A REVIEW OF THE WORLD

SHEEPMEAT MARKET

AUSTRALIA,
NEW ZEALAND AND
ARGENTINA

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THE AGRICULTURAL ECONOMICS RESEARCH UNIT
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The Unit has on hand a programme of research in the fields of agricultural economics and management, including production, marketing and policy, resource economics, and the economics of location and transportation. The results of these research studies are published as Research Reports as projects are completed. In addition, technical papers, discussion papers and reprints of papers published or delivered elsewhere are available on request. For list of previous publications see inside back cover.

The Unit and the Department of Agricultural Economics and Marketing and the Department of Farm Management and Rural Valuation maintain a close working relationship in research and associated matters. The combined academic staff of the Departments is around 25.

The Unit also sponsors periodic conferences and seminars on appropriate topics, sometimes in conjunction with other organisations.

The overall policy of the Unit is set by a Policy Committee consisting of the Director, Deputy Director and appropriate Professors.

CONTENTS

PREFACE

This volume is the second in a series of five reviewing the world sheepmeat market. Other volumes in the series are as follows: Volume 1 gives an overview of the world sheepmeat market. In this respect Volume 1 can be considered a summary for the whole series. Volume 3 reviews the sheepmeat market in the EEC whilst Volume 4 concentrates on North America, Japan and the Middle East. Volume 5 deals with East European countries.

The present paper (Volume 2) gives a review of sheepmeat production, consumption and trade in the major exporting countries of New Zealand, Australia, and Argentina.

The five volumes of this Discussion Paper form part of the AERU's programme of research in the marketing and international trade area. Other papers relevant to sheepmeat markets published recently by the AERU include Research Report No. 109 by R.L. Sheppard on Changes in U.K. Meat Demand, Discussion Papers No. 51 and 59 by N. Blyth on the EEC Sheepmeat Regime and Discussion Paper No. 52 on Future Directions for New Zealand Lamb Marketing.

P.D. Chudleigh,

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SUMMARY

The majority of the world's sheepmeat exports come from the Southern Hemisphere, where production is based on extensive grazing systems. The three main exporters are Australia, N.Z. and Argentina.

Australia's sheep industry is based primarily on wool production, with mutton generally a by-product. Exports consist of mutton sales to Japan and South Korea and, more recently, sizeable but irregular sales to the U.S.S.R. and the Middle East. Large numbers of live sheep are also exported to the Middle East.

N.Z.'s industry has been centred on lamb production, though wool and mutton are important secondary enterprises. The main market for N.Z. lamb has traditionally been the EEC, in particular the U.K., though reliance on this market has diminished. Sales have been diversified into a number of other markets.

Argentina's sheep industry has declined considerably in recent times. Sheepmeat supply is determined largely by wool prices, and relative returns from beef production. The country's political and economic problems have tended to discourage the industry, and foot and mouth disease is prevalent. Exports have fallen to low levels, but the main markets are still the EEC and the Middle East.

The outlook is for further expansion of exports from N.Z. and Australia, but there is no sign of an up-turn in the Argentinian sheep industry.

1. INTRODUCTION

International trade in sheepmeat is small; only about 12% of world production enters the world market. This trade has traditionally been dominated by the flow of sheepmeat from N.Z. to the U.K. (70% of world trade in 1960). Southern Hemisphere producers are the main exporters, partly due to the seasonality of supply which compliments production in the Northern Hemisphere, and partly because these regions have extensive pasture lands and small populations which permit excess supply to be sold overseas. Exports from the Southern Hemisphere have increased 38% over the period 1960-80. Few new exporters have developed to compete with them to any extent, though the U.K. and East European countries also have expanded exports recently. This paper outlines the market trends and potential in the three main exporting countries: Australia, N.Z. and Argentina.

The Australian sheep industry is based primarily on wool production with meat generally being a by-product of the industry. Trade has largely been the residual of a sizeable domestic demand, but has increased rapidly over the past 20 years. The main export is mutton, the majority of which has been sold directly to Japan (or indirectly through South Korea); more recently large, but irregular sales have been made to the U.S.S.R. and the Middle East. Large numbers of live sheep are also exported to the Middle East.

N.Z.'s industry has been centred on lamb production rather than on wool or mutton, although these are important secondary enterprises. The main market for N.Z. lamb has always been the EEC, in particular the U.K., though reliance on this market has

diminished considerably. Sales have been diversified into North America, Japan, the Middle East and a number of other small markets where heavy promotion has taken place in order to market the growing volumes of N.Z. lamb. Sales of mutton have been concentrated in Japan, the U.S.S.R. and, recently, in the Middle East. N.Z. has no trade in live sheep.

Argentina is the world's third largest exporter of sheepmeat, though there has been a continual decline in the industry for many years. Sheepmeat supply is determined largely by returns from the wool market, as wool is the main product, and the relative returns from beef. Both factors have discouraged sheepmeat production; moreover, Argentina's general economic problems and political unrest have caused a decline throughout the agricultural sector. Foot and mouth disease is still prevalent and sales of Argentinian meat are banned from several countries. Exports have fallen to a low level as a result of these combined factors; the main markets are the Middle East and the EEC, whilst Greece no longer purchases the large quantities that it did previously.

These three exporting countries are considered in more detail in the following sections.

2. AUSTRALIA

2.1 Production

Australia is the second largest sheep-rearing country in the world. It had a stock of 136 million in 1980 (which was around 20% of the world's stock) and is one of the lowest levels recorded since 1960 (Table 1).

The agricultural system is based on extensive grazing. Some regions such as the arid areas of central and north Australia are only suitable for cattle or sheep; the rest is favourable for either, or crop production, or dairying.

In the wheat-sheep zone livestock enterprises are generally closely integrated with cropping activities. Aggregative economic studies of supply suggest a competitive relationship between the two (Gruen et al; 1967; Mules, 1973; Smith & Smith, 1979; Vincent et al., 1978; Ryan, 1976). These results are supported by some linear programming studies of supply relationships (Powell and Gruen, 1967; Longmire et al., 1978).

Within the livestock sector, the relationship between cattle and sheep enterprises is complex, and influenced by many factors (Wills & Lloyd, 1973). At the aggregate level, sheep and cattle can be considered alternative, competing enterprises. This is supported by the results of a number of econometric studies of supply of beef, wool and sheepmeat in Australia (Gruen et al. 1967; Freebairn, 1973; Reynolds and Gardiner,1980; Throsby and Rutledge, 1977). During the 1970's there has been a tendency to develop mixed farming and cattle, at the expense of sheep rearing.

The relationships within the individual enterprises are

TABLE 1

Australia: Production Statistics

Year	Sheep Slaughter (million head)		Production Sheepmeat Kt	Production All Meat Kt	Sheepmeat as % of all Meat
1960	155.1	32.3	568.0	1,454	39
1961	152.6	32.7	586.3	1.650	35
1962	157.7	34.1	604.6	1,786	34
1963	158.6	32.8	590.3	1,852	32
1964	164.9	33.5	594.4	1,900	31
1965	170.6	32.5	574.1	1,858	30
1966	157.5	34.5	620.8	1,797	34
1967	164.2	35.7	640.1	1,920	33
1968	166.9	36.5	653.3	1,986	32
1969	178.6	39.9	730.5	2,177	33
1970	180.1	42.7	769.2	2,325	33
1971	177.8	50.1	908.4	2,625	34
1972	162.9	49.1	866.6	2,698	32
1973	140.0	32.0	569.9	2,297	24
1974	145.2	25.3	468.0	2,584	18
1975	151.6	30.2	547.8	2,978	18
1976	148.6	33.6	591.8	3,158	18
1977	135.3	30.5	537.7	3,320	16
1978	131.4	27.4	492.1	3,517	14
1979	134.2	29.2	526.1	3,310	16
1980	136.0	29.5	517.0	2,800	19

* Estimated.

SOURCE: USDA

also complex, and not readily analysed. The relationship between wool, mutton, lamb and live sheep for export is particularly complicated. (Studies which provide information on these relationships include those given above, and also BAE, 1971; Watson, 1970; Cornell and Hone, 1978).

Sheep farming in Australia specialises largely in wool production; flock size is governed by wool prices, and the relationship between beef and wool prices in the long-run. Sheepmeat production plays a secondary role, though mutton and lamb prices, in the short-run, are responsible for changes in flock composition.

Thus the number of sheep slaughtered varies inversely with wool prices; estimates are given in Table 2 for the supply response of lamb production to changes in the price of other commodities. No estimates appear to have been made for mutton production, though most of the fluctuation in output can be determined as a function of the number of adult sheep shorn, and a drought mortality index (Gruen et al., 1967).

TABLE 2

Estimated Sheepmeat Supply Elasticities

		Supply Response To:			
		Own-Price	Dairy Price	Wool Price	Beef Price
Gruen (1967)	Lamb	+0.25	-0.2	-0.05	-
Regier (1978)	Lamb	+0.32	-0.2	-0.12	-
Hall (1977)	Sheepmeat	+0.59	-	+0.18	-0.23
Hall (1981)	Sheepmeat	+0.16	-	-0.18	-0.95

A major factor affecting sheep numbers is seasonal weather conditions; several of the sharp falls in numbers (Table 1) were a result of severe droughts in 1965-6 and 1972-3. It appears as if sheep numbers will fall again through 1980, despite projections of an increase to 160 million by 1985 (FAO, 1979; BAE, 1979).

Because of susceptibility to drought, the hardier breeds of sheep are kept (mainly Merinos), although some change to cross-breeds takes place, depending on the relative prices of wool and mutton. Production aspects of the pastoral industries are described elsewhere (Alexander and Williams, 1973; McCarron, 1975; Watson, 1970) as are the structural and productivity changes that are taking place in the sheep industry (Easter, 1974; Lawrence and McKay, 1980). In the past, little emphasis has been placed on achieving high standards of carcass quality, though towards the end of the seventies, the ratio of lamb to mutton produced has risen from 2:3, to almost 1:1 (Table 3). Both export and domestic demand have given stimulus to increased production of higher quality lamb; mutton production has fallen despite the strong export trade in mutton because of lower sheep numbers, and growing exports of live wethers.

Total production of sheepmeat over the period 1960-80 has shown wide fluctuations (Table 1), peaking at 900 Kt in 1971, and with the lowest level in 1974 at 460 Kt. As a proportion of all meat produced, sheepmeat has declined from 39% in 1960, to 16% in 1980, mainly due to increases in beef production.

Over this period, lamb production has been more stable

TABLE 3

Australia: Production and Consumption of Lamb and Mutton

(Kt)

Year	Production		Consumption	
	Mutton	Lamb	Mutton	Lamb
1960	373	210	298	180
1961	374	222	266	206
1962	368	234	253	206
1963	366	228	241	208
1964	367	227	235	200
1965	396	213	240	192
1966	355	241	219	226
1967	419	246	225	234
1968	372	308	232	263
1969	441	313	211	267
1970	470	355	249	302
1971	596	360	263	315
1972	435	278	193	244
1973	228	237	174	215
1974	216	252	111	233
1975	293	256	109	226
1976	329	263	71	218
1977	288	250	116	221
1978	235	258	36	198
1979	264	265	86	212
1980	270	247	47	204

SOURCE: ABS

than mutton, peaking in 1971 at 360 Kt with a downward trend since (this is distinct from the seasonal fluctuations, as analysed by Bain and Hean, 1972). Mutton being essentially a by-product of the industry, has fluctuated more widely between 216 Kt and 596 Kt (Table 3).

In making projections of production in the Australian sheep industry, three factors are important. Firstly, the production rate per head is unresponsive to price : decisions to change output imply a change in flock size. Secondly, animals have a dual role in production, particularly breeding stock, of either investment in future production, or as part of current turn-off. Thirdly, there is an extended lag in the production process, which gives a 5-6 year period to make full adjustment to sheepmeat price changes (Gruen et al., 1967).

Using an econometric model, estimated from supply in 1950-78, the BAE (1979) project a gradual increase in sheep numbers to 1983, given reasonable weather conditions. Lamb output is projected to return to previous high levels of 330-360 Kt, but mutton production is likely to remain unchanged as the slaughter-rate of adult sheep declines. Assuming an export of 5 million live sheep, total production is forecast to be 760 Kt in 1983. FAO (1979) project a similar trend to 1985, with sheep numbers of 165-168 million, and a total output of 774-780 Kt. The drought in 1979-80 makes it unlikely that these levels will be achieved, as there has already been an estimated 12% fall in production in 1980-81.

2.2 Consumption

Per capita meat consumption in Australia is the highest in the world at 130 kg in 1975, though it fell slightly in the late 1970's (Table 4) as a result of higher prices for beef and sheepmeat. In the 1960's 80% of production went to domestic consumption; this fell to 50% in 1980, as production increased faster than consumption. A similar trend has occurred in the proportion of sheepmeat consumed, though this results from a fall in demand, not a rise in production.

Sheepmeat, as a percentage of all meat consumed, has fallen from 43% to 20%, as per capita consumption of mutton and lamb has fallen sharply from 46 kg in 1960, to around 20 kg in 1980. Total sheepmeat consumption has fallen less sharply, due to the population growth of 1% per annum (14.6 million in 1980), giving a total consumption of 322 Kt.

Since 1970, changes in the inflation and income growth rates have caused these structural changes in the domestic meat market; analysis of factors affecting demand for particular meats is likely to show different relationships to those in the 1960's, so only more recent studies will reflect this. Table 5 gives details of econometric studies of demand for lamb and mutton.

Estimates of the price elasticity of demand for both lamb and mutton tend to lie between -1.5 and -2.0, indicating that demand responds more than proportionately to a change in own-price. There was less agreement about the response of demand for lamb, when the price of mutton changed, and vice versa; estimates of cross-price elasticities with beef lay in the range of 0.5 to

TABLE 4

Australia: Consumption Statistics

Year	Population (million)	Consumption				Sheep-meat as % of all Meat
		Sheepmeat		All Meat		
		Total (Kt)	Per Capita (Kt)	Per Capita (Kt)	Total (Kt)	
1960	10.3	473.0	46.0	105.9	1,101	43
1961	10.6	462.8	44.3	109.6	1,166	39
1962	10.8	459.4	42.6	110.1	1,194	38
1963	11.0	444.0	40.6	110.0	1,216	36
1964	11.0	432.9	38.6	106.3	1,199	36
1965	11.5	416.0	37.5	104.0	1,197	34
1966	11.7	435.8	38.0	102.4	1,199	36
1967	11.9	461.5	38.5	106.3	1,268	36
1968	12.0	467.5	40.8	110.9	1,347	34
1969	12.2	486.2	38.5	108.3	1,343	36
1970	12.5	481.8	43.5	116.1	1,469	32
1971	12.9	544.4	44.7	119.5	1,541	35
1972	13.2	555.3	33.4	110.4	1,444	38
1973	13.3	366.3	24.1	100.6	1,335	27
1974	13.6	353.0	27.1	127.5	1,718	20
1975	13.7	343.3	25.4	122.3	1,775	19
1976	13.9	320.5	23.5	124.9	1,762	18
1977	14.1	273.9	19.9	125.9	1,735	15
1978	14.2	247.0	17.1	120.6	1,697	14
1979	14.4	280.0	20.8	106.8	1,548	18
1980	14.5	322.0	17.9	107.1	1,563	21

SOURCE: UN, USDA.

TABLE 5

Australian Sheepmeat Demand Studies at Retail Level

Year	Researcher	Product	Elasticities							Data	Period
			Own-P	Lamb	Mutton	Beef	Pork	Chicken	Income		
1963	Taylor	L	-1.80							1949/50-	A
		M	-1.20							1950/60	
1965	Taplin	L	-1.50							1951-64	Q
1967	Marceau	L	-2.07		-0.60	0.48			0.14	1951-63	Q
		M	-1.09	0.79		1.24			0.01		
1967	Gruen et al.	L	-1.55		+0.24	0.50			0.83	1949/50-	A
		M	-1.38	0.28		1.20			-1.73	1964/65	
1967	BAE	L/M							0.15	Cross Section	
1971	Papadopoulos	L	-1.30		-0.48	0.87			0.26	1962-70	Q
		M	-2.13	1.29		1.07	0.26		-0.72		
1974	Greenfield	L/M	-0.61			0.95	0.34	0.43	-0.51	1955-72	A
1976	Main et al.	L	-1.89		+0.48	0.64	0.91		-0.14	1962-75	Q
		M	-2.02	0.91		0.51	0.95		-0.96		
		L/M	-1.24			0.52	0.91		-0.49		

L = Lamb
M = Mutton
A = Annual
Q = Quarterly

0.8 for lamb and 0.5 to 1.2 for mutton. Only three studies showed any relationship between demand and the price of other meats; these were the more recent estimates, which could imply that consumers are becoming more conscious of prices of substitutes, and more flexible in their eating habits.

A similar pattern is seen in the estimates of income-elasticity of demand for lamb, mutton and sheepmeats : earlier studies tend to give low, but positive numbers for lamb, and negative numbers for mutton. Later studies suggest that the demand elasticity for both has become negative. Again, there is likely to be greater change in mutton-demand as incomes change, as the lamb elasticity is low.

Generally the demand elasticity for sheepmeats appears to be -0.5, which would give markedly different consumption patterns to those forecasted by FAO (1979) using an elasticity of zero.

From the above, and Table 3, it can be noted that lamb and mutton in Australia are considered to be different meats, each showing distinct trends. Lamb consumption was lower than mutton consumption in 1960 (18 and 29 kg per capita respectively). Mutton consumption has declined steadily to 4 kg (1980), whereas lamb consumption rose to 23 kg in 1971, but then fell to 18 kg in 1980. Domestic consumption of mutton is only 20% of production, whereas lamb takes over 80%, and is even imported periodically.

Projections of demand, assuming no further changes in taste (BAE, 1979), imply a small increase in lamb consumption to 18.2 kg (1982-3) but that mutton consumption will fall slightly to 3.4 kg. This gives a total per capita sheepmeat consumption of 21.6 kg,

which is similar to that in 1980.

Total consumption, with a population of 14.5 million is projected to be 50 Kt and 270 Kt for mutton and lamb respectively which gives a total demand of 320 Kt for sheepmeats in 1982-83.

FAO (1979) project a slightly lower consumption level of 270-80 Kt or 16.9 - 17.8 kg per capita by 1985.

2.3 Prices

Sheepmeat prices in Australia are largely determined by the interaction of supply and demand on domestic and overseas markets : there is little Government interference in either Australia or in the main markets to which it exports.

Table 6 shows trends in saleyard and retail prices for mutton and lamb. Wholesale prices for both have increased three-fold between 1960 and 1980, whilst retail prices have increased almost four-fold. However, since 1960 there has been a long term down-trend in real prices; an up-turn is projected after 1980.

Prices of mutton and lamb are determined by different factors, and the relative importance of the factors varies over time. Export prices have been estimated to play a dominant role in determining moves in lamb prices in the flush season of lamb production (BAE, 1973; Bain, 1972; Bain & Hearn, 1972). In the off-season, domestic market influences have a large impact on price movements, as over 80% of production is sold locally. As exports have increased (e.g. trade with the Middle East), the influence of export demand on lamb prices has increased.

There is less evidence available on the impact of supply and demand on mutton prices. Available information suggests that, due to a consistently high proportion of mutton output exported, the major factors determining moves in price, are the export prices for live sheep and mutton. However, the change in domestic supplies of adult sheep for slaughter are also important (BAE, 1979; Bain, 1972) this was particularly so in the late 1970's when numbers fluctuated sharply in response to changes in wool prices, and seasonal conditions. As discussed above, the relative price moves of beef and lamb have an influence on domestic demand for mutton, but the effect is probably less marked than the export price or the supply effects.

Average export values of mutton and lamb are consistently lower than domestic prices, though tend to vary by a similar amount. No analysis has been done to see whether prices fluctuate more, or less, as export volumes increase. It has been suggested that they will vary more widely, as the international markets which play a dominant role in determining prices received are either residual markets (such as Russia, which purchase in times of shortfall in domestic supply), or are highly unstable (e.g. the Middle East), and therefore more volatile than domestic markets (BAE, 1979). Also, Australian exports are likely to face greater competition as they move away from mutton, and into the lamb trade. Competition will increase if the EEC VRA quotas become binding and hence reduce the size of the "world market". The resulting influx of N.Z. and possibly East European lamb onto the world market could have a significant price dampen-

TABLE 6

Australia: Mutton and Lamb Prices

(¢/kg DCW)

Year	Saleyard		Retail	
	Mutton	Lamb	Mutton	Lamb
1960	24.3	42.8	44.1	76.4
1961	17.4	33.3	44.3	76.8
1962	18.1	39.9	43.3	75.8
1963	24.7	42.1	44.6	77.3
1964	28.2	47.4	48.6	82.1
1965	27.1	49.8	56.4	98.1
1966	78.2	43.7	60.8	95.2
1967	24.5	48.7	61.9	96.0
1968	25.6	37.3	59.7	90.0
1969	21.8	39.5	59.6	91.3
1970	16.3	37.3	63.0	97.2
1971	15.5	35.7	65.7	98.1
1972	21.5	40.1	66.4	101.2
1973	53.2	69.6	107.7	145.8
1974	35.3	68.5	118.9	170.9
1975	15.3	59.4	99.6	164.3
1976	19.1	61.2	110.5	183.8
1977	39.2	73.0	126.5	210.6
1978	52.7	87.8	146.0	243.1
1979	72.6	112.4	182.9	304.6
1980	75.0	135.0	217.0	354.0

SOURCE: ABS

ing effect on the other major markets, which would be reflected in Australian prices at all levels.

2.4 Trade

After New Zealand, Australia is the world's second largest exporter of sheepmeat, and has around 20% of the world export market (Table 7). Exports have doubled over the period 1960-80, peaking in 1976 at 285 Kt; exports in 1980 were 238 Kt. The proportion of production traded has also increased from 18% in 1960 to 44% in 1980. Fig. 1 shows that despite the overall increase, there have been wide fluctuations in exports in the early 1970's, as production varied.

Fig. 2 shows total sheepmeats divided into production and exports of mutton and lamb. Mutton trade, as discussed above, accounts for more of production (up to 80%) than does lamb trade (20%). Mutton exports are much larger than lamb exports (178 Kt and 41Kt respectively in 1980) and have increased more over the period 1960 to 1980 (456% and 52% respectively).

There have been large changes in the pattern of this trade in lamb since 1974 (Table 8), and in mutton since the late 1960's (Table 9). Prior to this change, 70% of Australian lamb went to the U.K., with small quantities going to the U.S. and Canada. After 1973, demand from the U.K. decreased (when it became a member of the EEC) and demand from the Middle East countries increased. Middle East countries now take up to 96% of lamb exports, with the main market being Iran.

A change in the pattern of mutton exports is also apparent :

in 1960 there were many small purchasers, but these markets disappeared as incomes rose, tastes changed, and countries such as Canada, Greece, the U.S.A. and the U.K. no longer needed cheap, bulk meats. Mutton trade was consolidated into a few large markets over this period, especially since 1974. The increase in exports has been concentrated in Japan, South Korea and the Middle East. Again, in the Middle East, Iran is the main importer.

Japan and Korea together account for 75% of Australian mutton exports : most of the meat is used in manufacturing hams and sausages, but it is difficult to tell how much is actually consumed in Japan as re-exports from Korea. There are problems involved in the use of mutton for manufacturing, which makes it preferable to use beef or pork, so there is a large degree of substitution depending on relative prices (Bowtell, 1978).

This important trade makes Australia the world's largest exporter of mutton and Japan the largest importer. The U.S.S.R. makes infrequent but substantial purchases of mutton from Australia, accounting for 10-43% of trade in those years (Table 9).

Australia is also the world's largest exporter of live sheep; in 1960 this trade was less than 200,000 head, which were sent mainly to Singapore. By 1972 the number had increased to over 1 million per annum as trade with the Middle East grew : it increased further, to 1.7 million head in 1976, and to 5 m in 1980 (which is 120 Kt carcass weight equivalent of sheepmeat). (For details and prospects of this trade see Cornell and Hone, 1978; Neil, 1974; Laurie, 1975).

TABLE 7

Australia: Export Statistics

Year	Total* Exports (Kt)	Exports** Mutton (Kt)	Exports** Lamb (Kt)	Exports as % of sheepmeat production	Australian* exports as % of world trade
1960	101.7	32	27	18	21
1961	125.9	38	29	21	23
1962	144.1	49	17	24	25
1963	145.8	62	26	25	26
1964	156.0	68	19	26	26
1965	162.8	74	25	28	27
1966	185.7	80	16	30	28
1967	169.0	80	15	26	26
1968	193.2	105	9	29	27
1969	238.5	76	29	32	30
1970	282.3	136	42	37	34
1971	367.0	131	44	40	40
1972	318.3	180	37	37	37
1973	189.6	131	29	33	27
1974	123.3	98	14	26	20
1975	194.0	162	32	35	26
1976	285.0	247	38	48	27
1977	271.5	235	37	50	32
1978	244.8	124	46	50	30
1979	213.0	120	47	40	25
1980	238.0	178	41	44	27

* SOURCE: USDA (carcass weight; excludes live animals).

** SOURCE: BAE (product weight; therefore may not be compatible with total export data).

FIGURE 1

Australia: Sheepmeat Market Trends 1960-80

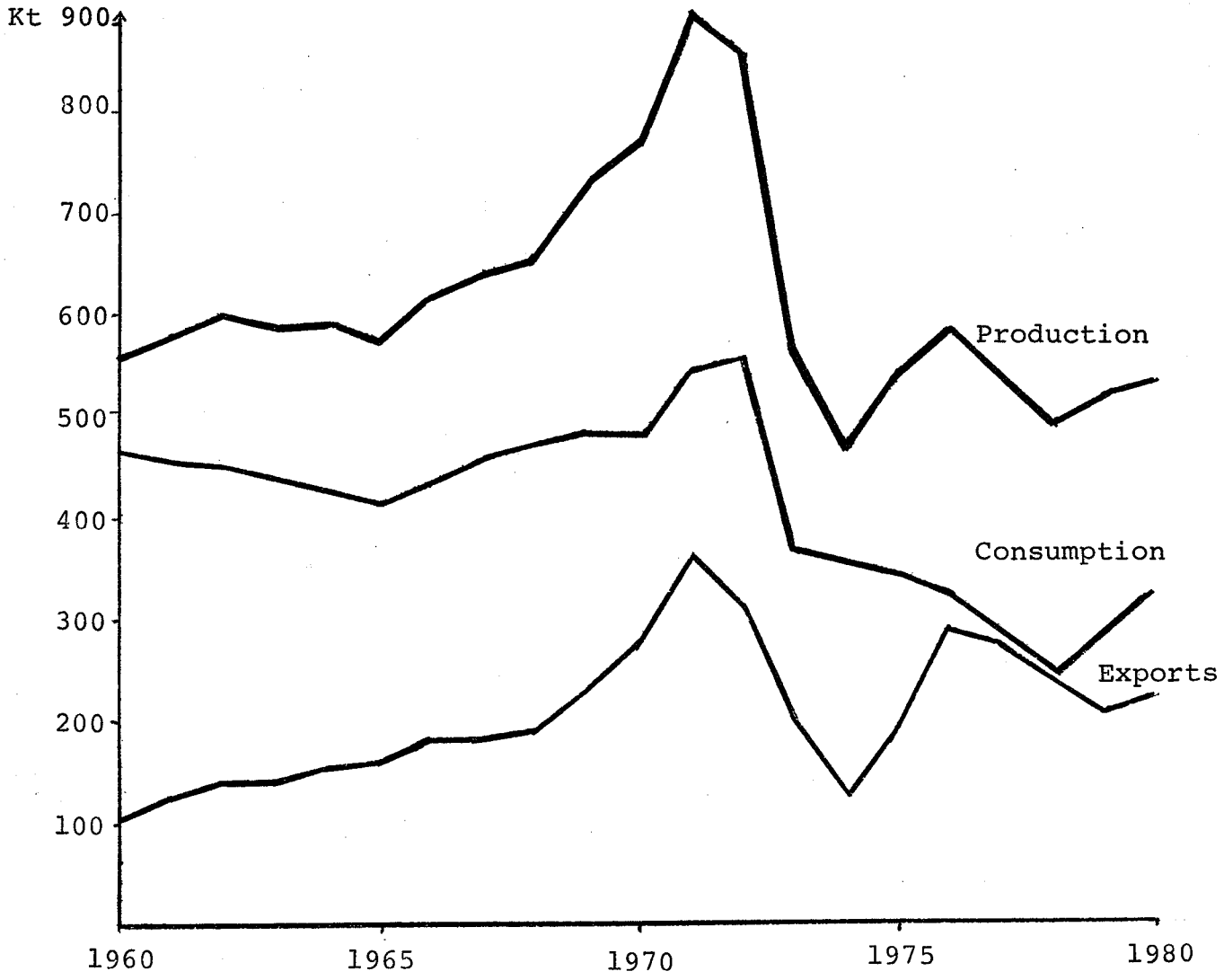


FIGURE 2

Australian Production and Exports of Mutton and Lamb

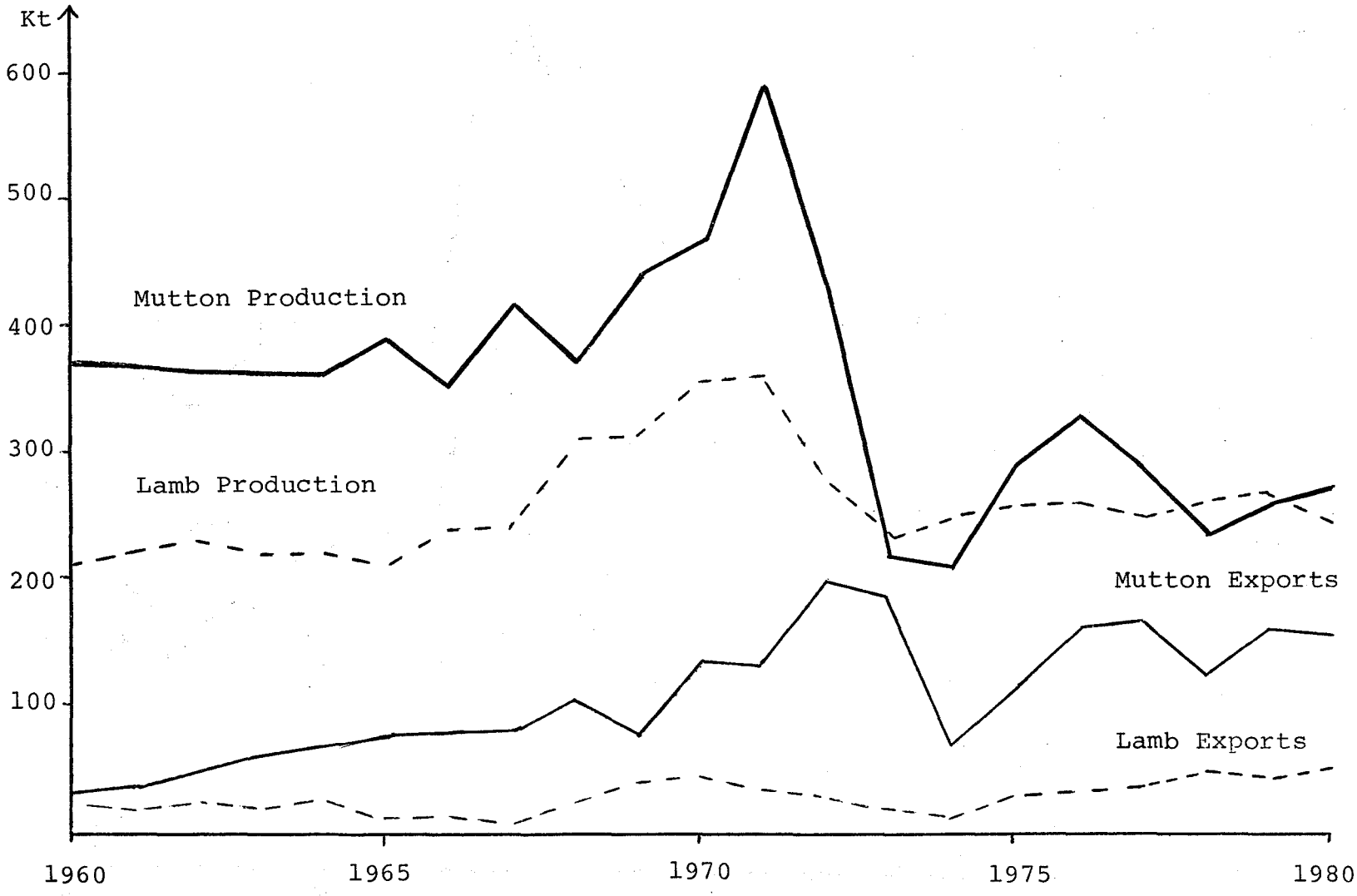


TABLE 8

Australia: Lamb Exports by Destination

(Kt)

Year	Total	U.K.	Canada	U.S.A.	Other	Middle East
1960	29	20	3	3	3	
1961	17	12	1	1	2	
1962	26	17	2	4	2	
1963	19	13	1	1	4	
1964	25	17	2	1	4	
1965	16	9	3	2	3	
1966	15	4	6	1	3	
1967	9	3	2	2	3	
1968	29	14	6	7	2	
1969	42	17	11	10	3	
1970	44	19	6	13	6	
1971	38	14	7	8	9	
1972	32	15	4	4	9	
1973	20	12	3	2	3	
1974	14	3	3	2	1	6
1975	32	2		3	3	24
1976	34	2		3	3	26
1977	35	1		1	3	33
1978	46	10		4	4	27
1979	47	2		6	8	31
1980	43	1		1	10	32

SOURCE: ABS

TABLE 9

Australia: Mutton Exports by Destination

(Kt)

Year	Total	U.K.	Canada	Greece	Japan	U.S.A.	M. East	Other*	U.S.S.R.
1960	33	10	2	1	1	14	1	4	
1961	38	8	4	1	2	17	1	5	
1962	49	7	8	2	2	23	1	5	
1963	62	7	12	1	4	32	2	4	
1964	68	5	10	4	19	20	4	5	
1965	74	12	8	15	17	9	5	8	
1966	80	4	10	4	26	27	4	5	
1967	81	5	13	3	28	22	4	6	
1968	105	7	15	2	41	33	3	5	
1969	76	4	16	1	23	22	4	6	
1970	130	12	28	5	45	25	10	12	
1971	131	17	3	15	40	10	4	12	
1972	201	15	19	29	68	24	10	26	30
1973	188	8	15	11	79	12	11	17	10
1974	72	4	10	4	31	3	15	6	
1975	113	5	9	3	69		19	8	
1976	162	12	5		95		28	20	2
1977	165	1	3		91		25	29	16
1978	125	3	7		63		26	26	
1979	120	3	4		58		15	39	1
1980	178	1	2		41		32	26	76

* To South Korea: 1976 = 10 Kt; 1977 = 20 Kt; 1978 = 14 Kt; 1979 = 18 Kt; 1980 = 5 Kt.

SOURCE: ABS

Little work has been done on determining the factors affecting the supply of live sheep and sheepmeat for export to the Middle East, though the ability of the Australian sheep industry to meet the world's rising demand for exports has been assessed (Cornell & Hone, 1978; Cornell, Haszler & Hone, 1978; Williams & Gardiner, 1978; Throsby & Rutledge, 1977; Park, 1977). The conclusion appears to be that Australia can increase its exports, especially to the Middle East, by altering the product-mix of sheepmeats, rather than adjusting traditional production levels.

The volume of sheepmeat exports from Australia is considered to be supply determined (i.e. as a residual of domestic demand) in the short-run; which assumes that the short-run supply curve is inelastic and shifts as a result of exogenous factors, such as weather conditions (McCarron, 1975). Studies which examine the short-run determinants of exports, show that export supply is determined by a) the level of past prices b) domestic supply and demand c) the volume of exports from competing suppliers and d) regular seasonal influences. For more detail on the latter, see Bain and Hearn (1972) and NZMPB (1977). A later study (Rutledge and Throsby, 1977) also shows that the quantity of exports of sheepmeat is responsive in the short-run to world prices. The responsiveness will increase as exports come to form a more significant part of disposal, and if some discretion is possible in timing of marketing. It has been estimated that there is a lag of 5 quarters before export prices affect production, but of only one quarter before domestic price changes affect production.

The gross revenue from exports has increased over the period by more than the volume of exports, indicating a rise in unit-value. A study of price and volume variations (Motha et al., 1975) showed that the volume of exports fluctuated less in the period 1960-73 than it did previously, and that in the same period prices were responsible for a similar amount of variation in total revenue.

Projections for exports to 1983 (BAE, 1979) estimate that mutton exports will decrease from the 1978 level and be similar to those in 1980. Any extra lamb produced is likely to be consumed domestically, not exported, and live sheep exports are expected to be around 110Kt (carcass weight equivalent). This gives a total sheepmeat export of 400Kt, which is close to that in 1980.

FAO (1979) projects much higher exports for 1985, of 490-520Kt, which is 34% of projected world trade in that year.

3. NEW ZEALAND

3.1 Production

New Zealand is one of the world's largest producers of mutton and lamb (Table 10), ranking third in importance after Australia and the U.S.S.R., and is by far the world's leading exporter of sheepmeats - particularly lamb - accounting for over 70% of recorded world trade.

The New Zealand economy relies heavily on export income and over 80% of the total value of the country's exports is derived from products of animal origin : meat contributes a growing proportion of this, and accounts for around 30% of export earnings (N.Z. Meat and Wool Boards' Economic Service, 1980).

The meat industry makes a substantial and increasing contribution therefore to gross farm incomes of which around 33% is from sheepmeats (NZMPB 1979). The importance of this sector relies on New Zealand's ability to grow grass. Some 20 million of the country's 26.9 m hectares are farmed, but it is difficult to estimate the actual area used for sheep alone as the typical New Zealand farm has several enterprises. This may include sheep or cattle (for either breeding or fattening), cropping or dairy farming. Most sheep however, are kept on extensive "principally sheep" holdings, with an average of 1,700 head per farm, and use little labour. The various types of farm, their output, complementarity and profitability have been discussed elsewhere (Brabyn, 1978; MAF, 1980; McClatchy, 1974).

Fifty three percent of New Zealand's sheep are kept in the

North Island, with the main regions being Wellington, Hawke's Bay and Bay of Plenty/S. Auckland area. In the South Island, which is mainly hill-country, Canterbury is the most important sheep region and supports 20% of the national flock on its plains and foothills.

The Romney is the main sheep breed, constituting 45% of the flock, and Romney, Coopworth and Perendales account for 80% of the sheep in N.Z. Romney lambs, together with wether lambs from long wool breeding flocks, and lambs produced by cross-bred ewes mated to Southdown/Down type rams, form the basis of the lamb export industry. Corriedales and half-bred sheep make up 10% of the flock : Merinos (5%) are mainly confined to the high country of the South Island.

The majority of sheep are from dual-purpose breeds, so returns from wool account for 35% of gross farm income, though the proportion varies greatly according to wool prices (Chudleigh & Filan, 1976).

Beef and veal production have become more important than production of sheepmeat since 1960 (Hardie, 1974) as resources moved out of the dairy sector and into the beef cattle industry. Nevertheless, the period has generally been one of expansion in sheep numbers although there was a period of decline after 1971. Table 10 shows the increase in sheep from 47.1 million in 1960, to 68.7 million in 1980, an average annual increase of 1.6%. The first major growth period in sheep numbers, after 1948, coincided with the introduction of aerial top-dressing (Woodford & Woods, 1978); the lower growth rate from 1968-75 coincided with

TABLE 10

New Zealand: Production Statistics

Year	Sheep Slaughter (million head)		Production (Kt) Mutton*	Lamb*	Total	Sheepmeat as % of all Meat	Production of all Meat (Kt)	N.Z. Sheepmeat as a % of World Production
1960	47.1	26.6	172	276	448	58	772	7
1961	48.4	26.2	171	285	456	58	777	7
1962	50.1	28.5	178	294	472	56	844	7
1963	51.2	27.5	168	295	462	54	850	7
1964	53.7	29.0	179	309	487	55	876	7
1975	57.3	28.5	172	303	475	56	847	8
1966	60.0	28.1	152	317	469	55	854	8
1967	60.5	31.7	188	332	520	57	920	7
1968	59.9	35.6	216	350	566	56	1,018	7
1969	60.3	35.5	199	362	562	54	1,047	7
1970	58.9	36.5	199	362	562	55	1,072	7
1971	60.9	36.3	204	358	563	53	1,076	7
1972	56.7	36.4	195	378	574	53	1,108	7
1973	55.9	37.0	215	341	556	50	1,124	7
1974	55.3	31.7	192	304	497	50	1,024	7
1975	56.4	32.5	160	329	490	45	1,120	7
1976	57.8	32.6	151	356	508	41	1,269	7
1977	59.1	32.4	170	350	520	47	1,188	7
1978	62.1	34.1	159	342	501	42	1,186	6
1979	63.5	33.4	163	351	514	46	1,119	7
1980	68.7	35.3	175	390	559	48	1,165	7

* BAE

SOURCE: USDA, NZMPB.

a prolonged period of difficult climatic conditions, economic uncertainty and a severe cost-price squeeze. Since 1975, new confidence has been instilled into the sheep industry : wool and sheepmeat prices improved relative to beef prices, and sheep numbers increased at 3% per annum.

This change in sheep numbers is important as, apart from small changes in animal performance, it is directly related to changes in annual meat production (with an adjustment lag, if stock-levels are to be maintained).

Several econometric models have therefore been developed to investigate and quantify factors influencing sheep numbers on farms (Rowe, 1956; Court, 1967; Rayner, 1968; Woodford and Woods, 1978; Rich, 1978). The early studies failed to explain adequately more recent changes in stocks. Rich measures the relationship between beef and stocks, and the long run response to economic conditions. Woodford & Woods, however, conclude that the main influence on stock numbers held in the short run is the annual variation in feed availability.

Though the numbers of lambs and adult sheep slaughtered annually has increased 26% and 51% respectively since 1960, the slaughter rate has remained steady (hence the usefulness of relating sheep numbers to production, to explain or project changes in the latter).

New Zealand's sheepmeat industry is geared to the export market, thus, export returns largely determine domestic sheepmeat prices (see Section 3.3 for further detail). The export lamb season begins in late October, with peak slaughterings in January/

February, and ending in May/June (with, of course, considerable regional variation (Johnson, 1970)). The slaughter of cull ewes tends to follow a similar path, but the peak in mutton production occurs in March, as the lamb kill begins to decline. Hogget slaughter for the domestic market occurs regularly throughout the year.

Sheepmeat production increased from 448 Kt in 1960 to 574 Kt in 1972 (Table 10) but then declined to 529 Kt in 1980. This gives a total increase of 18% over the period. Sheepmeat has declined relative to the production of other meats in New Zealand (Table 10) though it is still the most important meat in terms of tonnage.

Mutton production increased through the 1960's from 172 Kt to 215 Kt in 1973, but declined to 175Kt in 1980. Lamb production increased much more over the period (and was twice as great as mutton production at 390Kt in 1980) though it followed the same pattern of increase up to 1973 and decline after 1973. As a result of the more favorable outlook in the world market, and Government encouragement in recent years, production rose to record levels in 1980.

The Government has always been active in encouraging land development and improvement in New Zealand, as agriculture is so important to the economy. Various aids and incentives are given to increase productivity and output, several of which directly affect the sheep industry (such as fertiliser subsidies, a live-stock retention scheme, wool deficiency payments) (for further details see Brabyn, 1978). In 1978 a system of Supplementry Minimum Payments was introduced to guarantee producers a minimum return for their sheepmeat in the following seasons.

The outlook for sheepmeat production in New Zealand is for a small, but steady expansion into the 1980's (BAE, 1979; Taylor, 1980). FAO (1979) projected a large increase in sheep numbers to record levels of 68.5 - 70 million, by 1985. With off-take and carcass-weights similar to 1980, this gives an output of 642-656 Kt in 1985, which is 20% higher than 1980, but still 7% of projected world production in that year. Much of the projected expansion actually took place in 1981 with sheep numbers estimated at 71.2 million. MAF estimates are for a further expansion to 74.3 million head in 1982.

3.2 Consumption

New Zealanders are one of the largest meat-consuming peoples in the world, with a per capita consumption level of 117 kg, but with a different pattern of consumption to most countries. Sheepmeat accounts for a major, though declining, proportion of meat consumption : it fell from 40% in 1960 to 25% in 1980 (Table 11) following a similar trend in Australia, the other main sheepmeat-eating country. New Zealand still has the world's largest per capita consumption of sheepmeats, at over 40 kg in some years.

The decline in sheepmeat consumption from 42.8 kg in 1960 to 34.3 kg in 1980 (a 20% decrease), has been mainly due to a switch by consumers to other meats and also from mutton to lamb, with lamb consumption tending to increase, but mutton decreasing notably. The main type of sheepmeat eaten is derived from hogget (sheep of 1-2 years).

Sheepmeat is considered an 'everyday' meat and on special occasions there is a switch to beef or pork. There is a special demand for lamb over Christmas and Easter (as well as for turkey

TABLE 11

New Zealand: Consumption Statistics

Year	Population (million)	Sheepmeat Consumption Total (Kt)	Sheepmeat Consumption Per Capita (kg)	All Meat Consumption Per Capita (kg)	Sheepmeat as % of all meat
1960	2.4	102.8	42.8	108.2	39
1961	2.4	101.1	41.4	105.2	38
1962	2.5	104.8	42.9	112.1	37
1963	2.5	121.0	42.9	114.1	41
1964	2.6	114.3	42.4	113.1	38
1965	2.6	125.1	39.8	110.7	42
1966	2.7	123.5	36.9	107.3	42
1967	2.7	134.9	38.6	108.9	56
1968	2.7	144.2	39.3	110.0	52
1969	2.8	115.1	39.6	110.2	32
1970	2.8	124.4	40.0	111.2	48
1971	2.8	115.2	41.1	111.5	35
1972	2.9	127.0	43.7	116.1	37
1973	3.0	126.6	42.1	115.4	36
1974	3.0	116.4	37.7	109.4	34
1975	3.1	115.9	37.8	103.0	32
1976	3.1	104.1	33.2	99.9	28
1977	3.1	95.2	29.7	107.2	25
1978	3.1	96.9	29.5	104.9	28
1979	3.1	95.7	29.3	101.1	29
1980	3.1	93.4	29.2	96.0	31

SOURCE: USDA, UN.

and ham) but in general there is no marked seasonal variation in meat demand. Pork is considered a luxury meat because of the relatively high production costs which keep market prices high. In the past, chicken has been considered a luxury, too, but as availability has increased, the price has declined and much of the luxury-appeal has been lost (Yandle, 1968; Brodie, 1977).

Beef consumption has shown the main increase over most of the period though recently high beef prices have caused a swing in consumption towards sheepmeat (Brodie, 1977).

Beef tends to be the highest priced meat, though pork prices in the late 1970's tended to be higher than beef. Lamb commands a premium over hogget - both used to be cheaper than other meats, but are now more expensive than chicken and certain beef-cuts. There is often a rise in mutton consumption (despite its status as a non-preferred sheepmeat) at the expense of lamb, as prices increase. Table 12 gives estimates of price and income elasticities of demand for mutton and lamb (no recent estimates are available).

TABLE 12

Estimates of Elasticities of Demand for Sheepmeats

		Elasticity of demand, with respect to:-			
Researcher	Product	Own-P	Beef-P	Pork-P	Income
Court (1967)	M	-0.69	0.71	-0.02	0.42
Yandle (1968)	M	-0.54	0.29	-0.84	0
	L	-1.5	0.44		2.0

The estimates by Yandle (1968) would appear to be the most useful, given the pattern of consumption in New Zealand, and given similar estimates made in other countries (Gruen, 1969; Greenfield, 1974).

The population of New Zealand is small and stable (Table 11) at just over 3 million, though it increased 30% from 1960-80. This offset the 20% decline in per capita consumption of sheepmeats, and total consumption rose from 100 Kt to 110 Kt in 1980, with fluctuations between 95 Kt and 145 Kt during the period.

The population is not projected to increase in the 1980's and FAO (1979) estimate that sheepmeat consumption in 1985 will be the same as 1980, at 110 Kt or 30.2 - 31.3 kg per capita.

3.3 Prices

New Zealand exports about 90% of its lamb production and over half its output of mutton (Section 3.4). Thus the prices received by the producer for fatstock are strongly influenced by export prices, except where seasonal and quality factors tend to separate the internal and export market.

Local market forces tend to dominate the market for lamb early in the season, when most of the available lamb is needed to supply the domestic market. Also, as higher quality grades of beef and mutton are consumed in New Zealand they attract a premium on the domestic market (NZMPB 1977; Yandle, 1968). Meat sold domestically is in the hands of private traders and is not controlled by a statutory body. As discussed below, meat exports are controlled by the New Zealand Meat Producers Board.

The farmer has several options for selling livestock for export:

(1) At schedule prices, selling to an export company.

(2) On a pool/consignment system marketing through a farmers co-operative.

(3) Selling on own account.

The first method is the most commonly used. Each week the meat export companies in consort, determine and publish schedule prices for specific grades of meat, based on an assessment of overseas markets some weeks in advance. Farmers sell at this price to the export slaughter houses (which are licenced separately from local supply abattoirs).

All the selling methods have advantages and disadvantages, these have been described and criticised elsewhere (Brabyn, 1978; Hardie, 1974; Yandle, 1968; Meat Exporters Council, 1980).

In any event, the schedule price (which is closely linked to the Smithfield price) generally becomes the base price for all methods of selling livestock; it is unlikely that producers will sell for less, but greater risk of variation in returns is associated with other methods.

The NZMPB operates a deficiency payment scheme on all meat exports, according to the Meat Export Prices Act: 1955; Hardie (1974) and the Meat Producer (1978) give further details.

The schedule prices for mutton and lamb have fluctuated since 1970, but with a general, upward trend. The late 1970's have seen a sharp rise in prices offered (Table 13).

Table 14 shows monthly changes in prices received for New Zealand lamb at Smithfield since 1971 : in recent years these

TABLE 13

New Zealand: Meat Operators Mid-Month Schedule Price (North Island)

PM Grade Lamb 13-16kg N.Z. ¢/kg

Month	Season								
	1971/72	72/73	73/74	74/75	75/76	76/77	77/78	78/79	79/80
July		33.9	56.9	37.2	42.0	63.0	64.9	74.0	86.5
August		33.9	56.9	37.2	53.7	63.0	64.9	74.0	86.5
September						63.0	64.9	74.0	86.5
October	27.3	46.9	69.7			74.8	68.5	90.7	86.0
November*	27.3	44.7	69.7	42.4	59.2	77.7	68.5	87.0	86.0
December	27.3	44.7	68.0	38.0	53.2	80.0	68.5	76.5	86.0
January	27.3	43.7	58.5	38.0	53.2	70.3	64.2	73.5	86.0
February	27.3	45.9	53.2	38.0	53.2	70.3	66.5	73.5	86.0
March	27.3	48.1	52.2	38.0	53.2	70.3	69.0	73.5	93.0
April	27.3	51.4	51.2	42.0	55.2	64.9	67.0	75.5	100.0
May	31.7	51.4	46.2	42.0	60.0	64.9	67.0	75.5	102.0
June	33.9	56.9	44.2	42.0	63.0	64.9	72.0	82.5	106.0

* (includes premium for early shipment).

SOURCE: N.Z. Meat Producer.

TABLE 14

U.K. (Smithfield) Wholesale Price

PM Grade Lamb 13-16kg N.Z. ¢/kg

Month	Season								
	1971/72	72/73	73/74	74/75	75/76	76/77	77/78	78/79	79/80
July		83.9	105.8	87.2	112.9	146.6	159.9	216.0	236.8
August		97.2	108.7	82.6	124.2	150.9	158.9	215.6	228.3
September		90.6	104.1	89.7	125.4	160.7	165.8	219.6	223.4
October	60.8	84.2	108.4	103.7	125.9	166.5	176.1	231.3	227.0
November	69.4	84.0	111.4	101.2	129.8	170.4	184.1	213.0	237.2
December	69.4	88.2	112.9	102.2	136.2	186.5	187.0	209.7	224.2
January	71.2	91.7	117.3	110.9	139.4	194.2	192.6	214.2	225.2
February	66.4	86.6	101.6	104.2	131.3	166.9	184.5	202.6	260.9
March	72.8	89.9	100.8	110.9	130.1	164.1	181.2	201.2	256.9
April	71.2	95.7	99.6	114.6	133.7	160.2	180.8	211.6	298.2
May	78.9	96.7	111.9	147.1	164.4	192.6	192.6	219.3	302.1
June	99.9	95.9	94.3	117.0	148.5	165.1	201.6	223.8	300.8

SOURCE: N.Z. Meat Producer.

have increased even more rapidly, though are still lower than prices received in other markets. As schedule prices are partly based on the Smithfield prices (Shadbolt, 1981), they may not fully reflect market opportunities, or the type of carcass required in these other markets. Table 15 shows an index of deflated prices and returns for exports and an export volume index (Base, 1965/6). All three have fluctuated around the base, though in 1979/80 even though the average export price was close to the 1965/66 level, total receipts were considerably higher because of the record volume of exports.

3.4 Trade

Though New Zealand produces only 7% of the world's sheepmeat, it plays a dominant part in world trade. Its importance has declined however, from 75% of world exports in the 1960's, to 55% in the late 1970's (Table 16). Exports in this period have increased 32% from 340 Kt to 450Kt (Fig. 3), as production has risen faster than consumption: around 80% of New Zealand production is exported (Table 16).

Together, New Zealand and Australia account for the major part of the world's sheepmeat trade, but competition between the two is limited to the extent that each specialises in different products, and servicesdifferent markets. New Zealand's main export is lamb (80% of N.Z. sheepmeat exports : Table 16), with the EEC, and particularly the U.K. being the main importers. The proportion of lamb exports sent to the EEC declined from 96% in 1960 to 70% in 1980. New Zealand supplies 84% of the EEC third country imports, and about one-third of total EEC sheepmeat consumption. This unique situation is not seen in the pattern of any

TABLE 16

New Zealand: Trade Statistics

Year	Total Exports (Kt)	As % of Production	As % of World Trade	Exports of Mutton Weight (Kt)	Mutton %	Lamb Weight (Kt)	Lamb %
1960	340	77	71	77	23	263	77
1961	346	76	73	77	22	269	78
1962	356	75	75	86	24	273	76
1963	350	76	70	75	30	275	70
1964	374	76	72	87	23	287	77
1965	360	76	65	77	21	283	79
1966	378	80	66	84	22	293	78
1967	386	74	67	87	22	299	78
1968	422	74	67	107	25	315	75
1969	447	79	65	138	31	309	69
1970	438	78	60	103	23	335	77
1971	450	80	62	113	25	337	75
1972	440	76	55	100	23	340	77
1973	398	71	51	92	23	306	77
1974	361	72	60	111	31	250	69
1975	402	82	60	107	25	295	75
1976	385	76	52	80	21	315	79
1977	406	78	60	95	23	311	77
1978	378	76	45	75	20	303	80
1979	455	85	55	126	27	324	73
1980	462	84	53	130	28	332	72

SOURCE: NZMPB

other traded good (NZMPB, 1977).

The U.K. takes the majority of lamb exports; the quantity has decreased since its accession to the EEC in 1973, but is stable at around 200 Kt. Other EEC countries take small but increasing quantities (Table 17) and in value terms constitute important markets.

Since 1966 the New Zealand Meat Board has run a Market Diversification Scheme, which requires lamb to be diverted away from the U.K. market : a money penalty is imposed on companies which fail to achieve the target (Hardie, 1974; Veeman, 1974; Brabyn, 1978).

New markets for lamb have been developed in the U.S.A., Canada, Greece and more recently, the Middle East (Table 17), but only 34% (1980) of trade has been diverted away from the U.K. Some of the 34% has been sent to other EEC countries (Germany, Denmark, Italy) and there may be room for further expansion of trade in Continental EEC under the VRA, which allows N.Z. to export up to 234 Kt into the community.

However, all trade with the EEC has been subject to a 20% ad valorem tariff up to 1980, and a 10% tariff thereafter which reduces producer-returns considerably. Marketing lamb in countries such as Iran is therefore more profitable, even if there is a greater risk attached, and higher costs are incurred in developing new markets.

Mutton exports account for a third of N.Z. sheepmeat exports (Table 18) and the volume has increased from 77 Kt in 1960 to 116 Kt in 1980. The pattern of exports has changed greatly in this time as Table 18 shows. In the early 1960's the U.K. was the

TABLE 17

New Zealand Exports of Lamb by Destination (Kt)

Year	Total	U.K.	Canada	U.S.A.	Greece	Other* EEC	Middle East	Other**	Proportion Sold to U.K. (%)
1960	269	258	5	3	3				96
1961	273	259	5	4	0			5	95
1962	275	258	6	5	0			6	94
1963	287	276	6	2	3			0	96
1964	283	263	6	6	1			7	93
1965	293	271	7	6	1			8	92
1966	299	274	5	4	3			13	91
1967	315	278	8	6	6			17	88
1968	328	286	5	10	7			20	87
1969	335	291	2	11	9			21	87
1970	338	292	2	6	15			23	86
1971	339	279	4	8	17			31	82
1972	306	221	5	11	25			44	72
1973	335	253	5	10	25			42	75
1974	251	198	4	8	5	6		30	79
1975	295	208	5	5	8	9	7	53	70
1976	315	215	8	13	15	9	12	43	68
1977	311	202	9	10	3	11	18	58	65
1978	304	185	8	12	14	22	33	30	61
1979	320	205	8	14	14	28	21	42	63
1980	350	181	10	11	5	13	97	33	52

* Mainly Germany and Italy.

** Of which approximately half exported to Japan.

SOURCE: NZMPB

TABLE 18

New Zealand: Exports of Mutton by Destination

Year	Total	U.K.		Japan and South Korea		U.S.S.R.		Other	
	Kt	Kt	%	Kt	%	Kt	%	Kt	%
1960	77	39	50	23	30	14	18	1	2
1961	86	37	43	21	24			28	33
1962	75	25	33	39	52	1	2	10	13
1963	87	28	32	40	46			19	12
1964	77	29	37	36	47			11	16
1965	84	14	16	59	70			11	14
1966	86	20	23	59	68			7	9
1967	106	27	25	74	70			5	5
1968	137	29	21	98	71			10	8
1969	103	20	19	66	63	7	8	10	10
1970	111	23	20	61	60	17	15	10	5
1971	106	13	12	63	59			40	29
1972	92	8	8	64	69			20	23
1973	107	7	7	76	72			24	21
1974	111	6	7	66	68			39	25
1975	107	5	5	46	42	44	41	12	12
1976	80	10	13	50	63	10	13	10	11
1977	99	8	8	32	31	59	36		
1978	75	14	18	49	65	16	8	6	8
1979	116	5	4	49	42	54	46	8	8
1980	100	4	4	21	21	62	62	3	3

SOURCE: NZMPB

main market with Japan; a few other countries purchased small amounts. The U.K. trade has declined to under 10% of the total, but trade with Japan, and also S. Korea, increased to around 70% of mutton exports. There was a slight decrease in trade with Japan in the late 1970's, but periodic shipments to Russia compensated.

Apart from these main countries, New Zealand exports to many small markets (N.Z. traded with 30 countries in 1960, and with 89 by 1980), 20% of which buy less than 0.1 Kt, and 45% of which buy less than 1 Kt. Only 5 of all countries buy more than 10 Kt. A similar pattern is seen in both mutton and lamb trade, with a few, large buyers dominating the market and many small buyers taking a minimal part of the trade. New Zealand has no export trade in live sheep, as a result of Trade Union pressure to retain the volume of throughput in the N.Z. freezing industries.

The New Zealand Meat Producers Board has the broad responsibility of supervising the export marketing of New Zealand meat. Apart from its basic functions of administering price stabilisation schemes, in accordance with the Meat Export Prices Act (1976) the Board is responsible for issuing licences to exporters, and supervising the Market Diversification Scheme. Several companies have been set up by the Board to market New Zealand lamb abroad (Meatmark, U.K.; Franzim, France). In other countries which have been declared "development markets" a single company has been set up by the Board, to regulate trade (for example Canada and the U.S. (Devco Ltd); N.Z. Meat Marketing Co., (Iran), or a limited number of licences are issued (as in West Germany) (Veeman, 1974). Ninety-eight companies are licenced to

export meat from N.Z., but various types of licence are issued (see NZMPB Annual Report (1980) for details) to prevent exporters selling in all markets. Many of the export companies also own processing works in N.Z., and virtually all processing works are owned by exporters.

The delicensing of the processing industry in 1980 is intended to increase returns to the farmer. A severe burden is placed on the N.Z. producer by the total charges from farm gate to the wholesale markets (Brabyn, 1978; Chudleigh, 1978). Killing and freezing charges are high, but FOB to "ex-hooks" costs have increased more rapidly due to higher freight costs and, in the EEC, the phasing in of the common external tariff.

Prices for mutton and lamb vary widely between overseas markets, though it appears that the differences are decreasing over time (see NZMPB, 1977 for international comparisons). However, the higher priced markets, which offer the greatest potential for expansion, are also the least stable areas (e.g. the Middle East), or are likely to be artificially restricted (e.g. Italy, West Germany).

Therefore long term stable markets need to be actively sought and expanded to absorb N.Z.'s increasing exports at favourable prices. FAO (1979) project that exports will increase to 1985 to 530-550 Kt, an 18% increase from 1980 levels.

As trade with the EEC is restricted to 234 Kt, this level of exports will require markets to be found elsewhere in the world for 300 Kt. The opportunities for new, long-term stable markets are considered elsewhere*, but it seems likely

* Volume 4 of this series.

that demand for N.Z. sheepmeat will remain strong. There is, however, likely to be greater competition in the world market from other exporters such as Australia and Eastern Europe.

4. ARGENTINA

4.1 Production

The Argentine livestock industry is based on extensive grazing of fertile grasslands. Earlier in the century, sheep were more numerous than cattle, but cattle numbers increased gradually over the period to over 60 million head in 1979 (Table 19).

Sheep numbers were formerly much greater than they are now, with an estimated 74 million head in 1895. From then on, numbers fluctuated widely. The first major decrease was accompanied by an increase in land used for cultivation of crops in the early 1900's. In the period following, numbers increased by 1.5% per annum up to 1947. From then until the mid 1960's, sheep production stagnated,unlike cattle and pig production which have grown almost continuously.

Since 1966, sheep numbers have declined rapidly (Table 19) from 51 million to 30 million in 1980, a decrease of over 40%. There are no signs of any improvement in numbers; indeed, extensive flooding during 1979/80 caused a further loss of 2 million head. Production has fallen correspondingly to around 130 Kt per annum from over 200 Kt in the 1960's (Table 19).

The decline in stock was accompanied by a geographical redistribution of sheep farming. The Central Pampas region has always been the major sheep area with 88% of total

TABLE 19

Argentina: Production Statistics

Year	Cattle ('000 head)	Sheep ('000 head)	Sheepmeat Production (Kt)	Proportion of Production Exported (%)
1960	43,509	50,171	168.6	27
1961	43,165	50,002	166.4	24
1962	43,225	49,749	166.1	25
1963	41,227	49,311	150.6	24
1964	n.a.	49,848	135.4	15
1965	46,709	51,453	163.0	23
1966	n.a.	51,643	187.7	34
1967	51,227	50,464	203.8	36
1968	51,465	48,012	208.9	29
1969	48,298	45,043	193.0	30
1970	n.a.	42,361	176.1	24
1971	49,786	39,904	175.1	12
1972	52,300	37,218	132.1	14
1973	54,800	36,449	127.5	20
1974	55,355	35,686	111.9	22
1975	58,000	34,700	123.4	22
1976	59,561	34,142	127.1	30
1977	61,034	33,448	131.9	32
1978	61,825	32,409	130.3	29
1979	60,174	30,000*	132.0	29
1980	n.a.	28,000*	130.0*	23*

n.a. Not available

* Estimated

SOURCE: USDA

numbers at one time though recently this has fallen to 42%. Most of the decrease in sheep farming took place in this region with sheep numbers falling from 19 million in 1960 to only 9 million head by 1978. Over the same period the proportion of sheep kept in Patagonia rose from 0.5% to 36%.

These regional changes have been accompanied by marked changes in the distribution of breeds. According to the 1960 census the Lincoln and Argentine Merino were the dominant breeds followed by Corriedale and Romney Marsh. Recently Corriedales and Lincolns have become more important with growing numbers of Australian merinos.

In Argentina, sheep are kept for two purposes. According to product value, wool is the more important product. Meat is of secondary importance and its value is only 16% of total returns from sheep. Developments in the wool market are, therefore, a major factor in determining sheepmeat production.

There has been an increase in the predominance of dual purpose breeds over the whole country. This is very noticeable in certain regions (INTA, 1976). Within this trend there has also been a move towards breeds which produce fine wools (Martin, 1979). However, some of the trends cannot be explained by prices of wool but rather by the different characteristics of each breed which make them more suitable (in terms of wool-quality and productive adaptibility) for the poor soils and harsh climate. This

is especially true of the move away from Argentine Merinos to Australian Merinos in Patagonia. The spread of Corriedales is related to economic factors including the favourable trends in fine-wool prices compared to coarse wool prices and also to crop prices (AIAC, 1974).

The adaptive and hardy nature of the Corriedale allows its use in commercial breeding systems and diverse environmental conditions (lowlands, dry summers, cold etc.). Moreover, it can produce early lambs from April onwards which are then ready for the export market before December (and before the main availability of Australian and New Zealand supplies).

Although all sheep farming is extensive, the size and productivity of flocks varies widely. There are only 10,800 farms holding sheep (1978) as opposed to 151,379 in 1960 with an average flock in 1978 therefore of 3,050 head. However, over two-thirds of the country's sheep are kept on only 7% of the farms in flocks of over 1,000 sheep whereas two-thirds of the country's farms have small flocks of less than 100 sheep.

It seems that the majority of the small flocks are kept for domestic use. The larger flocks (in Patagonia and Mesapotamia) which are a major farm activity or complementary to crop production, tend to be more commercial enterprises. The greatest decline in sheep numbers has been on these large farms.

A relatively high proportion of slaughterings (34%) still takes place on farms. Registered slaughter is increasing, however, as transport improves and more people leave rural areas.

Of the registered slaughterings, 70 to 80% take place in factories and freezing works for both domestic consumption and export. The rest is done in local abattoirs which are often extremely old and unhygienic.

The slaughter rate has risen from 20% in 1960 to 25% in 1977 but the average carcass weight has fallen from 23 kg to 16 kg. It appears that productivity is falling mainly as a result of declining birth rates, lower nutrition and poor health standards (McMahon, 1965; Pereira, 1973).

The number of sheep slaughtered shows a clear, inverse relationship to both sheep and wool prices. A short-run (annual) supply elasticity of (-0.32) with respect to sheep prices has been estimated (Pereira, 1974). In the medium term (2 years) this becomes +0.33. The cross price elasticity with respect to wool prices is estimated to be -0.55. There seems to be no evidence of a strong relationship between sheep and cattle prices.

Table 20 gives actual and real sheep prices (wholesale per head) from 1960-78. Real prices have varied between m$n224 and m$n603. In fact the real prices of both sheep and wool have fallen over the last 20 years and have fluctuated widely. At the same time, production of sheepmeat has also fluctuated around a decreasing trend with a net annual decline of 1.6%.

TABLE 20

Sheep Prices at Avallenada*

Year	m$n/head (a)	Deflated Price ($^{a}/_{b}$) (m$n real)	Cost of Living Index (b) (IMF)
1960	414.61	414	100
1961	362.10	320	113
1962	455.11	311	146
1963	916.38	506	181
1964	1,314.86	394	221
1965	1,311.27	461	284
1966	1,238.00	331	374
1967	1,189.00	245	484
1968	1,260.00	224	562
1969	1,781.00	294	605
1970	20.91	304	687
1971	36.81	397	925
1972	83.51	569	1,466
1973	141.86	603	2,350
1974	125.76	430	2,920
1975	207.93	251	8,256
1976	2,130.38	474	44,916
1977	5,736.63	462	123,982
1978	13,100.00	320	214,684
1979	20,361.00	300	375,823

* m$n = moneda nacional: Pesos

SOURCE: JNC, 1978; IMF, 1979.

The outlook for the Argentinian sheep industry is bleak according to most observers (Anon, 1978; Pereira, 1973). They predict a further decline in both sheep numbers and production. FAO (1979) however, in their more recent projections, suggest that by 1985 numbers may increase again to 45 million head and production to 160-190 Kt.

4.2 Consumption

The Argentinians consume almost as much meat as the Americans at 105 kg per capita even though incomes are only about a quarter of those in the U.S.A. Beef is the main meat consumed (more than 80% of the diet); pork and sheepmeat are less important and their consumption levels are more stable.

There has been a distinct long term decline in sheepmeat demand. In the early 1900's mutton and lamb were the mainstay of the diet. By 1960 consumption had fallen to 6 kg per capita. By 1980 it fell to 3.4 kg. As a proportion of all meat consumed it has declined in a similar way (Table 21). Total consumption of sheepmeats in Argentina has therefore also declined from 123 Kt in 1960 to 92 Kt in 1980 despite a population growth rate of 1.7% per annum. The domestic market, with a population of 26 million absorbs 70% of production.

TABLE 21

Argentina: Consumption Statistics

Year	Population (million)	Sheepmeat Consumption Total (Kt)	Sheepmeat Consumption Per Capita (Kg)	Per Capita Consumption of all Meat (Kg)	Sheepmeat as % of all Meat
1960	19.9	123.3	6.2	90	6.8
1961	20.2	125.8	6.2	101	6.1
1962	20.5	124.4	6.0	103	5.9
1963	20.8	114.3	5.6	102	5.4
1964	21.2	115.1	5.4	80	6.8
1965	21.5	125.6	5.8	85	6.9
1966	21.8	122.6	5.8	96	5.9
1967	22.2	130.7	5.9	97	6.0
1968	22.5	147.6	6.5	101	6.5
1969	22.9	134.8	6.0	107	5.5
1970	23.2	132.9	5.7	98	5.8
1971	23.6	153.2	6.5	80	8.1
1972	24.0	114.4	4.8	75	6.3
1973	24.3	102.1	4.2	80	5.2
1974	24.7	87.0	3.5	88	4.0
1975	25.0	96.0	3.8	109	3.8
1976	25.4	88.3	3.4	109	3.4
1977	26.1	90.2	3.5	108	3.5
1978	26.4	92.4	3.5	112	3.4
1979	26.7	93.4	3.7	110	3.4
1980	26.8	104.5	3.9	111	3.5

SOURCE: UN, USDA.

It has been shown (Sjaastad, 1966) that beef and sheepmeat are substitutes but consumption of sheepmeat is still falling even though it is now much cheaper than beef. No strong relationship appears to exist between pork and sheepmeats (Pereira, 1973; Sjaastad, 1966). Pereira (1973) shows that sheepmeat is no longer a staple but is now an inferior good which is confirmed elsewhere (Janvry et al., 1972). The proportion of incomes spent on sheepmeat has diminished despite a 43% increase in real incomes. No estimates of price and income elasticities for sheepmeat demand have been found to confirm this.

As well as the price and income effects on mutton and lamb demand, taste and consumption patterns are changing. The process of urbanisation has been the main cause of declining consumption. The latest available survey shows that rural consumption was five times greater than urban consumption up to 1970 but by 1975 it was 11 times greater. Part of this is an income effect (incomes are higher in towns) but it is mainly because only rural families are able to keep and slaughter their own sheep. As urbanisation is taking place at over 2% per annum, total sheepmeat consumption will be greatly affected; the opposite trend is occurring in beef and pork consumption.

As consumption has fallen, there has also been a shift in the type of meat preferred; younger lamb is gradually taking the place of the traditional mutton. However, no increase in consumption of sheepmeat is foreseen; FAO (1979) predict that the only increase will result from population growth which should give a total consumption of 100 Kt in 1985.

4.3 Trade

Figure 4 shows the trend in the number of sheep slaughtered for domestic consumption and export. Domestic use has generally been more stable than exports; exports represent 25-30% of production (Table 19) and have reflected virtually all the variation in output. Exports have therefore always been an important part of the Argentinian sheep industry and have tended to follow the general decline.

The number of sheep exported live has declined most rapidly, falling from over a million in the 1940's to virtually nil after 1976. The former main traders were Kuwait, Libya and the Lebanon but they bought no sheep from Argentina in 1979 and few were sent to other countries in South America.

FIGURE 4

Argentina: Sheepmeat Market Trends 1960-80

Table 22 and Figure 5 show the volume of sheepmeat exported to the main buyers and in them several trends appear: Firstly, the decrease but recent upturn in total exports, and secondly, the changing composition of export destination.

The reduction in export volumes can be attributed to (a) restrictions imposed by many countries on imports of fresh or chilled bone-in meat from countries with foot and mouth disease; (b) reductions in supply, caused by the wool price - meat supply relationship and the difficult economic climate.

Most of the meat exported is mutton which finds less favour in major markets that prefer high quality lamb. Prices received are therefore relatively low and give little incentive to production. However, the total value of sheepmeat exports has risen from U.S.$7 million in 1964 to $35 million in 1977. The distribution of Argentina's exports has changed noticeably in recent years. The importance of trade with the EEC has trebled since 1969 (from 17% of exports to 54% in 1978). Argentina supplies 4% of EEC sheepmeat imports and agreed to limit exports to the EEC to 23 Kt after 1980. The strongest demand is from West Germany; France and Italy are also important consumers. The increasing demand from Greece and Spain could become greater as a result of Common Market membership, though Greece has tended to purchase elsewhere recently.

TABLE 22

Exports by Destination (1968-1980)

(Shipped Weight: Kt)

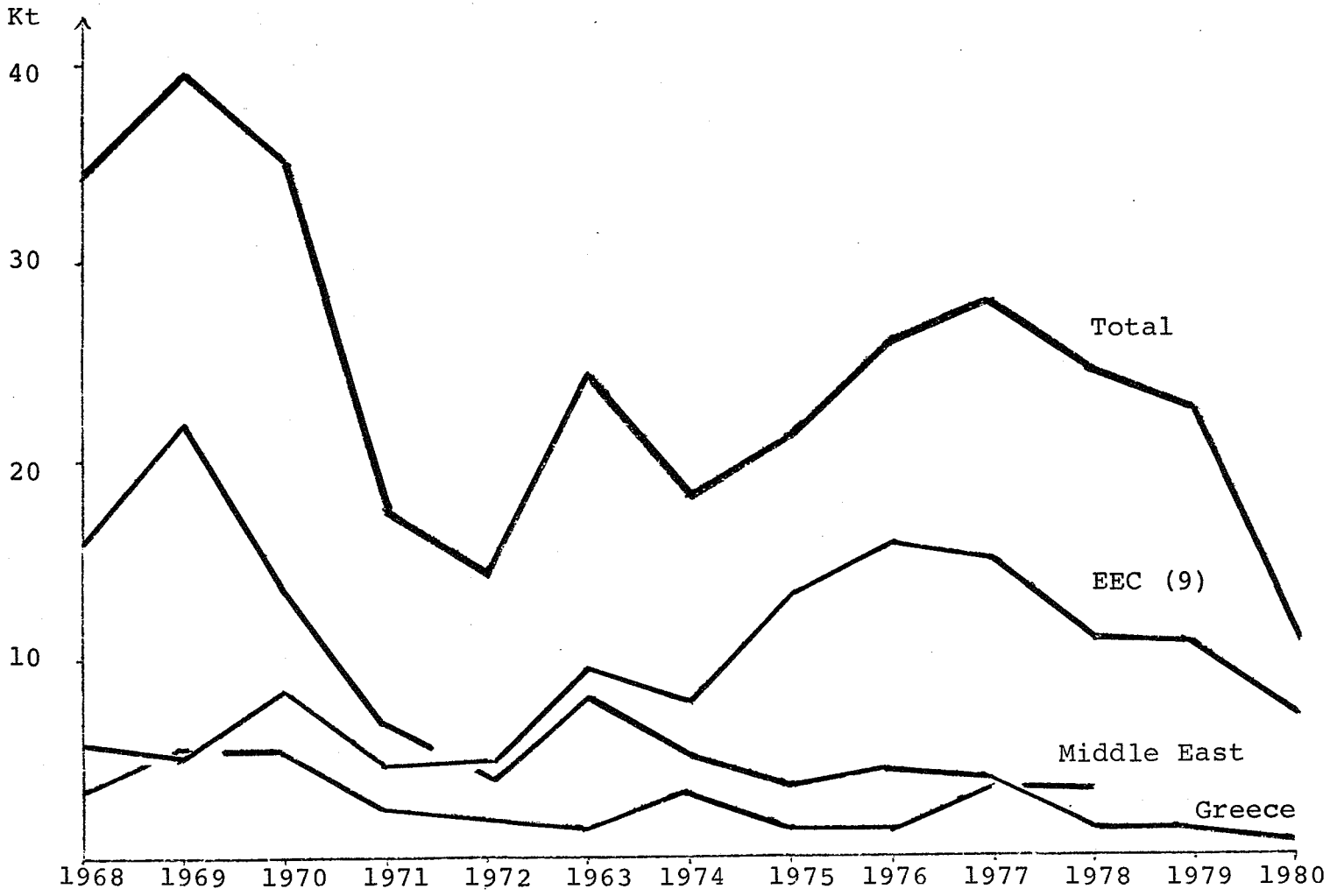
Country	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
EEC	5.9	5.2	8.5	4.9	5.0	9.5	8.1	13.3	16.0	15.2	11.1	10.8	7.3
West Germany	2.3	1.8	1.8	1.2	1.7	4.6	5.2	8.8	13.5	12.5	9.5	9.9	7.1
Belgium	1.2	1.4	1.6	.5	.1	.6	.1	.3	.2	.1	n.a.	n.a.	n.a.
France	1.6	.9	3.4	1.9	2.2	2.4	2.1	2.4	.8	1.1	.2	.2	-
Netherlands	.2	.3	.5	.2	.1	.5	.1	.1	.3	.5	n.a.	n.a.	n.a.
Italy	.6	.7	1.4	1.1	.8	1.2	5.1	1.5	1.1	.9	1.3	-	.1
Spain	.2	.3	.3	.3	1.4	4.1	.6	.9	2.5	1.8	n.a.	n.a.	n.a.
OTHER WEST EUROPE	16.3	22.2	14.3	6.5	4.5	8.5	5.1	3.6	4.5	4.1	n.a.	n.a.	n.a.
Greece	15.9	21.7	13.2	6.4	4.2	8.2	5.0	3.6	4.5	4.1	1.3	1.3	.6
Switzerland	.3	.5	1.1	.1	.2	.3	.1	.1	.1	.1	n.a.	n.a.	n.a.
ASIA	3.3	5.3	5.5	2.5	2.3	1.3	3.1	1.3	1.2	3.4	n.a.	n.a.	n.a.
Saudi Arabia	-	-	-	-	-	-	-	-	.1	.8	-	-	-
Israel	-	.1	-	-	-	.1	.1	.3	.1	-	-	-	-
Jordan	2.4	2.4	2.8	1.3	1.5	.3	-	.1	.4	1.2	-	-	-
Kuwait	-	-	.1	.1	-	-	.5	.8	.4	.8	-	-	-
Lebanon	.9	2.9	2.1	1.1	.7	.9	.6	.1	.1	.5	-	-	-
Syria	-	-	.4	-	-	-	1.8	-	-	-	-	-	-
AFRICA	-	-	-	-	-	-	-	.2	1.1	.5	n.a.	n.a.	n.a.
Ivory Coast	-	-	-	-	-	-	-	.1	.2	.3	-	-	-
Morrocco	-	-	-	-	-	-	-	-	.1	.1	-	-	-
Tunisia	-	-	-	-	-	-	-	.2	.6	.1	-	-	-
PERU	6.7	5.9	5.0	2.3	.4	.3	.7	1.3	.5	1.9	n.a.	n.a.	n.a.
OTHER	2.1	.4	1.2	.2	.3	.3	.4	.1	.1	1.2	n.a.	n.a.	n.a.
TOTAL	34.8	39.5	35.1	17.0	14.1	24.3	18.2	21.1	26.2	28.4	24.3	22.5	11.1

n.a. Not available.

SOURCE: JNC, Sintesis Estadistica

FIGURE 5

Argentina: Sheepmeat Exports by Destination (1968-80)



As with live exports, trade with the Middle East is declining but is still important for Argentina accounting for about 10% of exports.

It is noticeable that there is now no trade with the U.K. which was a major customer. Argentina is now prohibited by health restrictions from trade with the U.K. as well as Japan, Canada and the U.S.A.

In relation to total world exports of sheepmeat, Argentina's share has fallen slightly since 1970 and remains at around 3%. It therefore poses little competition for other exports but is still the world's third largest exporter despite the decline in the industry.

Exports are unlikely to show any dramatic change in the short to medium term though FAO (1979) predict an increase to 60 Kt in 1985.

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