply from 87.4 percent during the five year period 1950-54 to 85.3 perce in the period 1955-59, furthermore to 78.6 percent during the period 1960-64 and 74 percent in 1967 (Table V.1).

Otherwise, this problem can be expressed in the reduction of the average annual rate of increase of domestic production of meat from 11.0 percent during the period 1950-54 to 5.32 percent during the period 1955-59, to 7.4 percent during the period 1960-64 and finally to 4.5 percent during the period 1965-68.

Greece makes a relatively high proportion of its imports of meat from the countries of Latin America (58 percent in 1964) and from New Zealand, in the form of frozen meat, mostly beef and mutton. The proportion of imports of live animals is insignificant and is mainly calves for fattening, animals of improved races, or import of lamb in seasonal peaks of demand in Christmas or Easter. As to import of calves, they come by about half from Yugoslavia (48 percent in 1966)[3] and secondarily from Switzerland and other countries.

3. Greece has been the second best customer of Yugoslavia since 1965 (After Italy) and the development of trade between the two countries seems likely to continue. See O.E.C.D., (1969), p.20.

2. Livestock and Meat Production in relation with the Agricultural Sector.

A brief discussion to the relative position of the livestock in the Agricultural Sector and the latter in the Greek economy, is expected to be helpful in understanding the problems of expansion of the meat production in that country. Greece is today a small country with a total area of 131.9 thousand square kilometers of which 90.9 thousand square kilometers represent agricultural area. Greece is also relatively poor in natural resources, particularly in land resources; it does not have any special surface or underground resource in sufficient abundance to serve as the basis for development of a leading modern sector.[4]

Greece, being predominantly a mountainous country, has an intermediate climate ranging from the Mediterranean type in the South and the Islands, to the temperate type in the North. The soil is poor in plant food, especially in phosphorus and nitrogen. Climatic and soil conditions favour the cultivation of tobacco, vineyards, raisins, olives, etc., although large areas in the central and Northern regions seem equally suitable for extensive grain production.

Population density amounts in Greece to 67 persons per square kilometer, in 1968, (and in terms of arable land 222.2 persons per square kilometer), compared with 43 persons in Turkey, 65 in Spain, 91 in France, 242 in Germany and 227 in the United Kingdom.[5] 50.1 percent of the total active population is engaged in agriculture (1967) which is still the dominant activity in Greece, accounting for 22 percent of Gross Domestic Product (1967), compared with 35.8 percent of GDP in Turkey, 16.4 percent of GDP in Spain, 7.4 percent in France (1966), 4.1 percent in Germany and 3.3 percent in the United Kingdom. The share of agricultural sector in Greece was steadily falling in the last two decades (28.7 percent of GDP in 1948) and for the first time fell below the product of the secondary sector in 1962 (see Table V.2.)

Manufacturing industry in Greece is mainly the result of development in the inter-war/

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4. This does not mean that we take the position that the main factor of the low level of development of the Greek economy compared with other Western European countries is attributed to lack of domestic mineral resources, in view of other historical examples. In fact, Greece exports, still in a rather crude form, much of its mineral production as many other backward countries do (21% of exports are raw materials and minerals and ores in 1965-1968).

5. See O.E.C.D. "The O.E.C.D. Observer", No.44, February, 1970.

TABLE V.2.

SHARES OF AGRICULTURAL SECTOR IN GROSS DOMESTIC PRODUCT

(Gross Value Added, 1958 prices)

SECTORS	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961
AGRICULTURAL SECTOR	28.7	33.2	28.8	30.3	28.6	31.9	30.1	30.1	29.2	30.7	27.7	27.8	25.0	27.6
SECONDARY PRODUCTION(1)	15.8	15.9	20.1	19.2	19.4	19.7	20.8	21.7	22.9	22.7	24.4	24.7	26.5	25.9
SERVICES	55.5	50.9	51.1	50.5	52.0	48.4	49.1	48.2	47.9	46.6	47.9	47.5	48.5	46.5
GROSS DOMESTIC PRODUCT	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

SECTORS	1962	1963	1964	1965	1966	1967	1968	1948-49	1950-54	1955-59	1960-64
AGRICULTURAL SECTOR	24.9	24.9	24.4	23.3	22.2	22.3	19.7	31.1	30.0	29.1	25.3
SECONDARY PRODUCTION(1)	26.8	27.3	28.1	28.6	29.6	29.3	31.2	15.9	19.9	23.4	27.0
SERVICES	48.3	47.8	47.5	48.1	48.2	48.4	49.1	53.0	50.1	47.5	47.7
GROSS DOMESTIC PRODUCT	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

(1) Including Manufacturing, Mining, Electricity - Gas and Water-Works and Total Construction

Sources: National Accounts of Greece 1948-65, Table 19, pp.105-106,
National Accounts of Greece 1960-66, Table 19, p. 81,
National Statistical Yearbook, 1969, Table XXIII : 1a, p.339.

inter-war period. The manufacturing industries employ about 20 percent of the labour force and account for close to 29 percent of Gross Domestic Product, 1967[6].

The majority of labour force in manufacturing industry is employed in relatively small scale establishments. More than half of those engaged in manufacturing are working in establishments with less than 10 persons; only 20 percent work in farms employing 50 persons or more[7].

Under the above structure, and the low level of development of the Greek economy, agriculture contributes about three-fourths of the total exports of goods (with fruits, tobacco and cotton representing on average 23 percent, 36 percent and 10 percent respectively of total exports during the period 1950-66). This composition of exports is also associated with the domestic orientation of the Greek manufacturing industry and an increasing balance of payments deficit. The composition of exports has not substantially changed since the last World War except for the inclusion of cotton. Under these conditions the expansion of total exports has been moderate and gradual (7 percent average annual percentage increase rate during the period 1954-68), as against a relatively rapid increase in imports (12 percent average annual percentage increase during the period 1954-68).

Greece has, however, escaped from international crisis up to date, thanks to the expansion of invisible receipts, in the form mainly of remittances of Greek workers abroad, of Greek shipping, tourism, etc., and the expansion of foreign suppliers credit, which has exceeded the foreign exchange reserves of the country since 1965.

The above trade balance problem is associated with the limits of rapid expansion of exports under their present structure; in the meantime, the expansion of imports comes to meet partly the demand for the products, the domestic supply of which does not seem to be properly adjusted to demand requirements, at least as rapidly as it possibly could be. Thus, there is a gradual expansion of inventories of non-demanded agricultural products, such as wheat and tobacco, which cannot/

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6. As is easily shown, the ratio of the percentage of output (say O) and of labour (say N) employed in a sector (i) equals the ratio of the average product per man of this sector and the economy at large $\left(\frac{Oi/O}{Ni/N} = \frac{Oi/Ni}{O/N}\right)$. Thus, on the basis of the above numbers the average Output-Labour ratio in the Greek Manufacturing sector is about one-and-a-half times as much of the average of the economy, while that of agricultural sector is less than half of it.

7. See National Statistical Service of Greece, Statistical Yearbook 1969, Table X.1.

cannot be exported at the present world prices and foreign exchange rate without losses to the government budget. This is partly due to the fact that the government supports the domestic prices of these commodities for the sake of the government's incomes policy.

At the same time, the expanded domestic production of certain agricultural products, (notably meat) and non-agricultural ones, such as consumer durables with relatively rapidly expanding demand are satisfied at increasing rates through imports. This process was accelerated after the liberalisation of imports and the lack of quantitative controls which have held since 1953. This seems that it has preserved a relative price stability, which was considered as a main task by policy makers in Greece.

The above situation is to some extent reflected in the composition of Greek farm production (Table V.3)

TABLE V.3

COMPOSITION OF AGRICULTURAL OUTPUT

(Average of two year periods)

(At constant prices 1958)

	1949/50	1953/4	1957/8	1959/60	1961/2	1963/4	1965/6	1967/8
Crop Production(1)	75.0	72.4	71.9	68.3	68.3	68.1	68.3	66.5
Livestock Production	19.9	22.6	23.1	25.3	25.6	25.9	26.2	28.2
Forestry and Fisheries	5.1	5.0	5.0	6.4	6.1	6.0	5.5	5.3
TOTAL AGRICULTURAL OUTPUT	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

(1) including annual crops and trees.

Sources: Center of Planning and Economic Research, Analysis and Assessment of the Economic Effects of the U.S. PL.480 Program in Greece, Athens 1965, Table 45, p.71. - Bank of Greece, The Greek Economy 1968, Athens, 1969, p.17.

More specifically, the share of livestock production, although it has been steadily increased since 1950, still remains about half that of crop production which includes also wheat and tobacco. More specifically, livestock production in Greece accounts for less than one third of the final agricultural product, which is much lower than that among other countries listed in Table V.4.

TABLE V.4

LIVESTOCK PRODUCTION AS A PROPORTION OF THE FINAL AGRICULTURAL PRODUCT

(Percentages)

Average 1956-58/1962-63

NORWAY	89	YUGOSLAVIA	54
IRELAND	88	ITALY	39
NETHERLANDS	77	SPAIN	35
AUSTRIA	74	PORTUGAL	35
FRANCE	67	GREECE	32(1)
		TURKEY	29

(1) The higher percentage of livestock sector to total agricultural product for 1956-58/1962-63 period compared with that of Table V.3. may be due to the fact that O.E.C.D. has taken the value of livestock sector at current prices.

SOURCE: O.E.C.D., The development of the production of beef and veal, Mediterranean countries of O.E.C.D., Dubrovnik 16-20 September, 1968, Paris 1969, No. 25397, Table 4,p.15.

3. Interindustry Relationships of Livestock and Meat Sector

Knowledge on the interindustry dependence of the livestock and meat production with other sectors of the Greek economy seems useful to understand the problems that the acceleration of meat production in the future has to face. Table V.5 provides information on the interindustry relationships of the livestock sector. The data were taken from those published by the Center of Planning and Economic Research, "Input-Output Table of the Greek Economy for 1960". This Table includes a total of 50 sectors among which the livestock sector has been treated as a separate entity.[1]

The purchases by the livestock sector from other sectors (inputs) have been estimated from coefficients (per animal) based on information of the Ministry of Agriculture and information relating to sales of various other sectors and to imports (sales of industries producing animal feeds, imports of animal drugs, etc.)

The Wheat and Cereals sector is the first in order of importance among the 23 other sectors in the supply of total inputs offering something less than one-third of the total interindustry demand. Evidently, this sector includes animal fodders in the category of Cereals. This incorporation seems to have been made in the Input-Output Table for purposes of simplification on the one hand, and on the other, in view of the recent research to find economic and harmless methods to feed animals with the surplus of wheat. Total interindustry demand of the livestock sector represents 45.9 percent of the total value of its supply.

Another separate input, labour, contributes about 17 percent to the Total value of supply and 33.1 percent of the total value added of the sector. However, given that the managerial and business function in this sector, as we shall see later on, largely coincides with the labour, the total contribution of the farmers to the livestock production is probably to be higher than that mentioned above. The difficulty here arises in the breaking down of the item "Other Value Added" into interest charges, rents and profits (33.5 percent of the total) If one assumes, as seems reasonable under the Greek conditions, that the 10-15 percent/

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1. There has previously been published another Input-Output Table for the year 1954 by the Director of the National Accounts Service, including only 20 sectors with no separation of livestock sector from agricultural sector as a whole.

TABLE V.5.

INTERINDUSTRY FLOWS OF LIVESTOCK SECTOR FOR THE YEAR 1960

(In Million Drachmas at current prices)

I N P U T S				O U T P U T S			
Items	Absolute Values	Percentages		Items	Absolute Values	Percentages	
INDUSTRIAL CROPS	5	.06	.03	INDUSTRIAL CROPS	418	3.60	2.45
WHEAT AND OTHER CEREALS	4,817	61.62	28.27	WHEAT AND OTHER CEREALS	2,093	18.04	12.28
FRUIT TREES	98	1.25	.57	FRUIT TREES	709	6.11	4.16
OLIVE GROVES	272	3.48	1.60	OLIVE GROVES	459	3.96	2.69
VINEYARDS	167	2.14	.98	VINEYARDS	505	4.35	2.96
VEGETABLES	53	.68	.31	VEGETABLES	2,121	18.29	12.44
LIVESTOCK	266	3.40	1.56	LIVESTOCK	266	2.29	1.56
MINING-QUARRYING	51	.65	.30	FORESTRY-HUNTING	185	1.59	1.09
FLOUR, BREAD, SUGAR, ETC.	461	5.90	2.71	SLAUGHTERING OF ANIMALS	2,046	17.64	12.01
BEVERAGE INDUSTRIES	290	3.71	1.70	MILK INDUSTRY, TINNED FOODS	2,053	17.70	12.05
OTHER TEXTILE INDUSTRIES	124	1.59	.73	FLOUR, BREAD, SUGAR, ETC.	26	.22	.15
WOOD AND CORK	40	.51	.23	COTTON INDUSTRY	3	.03	.02
LEATHER INDUSTRY	40	.51	.23	WOOL INDUSTRY	63	.54	.37
ORGANIC CHEMICALS, ETC.	38	.49	.22	OTHER TEXTILE INDUSTRIES	28	.24	.16
OLIVE OIL, SEED OIL, FATS	200	2.56	1.17	LEATHER INDUSTRY	204	1.76	1.20
METAL PRODUCTS	105	1.34	.62	ORGANIC CHEMICALS, SOAP	10	.09	.06
MACHINERY	58	.74	.34	OTHER SERVICES	50	.43	.29
TRANSPORT EQUIPMENT	19	.24	.11				
MISCELLANEOUS INDUSTRIES	3	.04	.02				
CONSTRUCTION	18	.23	.11				
BANKING INSURANCE	100	1.28	.59				
TRANSPORTATION-STORAGE	592	7.58	3.47				
I. INTERINDUSTRY DEMAND	7,817	= 100.00	45.87	I. INTERMEDIATE DEMAND	11,599	= 100.00	65.94

continued overleaf/

TABLE V.5
(continued)

I N P U T S				O U T P U T S			
Items	Absolute Values	Percentages		Items	Absolute Values	Percentages	
WAGES AND SALARIES	2,825	33.11	16.58	CONSUMPTION	5,138	94.42	30.15
OTHER GROSS VALUE ADDED	5,706	66.89	33.48	INVESTMENT	268	4.92	1.57
				EXPORTS	36	.66	.21
II. TOTAL GROSS VALUE ADDED	8,531	100.00	5o.06	II. TOTAL FINAL DEMAND	5,442	100.00	31.94
TAXES - SUBSIDIES	277		1.62				
IMPORTS CIF	406		2.38				
IMPORT DUTIES AND TAXES	10		.06				
T O T A L S U P P L Y	17,041		100.00	T O T A L D E M A N D	17,041		100.00

Sources: Center of Planning and Economic Research "Input-Output Table of the Greek Economy (Year 1960) by A. Koutsoyianis in association with A. Ganas, Athens, 1967.

percent corresponds to interest and rents, then the main problem is how the 18-23 percent of the total value of livestock production is allocated between the producers and the distributors.

The remaining items of total supply are taxes (which include indirect taxes related to the volume of production and of trade in particular goods and services paid to the central government or to local authorities) and subsidies, 1.6 percent of the total supply.

The share of imports CIF is only 2.4 percent of the total value of livestock imports./ Imports are generally classified in the sector which would show them as a principal product in their country of origin. As is shown in Table V.1., the share of imports in tons of meat is much higher than the referred to above in the Input-Output Table, as it includes also imports of live animals, a proportion of which are slaughtered within the year they are imported. If the value of live animals were included in the imports, the contribution of them to the total revised value of supply would account for 5.24 percent with a parallel reduction in the shares of other items of total supply. A part of imported meat is also frozen which has also included in the Input-Output Table.

No attempt has been made in the Input-Output Table to split imports into competitive and non-competitive, given that the imports of livestock products are mostly competitive.

The value of imports does not include, on the other hand, trade and transportation margins within the country, since they are included in the inputs from the relevant sectors. Imports, therefore, according to this treatment, are distributed to users (final or intermediate) along with the domestic supply of the same product.

The livestock sector distributes its output to 17 other sectors of the economy. The total output of the sector is so defined to incorporate: (a) production for sale, (b) production for the sector itself, and (c) production for final consumption. The intermediate demand of other sectors covers 65.9 percent of total output of the livestock sector. This percentage is mainly attributable to the classification of slaughtering of animals and milk industry, as separate entities. Specifically, in the case of intermediate demand, the following sectors contribute in order of importance (in terms of percentages to total intermediate demand), Vegetables Sector 18.3 percent, Wheat and other Cereals 18 percent, Milk Industry 17.7 percent, Slaughtering of Animals 17.6 percent, etc.

The intermediate output of the livestock sector, which is used as input to most other sectors, includes mainly manure (used in the cultivation of vegetables, fruit trees, vineyards, olive trees, etc.) as well as the value of the work of animals (mainly ploughing and transportation services). It must be noted here that the working animals which offer ploughing and transport services to the livestock sector, are mostly owned by the individual stock farmers and constitute an "imputed" input to the livestock sector (under the item livestock). Also for the same reasons the output used as manure, ploughing and transport services by the "Vegetables" sector, by other agricultural products and by the farmers themselves is also "imputed".

However, it is difficult to separate the above services of the animals as a distinct item of the Value added; therefore, within the "livestock", as a separate sector, the value of the work of animals is taken as a part of the sector's output, which is sold as an input to other sectors.

The direct final demand, under the aforementioned classification, consists of 31.9 percent of the total final demand. This final demand includes also private and government consumption. If the slaughtering of animals (which represents 17.6 percent of total intermediate demand) is included in the direct demand, given that the share of transformation by the Slaughtering sector is relatively small compared with the total value of meat, the share of consumption to total demand for livestock products would increase to 50 percent. Including also other dairy products into final consumption, this percentage would rise even more. The final demand also includes investment, ie. capital assets (new building, vehicles, plant, machinery, other equipment) either for replacing or adding to the stock of existing capital assets. The share of investment in livestock sector, 1.6 percent of the value of the total demand, consists of new stalls, cheese dairies and repairs.

Lastly, the final demand includes exports of .21 percent of the value of total demand. Specifically, these exports include mainly dairy products (90 percent) and secondarily live animals not producing meat, i.e. asses, horses, etc. (10 percent).

CHAPTER VI

PHYSICAL IMPEDIMENTS OF MEAT PRODUCTION

1. Nature of Land

In view of the fact that almost half of Greek territory is mountainous (Table VI.1, column 2,) it seems to have been a potential constraint to meat production. As we remember, however, livestock production represents today only about one-third of the total output of the agricultural sector. We observe also from Table VI.1 (column 4), that some 36 percent of plain area is cultivated by animal fodders and the pastures cover almost the total mountainous area (column 3). This seems to suggest that pastures are mostly rough grazings and animal fodders production is impeded not only by plain areas but also by some competition between fodder crops and food crops for human consumption (almost two-thirds of plain land is devoted to other than fodder crops).

The conclusion that the total area of pasture land is mountainous, where no other opportunity exists except stock farming, seems to be supported by the fact that the order of proportions of pastures to total land by region (column 3) is closely corresponding with the proportion of mountainous to total land by region (column 2).

Moreover, in two relatively plain areas, namely Thessaly and Macedonia the proportion of the plain land which is used for fodder production is relatively low, namely below the country average of 35.7 percent (column 4). It means that in places where the farmer can have a choice and the possibilities for specialisation are relatively high, livestock production seemingly has not offered yet an attractive alternative.

The regional land structure seems to be somewhat related to the proportion of livestock sector to total agricultural output of each region. A comparison of columns 1 and 2 of Table VI.1 in terms of order of magnitude seems to indicate that the percentage shares of the livestock sector in the total agricultural product of each region are only in part related to the proportion of mountainous to total land. Thus, three out of nine regions, (Sterea Hellas, Epirus and Aegean Islands) have a correspondence in these percentages, namely both percentages higher than the country average. In the relatively fertile Macedonia/

Macedonia both percentages are below the country averages while the ratio of livestock to total agricultural output in the other plain region, Thessaly, approaches the country average. This seems misleading since it is affected by the relatively high share of livestock to total agricultural output in the mountainous west part of that region. The three relatively plain regions, Macedonia, Thessaly and Thrace - with proportion of mountainous land well below the country average (column 2) - have lower than the country average proportion of livestock output (column 1).

We reach the conclusion that the share of the livestock sector - and likely of meat production which is about half of it - to the agricultural sector is relatively low in the relatively flat regions of Greece, despite the indications of relatively high meat production in these regions. The question therefore arises, why the relative rate of expansion of fodder production was not higher than it was particularly in these regions is possibly associated with various problems of the production and trade of animal fodders. Consideration of these conditions of production of feeds consists of the task of the next few paragraphs.

2. Animal Feeds

Pastures

The indicated relatively low expansion of fodder production in plain areas still gives pastures a leading part in the feeding of livestock although their share to total livestock feeds is decreasing through time (Table VI.2)

TABLE VI.2

PERCENTAGE DISTRIBUTION OF LIVESTOCK FEEDS IN 1963, 1966 and 1970

	1963	1966	1970(1)
PASTURES	67.3	61.0	52.5
FODDERS(2)	32.7	39.0	47.5
	100.0	100.0	100.0

(1) Provisional Estimates, See Appendix B, TableB1

(2) Including concentrates and by-products.

Sources: Ministry of Agriculture, Program of Livestock Sector, by A. Karadounia, Athens, 1965.

The total pasture grassland covers about 53 million stremmas with annual grass production on average 230 kgs. and 340 kgs. per stremma from the mountainous and plain areas respectively. The relatively high importance of pastures seems to be associated with the realized stability of animal population in recent years. Thus, reliance on grass means that an increase in population may force stock farmers to sell their stock under unfavourable terms to avoid starvation of the animals in case of unexpectedly bad weather conditions. This uncertaint could be reduced of course if supply of fodder was increased and the trade of them was organised.

The relatively high proportion of pastures in mountainous areas must have a direct positive effect on per unit cost of meat production(1). An additional factor to cost seems to be the fact that re-seeding of permanent pasture is not practised to a large extent. Little fertilizer is on the other hand applied to pastures except in some areas in the plains. Pastures suffer moreover, from weed infestation, brush intrusion and erosion from water and wind. Clipping and other mechanical or chemical controls of weeds and brush are seldom practised.

A great deal has, therefore, likely to be done in terms of benefit of grass, which will enable substantial savings to be made on the relatively costly purchases of concentrates.

The improvement in the use of pastures and the more extensive use of fertilizer is going to increase the yield per stremma; the existing possibilities seem to be proved by the fact that a test carried out by the Agricultural Bank of Greece by dividing a pasture-land in three equal parts of which two were fertilized, gave the following results: the fertilized ones yielded 500 kgs. and 400 kgs. of grass each against 100 kgs. from the non-fertilized part[2]. Parallel improvements would be made by brush intrusion to protect the grass from dryness and by cleaning the pastures from weeds. These improvements might also reduce the size of seasonal variation in grass production and the consequent malnutrition of animals during the whole year because of the relatively low purchase and use of/

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1. The opposite seems to happen in the case of United Kingdom namely that grass is relatively cheap compared with most other feeds. See Hamilton, R.A. Home Feed Resources for Livestock, Agriculture in the British Economy, Proceedings of Conference, ed. by Sir J. Scott Watson, March, 1957, Table 4, page 161.

2. T.G. Trakas, "It is necessary and potential the coverage of dairy products deficit". Economikos Tahydromas, 9th February, 1967, p.13.

of fodders.

Regarding the management methods of pastures in Greece, one may say that there is lack of a systematic management in any literary sense of the term. Particular mention might be made of the absence of any practice of cutting the grass for feeding the animals which may not be possible for mountainous areas, but not impossible for semi-mountainous and plain areas if fertilizer is going to be applied.

There is also a lack of any system of periodic fallow of grass land. Overuse of grass land by more than the appropriate number of animals results in the consequent underfeeding of animals.

According to some estimates the use of pastures consists in 85 percent of the feeding of small animals (sheep-goats), 54 percent of cattle, some 40 percent of pigs, hens and rabbits and 58 percent of the feeding of asses, mules and horses[3]. These percentages are, of course, a matter of gradual change and to some extent indicators of the relatively limited amount of stabled livestock production and the low average number of cattle per holding.

Fodder Production

Domestic Fodder Production achieved an increase of 58 percent between 1954 and 1968 as a result of relatively high increase in the average yield (26 percent) and to a smaller extent in the rise of cultivated by fodder area (20 percent). Table VI.3. This represents an average annual rate of increase of fodder production of about 4 percent compared with rate of growth of 4.5 percent of green production.

At the same time we had imports of fodders mainly of maize, barley and oats from the U.S.A. on the basis of the PL 480. The imports of these feeds have represented an obviously increasing ratio of the domestic production of the maize and barley (Table VI.4)

It is, of course, difficult to say whether the imports of maize and barley, which represent almost 20 percent of total domestic production of feeds, through the PL 480 have had a restraining effect on their domestic production. The factors of domestic production of these two and of other feeds are too many to isolate the net positive or negative effect of each on its expansion. First, this was a period of relatively rapid rise in the average yield per stremma/

3. Ministry of Agriculture, "Program of Livestock Sector", by A.G. Karadounia, Athens, 1965, pp.98-99.

TABLE VI.3

PRODUCTION OF LIVESTOCK FODDER AND DEVELOPMENT INDICES

(In Thousand Tons)

KIND	1954	1960	1965	1966	1967	1968	1968 1954 = 100
1. MAIZE	254	282	298	323	338	375	147.6
2. BARLEY	233	232	412	638	839	487	209.0
3. OATS	139	149	150	167	153	99	66.0
4. FODDER LEGUMES	35	45	69	68	71	53	151.4
A. INDEX (1 - 4)	100	105	132	177	208	150	150.0
5. HAY FROM LEGUMES	127	307	479	416	404	306	240.9
6. BARLEY, OATS	158	149	150	167	160	160	101.3
7. ALFALFA	340	596	959	1243	1406	1480	435.3
8. HAY FROM CEREALS	1602	2073	1610	1627	1812	1648	1028.7
B. INDEX (5 - 8)	100	140	143	155	178	161	161.0
A. + B. INDEX (1 - 8)	100	132	142	160	182	158	158.0

Sources: Center of Planning and Economic Research, "Analysis and Assessment of the Economic Effects of the U.S. PL 480 Program in Greece", Athens 1965, Table 4.17, National Statistical Service of Greece, Statistical Yearbook 1968, Table VIII.7, NSSG, Monthly Statistical Bulletin, April 1969, Table 27, Bank of Greece, The Greek Economy 1968, Athens 1969, p.23.

TABLE VI.4

IMPORTS OF FODDERS THROUGH PL 480, TITLE I, 1955-68.
AND THEIR RATIO TO DOMESTIC PRODUCTION
(In Thousand Tons)

YEAR	MAIZE		BARLEY		OATS	
	Imports	Ratio to Domestic Production	Imports	Ratio to Domestic Production	Imports	Ratio to Domestic Production
1955	26.7	9.4	-	-	16.6	10.6
1956	20.7	8.7	21.4	9.3	7.8	5.3
1957	9.1	3.5	2.5	1.0	6.1	3.2
1958	62.9	27.8	20.3	7.6	12.4	7.1
1959	57.3	19.6	16.7	7.7	6.0	4.3
1960	73.3	26.0	34.5	14.8	-	-
1961	94.3	34.9	29.6	12.6	-	-
1962	120.6	45.3	48.8	19.4	-	-
1963	130.4	40.4	21.9	9.0	-	-
1964	145.0	50.0	62.5	22.5	-	-
1965	161.1	55.6	9.4	22.8	-	-
1966	270.8	83.6	58.2	9.1	-	-
1967	274.9	81.4	1.6	.2	-	-
1968	153.1	40.8	.02	-	-	-

Sources: Center of Planning and Economic Research, "Analysis and Assessment of the Economic Effects of the U.S. PL480 Program in Greece", by G. Coutsoumaris, R.M. Westebbe and others, Athens, 1965, Table 4.18, p.98, Ministry of Agriculture, "Program of Livestock Sector", by A.G. Karadounia, Athens, 1965, p.104, National Statistical Service of Greece, Monthly Bulletin of External Trade Statistics, December, 1965-68.

stremma of most crops including animal feeds. However, only animal feeds were subjected to 'competition' of the PL 480.

This 'competition' does not operate on comparable terms as price changes seem to indicate. Thus, as Table VI.5 shows, the price of PL 280 maize has fallen relatively rapidly between 1954 and 1962 compared with the price of domestically produced maize. This seems that it has been contributed to some fall in the market price of domestic maize and therefore possibly to the rate of growth of its production.

The likely sensitivity of domestic production of maize seems to be shown in part by the fact that in the period 1956-57 when the domestic production fell due to weather conditions, the imports happened to fall too. The resulting increase in prices has been associated with relative rapid rates of expansion of the domestic production in the period 1958-59. In the year 1960, when the domestic supply fell because of unfavourable weather again, the mechanism was not left to work since prices were not left to rise because of a sharp rise in imports of maize and barley (Table VI.5)[4].

The expansion of domestic fodder production may have been restrained by the imports through PL 480 in view of the relatively higher rate of increase of domestic production (1954-1968) of those animal feeds (5 - 8 of Table VI.3) which have not corresponding imports through PL 480. However, apart from PL 480 there are also other factors restraining the domestic production of feeds and appearing as difficulties in a swing away from other agricultural crops, notably wheat.

Table VI.6 gives an estimate of the incomes realised from cultivation of one stremma by alternative crops, i.e. wheat, cotton, and animal fodders - barley, oats, corn - given their relative government protection in 1962-64 period. This estimate of course takes into account the existed at the time subsidies, the average yield per stremma and the prices paid to producers. The comparison seems to answer the question why domestic production of feeds has not been increased at a higher rate.

It/

4. It seems, therefore, to create doubts on the assertion that PL 480 fodders are likely of better quality than the domestic ones which have contributed to expansion of stabled livestock in Greece, See G. Coutsoumaris et al. op.cit., p.95. As we shall see later on there are indications that the expansion of stabled livestock was at a particularly low rate.

TABLE VI.5

AVERAGE WEIGHED PRICES FOR DOMESTIC AND IMPORTED LIVESTOCK FODDER, (1954-1966)

(In Dollars per Ton)

YEAR	MAIZE		BARLEY		OATS	
	Domestic	Imported	Domestic	Imported	Domestic	Imported
1954	73.0	81.3	69.0	72.0	66.0	-
1955	70.0	76.7	75.0	-	67.3	-
1956	81.7	77.3	82.0	-	78.0	-
1957	81.3	80.3	81.7	-	78.3	-
1958	72.0	60.3	66.7	47.3	63.3	-
1959	68.7	67.0	69.0	59.3	64.7	-
1960	68.7	67.3	71.7	67.3	75.7	-
1961	68.7	61.0	72.0	56.7	73.3	-
1962	70.7	63.3	72.7	67.7	69.0	
1963	73.6	61.4	77.0	71.1	79.3	-
1964	76.6	66.1	79.3	66.8	83.7	-
1965	88.0	66.7	83.0	54.1	83.1	-
1966	84.3	74.1	76.0	74.1	80.0	

Sources: Center of Planning and Economic Research, "Analysis and Assessment of the Economic Effects of the U.S. PL 480 Program in Greece", Athens, 1965, Table 4.19, p.100. Bank of Greece, The Greek Economy, 1968, Athens 1969, p.19, National Statistical Service of Greece, Monthly Bulletin of External Trade Statistics, December, 1963-1966.

TABLE VI.6

ESTIMATED GROSS REVENUE PER STREMMA OF ALTERNATIVE USE OF LAND

(In Drachmas)

YEAR	SOFT WHEAT	COTTON	OATS	MAIZE	BARLEY
1962	584	481	336	317	402
1963	500	424	363	356	452
1964	650	598	414	429	460

Source: Center of Planning and Economic Research, "Agricultural Subsidies", Athens 1966, p.40 (data taken from the Ministry of Agriculture).

It is possible to say with the least uncertainty that the domestic production of fodder had more than one obstacle to face. However, it is not known if one was absent how less decisive the other would be. It may be noticed, for instance, that the production of other non-imported fodders has risen relatively fast, following a similar pattern of their prices paid to the producer. This has happened recently in the case of Alfalfa (Table VI.3).

A contributory factor to the expansion of fodder production against these obstacles may have been the short and long term credit granted by the Agricultural Bank of Greece for this purpose.[5]

Concentrates

Concentrates are fed mainly to cattle, mostly as simple mixtures rather than as complex ones. They are usually prepared by grains of corn, barley, wheat and oats. There are also concentrates made from by-products of flour industry (wheat screenings), of seed-oil industry (linseed cakes, cotton-seed cakes), and of sugar industry (sugar-beet tops and leaves).

The grains of corn, barley, wheat and oats for making simple concentrated mixtures are partly produced by the stock farmers themselves, or are supplied by the free market or by the Agricultural Bank of Greece. The by-products of different industries are exclusively supplied through the free market.

Some research is carried out by the Ministry of Agriculture on the results of various grain mixtures, particularly of wheat and barley, containing also protein supplements and vitamin additives. The number of industries producing complex mixtures is limited (11 private, 21 co-operative, 32 small preparatories and 58 preparatories exclusively for poultry industry).[6]

The annual production of mixture producing industries has been as follows since 1960:

1960	70,000 tons
1961	80,000 "
1962	100,000 "
1963	130,000 "
1964	170,000 "
1965	215,000 "

In 1965 the livestock sector had consumed simple concentrated mixtures, maize, barley/

5. For the credit-subsidy scheme applied in that case, see Ch.VIII.4.

6. It is estimated that 90 percent of their production is fed to the Poultry industry.

barley, wheat, cotton-seed cakes, etc., 1,500 thousand tons and in the form of complex concentrates only 215 thousand tons. The relatively rapidly increasing demand is not easily covered by the existing operating small-scale industries without modernising them or establishing new ones.[7]

Cattle Feeding in Greece

A few words need to be said about the cattle feeding in Greece, given that the share of veal-beef seems to have an increasing importance in the future expansio of meat production. On the other hand, the feeding of cattle presents higher specialisation compared with that of other animals. Over half of the total feeding of cattle relies on pastures which cover an area of 15 million stremmas of rough grazing which produce about 3.5 million tons of grass. Furthermore, about 700 thousand stremmas are used for permanent grazing which produce about 800 thousand tons of grass.[8] These proportions are indicative of high costs of cattle feeding in view of the observed management of pastures in Greece.

The relatively high use of pastures indicates furthermore low use of cowsheds which reduce the rate of rise in weight, includes relatively high labour costs and makes cattle vulnerable to diseases. In view of the relatively high cost of fodders compared with grass and the relatively small size of the cattle holdings in Greece, as we shall see later on, exclusive promotion of stall-fed cattle does not appear as a reasonable suggestion for removing the above situation and accelerating the expansion of cattle production. Organization of semi-stalled livestock and complementary use of pastures and fodder in different seasons appear as appropriate solution. The problem of supplying additional amounts of fodders seems to have particular importance for such improvement to take place.

The baby-calves in Greece after their birth are fed exclusively with natural milk by natural or by artificial suckling for about three months except for dairy industries near big milk consumption centres which keep them for only three to four weeks. The feeding with natural milk is relatively expensive, given the existing structure of relative prices for meat and milk in Greece. As has been shown, about 10 kgs. of natural milk are needed to produce 1 kg. of/

7. "Economikos Tahydromos", (weekly published economic newspaper), 2nd March, 1967, No.306.

8. See Ministry of Agriculture "Summary Report on Production and Consumption of Cattle Meat in Greece", Athens, 1968, pp.16-17.

of liveweight of calf[9]. The feeding of baby-calves in the mountainous regions takes place almost exclusively with natural milk, because the transportation services there are very poor for delivery of the milk to the market. The utilization of suckling cows in areas distant from consumption centres is not a well organized business yet in Greece. This is related to the disproportional expansion of milk production which seems that has led Greece on the verge of overproduction of milk. Therefore, in planning to allot priority to meat production this practice may be considered as a potentiality. It is borne in mind that milk production will expand in the future parallel with the expansion of meat sector[10].

Of the calves kept for fattening, some are fed with skimmed milk by artificial suckling. The skimmed milk is fed warm to calves about 35-37°C. By this method, which is still not so widely practised in Greece, the milk is processing into butter and the beef-type calves are considered as a by-product of dairy operation. The quantity of skimmed milk by which the calf is fed, is at the beginning equal to 10-12 percent of its liveweight, increasing gradually to 15 percent and after, to 20 percent of its liveweight.

The results of feeding the baby-calves with skimmed milk, enriched with vitamin additives in the place of fat, have been considered very satisfactory. At first, two Italian Agriculturalists dealing with animals, Usuelli and Piana, applied this method of feeding. The results of their experimental research (University of Milan) have been the following:[11]

(a) A calf fed with natural milk was gaining 850 gr. daily, while the other fed with skimmed milk was gaining 900 gr. (average weight of first ten weeks).

(b) The increase of liveweight of calves by 1 kg. needed 11 kgs. of natural milk, while for the same weight it needed 14 kgs. of skimmed milk.

(c) A wide range of diseases was fully avoided with feeding with skimmed-milk, because of the effect of vitamin additives in the place of fat.

(d) The meat of calves fed with skimmed milk contained less fat and so it was preferable.

After/

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9. This was proved in the experimental Station for Livestock of Milan. It is expected that about the same happens in the Greek Livestock, given that the climate and soil conditions of two countries are similar.

10. See O.E.C.D., (1969), p.40.

11. G. Theophanous "Systematic Feeding of Animals", Athens, 1961, pp.79-81

After the weaning time, which ranges between four to six months, the improved calves are fed in experimental stations in Greece with special ration for fattening, consisting of 4-6 kgs. of concentrated food and 1-2 kgs. of alfalfa. A minimum of 1 kg. per day is the target of these experiments. When the calves have fully grown in a year's time, so that they do not need foods rich in nitrogenous matter, their ration for further fattening contains feeds rich in hydronate matter, which causes mainly fat.

Fattening by stock farmers takes place mainly in pastures and sometimes, when the pastures are poor, is completed with various concentrated fodder or rarely with mixtures. Unfortunately, the stock farmers do not frequently give the cattle the necessary ration for fattening so that the time for fattening is extended and the feeding costs increase[12]. Of course, this is mainly due to the lack of proper fodders in certain regions on one hand, and on the other to the lack of information about the proper feeding.

Dairy cows are fed with fodders rich in nitrogenous matter (alfalfa, clovers, cotton seed cakes, linseed cakes, etc.) necessary for increasing milk production. The relation between fodder with nitrogenous matter and without must be one-fifth to one-ninth, i.e. in the 9 kg. of ration, the one kg. at least must contain nitrogenous substances. Besides this, the cow must be fed with green fodders, given that 85 percent of cow milk contains water and she needs a lot of water and to eat fresh green fodders rich in water as well.

The problem of watering of cattle is especially important particularly during the summer drought when cattle as well as other animals are driven for watering to the nearest river or in the private wells, which may be a long distance from the pastures. Given that the latter areusually fragmented in small scattered plots, the additional walk for watering reduces further the conversion rate of food and increases labour costs. In these terms the watering of animals adds one more constraint to the expansion of livestock population.

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12. G. Theophanous, op.cit., p.97.

CHAPTER VII

INSTITUTIONAL FACTORS

There seem to be a series of institutional and attitudinal factors which are associated with the realised expansion of meat production in Greece and the form it has taken place by keeping relatively stable the livestock population. As is known, value and institutional factors have been already considered as noticeable impediments of economic development[1]. Their role for the development of the livestock sector and meat production has also preserved attention in various occasions[2].

Problems of definition and classification of institutional factors are taken here for granted. More specifically, only the seemingly more important factors of institutional nature for meat sector are taken here. Such factors include traditions and education of stock farmers, size of livestock holdings, land tenure system and labour hiring. Reservations might refer mainly to the size of holdings in view of the fact that physical conditions also affect that size. However, it might be said that given the physical conditions the livestock holdings might have had quite different size under different institutional settings.

1. Traditions and Education of Stock-Farmers

The livestock sector in Greece has a traditional character and as such constitutes a part of the way of life of the Greek farmer. This factor is related to the conditions of livestock production and its postwar expansion. This is alleged to hinder the growth of rapid structural or marginal improvements to the extent the relative price structure might justify. Therefore, this is a problem of psychological inertia which, however, seems to tend gradually to recede as production conditions change.

A rather strong incentive for changing the 'way of life' is the higher standards of living in towns gradually known to farmers. The effort to expand the so-called non-committed expenditure in consumer durables (demonstration effect) induces for finding ways of increasing the yields and the income of the stock farmers. This seems to be one of the factors that promote gradually more rationalisation in the Greek livestock sector.

The/

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1. C. Wolf, Jr. "Institutions and Economic Development", B. Okun and R.W. Richardson, Studies in Economic Development, N.Y., 1962

2. E.M. Carpenter, "Abattoirs and Marketing", O.E.C.D. (1969), op.cit. Paper VII.

The search for better living has initiated the relatively rapid rate of urbanisation since the Second World War and emigration in the sixties. This results, by itself, in a rise of farm income of the remainders, in so far as there was before under-employment and no fall in the level of output because of the migration. The villagers on the other hand, get knowledge of the living standards in towns and abroad from the members of the family who left the village.

The implied increase in the price of labour seems not to have contributed to an appreciable change of production methods and adoption of relatively more capital intensive techniques. This is attributed to the relative low level of 'education' of the stock farmers, defined broadly to include knowledge on technical matters, independently, of the way they have obtained it. The low level of knowledge is in part due to priority given to literal education in schools and to government measures for offering advice to stock farmers, which shall be discussed later on.

The relatively low degree of mechanisation and dissemination of modern feeding techniques is in part attributed to the fact that many of them may not fit well to the small size of holdings. It is also however, due to lack of appropriate education given that there seem to be available a number of simple methods of feeding and processes of management which involve small capital expenditure. It is expected that the gradual change in conditions of employment because of migration and emigration will press towards wider application of such improvements even in cases of farmers who consider livestock as a marginal business.

2. Size of Livestock Holdings

Some information on the meat production conditions, in Greece as a whole and in each of the nine regions is given by the relative size of holdings. Of course, this relationship, as presuming knowledge of the "optimum" size of holding and the behaviour of economies of scale in the livestock industry, which are not available, is not without objections. However, if the "size" is fairly low then we may be justified in inferring that if the size were greater than it is then the capital-labour ratio might be higher and a number of economies of scale might work.

These conclusions depend/on whether the meat output or specific inputs is used as a measure of the "size" of the livestock holding. For instance, we have no data on meat output per holding. The output as a measure of the size of holdings is not perfect in so far as there is underemployment and therefore possible changes in the input-output coefficients. The inputs used on necessity, namely number of cattle, sheep and goats per holding (columns 1-3 of Table VII.1), pasture area of holding (column 4), number of employees per holding (column 5) are not also perfect measures. The latter one refers actually to the number of employees in agricultural holdings including both livestock and green crops.

The results of the agricultural and livestock census of 1961 of the number of animals per holding seem that they have not changed drastically up to date. They provide a figure of 2.9 cattle per holding, 8.9 goats and 21.2 sheep, (average of the whole country). These sizes of holdings are not at all satisfactory compared with the standards of other meat producing countries. The following Table, VII.1 presents the average number of three types of animals per holding which varies among regions.

Interesting observations regarding the size of holdings with animals come from Table VII.1:

First, it seems that there exist important regional variations, in the average number of the animals per holding. A similar conclusion seems to be derived from the standpoint of the average pasture area of holdings (See Column 4).

Second, the average number of cattle and sheep per holding have the highest values in Athens and Salonica greater areas. Although the animals are reared mainly for milk production, this seems to indicate indirectly that there are economies of scale in the sector in the sense that the holdings in these areas are better organised.

Third/

TABLE VII.1

NUMBER OF ANIMALS, EMPLOYEES AND PASTURE SIZE BY GEOGRAPHIC REGION (1961)

REGIONS	ANIMALS PER HOLDING CATTLE	SHEEP	GOATS	AVERAGE PASTURE SIZE	NUMBER OF EMPLOYEES
	(1)	(2)	(3)	(4)	(5)
COUNTRY TOTAL	2.9	21.2	8.9	70.7	1.7
STEREA HELLAS AND EVBOEA [1]	2.8	19.2	9.2	) 104.5	)
GREATER ATHENS	9.9	31.4	5.5	)	) 1.5
PELOPONNESOS	2.3	15.0	6.5	54.3	1.6
IONIAN ISLANDS	1.8	5.9	4.9	29.5	1.6
EPIRUS	2.1	27.6	11.1	137.8	1.7
THESSALY	3.0	35.4	12.3	128.9	1.8
MACEDONIA [2]	2.5	34.9	14.2	)	)
SALONICA AREA	3.4	55.4	16.6	) 125.3	) 1.9
THRACE	3.3	28.3	21.1	23.7	2.2
AEGEAN ISLANDS	2.5	10.6	5.4	60.5	1.1
CRETE	1.8	9.1	4.3	69.7	1.5

(1) Excluding Greater Athens Area

(2) Excluding Salonica area

Source: National Statistical Service of Greece, Statistical Yearbook of Greece, 1967, Athens 1968, pp.182-86.

Third, in five regions of the country, the average number of cattle per holding is between 1.5 and 2.5. This reflects the fact that many families hold 1 - 2 cattle which they use also for ploughing and in some places (Epirus, Islands) for transport services as well. Besides Greater Athens and Salonica areas, only Thessaly and Thrace (the two areas with the highest percentage of plain land to the total), have an average number of cattle per holding over the average of the country.

Fourth, the regional variation in the average number of sheep and goats per holding gives less evidence on the production methods used and the farm size. There is no doubt that the small average number of both sheep and goats per holding in the Aegean and Ionian Islands and the Island of Crete reflect a relatively small proportion of time spent on tending a few animals (1 -10) in relation to the rest of their activities. There is however, some difficulty in concluding on the methods of breeding sheep on the basis of the average number of sheep per holding in regions which are over the country average, as in Thessaly, Thrace and Epirus.

The relatively small size of livestock holdings is associated with the land tenure system and the land fragmentation in Greece, the relatively high individualism of Greeks which prevents co-operation of producers, etc. It indicates a relatively low degree of specialisation within the livestock sector which was an impediment of its rate of growth. It is also related to the relatively small change of the livestock population. Thus, in view of the fact that the stock-farmers with 1 - 2 cattle for instance, consider the caring of animals as a complementary job, they do not expand their stock, a fact which would be against other business, to which wrongly or rightly they have been attached.

Looking at the distribution of livestock holdings by size, in terms of number of cattle per holding, gives additional information on the meat production conditions and problems; as can be seen from Table VII.2 there seems to be a strong concentration of the size of livestock holdings in the range of 2 - 4 cattle in the sense that this range has between 48 and 68 percent of holdings (58 percent for country as a whole) and between 43 and 65 percent of cattle (54 percent average for the country).[3] There are, in addition, 27 percent of holdings and 9 percent of cattle in holding with one cattle in the country and 13 percent and 26 percent correspondingly in the size 5 - 9 cattle and 2 percent and 10 percent correspondingly of over 10 cattle holdings. These numbers give evidence of a relatively small degree of specialisation in cattle enterprises, dairy holdings or calf/

3. There is one noticeable exception with Greater Athens area with 24 percent of holding and 6 percent of cattle in the range of 2 - 4 cattle per holding due to a number of dairy industries there.

TABLE VII.2

CUMULATIVE DISTRIBUTION OF LIVESTOCK HOLDINGS AND NUMBER OF CATTLE PER HOLDING BY REGION IN 1961

Animals Per Holding	Up to	GREATER ATHENS Holdings	GREATER ATHENS No. of Cattle	OTHER CENTRAL GREECE H	OTHER CENTRAL GREECE N	PELOPONNESOS H	PELOPONNESOS N	THESSALY H	THESSALY N	MACEDONIA H	MACEDONIA N	THRACE H	THRACE N
- 1	1	16.0	1.4	39.5	14.2	41.0	17.6	25.9	8.8	19.9	6.2	11.9	3.6
2 - 4	4	40.0	7.2	88.0	57.6	91.0	71.0	85.0	62.1	81.4	58.9	79.7	61.4
5 - 9	9	59.0	17.8	95.8	75.9	98.4	90.3	97.7	87.7	98.7	89.4	98.9	95.4
10 - 19	19	79.8	41.9	98.8	89.7	99.8	97.2	99.6	95.5	99.6	96.8	99.9	98.8
20‡		100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Animals Per Holding	Up to	EPIRUS Holdings	EPIRUS No. of Cattle	Ionian Islands H	Ionian Islands N	AEGEAN ISLANDS H	AEGEAN ISLANDS N	CRETE H	CRETE N	GREECE AVERAGE H	GREECE AVERAGE N
- 1	1	42.2	19.7	56.2	30.9	30.0	12.0	50.2	28.8	27.2	9.4
2 - 4	4	94.5	79.5	96.0	82.7	90.8	76.0	98.3	93.6	85.4	63.2
5 - 9	9	99.1	92.2	99.3	93.4	99.2	95.7	99.8	98.6	98.0	89.2
10 - 19	19	99.8	96.4	99.9	97.5	99.9	99.0	100.0	99.8	99.6	96.1
20‡		100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Where, H = number of livestock holdings
N = number of cattle per holding

Source: National Statistical Service of Greece, Statistical Yearbook 1969, Table VIII,10, p.160.

Calf-fattening holdings.

There seems to be, however, exceptionally high percentages particularly of number of cattle for holding size of 5 - 9 cattle. These percentages exceed the country average of 26 percent in the case of Macedonia (30 percent) and Thrace (34 percent) while Thessaly, the third relatively plain region, has closely the country average. On the contrary, Thessaly exceeds somewhat the country average (11 percent of cattle) by 1 percent in the case of holdings with over 10 cattle per holding, along with Greater Athens area with an astonishingly high percentage of cattle (82 percent) and rest Central Greece, around Athens with 25 percent of cattle.

Greater Athens and rest Central Greece have of course less than 9 percent of cattle of the country and mainly dairy cows. The same happens to a certain extent in Thessaly with dairy industries nearby the two milk consumption centres of provincial Towns of Volos and Larissa. These two regions and secondarily Macedonia, Thrace and Peloponnesos have begun since the mid-sixties a gradual - though at a relatively low rate - establishment of new holdings dealing exclusively with calf fattening. The Ministry of Agriculture of Greece has the opinion that only in exceptional cases this development has reached the stage of creation of poles with expansion tendencies[4]. As we have seen already dairy companies nearby milk consumption centres sell their baby calves relatively young for fattening to the extent new units are established for fattening.

The conclusion is that the expansion of meat production in Greece in recent years is not attributed to any significant extent to establishment of new units for fattening and corresponding specialisation in the field of cattle. It does not seem moreover this expansion to be highly attributed to creation of relatively rapid expansion of large cattle units. The latter conclusion is derived on the basis of a comparison of the average size of cattle holdings by regions between 1961 and 1950[5]. In regions which, as we have already seen, have relatively high proportion of large holdings, i.e. Thessaly, Macedonia and Greater Athens, the change in the average size of holding has not risen between 1950 and 1961 at faster rate than the country's average, as is shown in Table VII.3 In fact, the average size in the first two regions has risen at closely the same rate with the country average, while the average size in Greater Athens was held virtually constant.

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4. See Ministry of Agriculture "Summary Report on the Production and Consumption of Cattle Meat in Greece", Athens, 1968.

5. Data on the distribution of holdings and cattle by size of holding are not available for the year 1950.

TABLE VII.3

AVERAGE SIZE OF CATTLE HOLDINGS BY REGION

Region	Number of Cattle per Holding 1950	1961
GREECE	2.5	2.9
GREATER ATHENS	10.0	9.9
REST CENTRAL GREECE	2.8	2.8
PELOPONNESOS	1.9	2.3
IONIAN ISLANDS	1.7	1.8
EPIRUS	2.3	2.1
THESSALY	2.7	3.0
MACEDONIA	2.9	3.2
THRACE	2.9	3.3
AEGEAN ISLANDS	1.9	2.5
CRETE	1.6	1.8

Sources: National Statistical Service of Greece, 1961, 1969.

The conclusion seems to be that neither establishment of specialised meat units nor of new big mixed dairy-meat units attributed a particularly high part to the expansion of the production of cattle meat between 1950 and 1961, although how much is difficult to estimate. It is therefore now understood better how this production rise took place while population was held relatively stable, namely to a great extent through increase in the average weight of cattle as we shall see later on. Old stock farmers with small number of cattle, considered them as complementary business throughout their lives, have found it more convenient and cheaper to fatten more of their cattle which were largely underfed so far by the gradual increase in the yield of feeds per acre. It does not seem on the other hand that there has been anything to attract them strongly (e.g. sharp meat price increases, or fall in prices and improvement in the convenience of purchase fodder) so that change the role they attribute to livestock in their total business.

3. Land Tenure System

The question now is whether the land tenure system in Greece constituted one of the major constraints of expansion of meat production so far or is it going to be so in the future. Land ownership belongs in Greece after the Land Reform of 1911 to the farmers as a rule. This was associated with reduction of average size of holdings and increase in the number of plots each farmer got due to the spirit of equity, which imposed each farmer to take from all qualities of land. Various other reasons apart from the diversity of the physical environment and the land distribution criteria have contributed to further fragmentation of land since that time, as inheritance laws and dowryhabit. Some other factors, like increasing rural population and investment in rural land tend to lose weight in recent years, in view of an accelerated urbanisation and turning of the investment emphasis to urban estate[6].

The Land Reform had not only a bad aspect namely the fragmentation of land beyond probably what was economically justified, but also a good aspect as a factor contributing to progress in the agricultural sector and the livestock sector, particularly by disposing of the land to its user farmer. The fragmentation and the observed small size of livestock holdings reduce the importance of renting land for grazing or for fodder cultivation in Greece. Larger holdings have also larger size of pastures (See Table VII.1) while there the animals are mainly stall-fed and therefore do not need proportional increase in land use (even if allowance is not made for possible economies of scale).

Nowadays the land, as a rule, belongs to individual farmers as their property. As is shown in Table VII.4, the 89 percent of the total number of livestock holdings include pastures, owned and used as a rule by the farmer's family themselves. This percentage (column 8)(TableVII.4) ranges between 65.6 percent in Thrace to 98.2 percent in Crete. Macedonia and Thessaly/and Thrace have lower percentages of holdings with pastures than average(Column 8) and a higherr percentage of holdings with animals (column 7). It seems to indicate that particularly the relatively plain regions of Greece have still wide possibilities for meat expansion by substitution for food crops without increase in marginal cost of meat production.

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6. See for an extensive discussion of the factors of farm fragmentation and proposals for land consolidation in Greece in K. Thompson "Farm Fragmentation in Greece", Center of Planning and Economic Research, Research Monograph, Series No.3., Athens, 1963.

TABLE VII.4

DISTRIBUTION OF NUMBER OF HOLDINGS BY REGION (1961)

REGIONS	Number of Holdings With Animals only (No Agricultural Land)		Number of Holdings With Pastures		Total Number of Holdings		Total Holdings = 100 (1) : (5)	(3) : (5)
	(1)	% (2)	(3)	% (4)	(5)	% (6)	(7)	% (8)
STEREA HELLAS AND EUBOEA	3,697	23.1	16,718	12.9	20,415	14.0	18.1	81.9
PELOPONNESOS	1,126	7.0	24,043	18.6	25,169	17.3	4.5	95.5
IONIAN ISLANDS	182	1.1	7,906	6.1	8,088	5.6	2.3	97.7
EPIRUS	1,105	6.9	15,374	11.9	16,479	11.3	6.7	93.3
THESSALY	3,024	18.9	9,094	7.0	12,118	8.3	25.0	75.0
MACEDONIA	4,139	25.9	8,628	6.6	12,767	8.8	32.4	67.6
THRACE	1,293	8.1	2,466	1.9	3,759	2.6	34.4	65.6
AEGEAN ISLANDS	963	6.0	19,656	15.2	20,619	14.2	4.7	95.3
CRETE	480	3.0	25,667	19.8	26,148	17.9	1.8	98.2
WHOLE COUNTRY	16,009	100.0	129,552	100.0	145,561	100.0	11.0	89.0

Source: Statistical Yearbook of Greece, 1967, Athens 1968, Table VIII.1. pp.146-7. (National Statistical Service of Greece).

In absolute terms, Macedonia has 4,139 holdings with animals only (25.9 percent of the total), followed by Sterea Hellas and Euboea (3,697 holdings or 23.1 percent) and by Thessaly (3,024 holdings or 18.9 percent). Macedonia on the other hand, is sixth in absolute number of holdings with pastures (8,628 holding with pastures or 6.6 percent of the total). The leading region in the number of holdings with pastures is Crete (25,667 holdings or 19.8 percent), followed by Peloponnesos (24,043 holdings or 18.6 percent) and by Sterea Hellas and Euboea (16,718 holdings or 12.9 percent).

The distinction of holdings between those with animals only and those with pastures does not mean that the families, which own pastures do not also rent pastures. In other words, the fact that 11 percent of holdings have only animals (column 7) does not imply that stock farmers who own pastures do not rent in part from other farmers who specialise in other crops or from migrants to town or abroad. The higher shares of holdings with animals only to the total in Thrace, Macedonia and Thessaly may be partly an indication that the livestock sector in these regions is maintained on a more commercial basis, given that the tenants try to maximise their net profits after deduction of rents and maybe wages, interest rate charges and depreciation allowances.

The pasture tenancy agreement is in Greece either written or verbal and may include provisions about such matters as rights of cropping, liability for repairs and maintenance in compensation for tenant's improvements. The pasture are let under a cash rental system. The prevailing form of tenancy in Greece runs from year to year[7]. Complementarily the agreement provides frequently that a definite amount of dairy products, notably cheese, or a number of lambs, at Christmas or Easter time, will be given to the land-owner for family consumption.

Apart from the relatively small proportion of stock farmers who rent land for grazing, /that rented for producing fodder seems even lower. The increased urbanisation in recent years has resulted in letting land to the stock farmers' families remaining in the village in terms which involve often emotional elements rather than are based on purely business criteria. Secondly, migrants prefer their own land to be used during their absence. Another reason for relatively low rents is that the land-owners who have been established and work now in the towns/

7. In Scotland, leases for terms of 10 to 14 years are more common, Agriculture in Britain, London, H.M.S.O., 1967, pp.31-32.

towns or abroad have smaller marginal utility from this rental income, in view of the possibly relatively high income earned from their job.

This system of cash payment of rent has a risk increasing effect because the rent must be paid even if yields of meat and/or feeds and their prices are low. This risk could be reduced, if not altogether eliminated, by providing for a flexible cash rent[8]. The first step would be for tenant and landlord to agree upon a base rent. This base rental rate could be raised or lowered each year depending on weather conditions and yields and on prices of inputs used and prices of output. The advantage of a flexible cash rent is that initiative is not hampered, since the farmer receives all the return. Risk is reduced enabling the tenant to proceed with production plans involving risky products which yield the greatest long-run income.

Another kind of rental system is the crop-share when the land is let for fodder cultivation. In this case, rent is paid as some proportion of the production of land. Since rent is a share of production risk of poor crops or low prices, it is shared by tenant and landlord. The share-cropping system of rent brings about greater profit for the farm and individual if the landlord and tenant share as many costs as is feasible (i.e. seed, fertilizer).

The share crop system is particularly intense in some other underdeveloped countries of the world (Philippines, India, Pakistan, etc.), where usually the tenant bears all the costs of land improvements, although he must share equally with the landlord any resulting increase in output. While this system has been amply justified on grounds of equity, the stimulus to productivity would be greater if adjustment were confined to the marginal ratio. It is very likely that any appreciable improvement in crop sharing ratios-average or marginal - will have a significant influence on agricultural incentives, investment and productivity.[9]

Although quantitative evidence is not available in this field, there is information that some rather small increase in the average level of rent of land in Greece has been realised in the last decade. Higher increase of rent has appeared/

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8. C.E. Bishop and W.D.Toussaint, "Introduction to Agricultural Economic Analysis", N.Y., John Wiley and Sons, Inc. 1958, pp.155-160.

9. C. Wolf, Jr. "Institutions and Economic Development", B. Okun and R.W. Richardson, Studies in Economic Development, N.Y., 1962, pp.353-55.

appeared in the main areas, where the land is more grass producing and the breedi of animals relatively easier. On the contrary, the stock-farmers of bare mountainous areas have to rent pastures on neighbouring level areas for the winter, to avoid losses of livestock from the snow and the lack of grass. Thes winter quarters are sometimes far from their permanent residence, with the resul that the stock farmers change residence whether accompanied or not by their families. The costs of feeding during the winter (three to four months) are higher because the purchase of fodders is expensive and not easily available, given the still poor transportation services there and because the animals during the winter are fed partly in stalls and partly outdoors.

Also, the renting of scattered pasture plots of relatively small size because of land fragmentation adds to inadequate management of rough grazing.

4. Labour Hiring

The observation from the Input-Output Table is that labour contributes 16.5 percent to the Gross Value of the livestock production. This is associated with the stock farm technology in livestock production and the relatively low degree of mechanization of this sector.

There is, of course, qualitative information about a gradual fall in the labour content of livestock output, which has likely intensified in the sixties. Till then farm wage rate seemed to be held persistently stable and began rising dramatically during this decade, while the cost of capital is held constant, if not decreasing. However, the relative direct effect of these changes was not as much as might be expected in view of the fact that relatively low amount of labour is hired in Greece from outside the family keeping livestock.

The fact that labour is only exceptionally hired seems consistent with the small average number of persons per agricultural holding which is 1.7 on average for the whole country (see Table VII.1). On the other hand, according to the 1961 Agricultural Census, of the 1955 thousands active population in the agricultural sector as a whole, the livestock sector has mainly engaged only 161.2 thousands (159.9 thousand for main livestock works and 1.3 thousand offering skilled labour, i.e. agriculturalists, vets, etc.) or 8.2 percent of the total agricultural active population. The fact that the livestock sector contributes over three times as much proportion to agricultural output (See Table VI.1) does not necessarily indicate relative high productivity of labour in the livestock sector since we do not know the number of those who engaged part time in livestock and the time they spend for it.

Briefly speaking, labour is usually hired on a wage basis, mainly in the case of stall-fed livestock. In the case of in flock not-nomadic sheep and goats livestock, the herder mostly co-operates with the owner of the stock, sharing a definite percentage of total output. This is fixed on the basis of annual or two years contract with the stock farmer, who also provides the land (his own or rental). In some cases, the herder may come from a distant village and gets also residency, food and possibly fixed monthly wage, which, of course, reduce correspondingly his share of the output.

The practice of share-cropping tends to disappear in recent years in view of the/

the migration of labour from rural areas. The increase in the wage levels resulting from this sort of population movement raises the claims of herders f higher percentage share[10]. However, this does not seem to consist of a main impediment of meat expansion in the near future, except if the migration rises abruptly. It has not been one of the main constraints to expansion of meat production so far.

Migration increases ceteris paribus the need of labour hiring, in so far as family members who helped before the livestock management may be among the migrants. This does not necessarily happen in cases where the remainders of the family were previously underemployed. However, it is more probable that further increase in the size of livestock holdings under these conditions to rely relatively more than in the past on hired labour. How much more depends on the substitution of 'capital' for 'labour' in view of the possible further increase in the wage level if migration continues for long to exceed the rate of growth of active population in rural areas.

10. Data on wage level in agricultural sector does not exist in Greece and this conclusion is based on information of the Ministry of Agriculture and the Agricultural Bank of Greece.

CHAPTER VIII

GOVERNMENT INTERVENTION

The government intervention seems that has contributed to the realised increase in meat production and the way it took place as well as to the fact that its expansion was not in pace with the rise in final demand for meat. The variety of policy measures which exert direct or indirect influence on meat production in different ways and directions seem to justify devotion of a separate chapter in this study. In fact, full examination of the effect of government intervention in the sector of meat production might require a separate study itself, rather than a single chapter. Since this chapter cannot go as far as that it can be challenged from various points of view, though it seems useful for the purpose of this study to look forward to the problems of expansion of the meat production in Greece.

The forms that government actions have taken in the livestock sector are briefly discussed in the following with particular reference to the measures aimed at the promotion of meat production. Later on, we shall refer to the case for certain modifications of these policy measures as well as certain other measures probably required according to the results of this study. The measures introduced are often of too recent date for their results to be fully felt as yet. However, there seems to be some possibility for the assessment of particular measures.

Those measures are briefly summed up as follows:

(1) Aid in order to reduce the cost of the factors of production (low interest loans or subsidies)
(2) Support measures for producer prices.
(3) Various technical measures (health control, techninal advice, etc.)
(4) Credit to Stock-Farming.
(5) Plan's projections and future intervention.

1. Aid towards the cost of factors of production

Stock farmers have been granted since 1964 a subsidy to purchase bulls of improved breeds for natural fertilisation in mountainous areas where artificial insemination is not yet available[1] This subsidy corresponds to 50 percent of the value of a bull to a maximum of 3,000 Drachmas. An additional subsidy of 2,000 Drachmasa year is allotted for their maintenance. The government has subsidised since 1964 30 percent of the expenditure for purchase of the domestic improved cattle for breeding up to 2,000 Drachmaseach, which has been increased to 2,500 Drachmassince 1965. The amount of this subsidy increased to 40 percent of the expenditure for improved foreign cattle with a maximum of 5,600 Drachmaseach. This amount has increased to 7,000 Drachmasper head since 1965.

A corresponding subsidy for buying improved domestic sheep, goats and pigs represents 30 percent of the expenditure for the purchase of an animal with a maximum 200Drachmas each. This amount has increased to 300Drachmas per head since 1965.

The local producers of improved animals take frequent advantage of a part of the subsidy supplying the animals in higher prices. This seems to be in part the result of a still limited development of the local markets for supplying improved animals, which makes easier wide margins of profits. However, these profits may induce the producers to expand their production. The government has also subsidised since 1964 50 percent of the cost of purchase of animal drugs by stock farmers[2].

The government has taken steps since 1963 to prevent the slaughter of young calves; young cattle of over 250 kgs. liveweight attract a subsidy of 2 Drachmas per/

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1. See O.E.C.D., 1969, op.cit. p.35.

2. Center of Planning and Economic Research, "Agricultural Subsidies", op.cit., Ch.IV, Appendix I.

per kg.[3] This subsidy was amended (Pl 139/26-3-69) into payment of 1.50 drs. per kg. paid to the producer for cattle marketed which weigh between 300-400 kg. of liveweight. Moreover, a subsidy of 1.50 drs./kg. paid to producers for pigs marketed which weigh 90-100 kg. of liveweight.[4]

The Greek government, aiming at the expansion of fodder production has inaugurated since 1960 a subsidy of 50 Drachmas per additional stremma devoted to animal feeds. It was amended in 1961-62 to a payment of 25 Drachmas per stremma on total acreage devoted to such crops. The latter form of subsidy seems to have contributed to acreage expansion of fodder production, as was discussed in detail in the section of fodder production (Chapter VI., 2). Specifically the government has subsidised since 1965 by 100 drs./stremma devoted to clover, and by 140 drs. per additional stremma of irrigated or dry land used for alfalfa. This is probably associated with the rapid expansion of production of alfalfa observed already (Table VI.3) Moreover, since 1960 the government has subsidised the cost of purchase of selected seeds of different fodder varieties by certain amounts per kg.[5].

In June 1969, an additional subsidy was granted to promote the achievements of the targets of the Plan 1968-72 (on which there is more later on). This subsidy was mainly a fixed amount of Drachmas per animal up to a certain number of animals per holding and are given on the condition that improvement of stables will take place.[6] This subsidy which comes along with the already mentioned one of 30 percent of the borrowed capital for purchase of improved animals and investment in stables, includes:

- Subsidy of up to 1,000 drs. per head of cattle for model herds of 5 to 20 head for building cowsheds and purchasing equipment or concentrates[7].
- Subsidy/

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3. In Spain, to encourage the production of better quality animals a bonus of 3 pesetas per kg. of carcass is granted to farmers delivering to the slaughterhouse animals of a specified quality, giving a high meat yield. A bonus of 6 pesetas per kg. is paid to young animals with a carcass weight of over 210 kg. In Portugal, grants are provided for early weaning of calves of dairy breeds avoiding their slaughter at a very tender age. Other subsidies are granted to encourage the producers to keep heifers until first calving. See O.E.C.D., op.cit., Paris 1969, pp.33-37.
4. "Economikos Tahydromos", 5th June, 1969.
5. Center of Planning and Economic Research "Agricultural Subsidies", op.cit., Ch.IV.
6. "Economikos Tahydromos", 5th June, 1969.
7. In Spain, the "Concerted Action" scheme has been introduced aiming at building up larger and more up to date stock-farming. The farms must have at least 30 heads of cattle under 20 months only. These units are mainly set up by farmers co-operatives. The farmers must undertake to use up to date techniques and above all must observe the bar on the sale of livestock of less than 350 kg.liveweight.

- Subsidy of 10,000 Drachmas for model herd of 100 and over in flock sheep. This subsidy is mainly granted for improving the holdings. Moreover, for expansion of stabled-fed sheep-goats a subsidy of 3,000 Drachmas is paid to farmers for model herd of 20 sheep or goats. In particular, a subsidy of 50 percent of the cost of each selected sheep or goat is paid to stock farmers up to 500 Drachmas each, and up to 10 sheep or goats.

- Subsidy of up to 1,000 Drachmas per head of pigs is granted for model herd of about 20 pigs.

2. Support measures for producer prices

The government has applied in 1965 a programme of intervention in the market to smooth out the seasonal fluctuations in meat prices through minimum support prices.[8] These minimum support prices were fixed as follows:[9]

Veal	31 drs. per kg.
Lamb	30 drs. "
Pork	29 drs. "
Poultry	27 drs. "

First of all, these support prices are not reasonable nowadays in view of the fact that the wholesale prices are fixed at much higher level than minimum support prices. In the long-run the prices of meat tend to have an upward trend because of the persistently increased demand in Greece and in the international markets as well. This increase is expected to be continued because of the additional reason of development of backward economies.

The support prices of meat may not be absolutely necessary, in the sense that in the short-run, the production of meat does not present relatively high seasonal fluctuations causing sharp falls in prices. They may be necessary in a case when in a certain year the domestic supply has been substantially increased, given the increase in demand. In that case, the minimum support prices need to smooth out the temporary price fluctuations.

There are also difficulties in the application of a support prices programme by/

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8. In Spain, the CAT (the Supply and Transport Commissariat) buys meat when the average prices in the Madrid, Barcelona, Sevilla and Valencia slaughterhouses fall 5 percent below the guide price. It releases chilled and frozen meat on the market when the prices in these towns rise more than 10 percent above the guide price and stops selling when these prices fall under a level 5 percent above the guide price.

   In Portugal, a minimum price per kilo of carcass weight guaranteed to producers. This allows the exact meat yield of each animal to be recorded. To secure a uniform price the farmers register their livestock with the National Livestock Products Board which purchases all the animals offered for sale.

   In Yugoslavia, guaranteed prices are fixed by the State up to 15 percent below the market price. If the market price falls below this level, the State undertakes to buy all the supplies offered at the guaranteed price. This, of course, applies only to the proportion of output sold under contract. See in O.E.C.D. op.cit., Paris 1969, pp.33-37.

9. The fixed support prices for other livestock products except for meat are: for cow milk 2.7 drs. per kg, sheep milk 4.2 drs. per kg, eggs .85 drs. each, Center of Planning and Economic Research, "Agricultural Subsidies", op.cit., Ch.IV.

by direct government intervention in the market (cold storage). An alternative method of application of support prices could be for the government to pay to stock-farmers the difference of price paid to them by the merchants from the support price. This would have a bad result in the sense that the intermediate agents would take advantage by asking for lower prices and it would constitute an additional financial burden on the budget.

The government since 1963 has subsidised by .40 drs/kg. of cow milk delivered into dairies (controlled by the Agricultural Bank of Greece or by the Government) in order that the price paid to farmers per kg. cow milk can be 2.20 drs. per kg. This subsidy changed in the next year to .60 drs. per kg. so that the price paid to farmers to be 2.50 drs. per kg.[10]

By PL 139/26-3-69 the government to support the newly established dairies, decided to subsidize by .70 drs. per kg. cow milk delivered in dairies operating for the first three years period so that the price paid to the producer may reach 2.90 per kg. of cow milk.[11]

Against this price support policy, the Greek government has left since 1953 imports of meat without any quantitative restriction apart from the noticed already basic import duties 15 percent on live animals and 25 percent on imported frozen meat. In practice, these duties change according to circumstances/holding relatively stable the domestic meat prices and protecting the consumer. By this changeable duty rate the stock farmer is not fully benefitted by changes in the world prices of meat which would be otherwise transformed to domestic prices[12]. By this flexible policy the price paid to farmer for beef and veal for instance is estimated to be in Greece below half of farm prices prevailing in the countries of the European Economic Community.

The/

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10. Center of Planning and Economic Research, "Agricultural Subsidies", op.cit., Ch.IV, Appendix I.

11. Moreover, the government subsidises by .10 drs. per kilo cow milk delivered in dairies for pasteurisation and by 1.80 drs. per kg. of cow milk used for production of evaporated milk, See "Economikos Tahydromos", No.781, 10th April 1969, p.19.

12. In Portugal, the government regulates imports according to the internal market prices. From the quality aspect, the General Directorate for Stock-farming can bar imports of animals belonging to breeds which are not considered to further the country's policy of herd improvement, O.E.C.D., op.cit., Paris, 1969, pp.33-34.

The conclusion seems to be that the government policy may have been a restraining factor of domestic production of meat through expansion of the sector. On the other hand, the hope of the Greek stock farmers to get benefit from the process of gradual reduction of import tariffs for commodites of E.E.C. origin is frustrated. This is due to the "freezing" by the E.E.C. three years ago, of the integration process, whereby Greece would become a full member of the Community by 1984. This "freezing" resulted in holding up negotiations on harmonisation of agricultural policies.

3. Measures of Technical Nature

Measures of technical nature refer to animal breeds, health of animals and advisory work.

The Health Service belongs to the Ministry of Agriculture and has one of its tasks to check the health conditions of imported livestock and meat in ports and at borders. Vet Services are operated in Prefectures and exceptionally in Communes which deal with common animal diseases. They offer services at farmers request with a relatively small charge. However, the losses through sterility and various diseases are still about 18 percent of the herd in Greece, which is not comparable with other countries of Europe.[13] This is in general due to unsatisfactory housing conditions and possible underfeeding of animals. However, there seem to be indications that investment in stalls to improve housing conditions was increased at relatively high rates in recent years (see next section) and that the average weight has also undergone rapid increase so that reduced difficulties from underfeeding. The conclusion is that the Vet. Service does not work systematically throughout the country so that limits further the losses through diseases.

Artificial insemination as a means to improve animal breeds has on the contrary widely applied in Greece particularly in cattle since 1945 when it was introduced. Thus, about 60 percent of cow population is today fertilized, through artificial insemination.

Its success seems to be due to two factors, in the main: first the size of the insemination centres and the efficient way they are run; as there are only two centres for the whole country, full use can be made of the artificial insemination specialists and the maximum number of cows can be inseminated by each bull. Second, the fact that the inseminators, although specialised are not veterinaries; the latter are few and far between and would cost much more[14].

The Ministry of Agriculture, through the two artificial insemination centres one in Athens and the other in Salonica, provides the local services throughout/

13. O.E.C.D. (1969), p.28
14. O.E.C.D. (1969) pp.24-25.

throughout the country. The centre at Athens (Botanicos), established in 1945, serves 36 prefectures of the country and has 23 selected bulls. It had realised 842 inseminations in 1945 and 101,266 cows had been inseminated in 1966. The other centre at Salonica which was established in 1946 has 52 selected bulls and serves all the Northern Greece (Macedonia-Thrace). In 1946, 1307 cows had been inseminated and in 1966, 199,871 cows. The higher number of artificial inseminations at this centre than at Athens is due to the higher number of livestock population in North Greece and to the easier communication of this centre with the surrounding areas.

More specifically, the Ministry of Agriculture has appointed inseminators to 55 prefectures of the country. The local service invites at a definite date and time the stock farmers of the surrounding villages to one village having relatively better communication with the others. The response of farmers is high, even of farmers who have only one or two cows.

The economic benefits from artificial insemination are many. Besides the increase in the weight of cattle and milk production (one unimproved cow produces 500 kg. per year, while one improved 1,160 kgs. and one foreign about 2,960 kgs. per year), another benefit is that it has reduced the cost of importing 4,000 selected bulls which would be needed for the 300,000 cows in 1966, while now only 75 bulls of two Centres were used for these cows.

By artificial insemination the sterility of cows has been reduced from 20 percent to 10 percent. Moreover, the infection of cows is avoided today because the "sperm" of selected bulls is carefully examined by Vet. Services before using. This, of course, diminishes largely the cases of infection, which arise mainly from natural fertilisation (i.e. a bull crossed with a sick cow, afterwards infects a healthy cow crossed with her and so on).

There is furthermore government assistance for purchase of improved animals to replace unimproved ones. Until 1964, the problem of selection and acquisition of improved breeds had remained exclusively to be faced by the initiative and means of the stock farmer. Since then, for the purpose of facilitating the substitution of local unimproved animals by selected ones, the Agricultural Bank of Greece has undertaken this task.

The Agricultural Bank of Greece apart from the mentioned subsidies for purchase of improved animals imports itself, in addition to the individual importers/

importers, improved animals from abroad and sells them to the stock farmers on favourable terms. The Bank does not substitute the trade sector, but carries out this business on a non-regular basis and on no-profit criteria to help introduce improved animals. Their disposal is made through the noticed subsidy scheme which applies independently of whether the seller of the animal is the Bank or another trader.

Typical breeds in beef cattle in Greece are "Shorthorn" and "Steppekos". The unimproved domestic cattle of "Shorthorn" is scattered in the mountainous areas of North Greece, Central Greece, Peloponnesos and Islands. It is a small-bodied animal and weighs normally about 180-200 kgs. The annual milk production of each cow of this breed is about 500 kgs. and can reach 1,000 kgs. in certain plain areas A variation of the "Shorthorn" breed is found in the Island of Tenos and other Aegean Islands. It has a fair colour is larger in size than the typical "Shorthorn" breed, produces more than 800-1,000 kgs. milk and its meat production is moderate.

Another breed called "Steppekos" is spread in the plain areas of Macedonia, Thrace and Thessaly. It has a larger size than the "Shorthorn" breed and weighs about 300 kgs. each. The milk and meat production of this breed is also small.

These predominant breeds of cattle are improved by crossing with the "Brown Swiss" breed and fewer with the "Black multicoloured" and "Jersey" breeds.[15] The crossing takes place naturally or by artificial insemination.

Advisory work also applies to promote development of stock farming, though its success seems hardly exceeding that of Health Service. This seems to be a more general phenomenon in Mediterranean countries and is attributed to the relatively low level of technical knowledge of the farmers, to their number which is too high in proportion to population - and so requires a very high number of advisers - and to farms which are very small so that the advisers' output is small.[16] The advisory work is carried out within the Service of Agricultural Applications. This means that specialised advisers in livestock are only exceptional and there is not special organised programme of advice on livestock matters.

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15. In limited number Hereford and Aberdeen Angus breeds have been introduced, but they are still in experimental stage.

16. See O.E.C.D. (1969) p,28

4. Credit to Stock-Farming

The low income level of the stock farmers seems to leave limited saving potentials for self-financing quantitative expansion of their livestock, other fixed capital and working capital for current production. There is only one main source of outside capital to the Greek farmer, a government sponsored monopolistic financial institution, the Agricultural Bank of Greece, established in 1929. This is not a profit oriented institution, so that the interest charges are fixed by the Currency Committee on relatively low levels. However, the terms of credit and the collaterals of the loans, insurance changes, etc., are fixed by the Bank on the basis of criteria often critisized by farmers. These terms have contributed to increase in the farmers' stock of debt to the Bank, which was eventually abolished in 1968.

The medium and long-term livestock loans are mostly given for over a year term and are granted for the following reasons: purchase of improved animals; construction of farm buildings, stables, etc; irrigation works and other improvements of land (Table VIII.1) The total of medium and long-term loans to agricultural sector was by the end of 1968 almost seven times as much as they were granted in 1956. The absolute increase was higher for credits granted for construction or improvements of stables, although it includes also loans for construction of stores and other buildings in the agricultural sector.

The credit of the Agricultural Bank of Greece for all the above purposes has been accelerated since 1956 after the Central Bank's financing of the Agricultural Bank and the relaxation of the terms of loaning of the latter to the stock-farmers.

The rate of increase of loans for purchase of improved animals and for construction and modernisation of stables has considerably increased since 1960 after subsidising the 30 percent of the expenditure for construction of stables and of the expenditure for improved animals. Although, the amount of credit does not give direct evidence on the amount of stables construction, it is believed that this is somewhat higher than the credit, given that some of the members of the stock farmer's family can participate in the stables construction.[17] Stables construction loans have not been granted for any/

17. A part of the loans is paid, of course, for wages of the members of the family, which have the additional advantage of employment, since the amount of the loan is fixed on the basis of the total expenditure, independently by whom it was carried out. This factor does not seem to affect widely the inducement of construction or modernisation of the stables, in the sense that the unemployment rate beyond the seasonal one was reduced in recent years.

TABLE VIII.1

MEDIUM AND LONG-TERM LOANS TO AGRICULTURAL SECTOR(1)

YEAR	Farm Buildings, stables and Other Equipment	Improved Animals	Irrigation Works and other Improvement of Land	Total Medium and Long-Term Credit
1956	91	106	184	1,048
1957	149	153	323	1,376
1958	251	220	528	1,903
1959	481	348	668	2,628
1960	710	498	800	3,269
1961	886	628	814	3,884
1962	950	623	923	3,999
1963	1,112	599	980	4,282
1964	1,467	524	1,018	5,021
1965	1,896	599	1,033	4,703
1966	2,086	665	1,076	5,030
1967	2,623	651	1,176	6,028
1968	2,980	609	1,294	6,989

(1) In Million current Drachmas.

Source: Bank of Greece, The Greek Economy, 1959, 1960, 1965 and 1968.

any particular model of stable. This may be related to the observed relatively high percentage improper stables and of those constructed with relatively high costs.[18]

On the contrary, the increased credit-with-subsidy for expenditure on improved animals seems to have been relatively more effective since 1960, as can be seen from the rate of change in the quality structure of animals, especially cattle (Table X.7)

The loans granted for improvement of land and irrigation works refer to the agricultural sector as a whole and only a part of them is given for improvement of land devoted to fodders. This type of loaning has also increased since 1960.

There does not seem to exist any sizeable credit for purchase of small-scale machinery for stock farming. The Agricultural Bank attributes this situation to lack of demand for these types of equipment because these are labour saving devices not required so far by stock farmers because of the conditions of extensive underemployment and unemployment. However, it seems that the same conditions throughout the farm sector have not impeded the relatively rapid expansion of the use of tractors as indicated during the last two decades. In fact, if demand for complementary small-scale machinery was expanded, there could be some expansion of sales through credit in part, possibly by importers or retail traders. It seems, therefore, that the lack of use of this, possibly cost reducing, small-scale machinery so far, is in part due to the absence of consistent or effective education in this direction.

The Agricultural Bank of Greece, also grants short term loans for cultivation of fodders, which are mainly used for covering the current expenses of stock-farmers until the harvest and selling of their output. A part of these short-term loans for fodders are given in the form of seeds or fertilizers. All these short-term credits are granted on the basis of the cultivated area and at a rate of interest steadily held at 5 percent since 1964. In 1968 the limits of these loans per stremma have been increased and the Agricultural Bank of Greece (A.B.G.) was instructed to take also in the future into account the prospected yield apart from the cultivated area. The annual amount of this credit (new credit) was increased relatively fast. The relative numbers are shown/

18. Center of Planning and Economic Research, "Agricultural Subsidies", op.cit. p.69.

TABLE VIII.2

SHORT-TERM LOANS GRANTED BY A.B.G. FOR CULTIVATION OF FODDERS

NEW CREDITS (In Million Drachmas)

		Interest Rates			Interest Rates
1957	470	7	1963	575	6.5
1958	549	7	1964	628	5
1959	623	7	1965	730	5
1960	706	7	1966	760	5
1961	731	6.5	1967	883	5
1962	594	6.5	1968	1,109	5

Source: Bank of Greece, The Greek Economy Years 1959 until 1968.

shown in Table VIII.2 above.

The Plan 1968-72 provides for reorganisation of the Agricultural Bank of Greece and extension and improvement of agricultural credit.[19] This is an indirect recognition of failure of the A.B.G. to achieve a satisfactory distribution of its credit by purpose and use of it for finance fixed investment expenditure. There is not, however, available more direct information to assess the role of stall expansion in the realised rise in meat production in recent years through improvement of animal housing conditions. The relatively high rate of losses from diseases despite the improvement in artificial insemination and feeding of animals in recent years seems to indicate not a very high rate of improvement in housing conditions. The same conclusion seems also comparable with the relatively low rate of setting up new big holdings as we shall see later on.

19. Ministry of Co-ordination, Economic Development Plans for Greece 1968-72, Athens, 1968, pp.59-60.

5. Projections of Economic Development Plan for Greece 1968-72

This Section refers briefly to the projections of demand and supply of meat by the Economic Development Plan 1968-72, the policy measures intended to be taken and the specific projections for the production of particular meat species.

Most of the following information on 1968-72 Plans projections is not referred to the context of the Plan, but to a preparatory study carried out by the Center of Planning and Economic Research[20] upon which the projections were based. Our main attention is drawn to the forecasting assumptions of the Plan, and a minor reference is made to the methodology used.

The final demand for meat was forecast by the Plan through the use of a certain income elasticity of demand and the planned rate of income growth. The Plan seems to have tested only a semilogarithmic form of demand for meat function, which, as is known has decreasing income elasticity as income rises. Moreover, the elasticity used is based on the data for the period 1960-65 which might have been considered as a relatively small sampling period to measure the involved structural relationship. There is also no reference to any price variable used in the estimations, except as a deflator of income. Thus, forecasting the average annual rate of increase in the final demand for meat the Plan was virtually based on the assumption that the income elasticity of demand for meat will be within the period 1968-72, in the level of .9. This with an average 7.5 percent rate of rise in the per capita income and .6 percent population growth gave an average annual rate of final demand for meat 5 percent so that to reach 430 th. tons in 1972 compared with 356 th. tons in 1968.

The Plan 1968-72 has fixed the target so that the share of imports in total meat consumption will be 5 percent in 1972 as against 30 percent in 1966. This gives an average annual rate of increase in the domestic production of meat of 9.4 percent, so that the total domestic production reaches 400 thousand tons in 1972 as against 260 in 1968. Imports consequently are expected to fall to 30 thousand tons in 1972 as against 88 thousand tons in 1967.

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20. Center of Planning and Economic Research, "Possibilities of Rapid Increase in the Meat Production in Greece," Athens 1967.

It seems that the Plan had somewhat underestimated the future demand for meat (by use of relatively low size income elasticity of demand) and possibly overestimated somewhat the potential rate of expansion of domestic production.

Actually, the realisation of the first two years of application of the Plan 1968-69 was not so favourable. The average rate of meat production was about 4 percent compared with the corresponding 6 percent annual increase in the final demand, and imports are estimated at 90 thousand tons in 1969[21].

Moreover, the prospects of domestic meat supply up to 1972 were derived on the basis of the estimated demand requirements and the assumption that these requirements could be covered through the policy measures which, as we have seen in the previous section, have been introduced in the early sixties. In addition the Plan refers to the following actions for the achievement of the above production targets:[22]

(1) Import and distribution to farmers of a considerable number of animals of high quality breed, particularly calves, in order to improve the quality of the country's livestock population.

(2) Establishment and operation in all rural areas, particularly in those areas specialising in livestock breeding, of artificial insemination stations, units for qualitative control and implementation of animal stock improvement programmes.

(3) Expansion of production and improvement of marketing of livestock fodder in order to increase and regulate the supply to livestock breeding units at low cost.

(4) Establishment of organised livestock markets both for breeding animals and slaughter of animals.

(5) Establishment of slaughterhouses and dairies as well as the organisation of the marketing of meat and dairy products in the most important livestock breeding regions.

(6) Improvement of the veterinary services and better organisation of the livestock breeding research, training and extension services.

(7) /

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21. Although a part of the relatively low rates of increase in meat production is attributed to bad weather conditions (particularly affecting the small animals), the structural problems of development of the sector are not overlooked, Bank of Greece, The Greek Economy, 1968, Athens 1969.

22. Ministry of Co-ordination, Economic Development Plan for Greece, 1968-72, Athens 1968, pp.58, 61 and 62.

(7) Import of foreign investment capital and know-how for the establishment of large, modern, livestock breeding units.

(8) Alleviation of seasonal underemployment, by the planned rapid increase in livestock breeding, since labour requirements for breeding are evently distributed throughout the year.

According to the Plan, it would be less costly for the coverage of the deficit of domestic meat production in the period 1968-1972 to import meat instead of live animals which have on one hand high transportation costs and secondly require a great deal of fodders which cannot be produced domestically. In addition, the importation of live animals and especially 30,000 female calves yearly for five years and a great number of lamb-kidgoats is needed for the planned expansion of the livestock population.

It is, thus, expected that the foreign exchange for imports of meat will be reduced - apparently on the assumption of stable import prices - from 70.2 mill. $ in 1968 to 22.7 mill.$ in 1972.

The required expenditure (investments) for expansion of domestic production for the five year period 1968-72 accounts to 10. billion drs. (5 billion drs. for increasing of the livestock population, 3.5 bill. drs. for improving stables and for purchasing in different equipment, 1.5 billion drs. for increase in fodder inventories). 70 percent of the above amount is estimated to be invested in the cattle sector.

Specifically, the following measures are to be taken for the expansion of each kind of meat. Regarding cattle sector, the plan is based on the prospect of an increase of cattle population from 1,096 in 1968 to 1,600 thousand heads in 1972. The increase in beef (including veal) is going to be maintained not only by the imported yearly female calves but by an increase in the average weight of cattle from 120 kgs. in 1965 to 180 kgs. in 1972, and moreover by the increase in the share of slaughtered cattle to the total cattle population from 34 per cent in 1965 to 41 percent in 1972. In these projections of the Plan no attempt has been made for separate estimation of the future production of beef and veal or of any "choice" towards the promotion of differential expansion of any of them.

According to the Plan the increase in cattle production will come mainly from new/

new cattle holdings because of the structural deficiencies of the existing ones, although quality improvements through livestock and stables also are considered possible by the Center of Planning and Economic Research.

The "optimum" size of a new cattle holding is estimated to be 20 cattle and the expenditure for the required 20,000 cattle holdings for 1968-72 is estimated to cost 285 thousand drs. each (150 thousand drs. for the purchasing of cattle, 100 thousand drs. for stables and other equipment and 35 thousand drs. for purchasing of fodders). These new buildings are projected to be largely established in the plain areas of Macedonia, Thrace, and Thessaly where there are possibilities of expansion of fodders to irrigated land.

The pig population for breeding is considered capable of expansion from 62 th. heads in 1968 to 95 thousand heads in 1972. This is planned to be achieved by establishing new piggeries of 10 swine each. For the 1968-72 period, 3,300 such piggeries are required, each costing about 60,000 drs. They can be established in areas where there exist agricultural industries of processing fruits, vegetables for using their by-products and near the big centres for using the by-products of restaurants, hospitals, etc.

Poultry expansion is expected to come from the systematic modern aviaries near the consumption centres and not from the peasant poultry.

Sheep-goat breeding is expected to stress attention on improving the domestic sheep and goats in regions where vegetables and garden trees are cultivated for using their leaves as feed. The improvement in flock sheep and goats is going to take place mainly in the mountainous areas (Epirus, Western Macedonia, Thessaly Sterea Hellas) where the sheep-goat rearing adapts best. According to the Plan, for increasing the sheep-goat population, the importation and distribution to farmers of a number of 200,000 heads of high quality lambs and kid-goats per year for five years is necessary.

CHAPTER IX

GROWTH OF MEAT PRODUCTION BY KIND AND GEOGRAPHIC REGION

The question now arises in what specific way the various constraints affected the relative rates of expansion by kind of meat in different regions of the country. The relative rates of expansion of meat production and of livestock and the changes in their composition by kind of animal are going to be examined here. The particular development of total meat and each kind of meat are going to be associated with the aforementioned constraints in order to conclude about the possible relevance of each constraint on the realised changes.

The questions are not expected of course to be definitely answered through the qualitative analysis which will follow. Therefore, this Chapter does not aim to quantify the effect of each constraint and to make a complete study of assessment of them on regional level. The purpose here is to get some knowledge on the differential rates of expansion of various kinds of meat by region and on the main factors which have probably affected it.

Section 1 looks at the differential change in the livestock population by region and kind of animal given the relative small change in the total livestock population. More specifically, these changes are associated with the impediments of the meat production sector in order to get an idea which of them had relatively more influence, on the changes which took place.

Section 2 presents the main features of the realised rise in meat production by kind of meat and region. An attempt is made there to get a more complete idea on the phenomenon of the rise of the production of meat 3-4 times in the last two decades against increase in livestock population much less than 50 percent except for poultry.

1. Livestock Population by kind of Animal and Region

The relative stability of the livestock population measured in terms of heads is shown in Table IX.1. It is obvious that the increase in population during the period 1950-1967 has reached 34 percent in the case of cattle - while it was actually decreased in the case of pigs by 15 percent - compared with about three times increase in the domestic production of meat during the same period.

The stability of the livestock population in Greece was continued after increase by a relatively rapid rate till mid-fifties, in the effort to restore the pre-war size of holdings. Itwas then held relatively stable onwards as it has happened also in the pre-war period or at least the years 1934-1938 for which information is available (Table IX.1). Therefore, it seems to indicate that the constraints to a rapid expansion of the livestock population are of a rather permanent nature, which have not overcome by the government intervention in the last two decades.

Searching for these constraints we recall that the stability in the livestock population is connected with a relative low rate of established big new live-stock holdings and low rate of expansion of the existing ones. The latter have also relatively small number of animals per holding which are fed mainly on pastures in mountainous areas. Reliance on grass implies a series of problems and uncertainties, if one expands the size of holding at very high rate, say, from 2 to 3 or 4 cattle. A main problem seems to be the lack of fodder supply in the village in the case of unexpectedly bad weather.

Under these circumstances this problem might be reduced by improving trans-portation facilities and marketing of fodder to the village. In fact, marketing of fodder has not attracted attention until lately by either the government or the business initiate or the stock farmers. The reason does not seem to be accidental and it may be related with the relatively low rate of expansion of fodder production compared with the rate of growth of green production.

This comparison does not show that the fodder production was the only constraint to stability of livestock population in Greece. This simply tends to indicate that fodder production was one of the main impediments of expansion of meat production in Greece. But it cannot suggest that expansion of fodder produc-tion is sufficient condition to achieve expansion of the meat production sector in that country. Marketing to proceed and distribute the increased fodder to existing and new stock farmers is equally necessary,. Whether new business initiative/

TABLE IX.1

LIVESTOCK POPULATION 1934-1938 AND 1947-1967

(Thousand Heads)

END OF THE YEAR	CATTLE		BUFFALOES		PIGS		SHEEP		GOATS	
	No.	1950 = 100	No.	1950 = 100	No.	1950 = 100	No.	1950 = 100	No.	1950 = 100
1934	962	118.0	53	77.9	589	101.2	7,974	115.5	5,229	140.9
1935	975	119.6	59	86.8	638	109.6	8,310	120.3	5,351	144.2
1936	992	121.7	63	92.6	607	104.3	8,440	122.2	5,514	148.6
1937	1,004	123.2	67	98.5	465	79.9	8,451	122.4	5,288	142.5
1938	974	119.5	67	98.5	430	73.9	8,139	117.9	4,356	117.4
....	...	....	..	....	...	....	...	...	...	...
1947	693	85.0	59	86.8	480	82.5	7,116	103.0	3,535	95.3
1948	709	87.0	60	88.2	509	87.4	6,767	98.0	3,527	95.1
1949	751	92.1	63	92.6	537	92.3	6,785	98.3	3,629	97.8
1950	815	100.0	68	100.0	582	100.0	6,905	100.0	3,710	100.0
1951	846	103.8	69	101.5	636	109.3	7,326	106.1	3,958	106.7
1952	873	107.1	71	104.4	387	100.9	7,784	112.7	4,139	111.6
1953	904	110.9	72	105.9	603	103.7	8,254	119.5	4,510	121.6
1954	917	112.5	73	107.4	603	103.6	8,738	126.5	4,643	125.1
1955	957	117.4	76	111.8	621	106.7	8,970	129.9	4,795	129.1
1956	981	120.4	76	111.8	641	110.1	9,275	134.3	4,894	131.9
1957	1,005	123.3	76	111.8	640	110.0	9,195	133.2	4,939	133.1
1958	1,028	126.1	75	110.3	631	108.4	9,255	134.0	5,010	135.0
1959	1,046	128.3	73	107.4	638	109.6	9,374	135.8	5,066	136.5
1960	1,074	131.8	71	104.4	628	107.9	9,353	135.5	5,064	136.5
1961	1,069	131.2	61	89.7	547	94.0	8,962	129.8	4,603	124.1
1962	1,060	130.1	57	83.8	513	88.1	8,899	128.9	4,389	118.3
1963	1,034	126.9	51	75.0	483	83.0	8,513	123.3	4,153	111.9
1964	1,017	124.8	43	63.2	486	83.0	8,097	117.3	3,990	107.5
1965	1,046	128.3	38	55.9	558	95.9	7,819	113.2	3,895	105.0
1966	1,082	132.8	33	48.5	553	95.0	7,829	113.4	3,945	106.3
1967	1,094	134.2	27	39.7	492	84.5	7,874	114.0	4,042	108.9

1952, Table IX.6 (1934-1938 and 1947-1949), Statistical Yearbook 1968, Athens 1969, Table VIII.12 (1950-1966). National Statistical Service of Greece, Monthly Statistical Bulletin, April 1969, Table 29, (1967).

initiative is going to appear even after these two factors are resolved adds one more serious impediment to the expansion of meat production sector.

Under these circumstances, one cannot easily say what is the weight of factors like fodder production, marketing, enterpreneurship, etc., on the relative stability of livestock population so far and its expansion in the future. This is due to the co-existence of these factors which imposes the need for their simultaneous removal.

Table IX.2 shows the indices of the development of livestock population, i.e. the variations in the livestock population among the regions compared with the relative constancy in the total number of animals. The number of cattle has fluctuated between 32.5 percent of increase in Peloponnesos and 11.2 percent of reduction in Epirus. The number of pigs has fluctuated between 12.7 percent increase in Macedonia and 24.8 percent decrease in Sterea Hellas and Euboea. The number of sheep hasan increase only of 3.6 percent in the country as a whole during the period 1956-63, being accompanied by a regional variation of between 17.4 percent increase in the Ionian Islands and 10.4 percent decrease in Epirus. Similarly, the rates of increase in the number of poultry has fluctuated between 52.1 percent in Sterea Hellas and Euboea and 2.9 percent in Epirus.

Macedonia and Thrace two of the most plain regions of Greece have indices of expansion of livestock population between 1956 and 1963 higher than the country average virtually in all kinds of animals. Thessaly is below the country average mainly in the case of cattle and pigs. More mountainous areas like Epirus and Islands have indices of increase well below the country average. This differentiation seems to suggest that the animal feeds have been a considerable factor which prevented increase in population in less fertile regions.

It seems, on the other hand, more difficult to say whether plain regions could have achieved higher rates of livestock population growth with their given potential capacity for green production. The stagnation of cattle in Thessaly for instance, and the reduction of pigs in the same region between 1956 and 1963 seems to be due to other impediments than the capacity to produce animal feeds.

TABLE IX. 2

PERCENTAGE DISTRIBUTION OF LIVESTOCK POPULATION (1963) AND INDICES OF ITS DEVELOPMENT DURING THE PERIOD 1956-63

REGIONS	PERCENTAGE DISTRIBUTION 1963							YEAR 1963 with 1956 = 100						
	Cattle	Buffa-loes	Sheep	Goats	Pigs	Poultry	Rabbits	Cattle	Buffa-loes	Sheep	Goats	Pigs	Poultry	Rabbits
STEREA HELLAS & EUBOEA	8.3	.1	16.8	20.5	16.1	21.9	12.6	107.7	117.6	108.8	87.7	75.2	152.1	158.4
PELOPONNESOS	5.8	-	14.7	18.2	26.7	22.4	28.4	132.5	-	102.9	87.1	109.2	130.5	169.3
IONIAN ISLANDS	1.3	-	1.6	2.3	1.2	2.9	6.4	121.1	-	117.4	101.0	94.1	137.3	202.6
EPIRUS	5.0	.1	10.4	8.6	2.6	3.9	2.0	88.9	58.3	89.6	80.0	84.8	102.9	161.0
THESSALY	10.1	3.7	18.0	10.3	10.8	9.8	7.0	108.7	41.1	112.8	93.5	87.8	137.1	263.1
MACEDONIA	47.4	63.8	23.4	20.4	24.6	22.3	9.8	119.7	83.6	102.3	114.4	112.7	126.3	271.8
THRACE	13.1	32.3	5.7	6.1	3.9	5.3	1.6	126.0	91.0	106.0	144.3	106.0	124.6	305.7
AEGEAN ISIANDS	5.6	-	4.1	7.0	4.9	5.0	5.1	99.2	-	103.8	103.2	79.1	114.2	174.0
CRETE	3.4	-	5.3	6.6	9.2	6.5	27.1	97.4	-	95.7	104.4	99.1	114.2	166.9
WHOLE COUNTRY	100.0	100.0	100.0	100.0	100.0	100.0	100.0	114.7	82.7	103.6	96.6	96.8	130.5	181.6

Sources: Center of Planning and Economic Research, "Regional Agricultural Development", Athens 1967, Tables 14, 15 App. pp.176-177.

2. Production by kind of Meat and Geographic Region

In the following the main features of differential rates of growth of production by kind of meat are examined. The evolution of meat production is associated with the regional structure of it and of livestock population.

Greece has no specialisation in any kind of livestock although the mutton - lamb including goat - kidgoat represent about a third of the total meat production (a proportion steadily falling in recent years - 49 percent in 1950). Moreover, the proportion of pork to total meat production fell from 24 percent in 1950 to 18 percent in 1967. These losses in terms of percentages to total meat production were due to the increase in the share of beef and veal, which rose from 12 percent in 1950 to 30 percent in 1967. Poultry has also increased its share by almost half of that in 1950 (from 12 percent in 1950 to 17 percent in 1967), as Table IX.3 shows.

The above observations have to be slightly modified in the light of particular developments between lamb, veal and mutton, beef. Thus, most of the rise in the share of cattle meat in the total meat production was gained by veal (3.8 percent in 1950 to 19 percent in 1966). On the other hand, the share of lamb-kidgoat was held virtually constant between 1950 and 1967, at about one-fourth of the total (it actually increased during the fifties and fell equally in the sixties), while the share of mutton-goat fell constantly particularly in the sixties. These relative high rates of increase in the production of veal and lamb against beef and mutton keep in pace with the pattern of improvements of meat production along with rejection to increase in the size of livestock holdings and population. This does not mean that demand factors have not exerted any influence on this change in structure between beef and veal and lamb and mutton, in view of the relatively high rates of income growth and the estimated income elasticities of veal and lamb.

The reasons for the aforementioned relative high rate of increase of young carcass do not seem quite the same in the case of lamb and in the case of veal. Thus, the emphasis on young milk lambs of weight about 15 pounds seems to be the result of the following market and production factors[1]: (1) the custom of eating young lambs at Easter, (2) the desire to sell young lambs before the hot summer winds come, (3) the desire to use the milk for human consumption, (4) the/

1. U.S.D.A. "A Study of the Economics of Land Use and Livestock in Greece", June, 1967, p.20.

TABLE IX. 3

PRODUCTION OF VARIOUS KINDS OF MEAT IN GREECE

KIND OF MEAT	PRODUCTION IN THOUSAND TONS						TOTAL PRODUCTION = 100					
	1950	1955	1960	1965	1966	1967	1950	1955	1960	1965	1966	1967
VEAL(1)	2.8	8.1	15.2	51.1	44.1	77.0	4	6	10	22	19	30
BEEF(2)	6.2	8.4	13.6	15.4	21.4		8	7	9	7	9	
LAMB(3)	17.5	42.6	49.4	54.3	60.0	84.8	24	35	31	23	24	33
MUTTON(4)	18.8	24.6	32.3	31.9	31.8		25	20	20	14	14	
PORK	18.0	22.5	27.7	42.9	41.8	46.2	24	18	17	19	18	18
POULTRY	9.1	14.6	18.2	33.0	36.1	43.8	12	12	12	14	15	17
OTHER	2.7	1.9	2.4	2.5	2.9	3.9	3	2	1	1	1	2
TOTAL	74.1	122.7	158.8	231.1	235.1	255.7	100	100	100	100	100	100

(1) Including Buffaloes less than one year
(2) Including Buffaloes more than one year
(3) Including kid-goats less than one Year
(4) Including goats more than one year

Sources: Ministry of Agriculture until 1966 including National Statistical Service of Greece, Monthly Statistical Bulletin April 1969, Table 30 (Year 1969).

the lack of experience in feeding lambs for further gains after weaning, (5) the belief that the meat of older animals is tough, and (6) the need of additional herders in mountain areas for feeding a larger number of animals. The increase in their nummber over certain limits requires additional labour costs which have probably somewhat risen in recent years, due to emigration and the fall in the birth rate in Greece since the last World War.

The increase in the proportion of veal to total meat production against the relatively stable proportion of beef seems to be particularly associated with the uneven distribution of rainfall, which favours the premature slaughter of calves - summer fodder and winter supplies being inadequate because of drought - and with the fall in prices which occurs in the early summer when farmers are obliged to sell.[2] Rainfall does not seem to be an important constraint factor in fixing the share of cattle (beef and veal) in the livestock economy of the various regions of the country. It is true that Greece has dry climate - with other Mediterranean countries - and this is one of the factors contributing to the relatively low proportion of beef-veal to total meat production. The rainfall in Western Greece (Epirus, Ionian Islands and Western Peloponnesos) exceeds 1,200 mm. against well below 1,000 mm. in other parts of the country (data taken from the Statistical Yearbook 1968, Table I.9, p.12). The share of beef and veal taken altogether - either in the total veal and beef production of the above regions (Table IX.4) - is relatively low, although the Ionian Islands seem to constitute an exceptional case (better quality of cattle population). Therefore the view[3] that these regions have a large cattle sector does not seem to be well supported by the figures since it does not take into account the production of feeds by region.

Macedonia, Thrace and Thessaly, the three most fertile areas of Greece, have relatively high proportion of beef and veal, although the proportion to total meat production is still, in Thessaly, relatively low compared with the share of mutton and goat.

Epirus is gaining a reputation for its mutton, a feature which seems also happening in Thessaly, Peloponnesos and Sterea Hellas and Euboea and also in another highly mountainous region, the Island of Crete. Sheep-goat rearing is carried out in the relatively mountainous part of Western Thessaly, while cattle farming has not yet extended into the Central-Eastern part, the arable area of which/

2. O.E.C.D. (1969) pp.20-21.
3. O.E.C.D. (1969) pp.19-20.

TABLE IX. 4

REGIONAL DISTRIBUTION OF VALUE OF MEAT PRODUCTION
BY KIND OF MEAT (AVERAGE 1963/64)

I. ABSOLUTE AMOUNTS (Current prices, in Mil. Drs.)

GEOGRAPHIC REGIONS	BEEF	VEAL	BUFFALOES	MUTTON	GOAT	PORK	POULTRY	RABBITS & GAME	TOTAL
STEREA HELLAS & EUBOEA	62.7	90.1	-	229.7	206.5	152.5	168.5	10.5	920.5
PELOPONNESOS	65.6	53.2	-	218.4	203.4	189.4	128.9	15.7	874.6
IONIAN ISLANDS	17.1	24.9	-	29.0	25.6	10.9	16.1	3.8	127.4
EPIRUS	20.8	31.8	-	120.2	74.5	19.7	28.5	1.2	296.7
THESSALY	64.0	92.0	2.5	262.4	87.2	88.9	65.8	2.7	665.5
MACEDONIA	216.9	287.4	37.8	269.2	168.8	226.6	125.4	5.7	1,337.8
THRACE	82.3	87.8	26.0	77.8	57.6	34.3	28.3	1.2	395.3
AEGEAN ISLANDS	33.8	50.6	1.0	54.0	60.9	44.8	31.8	2.1	279.0
CRETE	17.6	25.0	-	78.3	76.4	58.7	31.1	14.3	301.4
WHOLE COUNTRY	580.8	742.8	67.3	1,339.0	960.9	825.8	624.4	57.2	5,198.2

II. PERCENTAGE DISTRIBUTION

STEREA HELLAS & EUBOEA	10.8	12.1	-	17.2	21.5	18.5	27.0	18.4	17.7
PELOPONNESOS	11.3	7.2	-	16.3	21.2	22.9	20.6	27.5	16.8
IONIAN ISLANDS	3.0	3.3	-	2.2	2.7	1.3	2.6	6.5	2.5
EPIRUS	3.6	4.3	-	9.0	7.7	2.4	4.6	2.1	5.7
THESSALY	11.0	12.4	3.8	19.6	9.1	10.8	10.5	4.8	12.8
MACEDONIA	37.3	38.7	56.2	20.1	17.6	27.4	20.1	9.9	25.7
THRACE	14.2	11.8	38.5	5.8	6.0	4.2	4.5	2.1	7.6
AEGEAN ISLANDS	5.8	6.8	1.5	4.0	6.3	5.4	5.1	3.6	5.4
CRETE	3.0	3.4	-	5.8	7.9	7.1	5.0	25.1	5.8
WHOLE COUNTRY	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Continued Overleaf/

TABLE IX. 4
(Continued)

III. TOTAL OF REGION = 100

GEOGRAPHIC REGIONS	BEEF	VEAL	BUFFALOES	MUTTON	GOAT	PORK	POULTRY	RABBITS & GAME	TOTAL
STEREA HELLAS & EUBOEA	6.8	9.8	-	25.0	22.4	16.6	18.3	1.1	100.0
PELOPONNESOS	7.5	6.1	-	25.0	23.2	21.7	14.7	1.8	100.0
IONIAN ISLANDS	13.4	19.5	-	22.8	20.1	8.6	12.6	3.0	100.0
EPIRUS	7.0	10.7	-	40.5	25.1	6.7	9.6	0.4	100.0
THESSALY	9.6	13.8	0.4	39.4	13.1	13.4	9.9	0.4	100.0
MACEDONIA	16.2	21.5	2.8	20.2	12.6	16.9	9.4	0.4	100.0
THRACE	20.8	22.2	6.6	19.7	14.6	8.7	7.1	0.3	100.0
AEGEAN ISLANDS	12.1	18.1	0.4	19.4	21.8	16.1	11.4	0.7	100.0
CRETE	5.9	8.3	-	26.0	25.3	19.5	10.3	4.7	100.0
WHOLE COUNTRY	11.2	14.3	1.3	25.7	18.5	15.9	12.0	1.1	100.0

Source: Center of Planning and Economic Research, "Regional Agricultural Development", Athens 1967, Table 16, App. p.178, Table 17, App. p.179.

which has been increased in the interwar period by the drainage of Lake Kopais. Under these conditions, Thessaly may be considered as a relatively promising cattle-farming region for the future, with possibly not unfavourable cost conditions.

Briefly speaking, it seems that the non-nomadic flock livestock (important in the case of small sized animals) is evidently located in mountainous regions. On the contrary, the production of large-size animals (cattle), which are to some extent stall fed, is located in relatively fertile regions (Macedonia, Thrace, Thessaly, Peloponnesos) which produce large amounts of fodders.

The above does not seem to prevail for the pig raising industry, which is located near dairy industries, fruit processing industries, hospitals, restaurants, etc. whose by-products it uses and for poultry industry which is also located near by consumption centres.

The conclusion seems to be that the location of meat production in Greece is largely fixed by the inputs (pastures, fodders etc.) and their transportation costs for cattle and sheep varieties and relatively more by the consumption centres in case of poultry and pigs. The same thing also happens for the largely improved milk producing cows on which Athens area has the highest percentage of the region (about 40 percent of Sterea Hellas and Euboea). They are mostly fed in the suburbs, where poultry and egg production have also been developed recently.

In brief, there seems to be a fairly close correspondence between the percentage distributions of veal and beef and the distributions of lamb and mutton by geographic region. This shows indirectly that there is no differential specialisation between young and old animals in the relative fertile regions of Greece. This is compatible with the fact that there is no significant differentiation in the distribution of cattle holdings by size in the nine regions of the country.

CHAPTER X

FORMS OF GROWTH OF MEAT SECTOR AND TECHNICAL CHANGE

The question whether the realised changes in the meat production represent a movement on a production function or shifts of it and technological change is difficult to answer in view of the data limitations. There was for instance a relative stability in the livestock population along with its change in improved breeds by about two thirds and the lack of indications of changing labour[1]. These developments might suggest that there may be technological changes of the Solow[2] rather than of the Denison form[3].

That is not quite certain, of course, in view of the fact that the meat output expansion took place largely through increase in the average weight of slaughtered animals. Thiswas a result of better feeding on one hand and on the other, of possible drastic changes in the conversion food rate of improved breeds. The second might be taken as shift while the first as movement along with a given production function.

Furthermore, the increase in the proportion of slaughtered animals - or the decrease in the capital-output ratio measured in terms of animal heads-is the result of improved breeds, better feeding and some improvement in the sanitary conditions.

In the following we shall concentrate on these main factors through which the meat output expansion in Greece was realised, without further attempt to attribute each of them to movement on the production function and economies of scale or to shifts in the production function and technological change. It is expected that examination of these factors will help to understand the main impediments to future development of the meat production sector in this country.

Section 1 presents the rate of change in the structure of breeds. Section 2 examines in comparative terms the rates of increase in the average weight of slaughtered animals and in the percentage of slaughtered animals which may in part be attributed to different kinds of factors.

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1. There seem to be also so far poor results in the advisory work to improve education and training of the stock farmers.
2. R. Solow (1957), (1959), (1962).
3. E.F. Denison, (1962).

1. Improved Breeds

Data on the structure of the livestock population has been available since 1961 for cattle, sheep, goats and hens. Data on the share of improved pigs in the total is not available. However, there is information[4] that about 90 percent of the pigs are improved breeds and stable-fed and only a 10 percent is unimproved. The improved breeds of pigs are mainly Yorkshire, Large Black and Lautracé and are bred domestically. Perhaps the more noticeable features of Table X.1 are the relatively fast rates of increase in the proportion of local improved cattle and secondarily of foreign origin against local unimproved cattle and the increase in the proportion of hens of foreign breed.

The relatively fast rate of improvement of local cattle in Greece has been supported that stands out as a shining example for Mediterranean countries[5], although the composition of cattle population in that country is not still comparable with that in the United Kingdom and Northern Continental Countries. The improvement in Greece in recent years has taken place largely through artificial insemination which we have discuss already, is one among other forms of government intervention in the livestock sector.

The improvement in hens is less representative of the total population of hens since it has been concentrated on the rapidly expanded poultry industries in the Island of Euboea in the last decade. At the same time, the rest of hen population is only very slowly improved throughout the country.

Sheep and goats are classified in the Table X.1 by method of breeding, in domestic, in flock not-nomadic and nomadic flock. It can be seen that the last two categories (in flock not-nomadic and nomadic) represent over 90 percent of the total number of sheep and goats. These are mostly of low quality, small size animals. This impedes the future possible increase in their average weight, without changes in their structure and in methods of breeding. It is worthy of note that the structure of sheep by breed (in domestic, in flock not-nomadic and nomadic) has not shown any particular trend in the period since 1961.

The/

4. Ministry of Agriculture, Program of Livestock Sector, by A. Karadounia, Athens, 1965, p.41.

5. See O.E.C.D., (1969) p.25.

TABLE X.1

PERCENTAGE COMPOSITION OF LIVESTOCK BY BREED

(Country Averages)

KIND OF ANIMAL	1961	1962	1963	1964	1965	1966	1967
CATTLE							
Local Unimproved	71.8	66.5	62.4	55.2	47.7	40.6	36.0
Local Improved	24.5	29.2	32.8	39.9	46.8	52.9	57.0
Foreign	3.7	4.3	4.8	4.9	5.5	6.5	7.0
SHEEP							
Domestic	9.3	9.8	9.0	8.2	8.6	8.6	8.4
In flock, non-nomadic	75.4	75.0	76.7	77.9	78.6	78.5	78.8
Nomadic	15.3	15.2	14.3	13.9	12.8	12.9	12.8
GOATS							
Domestic	17.4	18.0	18.9	19.7	20.0	20.7	20.3
In flock, non-nomadic	69.5	69.7	69.4	68.9	69.7	68.8	69.9
Nomadic	13.1	12.3	11.7	11.4	10.3	10.5	9.8
HENS							
Local Breed	79.8	80.2	82.7	69.0	57.1	51.8	52.2
Foreign Breed	20.2	19.8	17.3	31.0	42.9	48.2	47.8

Sources: National Statistical Service of Greece,
Agricultural Statistics of Greece,
1964, 1965, 1966, 1967.

The picture in the case of goats is very similar to that of sheep, with the difference that the percentage of domestic goats appears an increasing trend through time (about one percentage point per year).

It seems further useful to look at the regional differences in the breed structure. Table X.2 gives a cross section static picture of improved and unimproved cattle, sheep and goats for the year 1965. There seem to be relatively high regional differences in the proportion of local improved cattle and domestic and nomadic sheep and goats. Thus, the proportion of local improved cattle exceeds the country average only in the case of Macedonia - which has almost half of the cattle population - Thrace and the Ionian Islands. This indicates that a great deal of the program of artificial insemination by government services was carried out mainly in areas of high cattle density which means that the rate of improvement in the future will be lower than it was in the past. The relatively high rate of improved cattle in Ionian Islands was realised through private initiative which has begun from the time of British occupation of the Islands ended in 1864. However, it is of little importance given that the Ionian Islands represent about 1.5 percent of the cattle population of Greece.

Spreading of foreign cattle - usually through purchase of bulls - was mainly carried out in Sterea Hellas, Thessaly and Peloponnesos with proportions to total cattle over twice as much as the country average of 5.5 percent. In the first of these regions the share represents to a large extent improved dairy cows in the area of Attica around Athens. Peloponnesos is a relatively plain region with relatively small and scattered holdings so that the selling of foreign breed bulls was applied as more effective. The same practice was also applied in the lately expanding cattle holdings in plain regions of Thessaly.

TABLE X.2

NUMBER OF CATTLE, SHEEP AND GOATS BY REGION (1965) (In th. Heads)

REGIONS	CATTLE				SHEEP				GOATS			
						In flock				In flock		
	Total	Local Unimproved	Local Improved	Foreign	Total	Domestic	Not Nomadic	Nomadic	Total	Domestic	Not Nomadic	Nomadic
Macedonia	453.3	206.6	233.1	13.6	1,605.8	30.0	1,514.3	61.6	756.5	70.7	581.7	104.1
Thessaly	113.8	58.6	50.8	4.4	1,551.8	59.0	1,185.8	306.9	390.7	55.5	283.9	51.3
Thrace	181.7	84.8	87.0	9.9	388.8	7.2	379.9	1.6	245.1	4.8	234.4	5.8
Herea Hellas & Euboea	87.1	35.1	38.7	13.2	1,423.3	135.3	1,063.6	224.4	838.8	167.3	167.3	57.2
Peloponnesos	58.8	28.0	23.5	7.3	1,207.2	143.0	898.8	165.3	710.7	200.2	200.2	100.8
Epirus	40.9	27.3	11.5	2.1	712.7	59.2	511.7	141.8	288.7	67.7	202.7	18.2
Crete	31.7	22.0	7.6	2.1	436.1	125.1	222.3	88.7	274.4	109.9	119.6	44.8
Aegean Islands	62.4	33.8	25.0	3.7	369.5	54.7	307.5	7.3	302.1	77.3	207.0	17.8
Ionian Islands	16.0	2.8	12.1	1.1	123.9	58.6	62.2	3.2	88.2	26.7	60.1	1.4
WHOLE COUNTRY	1,045.7	498.9	489.3	57.5	7,819.1	672.3	6,146.0	1,000.8	3,895.2	780.1	2,713.7	401.4
TOTAL OF EACH REGION = 100												
Macedonia	100.0	45.6	51.4	3.0	100.0	1.8	94.3	3.9	100.0	9.3	76.9	13.8
Thessaly	100.0	51.5	44.6	13.9	100.0	3.8	76.4	19.8	100.0	14.2	72.7	13.1
Thrace	100.0	46.7	47.9	5.4	100.0	1.9	97.7	.4	100.0	2.0	95.6	2.4
Herea Hellas & Euboea	100.0	41.8	44.0	14.2	100.0	9.6	74.7	15.7	100.0	19.9	73.2	6.9
Peloponnesos	100.0	47.6	40.0	12.4	100.0	11.8	74.5	13.7	100.0	28.2	57.7	14.1
Epirus	100.0	66.7	28.1	5.2	100.0	8.3	71.8	19.9	100.0	23.4	70.2	6.4
Crete	100.0	69.5	24.0	6.5	100.0	28.7	51.0	20.3	100.0	39.9	43.6	16.5
Ionian Islands	100.0	17.6	75.5	6.9	100.0	47.3	50.2	2.5	100.0	30.3	68.1	1.6
Aegean Islands	100.0	54.1	40.0	5.9	100.0	14.8	83.2	2.0	100.0	25.6	68.5	5.9
WHOLE COUNTRY	100.0	47.7	46.8	5.5	100.0	8.6	78.6	12.8	100.0	20.0	69.7	10.3

Source: National Statistical Service of Greece, Agricultural Statistics of Greece, Year 1965, Table 2, pp.96-97, Table 3 pp.98-99.

2. Average Weight and Proportion of Slaughtered Animals.

The improvement in animal breeds, in feeding, health conditions, etc., have resulted in (a) an increase in the percentage of slaughtered animals to those left for breeding and (b) in the form of increase in the weight of slaughtered animals. It is difficult to say to what extent the relationship between (a) and (b) is of purely technical nature [illegible] Both are/partly due to improvement in breeds which brought about the fertility rate as well as the weight of animals. For instance, in the case of cattle there is a continuing rise in the fertility rate in the sixties, as Table X.3 shows.

TABLE X.3.

NEW-BORN BABY-CALVES TO TOTAL CATTLE POPULATION(1)

Year	Baby-Calves (In th. Heads)	Cattle Population (In th. heads)	1 : 2%
	1	2	3
1961	377	1,130	33.4
1962	398	1,177	35.6
1963	418	1,085	38.5
1964	416	1,060	39.3
1965	434	1,084	40.1
1966	464	1,115	41.6
1967	469	1,121	41.8

(1) Including buffaloes

Sources: National Statistical Service of Greece, Agricultural Statistics of Greece, 1961-67.

Similar change in the fertility rate may have happened to a lesser extent in other animals. Even so, there can be differences between the percentage changes of slaughtered animals and the increase in weight in so far as improved breeds, animal feedings, etc., exert different influence on weight and fertility.

Moreover, changes in weight of slaughtered animals and in the proportion of slaughtered over livestock population may be due to stock farmer decision for increase in the weight and /or population.

Table X.4 gives some idea of the relative changes of these two factors in the increase in meat production between 1955/56 and 1966/67. As is clearly shown in/

TABLE X.4

AVERAGE WEIGHT OF SLAUGHTERED ANIMALS AND CAPITAL-OUTPUT RATIOS

KIND OF ANIMAL	CAPITAL - OUTPUT RATIO[1]			AVERAGE WEIGHT OF SLAUGHTERED ANIMALS IN KGS.			
	1955/56	1966/67	(2) - (1)	1955/56	1966/67	Increase In kgs.	%
	(1)	(2)	(3)				
CATTLE	3.11	2.18	.93	96.5	146.3	49.8	51.6
SHEEP-GOATS	1.76	1.23	.53	8.8	8.5	- .3	-3.0
PIGS	1.22	.61	.61	45.2	60.2	15.0	33.2
POULTRY	.71[1]	1.00	.29	.8	1.4	.6	42.9

(1) In number of heads

(2) All kinds of Poultry

Source: Center of Planning and Economic Research, "Possibilities of Rapid increase in Meat Production", Athens 1967, Table 6, p.10, National Statistical Service of Greece, Agricultural Statistics of Greece, 1966, 1967.

in this Table the fall in the capital output ratio in heads (or the reverse of the rise in the percentage of slaughtered animals)[6] was higher in cattle (by .91) and pigs (by .61).

Also the percentage increase in the weight of slaughtered animals was higher in cattle (52 percent between 1955/56 and 1966/67), poultry (43 percent), and pigs (33 percent increase in weight). The conclusion seems to be that the fall in the capital output ratio (increase in the percentage of slaughtered animals) and the increase in the average weight are in close correspondence. The decrease in the capital output ratio - given the relative stability of the livestock population - is in part due to increase in the animal fertility rate and partly to the increase in improved breeds. It tends to suggest that both the increase in weight and the decrease in the capital output ratio are passive factors of the expansion of livestock population.

Average Weight of Slaughtered Animals

The increase in the average weight of most animals has been more or less a continuous process, interrupted by the appearance of temporary favourable demand conditions which induced the stock-farmers to slaughter their animals very young.

The evidence of Table X.5 combined with that of Table X.4 illuminates to some extent the question of the time pattern of average weight of each type of animal. Thus, regarding the "large size" animals i.e. cattle and pigs, concludes that the increase in the average weight of cattle has been achieved largely since 1961, while the increase in the average weight of pigs has been achieved in the period 1955-60 and since then is only slightly increasing. The change of the average weight of poultry has also been appreciable during the period 1961-67.

Moreover, Table X.5 gives also a disaggregation of animals by age. So, we have separated the weight of calves, buffaloes of less than one year of age, lambs kid-goats and piglets. This disaggregation allows us to see to what extent the increase in the average weight of slaughtered animals was different by age of animals. Thus, the increase in the average weight of young animals (less than one year of age) seems relatively higher than that of adult ones. This may indicate that Greek stock farmers prefer to fatten small animals to the extent fodder/

6. For more on the capital-output ratio so estimated, see later on.

TABLE X.5

YIELD OF MEAT PER ANIMAL SLAUGHTERED (1961-67) in Kgs.

KIND OF MEAT	1961	1962	1963	1964	1965	1966	1967
CALVES	72.4	79.4	89.3	98.9	107.3	137.4	142.3
HEIFERS	125.9	129.1	138.6	140.1	145.0	175.6	176.2
AVERAGE CATTLE	86.2	92.5	104.1	116.5	120.0	144.5	148.1
BUFFALOES (Less than 1 year)	88.6	83.3	97.0	113.5	109.5	135.9	118.8
BUFFALOES (more than 1 year)	110.7	146.7	153.0	160.2	174.7	88.7	160.5
AVERAGE OF BUFFALOES	102.3	108.6	122.0	133.1	130.4	111.8	138.3
PIGLETS	28.1	31.9	32.4	33.4	34.2	35.9	33.8
PIGS	68.5	71.8	73.5	74.4	79.7	79.9	78.5
AVERAGE PIGS	57.2	59.5	58.9	53.6	54.8	61.3	59.0
LAMBS (Less than 1 year)	7.1	7.2	7.2	7.3	7.6	7.9	8.2
SHEEP (More than 1 year)	12.3	12.7	13.1	13.2	13.9	14.6	14.0
AVERAGE SHEEP	8.0	8.0	8.1	8.3	8.6	9.0	9.1
KID GOATS (Less than 1 year)	5.9	6.1	6.1	7.1	6.6	6.8	6.9
GOATS (More than 1 year)	12.5	14.8	12.7	12.9	13.4	13.9	14.0
AVERAGE GOATS	7.2	8.3	7.3	8.2	7.8	8.0	8.1
POULTRY	1.1	1.1	1.2	1.2	1.3	1.3	1.4

Sources: National Statistical Service of Greece, Agricultural Statistics of Greece, 1961, 1962, 1963, 1964, 1965, 1966 and 1967.

fodder available increases marginally rather than to increase the livestock population. Also keeping calves for longer involves lower "food conversion rate" and also lower prices.

A first look at Table X.6 shows higher regional differences in the average weight of cattle and pigs than in other animals. Macedonia and Thessaly have an average weight of calves below the country average; Thessalyhas an average weight of piglets below the country average and Thrace has an average weight of pigs also below the country average. These differences support the view of relatively high importance of animal feeds to the expansion ofanimal population than increase in average weight in fertile areas.

3. Capital-Output Ratio by kind of Animals.

The following Table X.7 gives an estimate of the average capital-output ratio of cattle, pigs, sheep and hens between 1961 and 1967.

The capital output ratio was estimated in terms of number of animals irrespective of weight of slaughtered animals and of livestock population[7].

As was expected in view of the observed population and output developments, the capital-output ratio has fallen for all animals. The fall of the capital-output ratio is, however, relatively high in the case of cattle and hens, namely the two animals with relatively high rate of increase of improved breeds. This means that improved breeds may be relatively more fertile and that the stock-farmers have reasons to avoid increase in the livestock population.

TABLE X.7

CAPITAL-OUTPUT RATIOS IN TERMS OF HEADS OF MAIN TYPES OF ANIMALS

(Averages of Greece)

Kind of Animal	1961	1962	1963	1964	1965	1966	1967
Cattle	3.12	2.74	2.45	2.33	2.38	2.20	2.16
Pigs	.76	.70	.67	.67	.65	.64	.58
Sheep-Goats	1.59	1.46	1.36	1.28	1.25	1.23	1.24
Hens	1.54	1.15	1.21	1.16	1.19	1.10	.90

Sources: National Statistical Service of Greece, Agricultural Statistics of Greece, 1963, 1965, 1966 and 1967.

7. It does not include the meat output in the numerator since this would give in fact the C + O/O and not the C/O ratio.

TABLE X. 6

AVERAGE WEIGHT OF ANIMALS SLAUGHTERED WITHIN THE COMMUNE OF PRODUCTION BY REGION IN 1963 (Kgs. per animal)

GEOGRAPHIC REGIONS	Calves	Heifers & Oxen	Piglets	Pigs	Lambs	Sheep	Goat Kids	Goats	Poultry	Rabbits
MACEDONIA	68.6(1)	121.8(1)	43.0	82.1	6.9	12.8	5.4	12.3	1.19	1.16
THESSALY	79.3	160.3	28.3	77.9	6.7	12.5	5.1	12.0		
THRACE	161.4(1)	199.4(1)	64.2	73.1	8.1	15.4	5.9	15.4	1.29	1.08
PELOPONNESOS	116.2	154.3	33.1	74.4	7.8	13.8	6.8	13.0	1.19	1.17
STEREA HELLAS & EUBOEA	135.6	196.8	24.4	65.9	6.9	12.8	6.1	13.2	1.24	1.22
EPIRUS	49.9	107.0	38.8	56.5	6.1	10.4	5.9	11.0	.95	.95
CRETE	51.8	138.9	26.7	55.4	7.9	13.9	6.0	12.7	1.09	1.09
AEGEAN ISLANDS	66.0	126.1	40.5	76.1	7.6	14.2	6.0	12.5	1.16	1.07
IONIAN ISLANDS	102.9	161.8	27.4	59.0	7.9	15.0	6.2	14.3	1.02	1.08
COUNTRY AVERAGE	89.3	138.6	32.4	73.5	7.2	13.1	6.1	12.7	1.18	1.14

(1) Excluding Buffaloes

Source: National Statistical Service of Greece, Agricultural Statistics, Year 1963, Athens 1966, Table 7a2 p.125, 7b2, pp.126-143.

CHAPTER XI

FORECASTED FUTURE DEMAND BY THIS STUDY AND TARGETS FOR EXPANSION OF MEAT PRODUCTION

An assessment is attempted here of the results of this study, in order to derive certain basic policy implications, which may contribute towards acceleration of the expansion of meat production in Greece. In the projections of meat production possibilities in the future, we consider the particular problems which determine the demand and supply conditions in Greece.

Our concentration is on the long run problems of the sector and indicatively we derive forecasted numbers for final demand[1] and put targets for domestic supply of meat for 1975 and 1980, so that we leave aside problems of a short run character, namely those due to the relative variation in the rates of adaptation of the domestic supply of meat to the expanding final demand. Some reference to other joint products of the livestock sector (i.e. milk, cheese, eggs, etc.) which are positively associated with meat and compete partly with it, shall be also made. Only a minimum attention is given to these products since domestic production largely satisfies the final demand for dairy products, so that the main problem of livestock sector is the promotion of meat production.

An aspect of particular importance for formulation of the future meat production targets, is the fact of the gradual orientation of the Greek Economy to the case of eventual association with E.E.C.,(though possibly later than the year 1984 according to the original agreement). Thus, the production targets by kind of meat are put on the basis of forecasting future production limits under the condition of not increasing direct and opportunity costs. Under these circumstances, the feasibility of the fixed limits is possibly less certain[2] than that of the forecasted final demand for meat, which, if income rises so much and the elasticities used for the projection are correct, can be expected roughly to be realised.

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1. The projection of disaggregated meat items may result in errors because of substitutability between different kinds of meat. These errors balance out for total meat projections, see United Nations, (1963), pp.40-41

2. It depends only partly on a series of policy measures which are proposed in the last section to achieve the formulated here production targets.

The above criterion of relative costs for determination of the targets for the future production structure by type of meat seems also quite consistent with the results of this study as to the factors of demand for meat. The likelihood was indicated there of a rather statistically significant 'substitutability' among the eight meat varieties. This seems to permit the authorities to give priority to promotion of expansion of those types of meat which probably have better cost conditions and relatively high economies of scale. Incidentally, the kind of meat which seems to enjoy most these conditions in the long run is veal, which has also a relatively high income demand elasticity.

Thus, the primary target is towards expansion of veal production in the long-run after a likely possible marginal expansion of the cattle population in the seventies. This ordering of targets is based on cost considerations, as we shall see in Section 2. Moreover, the policy measures proposed (Section 3) concentrate on further quality improvement of livestock population, production methods and production and marketing of fodders. These measures are expected to contribute to target rate of future expansion of meat production in part through technological change and reduction in production costs.

1. Forecasted Demand for Meat

The considerations that follow involve numerical projections of future demand for meat which is technically simple with the estimated demand functions under alternative assumptions on the future income and price formation.

This procedure has to be considered with reservations regarding the elasticities used and the planned rates of change in income and prices. Thus, projection on the income growth rate refers to the disposable income and not to GDP. Disposable income projections involve future values of GDP, taxation and transfer payments, which are uncertain and exogenous to this study. The use of the planned rate of increase of GDP of the Plan 1968-72 (7.5 - 8.5 percent) differs from that of a disposable income concept and, on the other hand, these rates seem unrealistic at least for the reason that the average rate of income increase in 1968-70 is not expected to exceed, 4.5 percent.

Thus, we have used two alternative growth rates of real disposable per capita income, ie 3.4 percent and 5.4 percent annually for both the periods 1970-1975, and 1975-1980. These rates with an annual rate of population growth .6 percent (average of the period 1960-1970) correspond to about 4.0 and 6.0 percent average annual rates of increase of real disposable income, which are considered to represent reasonable limits of growth rates under present conditions.

Difficult problems arise particularly in the projection of future meat prices in Greece, since they are partly affected by the relative expansion of the domestic meat production and its speed and partly by the meat prices in the world market; the prices there will be possibly unstable in view of the prospects for relatively rapid further increase in world meat consumption. Under these circumstances, any serious forecasting of the future relative prices of various items of meat seems a difficult task.

Moreover, given possible substitutability of demand between various meat items, changes in their relative prices will affect the proportion of each of them demanded to the total and rather less the total volume of demand for meat. The total demand for meat is expected to change mainly according to the variations in the relative price of meat over other consumption items, and in the personal disposable income.

The/

The simplifying assumption in the following estimates is that this relative price of meat is expected to remain fairly stable. Therefore, in view of the likelihood that the relative prices of various meat items will change between today and 1980, the projection of the demand by kind of meat is only indicative and in so far as the ratio of the price of meat to other consumption prices is going to increase, our projections suffer from overestimation error.[3]

The values of the income elasticity used in the projections (Table XI.1, cols. 1 and 2) were derived from the results of statistical experimentation in Part One. For the period 1970-75 the income elasticity for total meat and particular meat species has taken as the average of the income elasticities of the selected equations for the period 1958-1966 and of the cross section elasticity from the budget survey[4]. For the projection of the period 1975-80 the average of the income elasticity of total meat of the period 1958-1966 and the elasticity of the international cross-section demand for meat function (.72) was used. The average so estimated elasticity for the period 1975-1980 is 1.1, which is 8.3 percent lower than the corresponding estimated elasticity of demand for meat for the period 1970-75 (1.2) The elasticities of particular meat kinds for the period 1975-1980 were derived by the elasticity of each of the period 1970-1975 reduced proportionally to the elasticity of demand for total meat.

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3. However, given the absence of government intention to affect the demand for meat through taxation, the projections of meat demand seem to reflect approximately of what may be expected to happen if the income and prices in the future are going to be as planned.

4. The latter may be considered - though with various reservations - a closer measure of the long-run elasticity of demand.

TABLE XI.1

PROJECTED FINAL DEMAND FOR MEAT

(In Thousand Tons)

	Income Elasticities		1970[1]	1975		1980[2]	
				Alternative Rates of Income Growth			
	1970-75	1975-80	(In th.tons)	4%	6%	4%	6%
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
VEAL	1.70	1.56	70	95	115	129	145
BEEF	1.18	1.08	36	45	50	55	60
FROZEN BEEF	1.53	1.40	24	32	36	40	45
LAMB	.93	.85	75	90	100	106	115
MUTTON	.20	.18	35	37	38	38	39
FROZEN MUTTON	1.38	1.26	35	45	48	57	62
PORK	.62	.57	50	60	66	72	77
POULTRY	1.70	1.56	65	85	95	110	123
OTHER	.60	.60	10	11	12	13	14
TOTAL	1.2	1.1	400	500	560	620	680

(1) Preliminary estimates

(2) Estimated on the basis of the numbers of column (4) for 1975

2. Targets of Future domestic Production of Meat

Basic Assumptions and Forecasting Procedure

At attempt is made in the following for projecting the future meat production potentials in the decade of seventies with declining cost per unit. These projections are taken as feasible targets which are expected to be achieved through a series of policy measures discussed later on.

The forecasting of meat production is subject to constraints of all the discussed already production factors and cannot be carried out correctly without taking all of them together and solving the problem by appropriate mathematical techniques. In practice, as is known, it is difficult to follow strictly this procedure and as a result we have taken into consideration here first, the expected fodder production potentials and in addition a number of basic qualitative improvements in the production of various types of meat - in average weight of slaughtered animals, structure of breeds, and percentage of slaughtered animals to total livestock - and the relationship of the rates of increase of meat production and the production of animal feeds for the other kinds of animals, except cattle.

The assumed expansion and qualitative improvements of meat production presume certain rates of capital accumulation, continuation of the process of improving the animal breeds, improvement in the production techniques and in health care, which result in fall in per unit cost of meat production. More precisely, certain capital accumulation and other improvements were also assumed to occur in the expansion of the fodder production and in the rises of yields of other crops, which determine the potential production of fodders. Thus, the problem of meat production is in part a problem of supply of capital and quality improvements throughout the whole farm sector.

The above problemsas such cannot be considered as a direct object of this thesis; it only adopts the assumption that the authorities' plan for irrigation works and other improvements of land will not be hampered by lack of capital or inefficiency in the programme of education of farmers, etc. It is further assumed that their costs, or more precisely the part of costs paid by the farmers, will not be a factor raising the marginal cost of animal feeds.

The discussion so far, has indicated a relatively low level of tariff protection and/

and subsidies to the sector, a relatively small average size of holdings, and likelihood that the optimum size of holdings (with maximum average cost per unit of output) is for most animals well above the present size. Under these circumstances, it is believed, ceteris paribus[5] that the cost (or more precisely the value added[6]) per kg. of meat can be falling and likely not increasing for the forecasted expansion of meat production. The latter is assumed to come through quality improvements and some increase in the livestock population.

The estimate of the future forecast of meat supply also accounts for the opportunity costs of meat production in terms of other agricultural products. This seems important, because the output of the livestock sector is closely bound up with the output of other agricultural products; the marginal cost per unit of meat production will depend on whether its expansion will take place with replacement of other farm products cultivated so far in fertile irrigated land or not. In the latter case, the only possibility will be more intensive use of the land already employed by the livestock sector, along with qualitative improvements in this sector. For instance, the more intensive use of land by the livestock sector means virtually the expansion of cultivation of fodders in semi-mountainous areas at the expense of pastures. These areas probably have increasing marginal cost per unit of fodders and subsequently per kg of additional meat if the difference is not going to be subsidised.

Opportunity cost considerations are more specifically taken for making our projections of meat production consistent with the expansion of the production of other basic farm products in accordance with the trends in their demand forecasted by the Plan (through a partial substitution of wheat by other crops and expected rise in yields). As time passes, further expansion of irrigations to new land is unlikely and the livestock sector expansion will require to shift land away from other products or to proceed in irrigations on hillside areas. The last case will depend on whether the increase in the yields of other agricultural products will reduce the used land by them. It depends on whether the increase in the yields of other agricultural products from use of land saving techniques does not raise their output beyond the rise in their final demand.

On the basis of these conditions, a projection of total cultivated land in 1975 (38.5 th. stremmas) and 1980 (39.5 th. stremmas) has been made; it is based on the preliminary estimates for the year 1970 (37.5 th. stremmas) and additional/

5. i.e. with given the prices of fodders, cost of capital borrowing, etc.

6. assuming that the value added will not rise its share to the total cost, because of structural changes in the production method.

additional information taken from the Plan and the Ministry of Agriculture about the construction of new irrigation projects (Appendix A, Table A.1). We assumed that the rise in the production of other farm products (cotton, vineyards, fruits, etc.) will be possible by raising their yields and using a land of about 400 thousand stremmas swinging away from wheat, we have assumed that all the new irrigated land can be devoted to fodder production (see more in Appendix B).

With forecast yields of fodders, it was estimated that fodder production will rise at an average annual rate of 4.0 percent in the period 1970-75 and 3.5 percent in the period 1975-80 (See Appendix B, Table B1).

A main assumption here is that the expansion in irrigated land will be directed to fodder production and more specifically to the cattle sector. This is supposed to permit some further expansion of the cattle population in this decade, after which the calves are expected to be the only economic means for any further expansion of cattle production.

Production Targets of Veal, Beef and other Varied Meats.

On the assumption that all the fodder productions from the newly irrigated land will be used for expansion of beef and veal production, forecast for these two has been estimated separately on the basis of an average yield of fodder per kg. of beef and veal, namely convertion rates. The conversion index of beef of improved variety has been estimated in Italy with similar conditions with Greece to be 700-800 Fodder Units per 100 kg. for cattle of 24 to 36 months of age. This can be reduced to 400-450 Fodder Units for up to 12 or 14 months old calves[7].

These relatively low conversion rates of calves is not the only reason why calves are taken here as the long run target for expansion of the sector, under Greek circumstances. Other possible reasons which make the veal more economic are, the shorter financial cycle which lowers interest charges, and the possibility for more extensive automation than in beef. More automation and more intensive production methods seem to be of primary importance in Greece, in view of the indicated important role of the scarcity of land and pastures. Calves may be housed in single boxes of wood or metal (possibly pre-fabricated with/

7. See O.E.C.D. op.cit., Paris 1969, p.72. Since these ratios of fodder to output are of course likely reduced as the proportion of improved cattle to the total (about two-thirds today in Greece) rises. Therefore use of the above ratios, which presumably refer to improved animals implies an upward error of over-estimating the future domestic production of calves and mainly of adult cattle.

with air conditioning) or in walled yards with space for five to ten calves or even more. Apart from the possible economies of scale involved, it seems that calves reared in boxes do not deteriorate in quality, but can, on the contrary, give better results, especially from the point of view of the colour of meat, which is paler than that obtained from calves raised in yards[8].

More intensive production methods mean, of course, use of rations made up mainly or entirely of concentrates or milk powder. There seems to exist relatively high uncertainty about the expansion of production of concentrates in the near future, in view of the observed relatively low rate of expansion of this industry in Greece so far. The relatively slow rate of adjustment of the concentrates industry is one reason which induced the adoption of the target of increasing the livestock population in the short run. Another factor affecting this distinction between short and long run targets is that the process of further improvement in the fertility of cattle (both beef breeds and dairy breeds) as a potential source of supply of calves for fattening does not seem adequately rapid. On the other hand, in view of the prospects that other Mediterranean countries well may turn to calf breeding too, there may be expected an increase in the price of calves for import, which creates risks in the rapid overconcentration in veal[9].

The projected beef and veal production for 1975 and 1980 follows two stages:
(1) estimates of the increase in beef and veal production from the existing units and cattle population, and
(2) estimates of the increase in beef and veal production of new units, which are to be installed, given the limits from the expansion of animal feeds.
These two projections to find the total beef and veal production (old units and new ones) are based on the assumption that the increase in fodder production from irrigated land is going to feed only cattle.

As we have seen already the percentage of new born baby-calves to total cattle population (fertility rate) had been increased from 33.4 percent in 1961 to 41.6 percent in 1966 due to the success of artificial insemination and the improvements of vet. services. Assuming that they will continue in the future, this percentage is supposed to be 43 percent and 45 percent of cattle population/

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8. O.E.C.D., op.cit., Paris 1969, p.75, 156.
9. It was remarked that such a possibility may well lead to a shortage of calves and a crisis in the breeding industry, see O.E.C.D. op.cit., Paris 1969, P. Buiatti, "Types of beef and veal production", p.72.

population for 1975 and 1980 correspondingly.

The average weight of slaughtered calves is estimated to be 160 kg. per head in 1970 against 142 kg. in 1966. Supposing that the average annual increase in kgs. of the period 1966-70 will continue in the future, the average weight of slaughtered calves is expected to be 190 kgs. in 1975 and 220 kgs. in 1980. Regarding the average weight of heifers and oxen, it is expected to be 220 kgs in 1975 and 250 kgs. per head in 1980 as against 200 kgs. per head in 1970.[10]

TABLE XI.2

PROJECTED AVERAGE WEIGHT OF SLAUGHTERED CATTLE

(In Kgs.)

	1970(1)	1975	1980
Calves	160	190	220
Heifers and oxen	200	220	250
Total Cattle(2)	168	196	226

(1) Provisional estimates

(2) Average Weight of total cattle is estimated on the basis of average weights of calf and average weights of heifers weighted by their shares to the total slaughtered cattle.

The number of slaughtered calves is supposed to be about 70 percent of the new born baby calves and the proportion of slaughtered heifers and oxen about 10 percent of total cattle population.

On the basis of the above assumptions, we have estimated the future increase in the production of beef and veal from the existing holdings and the provisionally estimated cattle population of 1970.

10. The weight of cattle is not going to increase indefinitely given that Greek consumer prefers tender non-fat carcass.

TABLE XI. 3

PROJECTED BEEF AND VEAL PRODUCTION

FROM OLD HOLDINGS AND EXISTING CATTLE POPULATION

(In Thousand Tons)

KIND OF MEAT	1970(1)	1975	Average Annual Change (1970-75)	1980(2)	Average Annual Change (1970-80)
BEEF	24.0	26.4	2.0	30.0	2.6
VEAL	58.0	68.6	3.4	83.0	3.9
TOTAL	82.0	95.0	3.0	113.0	3.5

(1) Provisional Estimates

(2) On the basis of 1970 year

Assuming that for producing one kg. of veal needs about 5 kgs. of starch equivalents , and one kg. of beef, 7 kgs. of starch equivalent, the fodders of increase of irrigated land between 1970-75 (590 th. tons of starch equivalent, Table B.1), can produce an additional 111,320 tons of beef and veal. The already projected increase in beef and veal production between 1970-75, i.e. 13,000 tons (Table XI.3) will feed with only 70 th. tons of starch equivalents. The remaining 520 th. tons can produce 98,320 th. tons more beef and veal, which we assume to come from the establishment of new units and the increase of cattle population.

The question now arises how much the cattle population and beef and veal production can increase in the period 1970-80 and how many new units are required for this increase.

The future increase in cattle population for 1970-75 is estimated by the following formula:

$$C \times W^b + (.43)C \times W^h = 98{,}320 \text{ th. tons beef and veal,}$$

where : C = cattle population W^b = average weight of heifers and oxen projected for 1975, W^h = average weight of calves projected for 1975, (.43) = percentage of new born baby calves to total cattle population projected for 1975.

Solving/

12. See next detail in page

Solving the above equation, we estimated that the increase in cattle population between 1970-1975 is going to be 325 th. heads i.e. a cattle population of 1,525 th. heads in 1975 (average annual increase 4.9 percent for the period 1970-75). On the basis of thisprojected increase in cattle population and the average weight, we find the increase in beef and veal production of new units (Table XI.4) The same procedure was followed for estimation of the increase of beef and veal production of new units in 1980 based on the 1970-80 period.

TABLE XI.4

PROJECTED INCREASE IN CATTLE POPULATION AND BEEF AND VEAL PRODUCTION FROM NEW UNITS

	1975	1980(1)
INCREASE IN CATTLE POPULATION (In thousand heads)	325	550
1. BEEF PRODUCTION (In thousand tons)	7.2	13.8
2. VEAL PRODUCTION (In thousand tons)	18.6	36.6
TOTAL (1 + 2)	25.8	50.4

(1) On the basis of 1970

Then combining the projections of increase of beef and veal production of old units (Table XI.3) and of new ones (Table XI.4) we have the total beef and veal production in 1975 and in 1980 and the total cattle population as well (Table XI.5)

TABLE XI.5

PROJECTED CATTLE POPULATION AND BEEF AND VEAL PRODUCTION

	1970	1975	Average Annual % Change	1980(1)	Average Annual % Change(2)
CATTLE POPULATION (In Thousand Heads)	1,200	1,525	4.9	1,750	3.9
1. BEEF PRODUCTION (In th. tons)	24	34	7.0	44	6.2
2. VEAL PRODUCTION "	58	87	8.5	120	7.5
TOTAL (1 + 2)	82	121	8.0	164	7.2

(1) Estimated on basis of 1970.
(2) For the period 1975-80.

The forecasting of production of other meat products (except cattle meat) was based on the assumption of a fairly stable relationship of the average annual rates of increase in the production of animal feeds and of meat production in the past and these rates will vary among each other by something like 2-3 percent as in the past. (Table B.2 in Appendix B). This procedure gave us an average annual rate of increase of total meat of about 6.0 percent in between 1970 and 1980 period.

There seem to be, of course, possibilities for further expansion of the meat production from improvement of the existing livestock population and of the production methods. The possibilities for expansion of meat production due to further qualitative improvements are not unlimited and are assumed to continue at a relatively lower rate than before in the future (Appendix A, Table A.1). Therefore, continuation of the trends of the past evolution of average weights seems unrealistic particularly for the period after 1975 in view of the achievements already made.

The forecast rates of growth of the other meat varieties are in accomplishment with the rate of total meat growth and are fixed on the basis of rather crude assumptions related with the special conditions in the production of each meat, and the future prospects of particular factors like technological change manufacturing by-products completion of irrigation works, etc.

TABLE XI.6

PROJECTED DOMESTIC PRODUCTION OF MEAT

Kind of Meat	Average Annual Rate of Growth (%)		Volume of Production (Thousand tons)			Percentage Composition		
	1970-75	1975-80	1970(1)	1975	1980	1970	1975	1980
VEAL	8.5	6.7	57	87	120	19	21	22
BEEF	6.5	6.0	24	33	44	8	8	8
LAMB	5.0	4.5	78	99	125	26	24	24
MUTTON	3.0	2.5	36	40	45	12	10	8
PORK	6.0	6.5	54	72	100	18	18	19
POULTRY	7.5	6.5	48	70	96	16	18	18
OTHER	5.0	4.0	3	4	5	1	1	1

(1) provisional estimates.

The/

The rate of growth of poultry production will continue relatively high (7.5 per cent) in the first half of the seventies as a result of rapid expansion of the sector by establishment of new firms so far and will fall thereafter to 6.5 per cent. On the contrary, the rate of growth of pork production will rise slightly in the second half of the seventies as a result of acceleration of restaurants, tourism and by-products of manufacturing industry. The prospects for rise in the domestic stalled sheep production do not seem particularly favourable and this will contribute to the fall in the annual rate of growth of lamb and mutton.

On the basis of the formulated production targets, and the already projected final demand for meat, it is now possible to estimate of the net difference which is required to be satisfied by imports or price increases (Table XI.7). This Table gives also the differences:

TABLE XI. 7

ESTIMATED SURPLUSES AND DEFICITS OF MEAT PRODUCTION AND IMPORT REQUIREMENTS (1) (2)

	1975		1980	
With Rate of Income Growth	4%	6%	4%	6%
Veal	8	28	9	25
Beef	12	17	11	16
Frozen Beef	32	36	40	45
Lamb	+ 9	1	+19	+10
Mutton	+ 3	+ 2	+ 7	+ 6
Frozen Mutton	45	48	57	62
Pork	+12	+ 6	+28	+23
Poultry	15	25	14	27
Other	7	8	8	9
	95	155	85	145

(1) Surplus (+) and deficits without any sign.

(2) Based on the assumption of not future change in inventories in the hands of traders.

Sources: Tables IX.1, IX.2.

between the estimated future demand and domestic production which consist of surpluses and deficits of each kind of meat, which are going to be eliminated either through external trade or price adjustments.

The/

The first observation is that import requirements, if meat price increases are going to be avoided, are not going to increase against the estimated volume of 95 thousand tons in 1970, only with a rate of income growth of 4 percent and they are going to increase only if the rate of income growth exceeds that number. Moreover, if the 4 percent rate of growth is going to continue in the second half of the seventies, the import requirements are expected to be reduced to 85 thousand tons. The latter will come mainly as a result of the fall in income elasticity of demand for meat and the relatively low fall in the rate of growth of domestic production in the period 1975-80 (See Tables IX.1, XI.6).

More specifically, while most meat varieties are expected to have excess demand appearing in Table XI.7 as "deficit" of domestic production against final demand, mutton, lamb and pork will probably generate a "surplus". However, the indicated substitutability of demand for the meats in "surplus" for those in "deficit" (for example, of lamb for frozen beef and frozen mutton, of pork for frozen beef, as can be seen in Table III.2) is expected to offset eventually in part by the relative price mechanism. In other words, allowing for forecasting errors, one can expect that the relative price of lamb, mutton and pork in terms of other meats will fall so that their "excess" supply will be bought by the final consumers. It seems, however, that these readjustments will be "marginal" and will not create particularly serious social or economic problems.

It must be pointed out that it is possible the relative rates of growth of domestic supply and final demand in particular years within the two five-year periods of our projections to be quite different, as a result of short-run variations in the rates of their relative expansion. Therefore, it must not be thought that the problems of the livestock sector are as simple as Table XI.7 shows. Uncertain and in part uncontrolled factors, like weather, animal diseases, etc., can create various problems in the adjustment process of the sector to meet the expanding demand with probably gradually changing consumer preferences.

3. Proposed Policy Measures for the Achievement of the Fixed Targets

A series of policy measures probably required for the achievement of the targets for future meat production are derived in this Chapter. Many of these policy measures could be possibly implemented only after detailed further elaboration for each of them separately. Moreover, policy measures are to be taken after a continuing process of trial and error, and as such can be modified later on. They need to be attended to carefully and to be flexible, i.e. to adjust to changing conditions in the expanding livestock sector in Greece.

Under these conditions, a brief statement of the chief of these measures follows under four heads: measures for the improvement of livestock and production methods; special measures for cattle sector; measures referring to animal feeds and finally measures referring to the marketing of livestock and meat. There is no distinction in these policy measures as to their institutional or structural function, or whether they simply aim at change in the current relative price structure, given the practical purposes of this thesis. There is no distinction also of these measures according to their character and substance or to costs and ease of application.

Measures to affect Factors and Methods of Meat Production

A number of measures proposed in the following consist of further modification of measures already applied. There is no attempt to specify whether each modification is extensive so that to constitute in fact a new measure or not. These measures are in addition, or some in place of, those proposed by the Plan 1968-72[12]. There is no discussion about the particular effect of each measure.

A measure of importance for the whole livestock sector seems necessary to be submitted at the outset. Thus, in view of the variety of the factors associated with the future development of this sector, there seems to be needed constant research and proposals to policy makers about investment, finance and technological advance in this sector. Given this and the present state of operation of the Ministry of Agriculture and of the Agricultural Bank, there seems to be necessary the establishment of a Corporation, which as an independent advisory body will perform this function in Greece. We are not going to discuss the particular problems of setting up such a body, but only some of the problems which seem to make necessary its establishment, namely the main difficulties that the Greek livestock sector faces in its expanding process.

The/

12. See Chapter VIII.5

The proposed new institution will have purely scientific function and as such can be attached to the Center of Planning and Economic Research, which has already a section with a small number of persons for this purpose. By this way, on the other hand, the possible reactions of the Ministry of Agriculture and the Agricultural Bank against the establishment of this advisory body are expected to be minimised. Needless to say, that the results of the research of this advisory body should be published according to its constitutional law, so that both farmers are well informed and policy makers take position on the result of the scientific research. The first measures which this new body will have to deal with may be summarised as follows:

(1) Closer co-ordination of agriculturalists of the Agricultural Bank of Greece, artificial inseminators and vets. of the Ministry of Agriculture and vets. of the Ministry of Health or control all of them by the proposed new Livestock Development Corporation. Municipal authorities and researchers might also serve the co-ordinated effort.

(2) Establishment of regular visits of specialists to main villages at dates known to stock farmers long in advance and preferably at week-ends.

(3) Turning the farmer's training programme towards small improvements probably suitable to the Greek technical and psychological environment. Research on these particular improvements and immediate introduction of subsidy schemes directly tied to the application of each small-scale improvement. Saving labour in existing holdings is of special importance in Greece nowadays[13].

(4) Reduction of the authority of ABG to order arrest of the debtor stock-farmers without previous juridical decision. Establishment of the right of the stock farmers to apply for complaints to a specially established service of the independent body of Livestock Development Corporation.

(5) More careful determination of decisions which abolish favours to stock-farmers (e.g. reduction of subsidy for increasing the weight of cattle from 2 drs./kg. of liveweight to 1.5 drs/kg. for cattle marketed between 300-400 kgs. in 1969). This kind of decision must be implemented with at least a one year lag. Careful research before decision making must replace the system of frequent changes of policy according to circumstances[14].

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13. Hesitation to establish new units and emigration are two main factors contributing to their importance.

14. Thus, the subsidy of 30 percent of value of purchase of improved pigs was referred to 10 sows until 1967 and then it was referred to 500 sows (PL 139/26-3-69) and subsequently it went back to the size of 20 sows for enjoying the subsidy for "model" herd.

Special Measures for Expansion of the Cattle Sector

A relatively large number of problems of the livestock sector are faced with respect to cattle production. Thus, our target is the establishment of an annual number of nearly 3.5 thousand new holdings of 20 cattle in the period 1970-75 and a corresponding number of 5.5 thousand new units of the same size in the second half of the 1970s. In view of the past stagnation of number of units and of the cattle population, there may be here in part a problem of supply of entrepreneurship apart from supply of animal feeds and/or loanable funds on easy terms.

The mentioned decision of granting a definite amount of free money per model herd[15] does not define the concept of a "model herd", a fact which may cause definite inconvenience to the stock-farmer and possibly injustice in some cases, both restraining the effectiveness of this measure on the sector. A pre-condition for this once-and-for-all subsidy is "improvement or extension" of cowsheds and purchasing equipment or concentrates, but it is not specified whether the grant is quite independent of the size of improvement, and who is going to assess, whether some minimum investment has actually been made to get the subsidy.[16] For the cattle particularly the subsidy is 1,000 drs. per head for "model" herd of 5 to 20 heads of cattle. This maximum actually disfavours the old and new, small and large scale holdings.

In fact, the above measure was taken (in June 1969) to favour the stock farmers to expand after late recognition of difficulties of inducing new entrepreneurship despite the optimism of the Plan, particularly in the case of cattle. The minimum of five heads per holding for getting the subsidy means that in view of the distribution of cattle holdings by size, the majority of the cattle owners will not get this subsidy. Therefore, the stock-farmers of small size who have likely greatly contributed in the postwar expansion of the sector are left out of this subsidy. This might be justified in economic terms if the big holdings were expected to be more likely to expand which is hardly guaranteed in view of the experience so far.

The maximum of twenty heads for the last subsidy seems to be particularly a restraining factor for a candidate new stock farmer with ambitious plans for production/

15. See Chapter VIII.1

16. The problem involved in such an assessment seems apparent from the fact that the decision fixes a maximum total amount (drs. 29 million) to be used for these subsidies. See, "Economikos Tahydromos", , 5.6.69.

production of calves through relatively large units, in view of the likelihood of relatively large economies of scale in this kind of meat.

Moreover, this once-and-for-all subsidy does not seem to ensure that a large proportion of the subsidy will be actually invested in stables to expand their capacity. It is supported here that this could be relatively more easily achieved if the existing subsidy of 30 percent of borrowed capital for stable construction would increase for any livestock holding old and new, "model" or not.

It should be stressed that the proposed change may not secure full employment of the stable capacity induced to expand, particularly if the rate of the subsidy in view is going to rise as much as one hundred percent of the investment.[17] The rise in the rate of this subsidy should be however extended also to the purchase of improved cattle, as an incentive for acceleration of the process of further improvement of cattle population (still about one-third unimproved). This inclusion seems a necessary but not a sufficient condition for improvement or further rise in cattle population up to the fixed targets. Thus, there can be a good business for the farmers to buy calves at quite frequent times and sell off after small or not fattening, so as to get the subsidy again by purchase of a new cattle. This phenomenon seems actually to have happened to a certain extent since 1964, when the 30 percent subsidy was introduced, if one takes account of the pervasive stability of cattle production. However, the rate of substitution of traditional breeds by selected ones has been increased somewhat.

It may be, therefore, suggested that the percentage of this subsidy should increase temporarily and the increase in the subsidy be granted only on the condition that the cattle bought will be kept for over a year or otherwise the amount of subsidy be given back. A practical way of application of this might be marking of the cattle bought, through the increased subsidy scheme, by a common mark for each year. Any dealer who buys cattle with the mark of this year or the previous one from a stock farmer will be obliged to withhold some definite percentage of the total value of the cattle, (possibly somewhat lower than the difference of the percentage of the new subsidy from the 30 percent of the existing one, because of fattening in the meantime).

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17. In other words, if any stable investment is free, there may be an extension of the capacity beyond that justified by marginal cost considerations, and consequently waste of capital and possibly underutilisation of it.

A particular problem for the subsidy differential over the 30 percent, if the bought improved cattle are held for longer than a year's time, is due to the fact that the price of veal is fixed by the market 20-30 percent over the beef price. Therefore, the increase in subsidy for improved calves to leave them for cattle must be somewhat higher than 60 percent to be successful (30 percent for purchase of improved calf plus another 30 percent for the higher price of veal than that of beef).

Moreover, there is a case for increase in cattle population from the existing stock-farmer's herd by leaving new born calves for expanding the size of his holding; they should attract therefore the same subsidy, if the breeds which are held are improved. For this purpose, the stock farmer should register the calves to be held with the agriculturalist of the Agricultural Bank of Greece and mark them exactly as those bought outside for the same purpose[18].

It must be further noticed that neither the target of rise in cattle population in the seventies, nor the longer-run policy of expansion of veal production is expected to succeed, if measures are not also taken for improving the fodder marketing. Thus, as the production of fodders expands (Appendix B), there will be an imperative need for securing regular supply of them to stock farmers - living sometimes in long distance from fodder production places, while the new holdings have to be established nearby fodder holdings. Briefly speaking, transport and marketing organisation are to be considered as two sides of the same problem, ie. the distribution of fodders to the stock farmer at minimum charges[19].

A further problem seems to be that the subsidies or the farmers' training programme do not give particular attention to the improvement in the production methods and practices used in the cattle sector and all over the livestock sector. There seem to be available numerous small-scale machinery, which might be possibly applied by the prevailing small holdings for feeding the animals, cleaning the stables, ventilating them, etc. These small scale instruments might be not necessarily compared with the capital intensive techniques used in the United Kingdom or in other Western countries.

The above small-scale machinery is expected to increase its importance in the future/

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18. The agriculturalist should register and mark the animal after application by the stock farmer who will be paid presenting the registration card to the Agricultural Bank.

19. For more detailed discussion of marketing problems in cattle and livestock sector, see E.N. Carpenter, Abattoirs and Marketing, O.E.C.D. (1969).

future, as the limits of expansion in the cultivated fodder area by extension of irrigation works and at the same time in the whole cattle population (in the level areas of Macedonia, Thrace and Thessaly), are going to appear by the late seventies. Allowing for the case of radical technological innovations in the future, further expansion of cattle production without rapidly rising marginal cost will be largely left to minor improvements in the production practices, when the cattle population will reach the level of 1.7-1.8 millions against 1.2 mill. in 1970.

By that time, therefore, the already discussed subsidy may be abolished, although the subsidy of increase in weight may still prevail as an inducement for fattening of calves. It is recollected that this latter subsidy was in the period 1963-1969 2 drs. per kg. liveweight of cattle over 250 kgs. and now is (PL 139/26-3-69) 1.5 drs. per kg. of liveweight paid to farmer for cattle marketed between 300-400 kgs. and 2 drs. per kg. for these marketed with over 400 kgs. liveweight. This liveweight seems to correspond to over the net weight of slaughtered calf (160 kg) and of heifers (200 kgs.) in 1970 (given a roughly 2:1 relationship between liveweight and net weight). This subsidy was apparently introduced to favour the expansion of cattle population and may have therefore to disappear by the late seventies.

Assuming that the potential expansion of cattle population is going to be achieved, any policy in favour of beef will disappear and therefore the market price differential in favour of veal is going to become again effective. Keeping, on the other hand, a single subsidy for fattening will induce the farmer to exploit all the production capacity and its possible marginal changes due to further technological improvements. If then it is possible to fatten more baby calves than those produced domestically, it will be appropriate to import them and to dispose of them to demanding stock farmers. It would possibly be a waste to introduce by then as an alternative, the further establishment of new holdings in mountainous areas, at increasing marginal cost per unit of cattle meat production.

In conclusion, by the late 1970's when use of more fertile land for animal feeds will become limited the possibilities for expansion have to turn to this kind of cattle which has more economies of scale, as veal likely seems to have. In this way the substitution of land for capital and possibly feeds and to a complementary extent veal by imports may take the most efficient combination under Greek circumstances.

Measures for Production of Animal Feeds

(1) Abolishing of the import duty (about 10 percent) for imported animal feeds of high nutritive value for animals (cattle cake and meal).

(2) Increase of subsidies already in operation especially of alfalfa in the irrigated land in order that the revenue may induce fodder producers to increase this production rather than cotton which competes for the irrigated land (enjoying higher subsidy per stremma).

(3) Demonstrations of methods of making corn silage, green chopped corn, and green chopped alfalfa to increase its value as a feed.

(4) Studies of the costs of raising two crops (wheat and corn or barley and corn) in a year on irrigated land and the estimating of the relative returns from the double crop system.

(5) A study in the economic feasibility of establishing an alfalfa dehydrating industry in Greece.

(6) Improved pasture management to raise the amount of feed livestock obtained from grazing.

(7) Feeding practice demonstrations to Greek farmers by the agriculturalists.

(8) Increase in the number of feed mills for mixing and preparing grain. These mills should add protein and feed additives to provide the farmers with the proper rations to get the best possible returns.

(9) Research to continue on the results of various grain mixtures, particularly wheat and barley. These mixtures should include protein supplements and feed additives.

(10) Reseacch to be made on the costs of and returns from feeding and caring for livestock in groups as compared to individual stall feeding and care. As the cost of labour increases, the costs of and returns from enterprises that make intensive use of labours must be examined closely and compared with those of establishments that use labour less intensively.

Measures for Marketing of Meat

The following list presumes as known the marketing conditions of meat in Greece and outlines only the problems which seem to be at the present more of an urgent nature in Greece:

(1) Livestock should be purchased on the basis of their weight. Permanent scales to weigh livestock should be installed at all locations where enough livestock are sold to make it practical. The Ministry of Agriculture should check and test the accuracy of these scales periodically.

(2) Regular information on market prices to villages by local newspapers and radio in order that exploitation and disappointments be minimised. Co-operation of numerous small stock farmers to put them in a stronger position in negotiations with the purchasers[20] seems difficult to be effective under Greek circumstances in the short-run. Improvement in the information mechanism promotes market forces and seems indispensable to reduce some sources of uncertainty of the stock farmers which may have a restraining effect on their investment plans.

(3) Encouraging and legalizing the establishment of privately initiated and managed meat-packing firms at places where they can operate all the year round (Thessaly, Macedonia, Thrace, etc.). This can be done along with promotion of new retailing techniques. It might be combined with changes in laws and regulations to permit the establishment of privately operated slaughterhouses which may include integrated meat-packing business.

(4) The market police to establish a separate and distinct set of regulations for the control of prices on meat that is previously cut and sold packed. These regulations should apply only to those places which sell meat in such a manner.

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20. This proposal was made in the Conference of O.E.C.D. in Dubrovnik, for Mediterranean Cattle, See E.M. Carpenter, Abattoirs and Marketing, Part VII, O.E.C.D., (1969).

APPENDIX A

Forecasting Cultivated Agricultural Land

The total cultivated agricultural land of Greece is estimated to be 37,500 thousand stremmas in 1970, from which 7,052 irrigated land or 18.8 percent of the total and 30,448 dry land or 81.2 percent of the total land.

TABLE A.1.

TOTAL AGRICULTURAL LAND IN THOUSAND STREMMAS

	1970*	%	1975	%	1980	%
Irrigated Land	7,052	18.8	8,330	21.6	9,680	24.8
Dry Land	30,448	81.2	30,170	78.4	29,320	75.2
TOTAL	37,500	100.0	38,500	100.0	39,000	100.0

* Provisional estimates

Sources: For estimates of the Year 1970, Ministry of Agriculture Draft of Agricultural Development Plan 1968-72, Athens 1968, p.49.

The irrigated land in 1967 has been 6,200 th. stremmas. Until then the constructed large scale irrigation works have begun to supply water in the late sixties. According to the Ministry of Agriculture the average annual increase of irrigated land for the period 1967-70 has been about 284 th. stremmas per year and for the period 1971-72 is expected to be 337 th. stremmas annually. According to our estimates of increase in irrigated land, we have assumed that for the period 1970-75 the irrigated land will increase by 337 th. stremmas annually for the period 1971-72 and 200 th. stremmas annually for the remaining years till 1975. Thus, the irrigated land in 1975 is forecast to be 8,330 th. stremmas or 21.6 percent of the total with decrease of the dry land by 278 th. stremmas. This reduction in dry land is assumed to be a shift into irrigated area.

Given that the Plan 1968-72 provides the construction of a number of new large scale irrigation works, the latter is assumed to yield considerably in the late seventies. The irrigated land is expected to be 9,680 th. stremmas in 1980 or 24.8 percent of the total cultivated land. The total cultivated land in 1980 has been estimated on the assumption that the irrigated land will increase by 200 th./

200 th. stremmas in 1976, by 250 th. stremmas in 1977 and by 300 th. stremmas annually during the period 1978-1980. Also, the assumption was made that decrease of dry land between 1975-80 by 850 th. stremmas will be shifted into irrigated land.

APPENDIX B

Potential Production of Animal Feeds

The cultivated fodder areas are estimated to be 10,300 th. stremmas in 1970 against 9,634 th. stremmas in 1966. This land consists of irrigated land, 22 percent, and dry land 78 percent of the total area. It has been also estimated that the yield per stremma of the irrigated land has been 330 kgs. of starch equivalents (s.e.) and the dry land 136 kgs. of starch equivalents[1]. Supposing that improved fodder varieties will be planted, fertiliser used, weed killer and mechanisation will be applied, the assumption has been made that their yields will rise to 410 kgs. of s.e./str. in 1975 and 420 kgs. of s.e./str. in 1980 regarding the irrigated land, and 165 kgs. of s.e./str. in 1975 and 170kgs. of s.e./str. in 1980 as regards the dry land (Table B.1)

Assuming that the whole increase in total irrigated land (Table A.1) will be shifted into fodder production, the total cultivated land by fodders in 1975 is expected to be 11,300 th. stremmas and 12,650 th. stremmas in 1980. This assumption is based on the consideration of a future rise in meat production without substitution for other products, which may involve high opportunity cost.

There is also expected a decrease in land planted with wheat (about 400 th.strs.) to shift to cultivation of vineyards, garden fruits, cotton, etc., as the Plan 1968-72 refers to (p.62). This is expected to be realised up to 1975. Also an area about 350 th. strs. is expected to swing away from wheat to other crops or plantations during 1975-1980 period.

Furthermore, dry land, as it decreases, (Table A.1) is assumed to be transformed into irrigated land.

On the grounds of the areas expected to be cultivated by fodders in 1970, 1975 and 1980, and the corresponding yields per stremma, we estimate the fodder production for these years (Table B.1) As is set forth in Table B.1, the average annual rate of increase of fodder production is expected to be about 4.0 percent/

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1. These estimations of yields have derived from the projections of the Center of Planning and Economic Research, regarding the required feeds for livestock in 1972.

TABLE B.1

PROJECTED TOTAL PRODUCTION OF ANIMAL FEEDS

	1970*		1975		1980	
CULTIVATED FODDERS AREA (In Thousand Stremmas)	10,300	100.00	11,300	100.0	12,650	100.0
Irrigated Land	2,270	22.0	3,270	28.9	4,620	36.5
Dry Land	8,030	78.0	8,030	71.1	8,030	63.5
YIELD PER STREMMA OF (In kg. of s.e.)						
Irrigated land	330		410		420	
Dry Land	136		165		170	
1. PRODUCTION OF FODDERS (1) (In thousand tons of s.e.)	1,842	30.3	2,665	35.9	3,310	37.6
Irrigated Land	750	12.3	1,340	18.0	1,940	22.0
Dry Land	1,092	18.0	1,325	17.9	1,370	15.6
2. PRODUCTION OF GRAZING FROM PASTURES (1) (In thousand tons of s.e.)	3,200	52.4	3,200	43.1	3,200	36.4
3. PRODUCTION OF BY-PRODUCTS (1) (In thousand tons of s.e.)	1,060	17.3	1,555	21.0	2,290	26.0
TOTAL PRODUCTION OF ANIMAL FEEDS (1) (In thousand tons of s.e.)						
1 + 2 + 3	6,102	100.0	7,420	100.0	8,800	100.0

(1) Starch equivalents

* Provisional estimates.

percent during the period 1970-75 and 3.5 during the period 1975-80.

The production of grazing from pastures is not expected to change in the future, as Table B.1. indicates. Although a part of pastures is expected to transform into irrigated land the grazing production is expected to not fall in the future given that in the meanwhile fertilizer, weed killer, etc. will increase somewhat the yield per stremma of the remaining pastures.

The production of by-products of factories for animal feeds is expected to be 1,060 th. tons of starch equivalents in 1970. Taking into consideration the average annual rate of increase of sugar beets, olive oil, cotton (their by-products are fed to animals) since 1967 and the annual rate of increase of the secondary sector provided by the Plan 1968-72 (11-12%), we adopt the assumption that the animal feeds from by-products are going to increase by 8 percent annually. On this basis, their production is going to be 1,555 th. tons of starch equivalents in 1975 and 2,290 th. tons in 1980.

Under the mentioned assumptions, the total production of animal feeds is expected to be 6,102 tons of starch equivalents (s.e.) in 1970, 7,420 th. tons of s.e. in 1975 (average annual rate of increase 4.0 percent 1970-75) and 8,800 th. tons of s.e. in 1980 (average annual rate of increase 3.5 percent during the 1975-80 period.)

On the assumption that there was a fairly stable relationship of the average annual rates of increase in the production of animal feeds and production of total meat in the past and varied each other by about 2-3 percent (Table B.2), we give a picture of these relationships in the following Table B.2 and the projected ones for 1975 and 1980.

TABLE B.2.

RELATIONSHIP OF THE PRODUCTION OF ANIMAL FEEDS TO THE TOTAL MEAT PRODUCTION

Year	Production Of Animal Feeds (In th.tons of s.e.)	Average Annual Percentage Change	Production Of Meat (In th. tons)	Average Annual Percentage Change
1961/2	4,454		182.9	
		4.2		6.8
1965/6	5,245		233.2	
		3.9		5.9
1970	6,102		300.0	
		4.0		6.1
1975	7,420		405.0	
		3.5		6.0
1980	8,800		436.0	

Sources: For the years 1961/62, 1965/66, Tables VI.3, IX.3 of this study have been used, for the remaining years 1970, 1975, 1980, Tables A.1, B.1., and XI.6 have been used.

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