THE PASTORAL LIVESTOCK SECTOR

AND THE SUPPLEMENTARY MINIMUM PRICE POLICY

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PREFACE

Government support for agriculture in the form of Supplementary Minimum Prices (SMPs) has stimulated considerable debate over the past two years. The main issue is whether the short term assistance given to farm incomes via SMPs will encourage resources to be maintained within the pastoral industry in order for the country to take advantage of an upswing in the terms of trade when, or if, they occur.

The present Discussion Paper represents a useful contribution to this debate. In particular, it is rewarding to see an econometric model used to present results that can be used as one input to policy formation.

The model on which this paper is based has been built over the past three years and has been reported in three former Unit Publications (Research Reports No.'s 127 and 137, and Discussion Paper No. 54).

P.D. Chudleigh
Director

SUMMARY

The Supplementary Minimum Price policy has been a major topic of debate in the past few years, but there have been relatively few attempts to quantify the impacts that the scheme has had on the agricultural sector. Although the level of payments can be readily identified, it is recognised to be very difficult to evaluate the long-term impacts on agricultural investment and development. In this study, an econometric model of the New Zealand pastoral sector is utilised in an attempt to evaluate the short and long-run impacts of the removal of the policy.

In order to isolate the effects of the SMP policies from other factors which are continuously changing, a simulation experiment was performed. Using 1982 price levels both with and without supplementary minimum payments, the levels of farm investment, farm production, and exports were estimated for a five-year period. The comparison of these two simulations made it possible to isolate both the short and long-run impacts of the pricing policy. The results suggest that in the short term the main implications of removing supplementary minimum payments would be to decrease both gross and net farm incomes with little change in output or export earnings. Although changing income levels do not affect production in the short term they have implications for agricultural investment and output in the longer term. Similarly, foreign exchange earnings decrease in the long run as agricultural investment diminishes.

It is concluded that SMP payments cannot be justified solely on the grounds that without them export receipts would fall dramatically. Also, the analysis shows that the productive capacity of the pastoral sector would not have been seriously run-down in the absence of SMP payments, and would have been able to respond to any upturn in market returns. Thus, recent increases in market prices seem not to present an ex post justification for an SMP policy.

SECTION 1

INTRODUCTION

The Supplementary Minimum Price (SMP) scheme became part of the pastoral economy in 1978. After almost five completed seasons of operation, doubts are being expressed as to whether farm support via the SMP mechanism should be continued. The influential Agricultural Review Committee has warned of "the dangers" inherent in the SMP scheme. These dangers "include difficulties in trade policy, in administration of the schemes and distortions of allocation of resources within the sector" (Agricultural Review Committee: 1983, p.10). These comments echo the Prime Minister's statement in his 1982 budget, that "It is therefore important for the prices set under this scheme not to diverge significantly from the prices determined in international trade over the medium term" (Budget, 1982, p.13). In their more general discussion on the philosophy that guides the implementation of the SMP scheme, Sheppard and Biggs (1982) have suggested that SMPs are an inefficient way of maintaining or increasing farm production, since the payments made under the scheme are not necessarily tied to productive expenditure.

To a large extent, the disquiet with the SMP scheme is a relatively new phenomenon. In the scheme's first three years of operation, relatively conservative levels of SMPs were announced, so that only small amounts were actually paid out, on wool and milkfat in 1979, and on beef in 1981 (see Table 1). For the 1982 season, the levels of SMP prices set were very optimistic, especially considering the actual market prices being received in 1981. As it turned out, the optimism proved unfounded, and the 1982 season saw $340 million being paid out under the SMP scheme, over half of this amount on wool. Only milkfat payments did not attract SMP supplements in that season. Table 2 compares the level of apparent market prices to those prices actually received by farmers for their output.[1] The difference between the two series is the supplement paid under the SMP scheme. Table 2 shows that on average market returns for wool had to be supplemented 19 per cent in order to bring the price received by farmers up to the SMP level. Market returns for lamb and mutton attracted a 13 per cent supplement, while manufacturing beef had the highest supplement in percentage terms, at 23 per cent. Milkfat prices received no supplement at all. Therefore, farmgate prices under the SMP scheme have been distorted significantly from market determined levels. Obviously, relativities between product prices are also distorted as a consequence.

For the 1983 season, SMPs for wool, sheepmeats and beef were either maintained at their 1982 level or increased by only a few cents. The milkfat SMP was increased by 16 per cent to 325 c/kg, though this is still below the estimated payout for the 1983 season of 360 cents. By holding SMPs relatively constant at their 1982 levels, an opportunity was given for market prices to catch up with SMP price levels, allowing for product price inflation on export markets and any subsequent devaluation by New Zealand. Domestic inflation itself would erode the real value of SMPs to New Zealand farmers if SMP levels were held relatively constant. Of course, allowing the SMP to be eroded in real terms is contrary to the philosophy of maintaining adequate farm incomes which was used as a justification for the introduction of the SMP scheme.

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[1] 'Market' prices include payments made under price stabilisation schemes administered by producer boards.

TABLE 1

Payments to Farmers Under Supplementary Minimum Price Scheme

Product	Season 1979	1980	1981	1982	1983[a]
			($ million)		
Wool	1.4	0.0	0.0	184.2	210.0
Lamb	0.0	0.0	0.0	93.9	135.0
Mutton	0.0	0.0	0.0	8.7	12.0
Beef	0.0	0.0	1.9	53.3	25.0
Milkfat	17.4	0.0	0.0	0.0	0.0
Total	18.8	0.0	1.9	340.1	382.0

Source: MAF (1983) New Zealand Agricultural Statistics 1983, Table 65.

[a] Agricultural Review Committee estimate

In spite of the fact that the levels of SMPs for the 1983 season are in real terms lower than those holding for 1982 (except for milkfat), Table 1 shows that the Agricultural Review Committee forecasts payments under the SMP scheme to reach over $380 million during the season. Even though the subsequent six per cent devaluation of the New Zealand dollar in March of 1983 will lower the actual amount paid out, SMP payments will continue to make up an important component of farmgate returns and therefore farm incomes.

Until now, the SMP policy has been debated in terms of the simple effects of SMP payments on current farm incomes and expenditure. Longer term distortions in resource allocation have been acknowledged, but only in qualitative terms. This discussion draws attention to the longer term effects of maintaining the SMP policy. The impact of the SMP policy is assessed not only in terms of farm income and expenditure, but also in terms of the level and composition of livestock numbers, farm production, and capital investment on New Zealand farms, as well as the volume and value of exports originating from these farms. Necessarily, these latter impacts are of a longer term nature.

Apart from measuring the potential longer term distortions introduced by the SMP policy, the analysis undertaken allows an important assumption underlying the SMP scheme to be tested. Namely, it is assumed that in the absence of SMP payments the productive base of the pastoral sector would be degraded to such an extent, that export receipts earnt from pastoral production would fall dramatically.

Section 2 of this paper summarises the methodology used in quantifying the effects of removing SMPs. Briefly, an econometric model of the pastoral livestock sector was used to analyse the SMP scheme using simulation techniques. The results of this analysis are discussed in Section 3. Conclusions are presented in Section 4.

TABLE 2

Farm-Gate Product Prices in 1982

Product	Price Received by Farmers	Market Price[a]	Supplement	Supplement as Percentage of Market Price
	(c/kg)	(c/kg)	(c/kg)	(per cent)
Wool (AWASP)	313	262	51	19
Lamb (PM lamb)[b]	166	147	19	13
Mutton (ML2 ewe)[b]	60	53	7	13
Prime Beef (P1 Steer)	143	133	10	8
Manufacturing Beef (M Cow)	125	102	23	23
Milkfat	330	330	0	0

Source: NZ Meat and Wool Boards' Economic Service (1982) Annual Review of the Sheep and Beef Industry
NZ Meat Producers Board (various) weekly schedule
NZ Dairy Board (1982) Annual Report

[a] includes payments under stabilisation schemes

[b] includes pelt and wool payments.

SECTION 2

METHODOLOGY

2.1 Description of Model

Laing and Zwart (1981) and Laing (1982) have reported the development of an econometric model of the pastoral livestock sector. The latest developments in the model's structure are reported in Laing and Zwart (1983). For convenience, the pastoral livestock sector has been defined as farming enterprises that involve sheep, beef cattle, or dairy cattle. Thus the econometric model of the pastoral livestock sector is aimed at describing changes in livestock numbers and farm production, as well as the financial position and decisions of the farm units making up the sector. The model also follows the flow of product produced in the pastoral sector through to the export level, after account is taken of domestic consumption and stock-changes.

Figure 1 presents a schematic summary of the model's structure. Three sub-models can be identified: the farm income and investment sub-model, the livestock numbers and production sub-model, and the consumption, stocks and export sub-model.

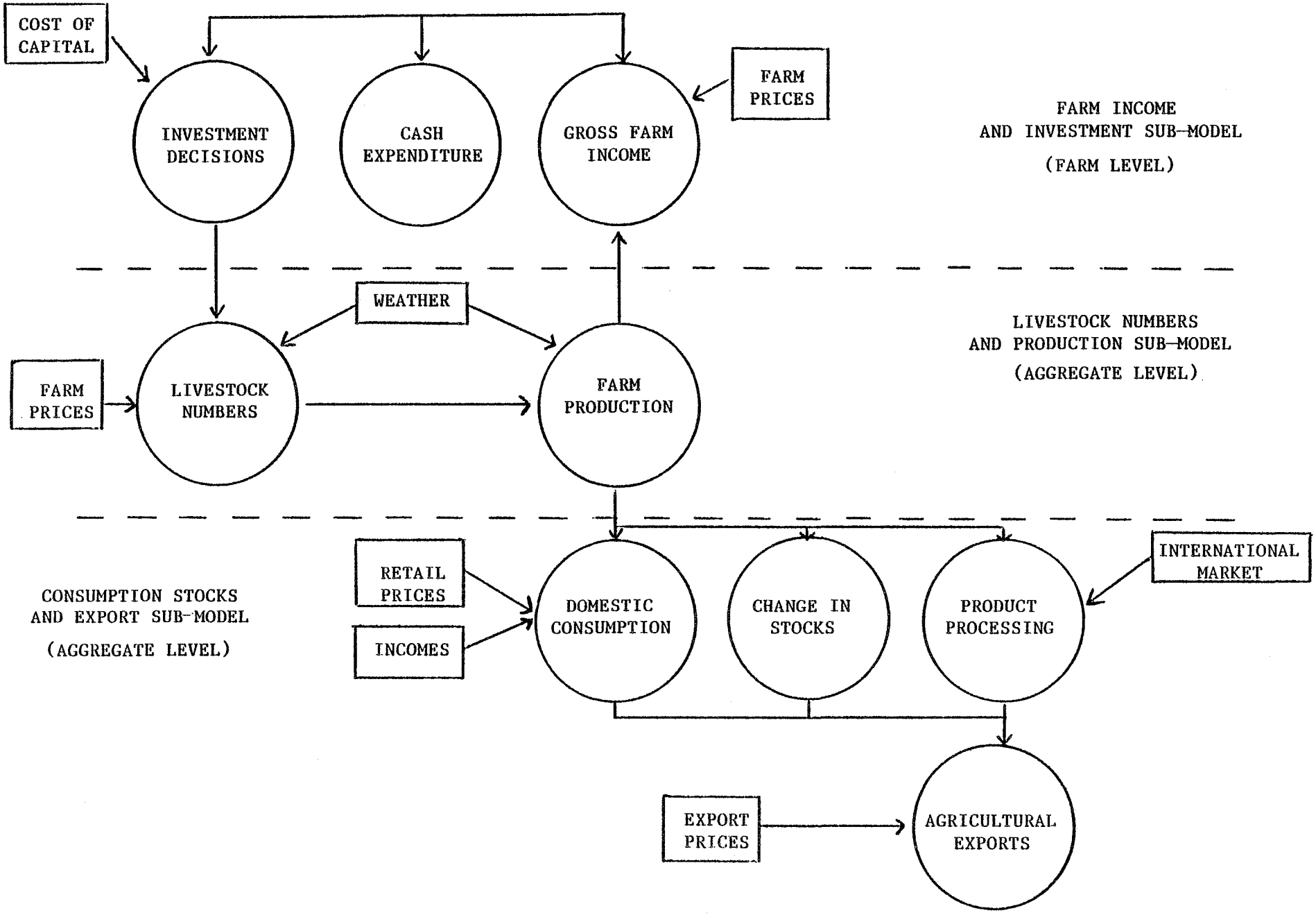
Individual income and investment sub-models have been developed for sheep and beef, and dairy farms. To a large extent these models are based on farm level data rather than national aggregates. Gross income per farm is generated from a number of simple price - quantity relationships representing the individual components of farm income. Having calculated gross income, current expenditure is estimated as a function of the level and change in both gross income and total stock units carried, as well as the farm's capital intensity (measured by capital stock per stock unit). Current expenditure is subdivided into four categories: fertiliser, repairs and maintenance, interest and 'other'. Farmers do not adjust every expenditure category to the same extent when farm incomes and other variables change from year to year.

Having generated net income from the difference between gross income and total expenditure, net income is then allocated between consumption (drawings), investment, and tax payments. The range of investment decisions includes off-farm investment (shares, debentures), land purchase, capital investment in buildings, plant, machinery, land development, and debt. Debt is included as an investment decision since debt management allows liquidity not to be solely represented by net income. Drawings and each investment decision are described in this framework as being determined by the level and change in net income, the returns to each investment relative to the cost of making that investment, and the opening level or stock of each asset held. Thus, it is recognised that a high degree of inter-relationship exists between individual investment decisions, and between investment decisions and consumption. A change in the level of any asset, or in the returns to that asset, has therefore inevitable consequences on the future levels of every other asset, and on the level of consumption possible.

Investment in land development is a key variable in the overall model, since strong links are found between land development and the livestock numbers and production sub-model. Land development includes a wide variety of capital improvements, from land clearing, contouring, and initial fertiliser and sowing, to water supply systems, drainage, irrigation

FIGURE 1

OVERVIEW OF MODEL STRUCTURE



and the planting of shelter belts. Livestock numbers are affected by such expenditure to the extent that such development work changes the overall carrying capacity of farmland. The livestock numbers and production model is however, affected by more than just the level of land development investment, which influences the total number of livestock able to be carried. Total livestock numbers are subdivided into a number of age and sex categories, reflecting their different economic functions within the flock or herd. Each category is affected in different ways and to varying degrees by both economic and environmental factors. In addition, each individual demographic category's ability to respond to economic stimuli is influenced by current and past responses in other demographic categories. The major economic variables affecting livestock numbers are the relative returns to individual farm enterprises. These are represented in the model by relative farmgate prices for farm outputs such as wool, lamb, beef and milkfat. Environmental factors are represented by a variable measuring the annual number of days of soil moisture deficit. In order to better understand the inter-relationships between age and sex divisions within farm enterprises, nine livestock categories are recognised in the model: breeding ewes, ewe hoggets, other sheep, beef breeding cows, beef heifers over one year old, beef heifers under one year old, other beef cattle (including steers and bulls), dairy cows, and dairy heifers.

Having modelled changes in livestock numbers over time, production trends are found as a consequence. Total production is determined simply by the numbers of animals slaughtered (or milked or shorn) and the carcase weight (or yield or woolweight). Depending on the type of output being modelled, livestock demographic variables are in the form either of the opening number of animals or the change in livestock numbers. For example, wool, lamb and milkfat production are determined by the numbers of sheep, breeding ewes and milking cows, respectively. On the other hand, mutton and beef production are better explained by also including the changes in the numbers of adult sheep and cows, since these account for whether numbers are being built up, or alternatively whether the flocks or herds are in a liquidation phase.

Additional variables are included in the production equations to account for changing per-head production of animals. Relative product returns guide the allocation of current resources among the various enterprises, while the capital stock per stock unit measures the capital intensity of per head production. Finally, since a major determinant of carrying capacity and per-head performance is pasture growth, the variable measuring soil moisture deficit was included to explain these effects.

The third major component of the overall model explains the level of domestic consumption and stocks of the major agricultural products which are derived from the pastoral sector. Consumption is estimated as a function of retail prices and per-capita disposable income while stock changes are determined by production levels, and market prices. From the knowledge of domestic consumption and stocks, and the production level determined earlier, exports are derived as a residual. Utilising the level of export prices for individual pastoral products, it is then possible to evaluate the f.o.b. value of exports. The main function of the consumption, stocks and exports sub-model described above is to allow the foreign exchange implications of policies affecting farm production to be evaluated. This sub-model is particularly important in identifying the time taken for a policy change to eventually affect the volume and value of exports.

2.2 Simulation Analysis

The complete econometric model of the pastoral livestock sector comprises almost 200 relationships. Each relationship describes the dependence between a particular variable and the rest of the model system. In econometric jargon, the endogenous variable is determined by a number of pre-determined variables. These pre-determined variables can be of two types. Firstly, they may be variables which influence the model system but are not in turn affected by the system's behaviour, i.e. they are exogenous to the model. For example, in the present model, farm-gate prices are the most important exogenous variables. The second type of pre-determined variable is that which measures previous years' values of other endogenous variables. These variables, known as lagged endogenous variables, provide links between equations, and are therefore important influences generating the time-path or dynamics of the model.

In order to analyse the influence of SMP payments on the pastoral sector two simulation experiments were undertaken; the first incorporated the influence of SMPs on exogenous variables, and the second excluded the effects of SMP payments. The simulations were run over seven years, with 1981 as the base year. Exogenous data for the simulation comprised actual data for 1981 and 1982, and then for the five post-1982 periods were generated by holding each exogenous variable constant at its 1982 level. By holding the exogenous variables constant at their 1982 levels, the implications of removing SMP payments can be evaluated under the assumption that exogenous factors such as export prices are held constant.

It is recognised at the outset that the assumption of a permanent difference between market and farm-gate prices is a strong one. Clearly, it is unlikely that such a situation would ever arise. The assumption of a permanent difference should therefore be regarded as one extreme possibility of a SMP-type policy. At the other extreme would be an assumption that no gap exists between market and farm-gate prices. Between these two extreme policies are an infinite number of other policies, representing every conceivable trend in market and farm-gate prices.

Although the analysis discussed in later sections is based on one of an infinite number of possible price assumptions, the results presented do still represent a forecast, but only on the condition that the extreme price assumptions are actually fulfilled. The actual impact of the SMP policy over time will lie somewhere between this extreme forecast and the forecast generated by assuming no SMP payments were made.

The results of the two simulation experiments described above were analysed by subtracting the generated time path for the 'without' SMP simulation from the simulation 'with' SMPs. The difference between the two simulations for each endogenous variable can then be attributed to SMP payments.

The use of the five time periods with constant 1982 prices is intended to isolate the generalised impacts of SMP payments over time while assuming that other factors are held constant. Thus, the most important results are the 'differences' between the alternative simulations. It will be noted in the results that, even though these variables are held constant, the endogenous variables can vary considerably both 'with' and 'without' SMPs. This is simply a reflection of the ongoing dynamic effects of the

changes that occurred between 1981 and 1982 and do not affect the evaluation of the policy.

The results of the simulation are discussed in Section 3.

SECTION 3

RESULTS

3.1 Introduction

In reporting the simulation results from the pastoral sector model it is apparent from the model's size and complexity that the discussion must necessarily be selective in its presentation of results. Figures 2 to 11 summarise graphically the simulation results. In each figure, the levels produced by the 'with' and 'without' SMP simulations for a number of variables are presented. For the purposes of this discussion, the concept of long-run is represented by the results generated five periods (years) after the removal of the SMP payments. Given the trends in each variable 'with' and 'without' SMPs, the difference between the trends can be attributed to the influence of SMPs. The discussion of results concentrates mainly on these differences, although the absolute level and trend in each variable is also of interest.

Since the differences 'with' and 'without' SMPs vary in magnitude, and often direction, over time, the discussion opens with a description of the immediate (or short-run) effects of removing SMPs, followed by a description of the long-run effects.

3.2 Short-Run Effects of Removing SMPs

In the short-run, the effects of removing SMP payments from farm-gate returns are confined largely to financial adjustments associated with the loss in income. Figures 2 and 3 show that livestock numbers and farm production in 1982 are at similar levels with and without SMP payments being made. This is not a surprising result, given the short-run inflexibility faced by farmers in changing between alternative farm enterprises. The removal of SMPs has immediate impacts on gross incomes. Figure 4 shows that in the absence of SMP payments, gross income per sheep and beef farm would be nine per cent lower than the 'with' SMP level.[2] In 1982 dollar terms, this is equivalent to over $9,600. The predicted decline in gross income is largely due to a 15 per cent decline in the level of wool receipts from the 'with' SMP level.

A decline in gross income inevitably produces adjustments in current farm expenditures. In the short-term, expenditure falls by only four per cent from the 'with' SMP level. This is due to the fact that the majority of current expenditure is tied to the level of farm activity in that year. Since the level of livestock numbers and production do not change significantly in the short-run, the expenditure associated with production is inevitable. However, some components of the total expenditure were more flexible in the short-run. For example, fertiliser expenditure declined by eight per cent in the short run, and repairs and maintenance by seven per cent.

Given the nine per cent decline in gross income, and four per cent decline in current expenditure, the majority of adjustment to the removal of SMPs is reflected in net income, and expenditure categories

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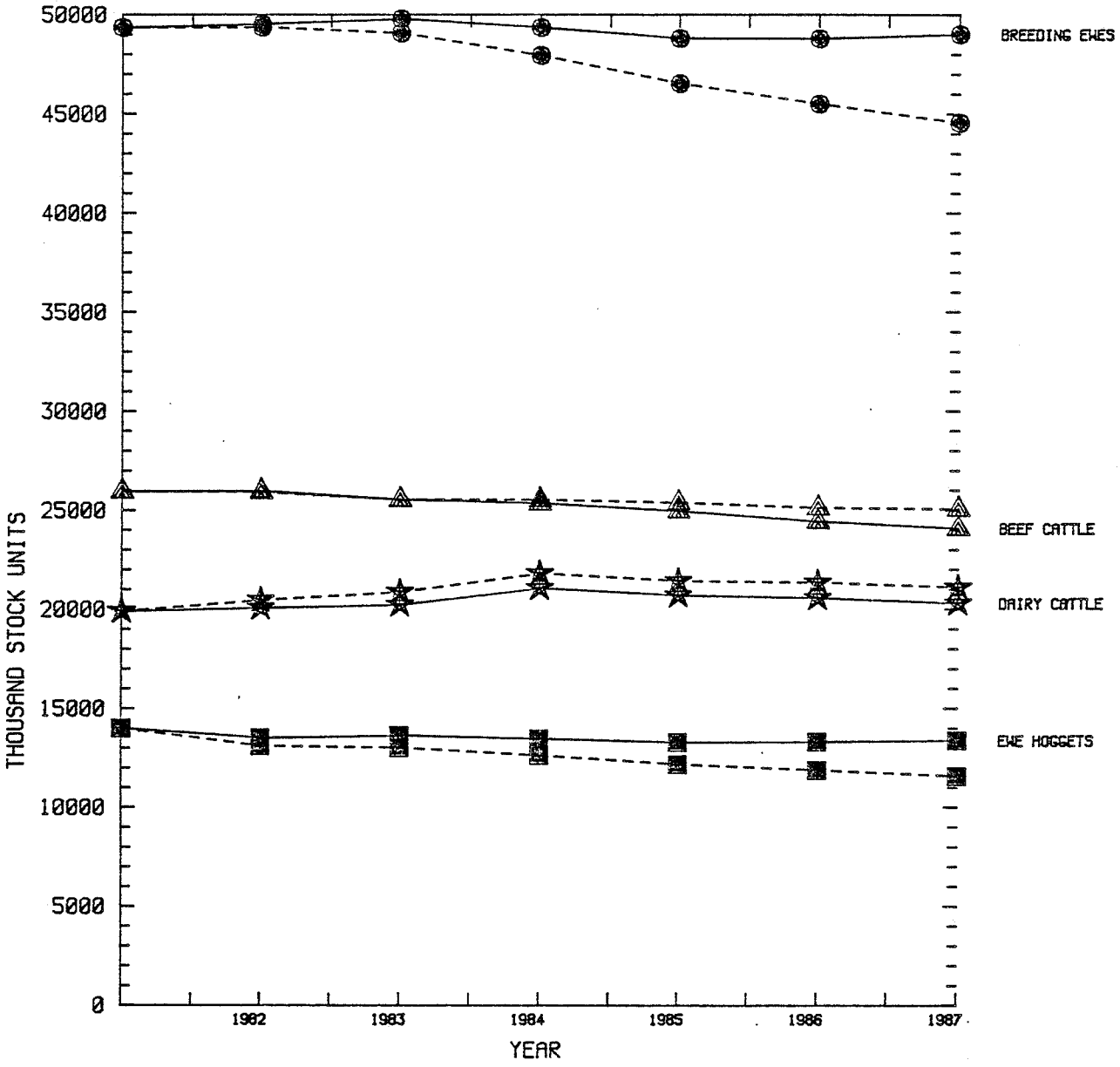
[2] See Appendix I for tables summarising results in percentage terms.

FIGURE 2:LIVESTOCK NUMBERS
-WITH AND WITHOUT SMPS



Key

——— with SMPs

– – – – without SMPs

FIGURE 3:FARM PRODUCTION
-WITH AND WITHOUT SMPS

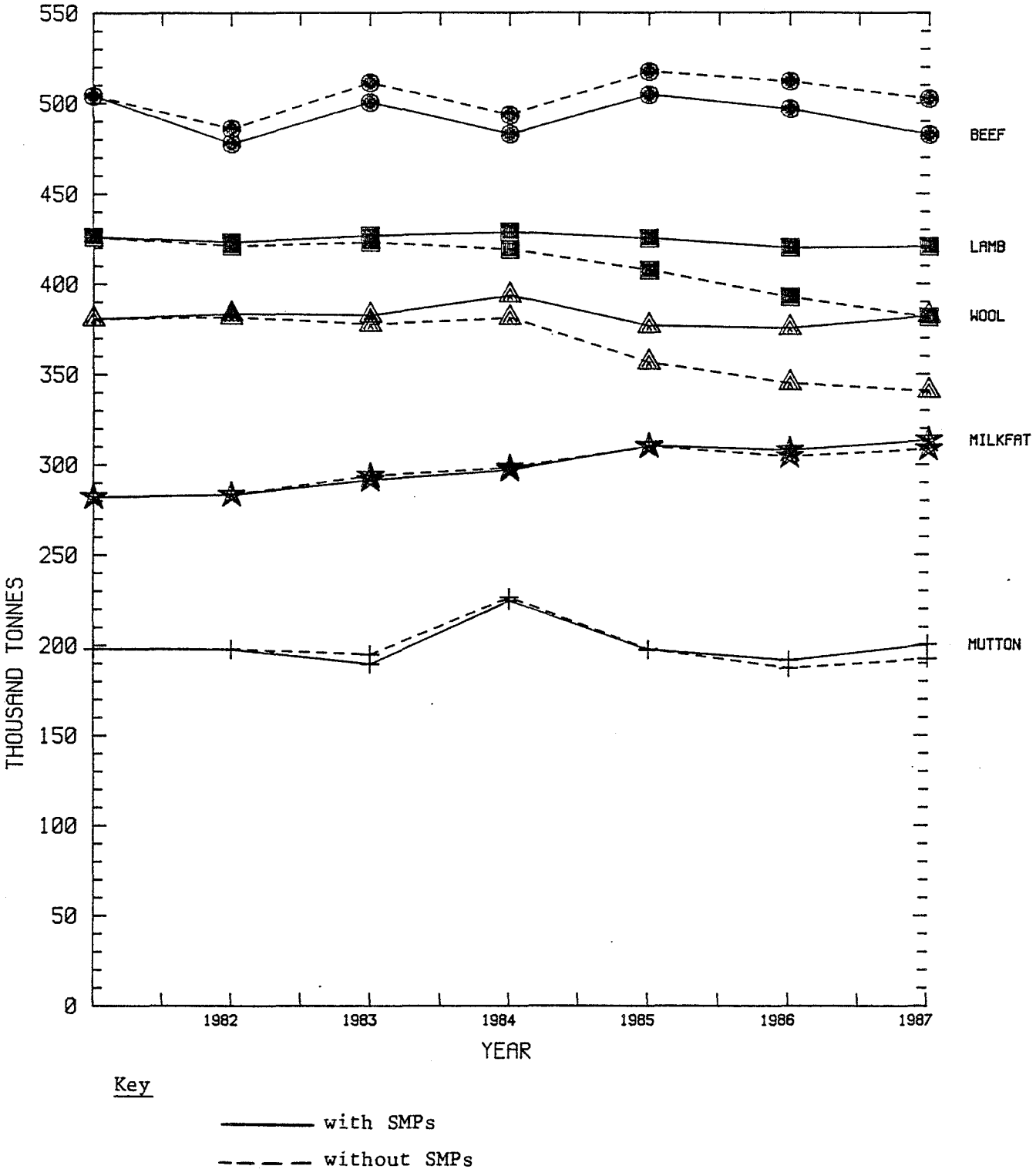
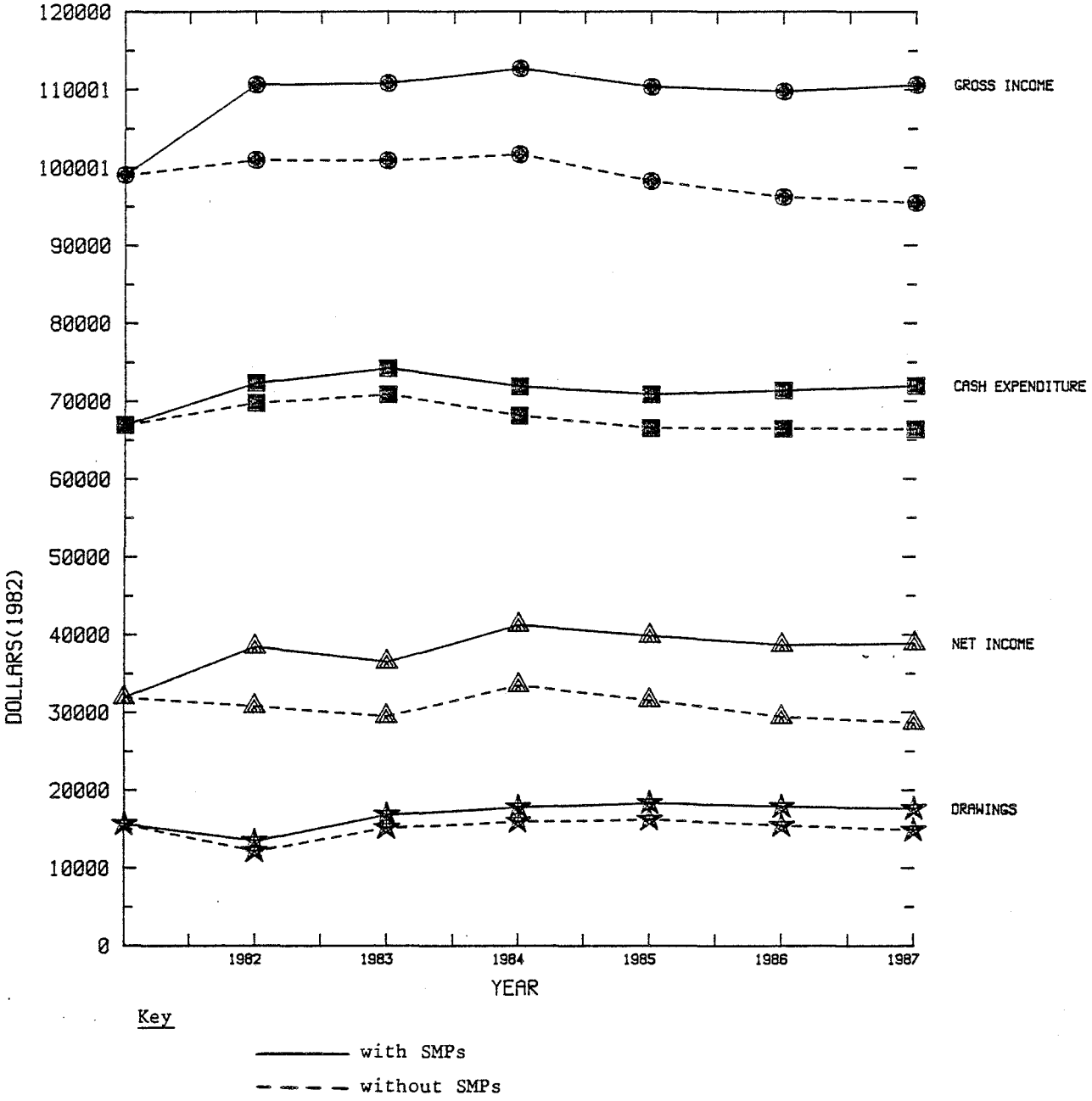


FIGURE 4: INCOME PER SHEEP AND BEEF FARM
-WITH AND WITHOUT SMPS



such as drawings, capital investment, off-farm investment and land purchase, which are dependent on net income. Figure 4 reveals a wide gap between the level of net income with SMP payments, and the level without. In 1982 dollar terms this is equivalent to over $7,600 per sheep and beef farm, a 20 per cent decline. The short-run effect on drawings of this decline in net income is a 10 per cent decline relative to the 'with' SMP level. The reduction of net income also causes adjustments in capital expenditure. Figure 5 shows that the level of expenditure on each capital type is reduced in comparison to the 'with' SMP level when SMP payments are removed. Plant, machinery and transport vehicle expenditure, being directly related to both the level and change in net income, declines by 6 per cent. Land development and building capital expenditure decline 4 and 3 per cent respectively in the short-run.

Figure 6 shows that in spite of a stable number of dairy cattle and milkfat production in the short-run, gross income per dairy farm in 1982 is two per cent lower without SMP payments than it is with SMPs. This is not due to the removal of SMP payments on milkfat, since market related milkfat payments were above the 1982 SMP level. The decline in income per dairy farm is found in the contribution beef production makes to dairy farm incomes. Such income declines 13 per cent from the 'with' SMP level when SMP payments on beef are removed.

Because of the small short-run reduction in gross income per dairy farm, current and capital expenditure are not adjusted significantly. Figure 7 does show a three per cent decline in plant, machinery and transport vehicle expenditure.

Figures 8 to 11 summarise the simulation results for meat and wool stocks and export volumes, the volume of dairy product exports, and the value of meat, wool and dairy exports. The results generated for domestic consumption and dairy stocks, being less important components of the overall model, are not presented graphically. Generally, Figures 8 to 11 show that for these variables, the short-run effects of removing SMP payments are very minor. The value of each variable in 1982 is basically the same whether or not SMP payments are made or not. Largely, this result reflects the fact that total production is maintained in the short-term. However, for lamb, significant differences do exist in the short-run between the level of stocks and exports in the absence of SMPs and the 'with' SMP level. Figure 8 shows that if SMP payments had not been made, stocks of lamb in 1982 would have remained at the 1981 level. With the presence of SMPs, a gap existed between market related and farm-gate prices for lamb, encouraging the accumulation of lamb stocks. In percentage terms, the short-run level of lamb stocks was 11 per cent lower in the absence of SMP payments, equivalent to about 14,000 tonnes. In terms of export volumes, this is the additional quantity of lamb exported in the absence of SMP payments, equal to a four per cent increase in lamb exports in the short-run.

3.3 Long-Run Effects of Removing SMPs

The removal of SMP payments from farm-gate returns, if sustained, sets off an adjustment process in the pastoral sector that occurs over a number of years. As described earlier, the short-run effects are restricted to changes in the financial position of farmers, since total production and enterprise choice are quite inflexible. In the longer run, however, these short-run financial adjustments lead to long-run changes in production levels and enterprise choices.

FIGURE 5:GROSS CAPITAL INVESTMENT ON
SHEEP AND BEEF FARMS -WITH AND WITHOUT SMPS

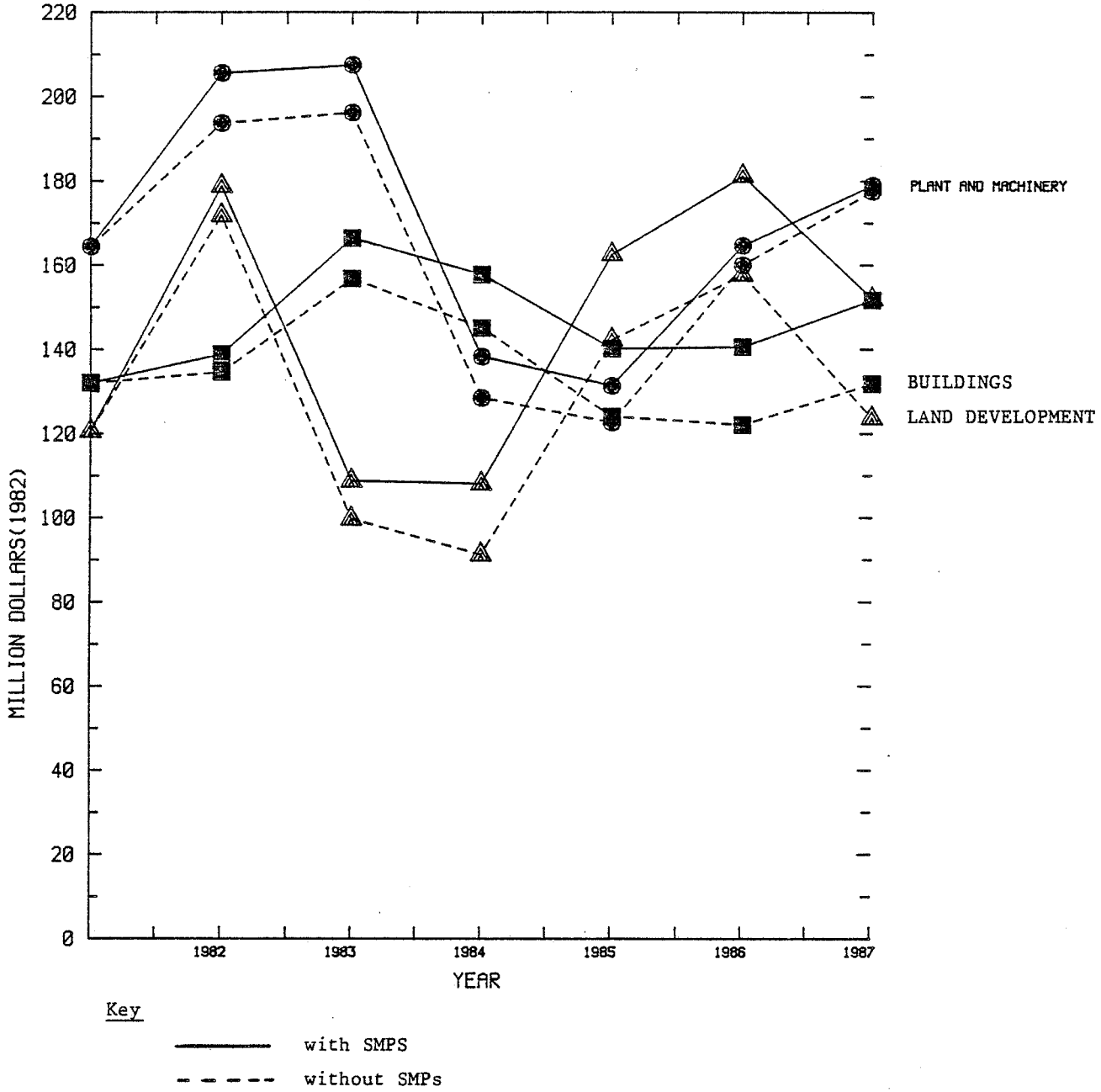


FIGURE 6: INCOME PER DAIRY FARM
-WITH AND WITHOUT SMPS

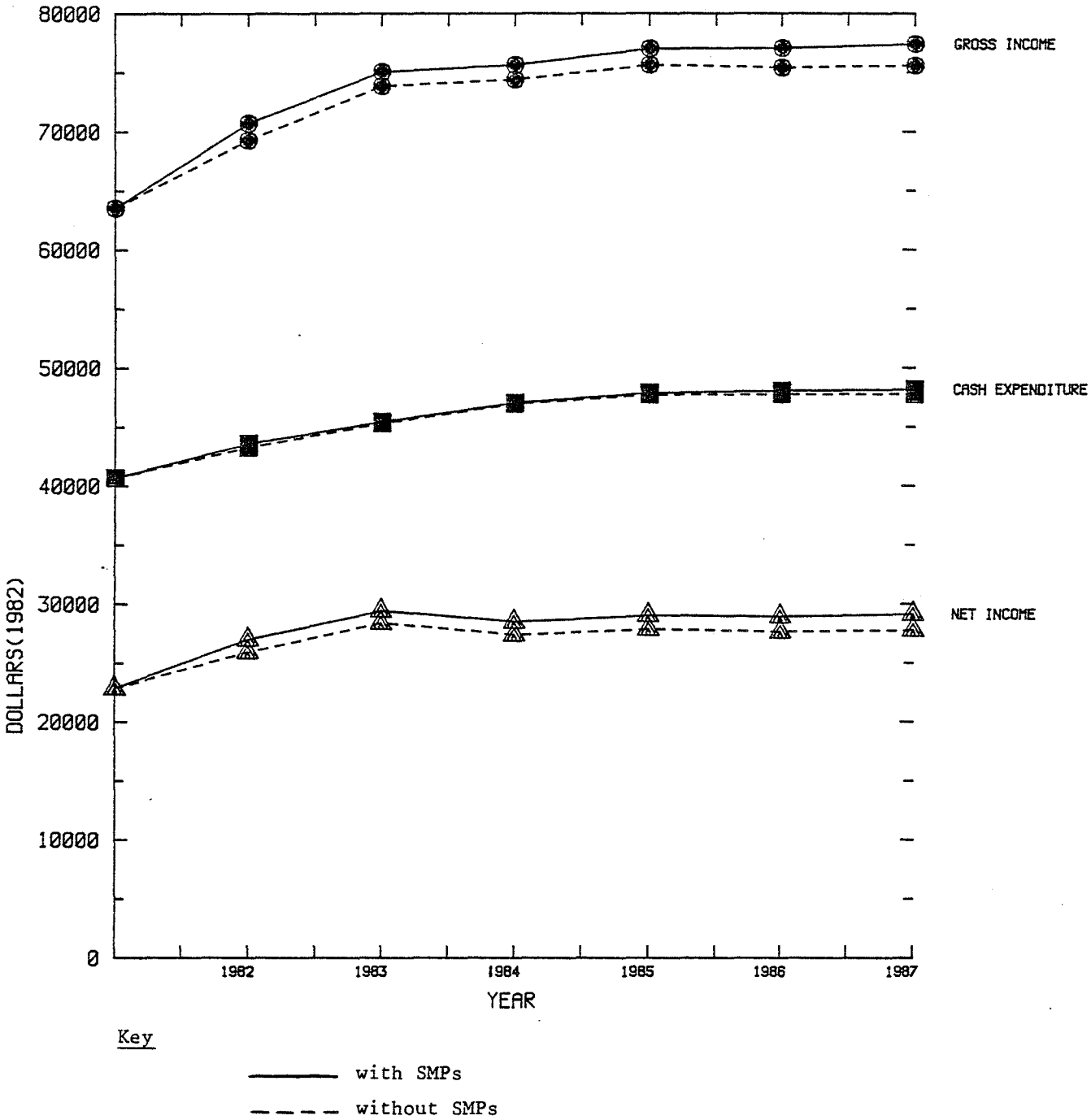


FIGURE 7:GROSS CAPITAL INVESTMENT ON DAIRY FARMS -WITH AND WITHOUT SMPS

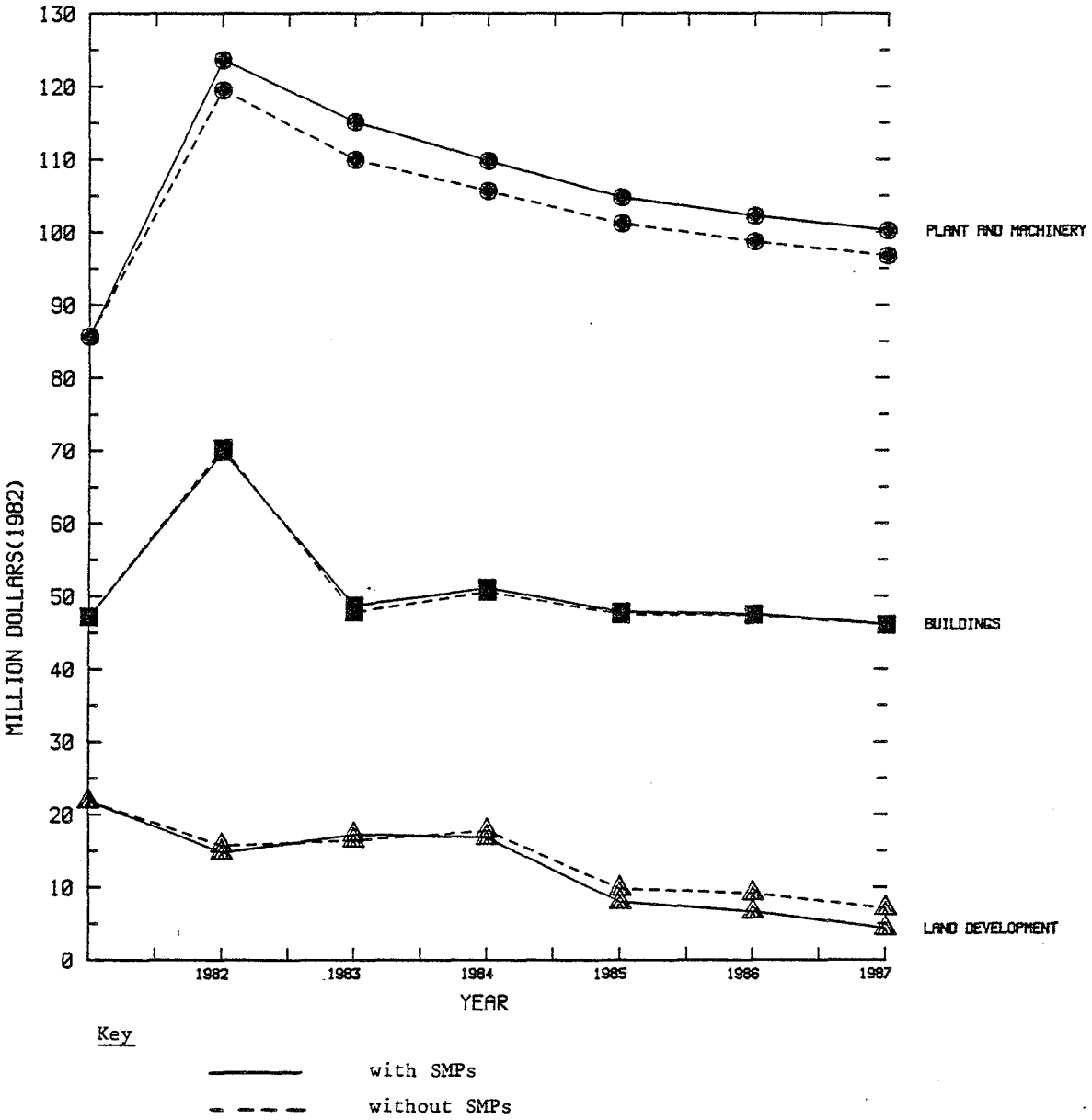


FIGURE 8:MEAT AND WOOL STOCKS
-WITH AND WITHOUT SMPS

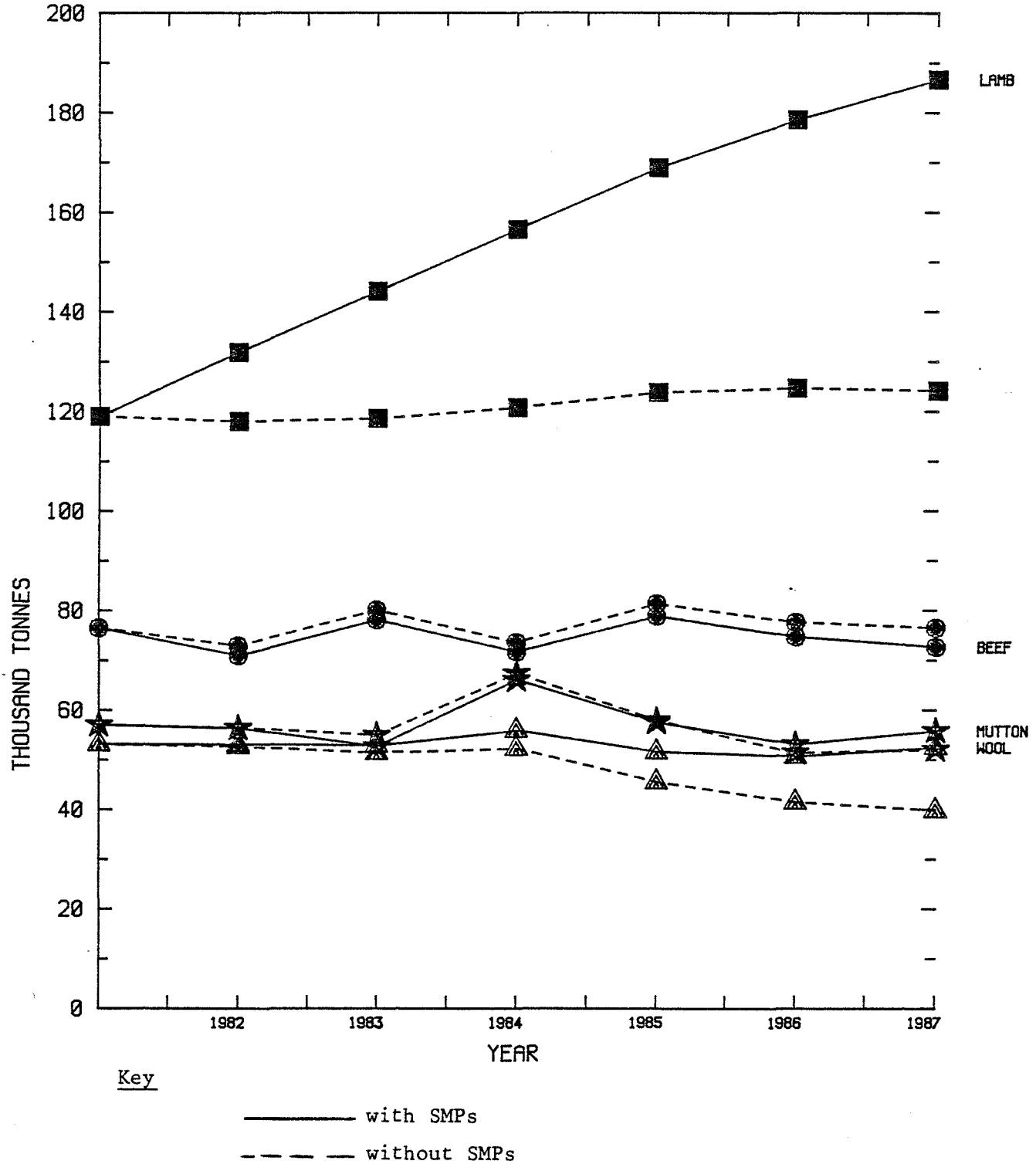


FIGURE 9: VOLUME OF MEAT AND WOOL EXPORTS
-WITH AND WITHOUT SMPS

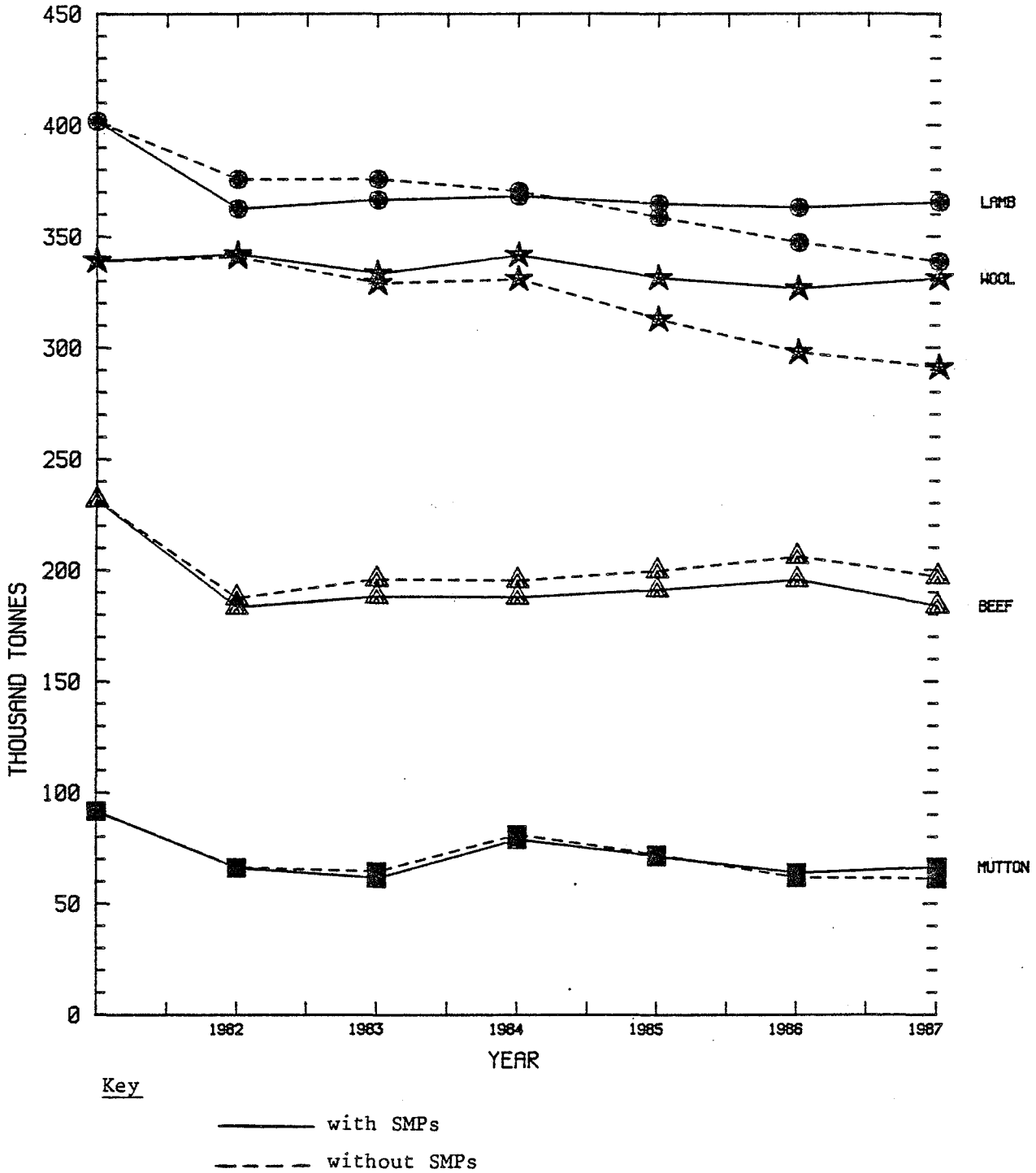
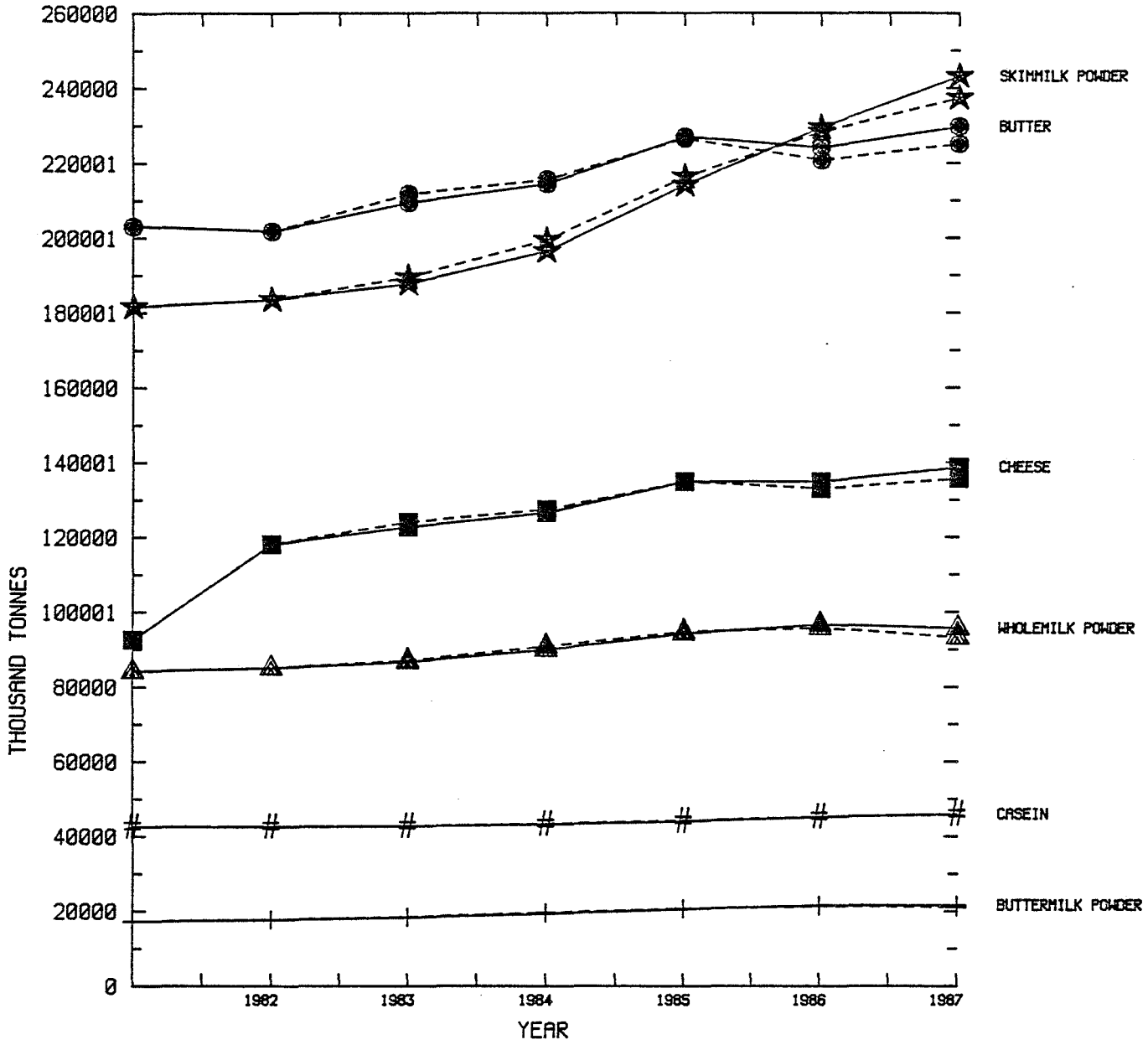


FIGURE 10:VOLUME OF DAIRY PRODUCT EXPORTS
-WITH AND WITHOUT SMPS



Key

With SMPs

Without SMPs

FIGURE 11: VALUE OF EXPORTS
-WITH AND WITHOUT SMPS

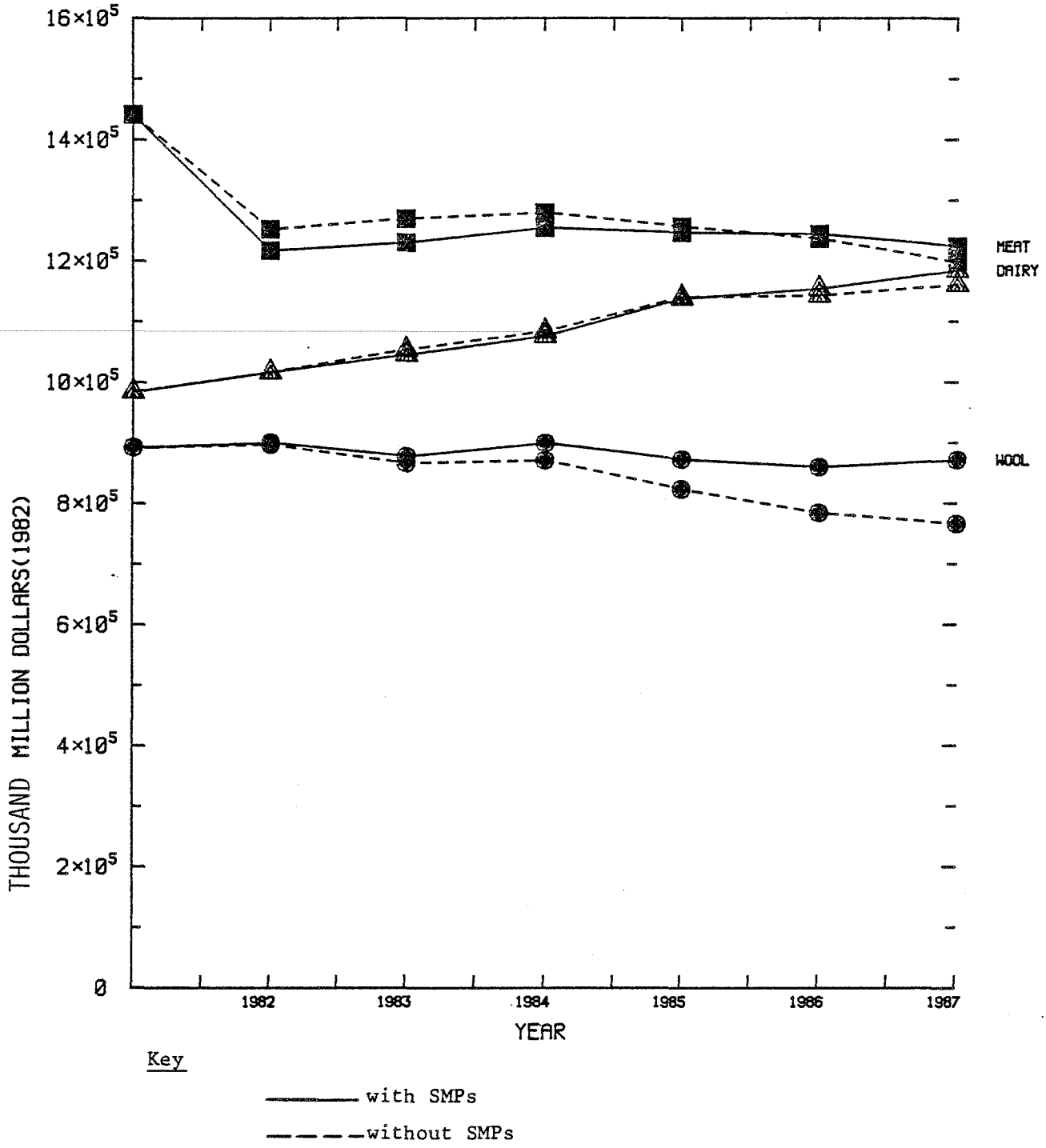


Figure 2 reveals that five periods after 1982, the removal of SMP payments meant that breeding ewe numbers were projected to fall by nine per cent, in absolute terms equal to 4.5 million head. At the same time, beef and dairy cattle numbers each rose by four per cent above their 'with' SMP level. These increases in the beef and dairy cattle populations failed to offset the decline in sheep numbers, so that total stock units held on pastoral farms declined by 4.4 million stock units. Thus, the removal of SMP payments affected not only the composition of livestock held on pastoral farms, but also the overall level. The change in composition was affected largely by the alteration to relativities between farm-gate prices associated with each farm enterprise. Clearly, the sheep enterprise received the largest incentive through SMPs (1982 levels) and so suffered the largest decline with the removal of SMPs. Beef and dairy cattle on the other hand were relatively more profitable with the removal of SMPs, and so increased relative to their 'with' SMP level. In terms of the levels of beef and dairy cattle, the removal of SMP payments slowed down the decline in the beef herd, and accelerated the growth in dairy cow numbers.

While the altered composition of livestock was influenced largely by changed price relativities, the overall level of livestock held on pastoral farms was affected by changes in the carrying capacity of pastoral farmland. This is largely affected by the level of capital expenditure on land development, since the estimation results reported in Laing and Zwart (1983) show this to be an important positive influence on each category of livestock. Figure 5 shows how the effect of removing SMPs on land development expenditure on sheep and beef farms increases over time, and thus reduces expenditure by four per cent in the short-run, and 19 per cent in the long-run.

Given the overall decline in the number of stock units held on pastoral farms, but the changed composition of those livestock, the long-run change in the farm-production mix revealed in Figure 3 is not unexpected. Lamb and wool production declined by nine and 11 per cent respectively in the long-run. Mutton production declined by only four per cent from the 'with' SMP level, though for the early years after the removal of SMP payments mutton production actually increased. This increase occurred due to the reduction in breeding ewe numbers through higher slaughter rates. The simulation generated a slight (2 per cent) decline in the long-run level of milkfat produced compared to the 'with' SMP level. Total production still increased but at a slower rate. This result can be traced through the model's structure to a decline in per-cow production, caused by the pressure of higher cow numbers on a reduced level of dairy farm capital (see Figure 7).

The long-run decline in gross income per sheep and beef farm compounds the short-run effect of lower farm-gate prices with the fall in total output, so that gross income declined by 14 per cent, or $15,142 per farm (see Figure 4). Current expenditure was more flexible in the long-run and so declined by eight per cent from the 'with' SMP level, double the short-run decline. Net income, which declined in the short-run by 20 per cent from the 'with' SMP level, declined by a further six percentage points to a 26 per cent decline, equivalent to over $10,200 per farm. Figure 4 also shows that drawings experienced a further decline from the short-run reduction of 10 per cent, to 16 per cent from the 'with' SMP level in the long-run.

In terms of capital investment on sheep and beef farms, Figure 5 shows that the gap between the 'with' and 'without' SMP expenditure on land development and buildings widened over time. While in the short-run building investment declined by three per cent in relation to the 'with' SMP level, in the long-run this decline grew to a 13 per cent difference.

For land development, comparative figures were 4 and 19 per cent. By comparison, investment in plant, machinery and transport vehicles actually grew closer to its 'with' SMP level over time. Therefore, over time the reduction in income available for capital investment resulted in a change in the composition of farm capital, away from capital more directly linked to production, towards that which leaves the farmer more discretion in determining production levels.

For dairy farmers, Figure 6 shows that the small short-run gap between gross income, expenditure and net income was maintained over time. This is reflected in the differences between the 'with' and 'without' SMP results for capital investment on dairy farms, shown in Figure 7.

The long-run effects of removing SMPs on stocks and export volumes and values are summarised in Figures 8 to 11. Generally, the results for meat and wool stocks follow the results for farm production shown in Figure 3. Lamb stocks tended, however, to build up as the difference between market related and farm-gate returns was maintained. In the long-run, the removal of SMPs reduced lamb stocks by 33 per cent from the level with SMPs.

The effect of the removal of SMPs on the volume and value of exports is largely determined by the effect SMP removal has on production and stock levels. For meat and wool the removal of SMP payments tended to decrease both production and stocks. If the decline in production outweighed the decline in stocks (which increases export availability), export volumes declined. Figure 9 reveals that for meat and wool, production had a greater impact than stock changes. In the long-run, the volume of wool exports declined by 12 per cent from its 'with' SMP level, lamb by seven per cent, and mutton by eight per cent. In absolute terms, these percentages were equivalent to 40,000, 27,000, and 5,000 tonnes respectively. Beef and veal exports increased relative to their 'with' SMP level by 13,000 tonnes or seven per cent.

Figure 10 shows that the removal of SMPs made little difference to the trend in dairy product export volumes. In terms of export value, the long-run difference in dairy exports attributable to the removal of SMPs was $23.2 million, or two per cent of total dairy exports. The values of meat and wool exports declined by 2 and 12 per cent respectively. Taken in association with the decline in dairy exports, the value of pastoral exports lost in the long-run following the removal of SMP payments was $156.1 million. The projected decline of $156.1 million in pastoral export receipts was equivalent to five per cent of the projected total export receipts earned by the pastoral sector if SMPs were maintained.

SECTION 4

CONCLUSIONS

It is apparent from the results presented in Section 3 that SMP payments have not so much been an incentive to increase production as they have ensured that the current level of farm activity is maintained. In the absence of SMP payments gross incomes earned by sheep and beef farmers would fall immediately by nine per cent, net incomes by 20 per cent. Over time, as these farmers adjusted their farm operations to the new levels of output prices, total farm production would fall, and consequently so would pastoral exports. Farmers would be encouraged by the removal of SMP payments not only to reduce the overall level of farm activity, but also to alter the composition of enterprises making up their operations. The relative attractiveness of sheep farming would be reduced in favour of beef and dairy farming.

No conclusive statement can be made regarding the profitability of farming in the absence of SMPs. While the level of income would be reduced, so would the level of current and capital expenditure undertaken. The level of drawings made by farmers could therefore be maintained by adopting a less intensive farming system. Of course, from a national point of view this situation may not be viewed favourably, since associated with a lower level of activity in the pastoral economy would be a reduction in farm production and export volumes, as well as reduced expenditure on goods and services. However, while these unfavourable side effects of removing SMPs have been identified, the costs of retaining SMPs should also be recognised. Firstly, the analysis discussed in Section 3 shows the distortions in resource allocation SMP payments create within the pastoral economy. Currently, sheep farming is artificially encouraged at the expense of beef and dairy farming. Secondly, and more importantly, is the cost to the nation of making SMP payments, equal to $340 million in the 1982 season.

The analysis presented in this paper has shown that the foreign exchange returns for the country with an annual outlay of $340 million varies considerably over time. In the short term there is little effect at all on the exchange earnings from agriculture. Thus, even as a short-term measure, the payment of subsidies to farmers under the SMP scheme cannot be justified on the ground that without them export receipts would fall dramatically. At the end of the five year period of analysis, it was projected that the maintenance of SMP payments could increase foreign exchange earnings above those earnt in the absence of SMP payments by $156 million per year. Taken in association with the $340 million per annum cost of making SMP payments, it can be concluded that if the SMP policy was to be judged solely on its foreign exchange implications, then the evidence presented in this paper would support the policy's removal. If the SMP policy is to be retained, even as a short-term measure then it should be realised that any payments made under the scheme will not be fully returned in the form of maintained export earnings. From a national viewpoint, the acceptance of such losses would suggest that the re-distribution of income in favour of the farming sector had become a goal of economic policy.

At the outset of this discussion, it was acknowledged that the assumption made in this analysis, namely, that the gap between market and farm-gate prices would be maintained over the period of analysis, was a strong one. As the 1983 season comes to a close it is apparent that this gap has narrowed

considerably. If this trend continues into the 1984 season, farm-gate prices will again reflect overseas market conditions. It would be tempting when this occurs to make an ex post justification for the SMP policy. It might be argued that without the SMP policy the pastoral sector would not have been in a position to take advantage of improved prices due to disinvestment in livestock numbers and farm capital. It can be concluded from the analysis presented in this paper that even under an extreme assumption of a permanent difference between market and farm-gate prices, this disinvestment is not large. Thus, the level of capital and livestock numbers would have been largely maintained even in the absence of a SMP policy, making it possible to respond to any upturn in market returns.

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APPENDIX I

Projected Differences in Levels of Variables : Removal of SMPs Relative to Retention of SMPs at Current Levels

TABLE I.1

Sheep and Beef Sector: Absolute Differences

Variable	Units	1982	Years After 1982				
			1	2	3	4	5
Livestock Numbers	(000 hd, or 000 s.u.)						
Breeding Ewes		-163	-719	-1408	-2270	-3283	-4460
Ewe Hoggets		-405	-615	-834	-1112	-1435	-1811
Total Sheep Stock Units		-402	-1282	-2173	-3362	-4638	-6140
Beef Breeding Cows		7	36	62	87	106	125
Beef Heifers		0	5	10	15	24	33
Total Beef Stock Units		-52	-1	184	429	699	977
Total Sheep and Beef Stock Units		-457	-1295	-2015	-2976	-4001	-5247
Farm Production	(000 tonnes)						
Wool		-2	-5	-12	-20	-31	-42
Mutton		0	5	2	0	-4	-8
Lamb		-2	-4	-10	-18	-28	-39
Beef		8	11	11	13	15	20
Income and Expenditure per Sheep and Beef Farm	(1982 $)						
Gross Income		-9648	-9899	-10986	-12062	-13560	-15142
Fertiliser		-773	-712	-739	-866	-961	-1103
Repairs and Maintenance		-664	-947	-1067	-1248	-1471	-1729
Interest		0	-2	-18	-45	-9	61
Other Expenditure		-1202	-1779	-1996	-2260	-2567	-2924
Total Cash Expenditure		-2554	-3370	-3747	-4332	-4909	-5578
Net Farm Income		-7657	-6999	-7759	-8269	-9255	-10224
Drawings		-1318	-1679	-1858	-2122	-2425	-2753
Capital Investment							
Off-farm Investment	(1982 $)	-1234	-1568	-1494	-1306	-1155	-841
Farm Purchase	(Number)	-33	-36	-43	-47	-60	-78
Buildings Investment	(1982 $ million)	-5	-9	-14	-16	-18	-20
Plant, Machinery, Transport Vehicle Investment	(1982 $ million)	-11	-11	-9	-9	-5	-2
Land Development Investment	(1982 $ million)	-7	-9	-16	-20	-23	-29
Total Liabilities	(1982 $)	-23	-181	-472	-88	644	884
Domestic Consumption	(000 tonnes)						
Beef		0	0	0	0	0	0
Mutton		0	0	0	0	0	0
Lamb		0	0	-1	-1	-2	-3
Wool		0	0	0	0	0	0
Stocks	(000 tonnes)						
Beef		2	2	2	2	3	4
Mutton		0	2	1	0	-2	-4
Lamb		-14	-26	-36	-45	-54	-63
Wool		0	-1	-4	-6	-9	-13
Export Volume	(000 tonnes)						
Beef		4	8	7	9	10	13
Mutton		0	3	2	1	-2	-5
Lamb		13	9	2	-6	-16	-27
Wool		-1	-4	-11	-19	-29	-40
Export Value	(1982 $'000)						
Meat		35171	39892	24920	9990	-7658	-26122
Wool		-3508	-11372	-28520	-49150	-75606	-105535

TABLE I.2

Sheep and Beef Farm Sector: Percentage Differences

Variable	1982	Years After 1982				
		1	2	3	4	5
Livestock Numbers		%	%	%	%	%
Breeding Ewes	0	-1	-3	-5	-7	-9
Ewe Hoggets	-3	-5	-6	-8	-11	-14
Total Sheep Stock Units	-1	-2	-3	-5	-7	-10
Beef Breeding Cows	0	2	4	6	7	8
Beef Heifers	0	1	2	3	5	7
Total Beef Stock Units	0	0	1	2	3	4
Total Sheep and Beef Stock Units	-1	-1	-2	-3	-5	-6
Farm Production						
Wool	0	-1	-3	-5	-8	-11
Mutton	0	3	1	0	-2	-4
Lamb	0	-1	-2	-4	-7	-9
Beef	2	2	2	3	3	4
Income and Expenditure per Sheep and Beef Farm						
Gross Income	-9	-9	-10	-11	-12	-14
Fertiliser	-8	-7	-8	-9	-9	-11
Repairs and Maintenance	-7	-10	-11	-13	-16	-18
Interest	0	0	0	0	0	0
Other Expenditure	-3	-4	-5	-6	-6	-7
Total Cash Expenditure	-4	-5	-5	-6	-7	-8
Net Farm Income	-20	-19	-19	-21	-24	-26
Drawings	-10	-10	-10	-12	-14	-16
Capital Investment						
Off-farm Investment	-6	-8	-6	-6	-6	-5
Farm Purchase	-15	-37	-22	-16	-22	-34
Buildings Investment	-3	-6	-8	-12	-13	-13
Plant, Machinery, Transport Vehicle Investment	-6	-5	-7	-7	-3	-1
Land Development Investment	-4	-8	-16	-12	-13	-19
Total Liabilities	0	0	0	0	0	1
Domestic Consumption						
Beef	0	0	0	0	0	0
Mutton	0	0	0	0	0	0
Lamb	0	-1	-2	-3	-5	-7
Wool	0	0	0	0	0	0
Stocks						
Beef	3	3	3	3	4	5
Mutton	0	4	2	1	-3	-7
Lamb	-11	-18	-23	-27	-30	-33
Wool	-1	-3	-6	-12	-18	-24
Export Volume						
Beef	2	4	4	4	5	7
Mutton	0	5	3	1	-3	-8
Lamb	4	3	1	-2	-4	-7
Wool	0	-1	-3	-6	-9	-12
Export Value						
Meat	3	3	2	1	-1	-2
Wool	0	-1	-3	-6	-9	-12

TABLE I.3

Dairy Farm Sector: Absolute Differences

Variable	Units	1982	Years After 1982				
			1	2	3	4	5
Livestock Numbers	(000 hd, or 000 s.u.)						
Dairy Cows		50	79	98	94	100	100
Dairy Heifers		5	13	3	8	9	12
Total Dairy Stock Units		394	647	750	738	784	801
Farm Production	(000 tonnes milkfat)						
Milkfat		0	2	1	0	-3	-5
Factory Production	(tonnes p.w.)						
Butter		0	2335	1237	-415	-3419	-4920
Cheese		0	1312	537	-140	-1838	-2560
Whole-milk Powder		0	805	1074	76	-1983	-3356
Skim-milk Powder		0	2449	2871	1489	-2542	-6752
Butter-milk Powder		0	362	197	-67	-534	-769
Casein		0	153	287	187	-142	-575
Income and Expenditure per Dairy Farm	(1982 $)						
Gross Income		-1425	-1215	-1237	-1379	-1653	-1826
Total Cash Expenditure		-316	-133	-75	-168	-299	-407
Net Income		-1060	-1031	-1107	-1155	-1292	-1357
Capital Investment							
Off-Farm Investment	(1982 $)	0	11	7	15	40	80
Farm Purchase	(Number)	-25	-25	-25	-25	-25	-25
Buildings Investment	(1982 $ million)	0	0	0	0	0	0
Plant, Machinery, Transport Vehicle Investment	(1982 $ million)	4	4	4	4	4	4
Land Development Investment	(1982 $ million)	0	0	0	0	0	0
Domestic Consumption	(tonnes p.w.)						
Butter		0	0	0	0	0	0
Cheese		0	0	0	0	0	0
Milk-Powder		0	0	0	0	0	0
Change in Dairy Stocks	(tonnes p.w.)						
Butter		0	40	-19	-28	-51	-26
Cheese		0	4804	-2839	-2478	-6219	-2641
Wholemilk Powder		0	1555	520	-1928	-3979	-2655
Skim-milk Powder		0	-520	-89	293	855	893
Butter-milk Powder		0	588	-267	-430	-759	-383
Casein		0	-370	-278	273	762	955
Export Volume	(tonnes p.w.)						
Butter		0	2290	1097	-468	-3332	-4655
Cheese		0	1328	878	-5	-1896	-3059
Whole-milk Powder		0	382	858	501	-907	-2451
Skim-milk Powder		0	1738	3004	2190	-1216	-5794
Butter-milk Powder		0	123	263	84	-218	-551
Casein		0	21	129	181	70	-173
Export Value	(1982 $'000)						
Dairy Products		0	8580	8020	2515	-11470	-23225
All Pastoral		29518	35284	3305	-37488	-95873	-156118

TABLE I.4

Dairy Farm Sector: Percentage Differences

Variable	1982	Years After 1982				
		1	2	3	4	5
Livestock Numbers	%	%	%	%	%	%
Dairy Cows	2	3	4	4	4	4
Dairy Heifers	1	3	1	2	2	3
Total Dairy Stock Units	2	3	4	4	4	4
Farm Production						
Milkfat	0	1	0	0	-1	-2
Factory Production						
Butter	0	1	0	0	-1	-2
Cheese	0	1	1	0	-2	-2
Whole-milk Powder	0	1	1	0	-2	-3
Skim-milk Powder	0	1	1	1	-1	-3
Butter-milk Powder	0	1	1	0	-2	-3
Casein	0	0	0	0	0	-1
Income and Expenditure per Dairy Farm						
Gross Income	-2	-2	-2	-2	-2	-2
Total Cash Expenditure	-1	0	0	0	-1	-1
Net Income	-4	-4	-4	-4	-4	-5
Capital Investment						
Off-Farm Investment	0	0	0	0	1	1
Farm Purchase	-2	-2	-2	-2	-2	-2
Buildings Investment	1	-2	-1	-1	0	0
Plant, Machinery, Transport Vehicle Investment	-3	-4	-4	-3	-3	-3
Land Development Investment	7	-5	6	23	38	63
Domestic Consumption						
Butter	0	0	0	0	0	0
Cheese	0	0	0	0	0	0
Milk-Powder	0	0	0	0	0	0
Change in Dairy Stocks						
Butter	0	1	0	-1	-1	-1
Cheese	0	-74	22	-48	21	40
Whole-milk Powder	0	8	2	-8	-29	-29
Skim-milk Powder	0	7	1	-3	-10	-10
Butter-milk Powder	0	8	-4	-5	-17	-6
Casein	0	-2	-2	2	6	7
Export Volume						
Butter	0	1	1	0	-1	-2
Cheese	0	1	1	0	-1	-2
Whole-milk Powder	0	0	1	1	-1	-3
Skim-milk Powder	0	-1	2	1	-1	-2
Butter-milk Powder	0	1	1	0	-1	-3
Casein	0	0	0	0	0	0
Export Value						
Dairy Products	0	1	1	0	-1	-2
All Pastoral	1	1	0	-1	-3	-5

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