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FARM BUSINESS UNIT
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Dairy Enterprise Costs Study: A review of the structure and economics of milk production 1987/88 to 1996/97

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SPECIAL STUDIES IN AGRICULTURAL ECONOMICS

University departments of Agricultural Economics in England and Wales have for many years undertaken economic studies of crop and livestock enterprises, receiving financial and technical support from the Ministry of Agriculture, Fisheries and Food. Since April 1978 this work has been supported in Wales by the Welsh Office following the transfer of responsibilities for agriculture to the Secretary of State for Wales.

The departments in different regions conduct joint studies of those enterprises in which they have a particular interest. This community of interest is recognised by issuing reports prepared and published by individual departments in a common series entitled *Special Studies in Agricultural Economics*. Titles of recent publications in this series are given in Appendix C.

ACKNOWLEDGEMENTS

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LIST OF ABBREVIATIONS

CAFRE	Centre for Agricultural, Food and Resources Economics
conc'	concentrates
DECS	Dairy Enterprise Costing Study
DP	Direct purchaser
DSRL	dairy specific regular labour
E&W	England and Wales
ent'	enterprise
EU	European Union.
FI	Fully inside LFA
GATT	General Agreement on Tariffs and Trade
ha	hectare
IMPE	Intervention milk price equivalent
IMI	Inside and mostly inside LFA
LFA	Less Favoured Area
ltrs	litres
MAFF	Ministry of Agriculture, Fisheries and Food
MC	Member Cooperative
MM	Milk Marque
na	not available
NFI	net farm income
NFU	National Farmers Union
NIEMP	National Investigation into the Economics of Milk Production
NPQHs	non-producing quota holders
OMO	Outside or mostly outside LFA
O	Other
ppl	pence per litre
SDL	specialist dairy, large
SDS	specialist dairy, small
SDIMI	specialist dairy, inside mostly inside LFA
SSEMP	Special Study into the Economics of Milk Production 1996/97
URA	Uruguay Round Agreement
VRP	Volume related payments
WTO	World Trade Organisation

MAIN FINDINGS OF THE ANALYSIS

- Average herd size in England and Wales increased steadily between 1975 and 1984, then more erratically. Between 1994 and 1997 it remained at around 75 cows.

- Since 1994/95, more large dairy farms (particularly between 70 and 100 cows) have quit milk production. The rate of loss is now similar to dairy farms with less than 70 cows.

- There has been a reduction in the regional variation in the annual change in cow and dairy holdings.

- National figures suggest that average annual milk production has increased at about 1.3% per year. Perhaps as much as 60% of this is due to improvements in the genetic basis of the national dairy herd.

- Between 1987/88 and 1996/97, average milk production per farm increased by 20.7%.

- Larger herds achieved higher average milk yields per cow. The difference in milk yields per cow between herd size is widening.

- Between 1993/94 and 1996/97, dairy specific direct labour employed on the smallest dairy farms (between 10 and 30 cows) fell by 18%. Dairy specific direct labour per cow remained highest on small farms. A higher proportion of dairy specific direct labour was carried out by the farmer and spouse, particularly on smaller dairy farms.

- Between 1987/88 and 1996/97, dairy output increased in value by £560 per cow (£72 in real terms).

- The value of milk produced per cow was higher in large herds, and the difference is widening.

- Since 1993/94 and more noticeably after 1994/95 larger herds have received higher milk prices.

- Expenditure on leasing quota increased from £5 to £61 per cow over the ten years.

- Variable costs per cow were similar across herd size groups but small herds were less productive so the consistently recorded higher variable costs per litre.

- Small farms are disadvantaged by their lower productivity and lower milk prices, and could make no noticeable savings in variable costs. Coupled with higher dairy specific direct labour costs they were consistently less profitable.

- Large farms reported the highest net farm income.

- Herds in the top 10% for gross margin per cow had large herds with high yielding cows. They attracted higher milk prices and had the lowest variable costs per litre of milk produced.

- Between 1987/88 and 1996/97, there was a larger fall in milk produced on farms 'inside or mostly inside' LFAs. Productivity on dairy farms in LFAs increased by 44% over the ten years.

- Farms in LFAs achieved a larger increase in milk yield per cow than those outside LFAs.

- In 1987/88 farms inside LFAs received 0.5 ppl more for their milk, in 1996/97 they received 0.5 ppl *less*.

- Farms inside LFAs achieved lower gross margins per cow than farms outside LFAs.

- Stocking rates on farms inside LFAs increased.

- Farms in Wales were on average smaller in terms of area and herd size than farms in the other three EU regional areas (North, East and West).

- Farms in Wales achieved the lowest gross margin per cow. These farms on average produced the lowest volume of milk per cow and per farm, achieved the lowest average milk price, were the smallest, had the highest leverage (debt to asset ratio) and recorded lower and more variable net farm income.

- Nevertheless, the percentage reduction in dairy farms in Wales was similar to England, indicating the role of the profitability of alternative enterprises and non-economic factors in the decision to continue dairy farming.

- Farms in the East fed more concentrates per cow and achieved a higher stocking rate, probably because of low concentrate prices, high land prices and generally less productive grassland than in the other EU regions.

- In 1987/88 average regional milk prices were highest in the North, but by 1996/97 they were highest in the East.

- Small specialist dairy farms were the least profitable at the gross margin level (compared to large specialist dairy farms, specialist dairy farms inside LFAs and other farm types with dairy enterprises).

- Over the ten years an increasing proportion of surveyed farmers leased or permanently transferred in milk quota.

- The number of farmers leasing in and leasing out, or buying and selling milk quota, in the same year increased.

- About three times more quota was leased in than was purchased over the ten years.

- The value of milk quota increased as a proportion of total farm assets from 16.7% to 27.7%.

- Since market deregulation small farms have lost their average milk price advantage over large farms. This may partly be explained by higher per litre collection charges and

volume related pricing incentives. The impact of milk quality on milk price could not be examined for all years.

- Selecting the appropriate milk purchaser has been a key determinant in raising the value of milk sold, but control of variable costs per litre is also crucial.

- It is estimated that the number of dairy farms in England and Wales may fall by between 33 and 40% over the next eight to ten years. If new technologies are permitted and are profitable it is likely that they will be taken up more readily on larger farms, and this may lead to an even higher proportion of dairy farmers quitting.

- Proposed changes to quota trading (currently listed as discretionary and under consultation) may also alter the future structure of the dairy sector.

- Horizontal measures, such as those related to retirement, may be attractive to the increasingly aged population of dairy farmers.

INTRODUCTION: AIMS AND OBJECTIVES

The agricultural and horticultural surveys commissioned by MAFF Economics (Farm Business) Division fall into two distinct types. The Farm Business Survey (FBS) is a survey of about three thousand farms undertaken by agricultural and rural studies departments in universities in England and Wales to produce whole-farm accounts. In addition to these whole-farm analyses, MAFF commission Special Studies to determine the economics of selected agricultural and horticultural enterprises (a list of reports published in the *Special Studies* series is given in Appendix C).

Having said this, the Dairy Enterprise Costs Study (DECS) is slightly unusual because it was a 'bolt on' to the FBS, which is to say that farms entered into the DECS were already participating in the FBS. As such the origins of the DECS was not that of a *Special Study*, into which series this report has been published. As a hybrid the DECS has the benefit of access to all the information collected to compile the whole-farm analysis required for the FBS. But a disadvantage is that the DECS did not record some aspects of the dairy enterprise (particularly measurements and records of physical quantities) that would usually be associated with a Special Study, such as the Special Study into the Economics of Milk Production.

Between 1987/88 and 1992/93 the DECS was designed to collect only that information needed to produce gross margin estimates for each farm's dairy enterprise. After 1992/93 the DECS recording document was enhanced to record additional details of physical inputs. Changes included revisions in the methodology used to compute the forage area used by the dairy enterprise, and also the hours and costs of dairy specific regular labour, which allowed margins after variable and dairy specific labour costs to be calculated.

This report presents dairy enterprise specific details from 1987/88 to 1996/97. Between 1987/88 and 1995/96 it uses information from the DECS and the FBS. The information for 1996/97 is drawn from a Special Study into the economics of milk production that was co-ordinated at Manchester. The full report on the Special Study into the Economics of Milk Production 1996/97 (Farrar and Franks 1998) presents additional detail on physical input use and reports the economics of milk production to the enterprise net margin level. The different origins of the data that is presented in this report should be noted. The final years data is based on a completely different sample to the DECS. This means that the 1996/97 findings are not perfectly comparable with the DECS figures for 1995/96 and previous years but they have been added to complete the time series and to indicate trends between 1995/96 and 1996/97.

The findings reported here have been raised using the appropriate weighting factors so that the results are representative of the population of dairy farms in England and Wales. The only exception to this occurs in Chapter 7, which discusses milk quotas.

This historical review of the economics of milk production in England and Wales can be seen as a sister report to 'Milk Production Before and After Quotas' (MAFF 1988). That report presented trends at the national level using data from the June Census data and the findings at the farm level from the National Investigation into the Economics of Milk Production (NIEMP) for selected years between 1976 and 1987.

This report is set out in a similar way to that publication. Chapter 1 presents June Census data from 1987 to 1997, and the following chapters present the findings from the FBS and the DECS between 1987/88 and 1995/96, and from the Special Study into the Economics of Milk Production (SSEMP) for 1996/97.

The objectives of this report are:

1   To undertake a historical review of the economics of milk production in England and Wales, using as a principle source of data the annual DECS, and additional sources from the June Census, the FBS, the SSEMP, and supplementary information from other sources as appropriate.

2   To examine the changing structure of the industry from the period immediately before the introduction of quotas through the 1980s and 1990s (taking account of the effects on the industry of milk quotas and then later the deregulation of the milk market) up to the present time.

3   Consider the implications for the future profitability and structure of dairy farming of proposed policy developments, including those outlined in Agenda 2000.

Chapter 1 The structure and productivity of dairy farming

1.1   Introduction

This chapter reviews trends in the structural development and productivity of dairy herds in England and Wales. Although the findings from the DECS/SSEMP presented in the following chapters refer to only ten years between 1987/88 and 1996/97, this chapter reviews national and regional trends revealed in the annual June Census over a longer time period.

This report can be seen as a sister document to a previous report 'Milk Production Before and After Quotas' (MAFF 1988) which examined *inter alia* the impact of milk quota on the economics of milk production. The first chapter of that report compares structural changes in dairy herds in England and Wales, and in five English regions in the years immediately before 1984 with those after 1984, the year in which milk quotas were introduced. This chapter looks more closely at changes that occurred before and after 1994, because of two important changes in policy that occurred in that year:

(a) A regulation which had restricted the transfer of milk quota between England, Scotland and Wales (the mainland) and Northern Ireland was relaxed. This allowed quotas to be traded from the mainland to Northern Ireland for the first time.

(b) The milk market was deregulated on 1 November 1994. This caused the dismantling of the MMBs and their replacement by over 100 licensed purchasers of milk. The MMBs had previously acted as sole purchasers of milk from farmers and sole seller to milk processors. Now many farmers can select between milk purchasers, though not all farmers have an effective choice. One important effect of deregulation has been to increase differences between producers in the milk prices received.

Importance of Milk quota regulations

'Milk Production Before and After Quotas' (MAFF 1988) argued that the introduction of milk quotas in 1984 had important impacts on the structural development of dairy herds in England and Wales. The summary of the effect of quotas on the structural development of the dairy sector given in Chapter 1 of that report (page 7) includes:

(i) Cow numbers increased steadily, if somewhat erratically, up until 1983 and then fell considerably in 1984 and 1985, steadying in 1986.
(ii) Dairy herd numbers fell consistently year by year up to 1984 and continued to fall, at a slightly increased rate, in 1985 and 1986.
(iii) Average herd size increased by some 2 cows per herd per year up to 1983, but remained fairly static in 1984 and 1985 with a modest increase in 1986.

The report found that responses to quotas included:
1   Total output, at the national level, declined due largely to a reduction in cow numbers rather than to lower yields per cow.
2   The number of holdings with a dairy herd continued to decline at an annual rate only slightly faster than in the pre-quota period.

3   In the first round of adjustments, quota contributed to an initial income fall and shake out of labour.

4   The restriction of output and revenue-increasing opportunities focused attention on the control of inputs in the production process.   Lower concentrate feeding levels per cow and per litre of milk (Table 2.6, p 23: Table 2.7, p 24 of that report), coupled with a switch to more effective grassland use and production of higher quality winter fodder, brought production efficiencies in the 'cost saving' rather than the 'output increasing' mode.

Clearly the introduction of quotas had substantial effects at the farm level.   The MAFF (1988) report pointed to the critical role of the quota market in redistributing production capacity at the margin between dairy farmers who had confidence in their ability to survive and grow in the industry and those for whom other alternatives seemed more attractive.

The efficiency with which the quota market may achieve this redistribution of resources is dependent, in part, on the regulations governing the markets operation. The relaxation in quota regulations in 1994 set out in (a) above may have influenced the efficiency of the quota market and therefore the structural development of the national dairy herd. This is because theoretical analysis of milk quota show that when low milk price-high cost farmers lease quota to high milk price-lower cost farmers both leasee and leasor increase farm incomes (Burrell 1989).   Any relaxation of regulations which increases the pool of milk producers who can trade with one another potentially increases the volume of quota that will be traded because the variation in milk prices and production costs can be expected to be larger in a larger population.

Average milk production costs in Northern Ireland are generally considered to be lower than on the mainland (Colman *et al.* 1988) so theory would predict a net transfer of quota from the mainland to Northern Ireland.   This has indeed been recorded by statistics issued by the Intervention Board, for example there was a net transfer of 52 million litres in 1995/96 and 50.6 million litres in 1996/97 (reported in Dairy News, November 21, 1997).

This is not to suggest that the impact of this change in the regulation would be as important as the introduction of milk quota, merely that it may be an explanatory factor in any discontinuity in structural change following 1994.   Further issues relating to the management of milk quota are discussed in Chapter 7.

Importance of changes in milk marketing

The deregulation of milk purchasing and the demise of the Milk Marketing Boards (MMBs) also occurred in 1994. Prior to 1994 the MMBs had sole rights to purchase of all milk produced. The price received from milk processors depended on its end use, milk sold on the liquid market fetching a higher price that milk sold for processing; the milk price the MMB of England and Wales paid each farmer was the weighted average of these market prices less MMBs' costs (adjusted for the quality of milk produced by each farm). After 1994 farmers were free to seek contracts with direct purchasers of milk.

Perhaps the most important impact of deregulation from the farmers' point of view has been to increase the range of milk prices available from competing licensed milk purchasers. The headline milk prices offered by direct purchasers are accompanied by a wide range of price incentives, so league tables of milk prices for a 'standardised' litre from a farm producing a specified volume of milk are available to allow farmers to compare headline milk prices on a even footing, and these are now a common feature in the farming press and are discussed further by Bates (1996).

At around the same time as market deregulation average producer milk prices increased (Monopolies and Mergers Commission 1999). It is likely that competition between milk purchasers bidding against one another to secure milk supplies was a contributory reason for this. At about the same time sterling depreciated against the ECU (Monopolies and Mergers Commission, 1999; Figure 6.4: page 236) and this would also be expected to increase milk prices through the intervention support mechanism: no studies attempting to isolate and quantify the effects of market deregulation and exchange rate variation on milk price are known to the author.

Clearly milk price is important, as the main component of total milk revenue is the value of milk sold in which milk price plays an important role. To reflect its importance this report sets out trends in milk price by herd size (Table 3.5), less favoured area status (LFA) (Table 4.8), location by EU region (Table 5.8), and farm type (Table 6.8). These trends are discussed further in Chapter 8.

This chapter is set out as follows. Trends in cow numbers, by region and herd size, are presented, followed by trends in the number and regional distribution of dairy holdings and in annual average herd size. Trends in milk production, the genetic development of dairy herds and farm gate milk prices are then presented and discussed.

1.2   Trends in cow numbers

Figure 1.1 shows the erratic changes in cow numbers between 1976 and 1984 referred to above. Between 1976 and 1997 the number of dairy cow numbers in England and Wales peaked in 1983, and has declined in every year but one since (the exception being 1994). Figure 1.2 shows the annual change in the number of dairy cows. It shows the increase in cow numbers in 1983, the year before the introduction of quota, and in 1994.

A linear regression estimate is presented in Figure 1.1. It estimates the average annual decrease in cow numbers between 1976 and 1997 at about 36,300 cows. A regression based on the years between 1983 and 1997 estimates the loss to be about 50,500 cows. This is an annual average percentage decrease of 2.3%.

Table 1.1 shows that in the ten years between 1987 and 1997 the number of dairy cows decreased from 2,476,000 to 1,9748,000, (20.2%). This compares with no net change in dairy cow numbers between 1976 and 1984. The decrease in herd size since 1987 has not been constant; in the seven years between 1987 and 1994 dairy cows numbers fell by 11.3 % (a simple average annual decrease of 1.6%), but in only three years since 1994 the number has fallen by a similar percentage (10.1%, therefore doubling the simple average annual decrease to 3.4%).

Table 1.2 shows the regional change in dairy cow numbers. Between 1987 and 1997 this has averaged between 17 and 20% in each region with the exception of the South East, which has lost a considerably higher percentage of its dairy cows (33.7%). In the South East this reduction occurred at a fairly constant annual rate, whereas the annual decrease in herd size in the Midlands, North East, North West and South West was greater in the three years since 1994. The annual rate of decline in the number of Welsh dairy cows was similar to that in England, at 2%, again with a higher rate of loss since 1994.

Figure 1.3 shows the change in the distribution of dairy cows by herd size. The number of cows in the smallest three herd size categories (between 10 and 40, 40 and 70 and 70 and 100 cows) has fallen at a fairly constant rate since 1987, whereas the number of cows in the herds of between 100 to 200 and larger than 200 cows increased prior to 1994 and fell afterwards.

Table 1.3 shows the regional distribution of cows by two herd size categories, 10 to 69 cows and 70 and above. The percentage of cows farmed in the smaller herd size category fell from 36% in 1987 to 30% in 1997. Table 1.4 shows the percentage change in cow numbers by region and by these two herd size categories over different time periods. In every region the number of cows in herds smaller than 70 cows has decreased more quickly than the number farmed in herds above 70 cows. For example, in England between 1987 and 1997 there was a 33% reduction in dairy cows in herds less than 70 cows (297,000 out of almost 898,000 cows), but only a 14% reduction in the number farmed in herds of 70 cows and above (204,500 out of 1,578,000 cows). This is a clear indication of the economic advantages of size to the viability of the dairy enterprise.

Whilst the average annual percentage fall in the number of cows farmed in herds smaller than 70 cows remained similar before and after 1994, all regions saw a larger percentage fall in the number of cows farmed in herds larger than 70 cows after 1994. For England as a whole, the number of cows in herds larger than 70 cows fell by 3.6 % in the seven years up to 1994 (an annual decrease on average of 0.5%), but by 10.5 % in the three years since 1994 (an annual average of 3.5%).

This suggests that the rate and nature of the restructuring in the national dairy herd increased and changed after 1994.

Figure 1.1 Trends in dairy cow numbers (England and Wales, 1976 to 1997)

$$y = -36.342x + 74630$$

Dairy cows — Linear (Dairy cows)
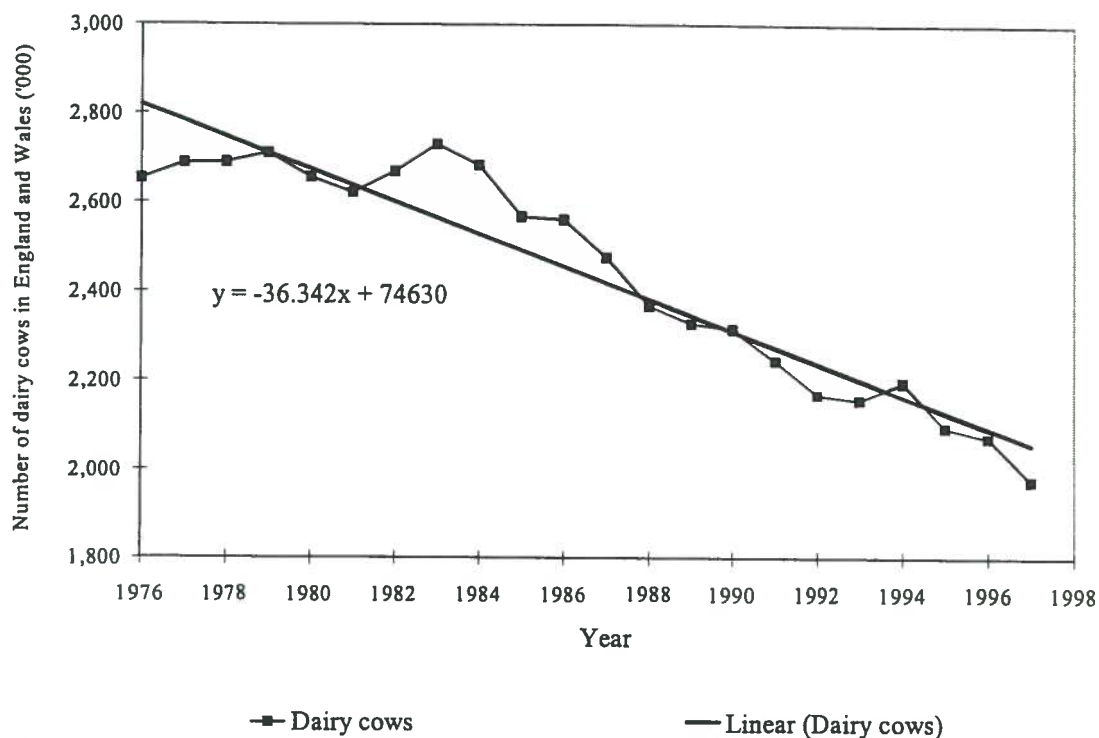
(Source: June Census (various)).

Figure 1.2 Trends in annual change in dairy cow numbers (England and Wales, 1976 to 1997)

Trend in the change in dairy cow numbers in England and Wales ('000)
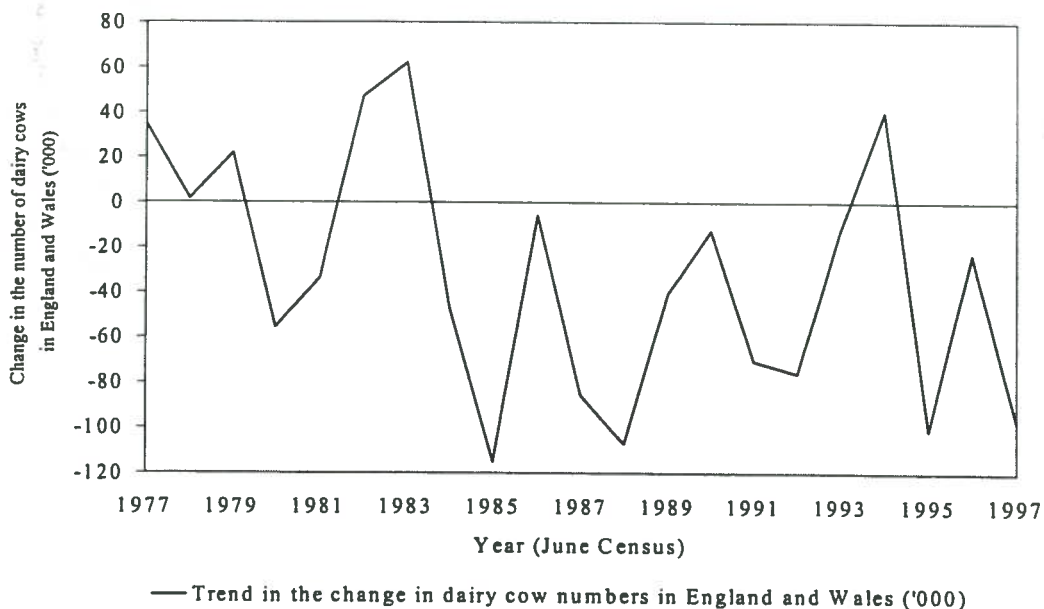
(Source: June Census (various)).

Figure 1.3 Trends in dairy cow numbers, by herd size (England and Wales, 1976 to 1997)
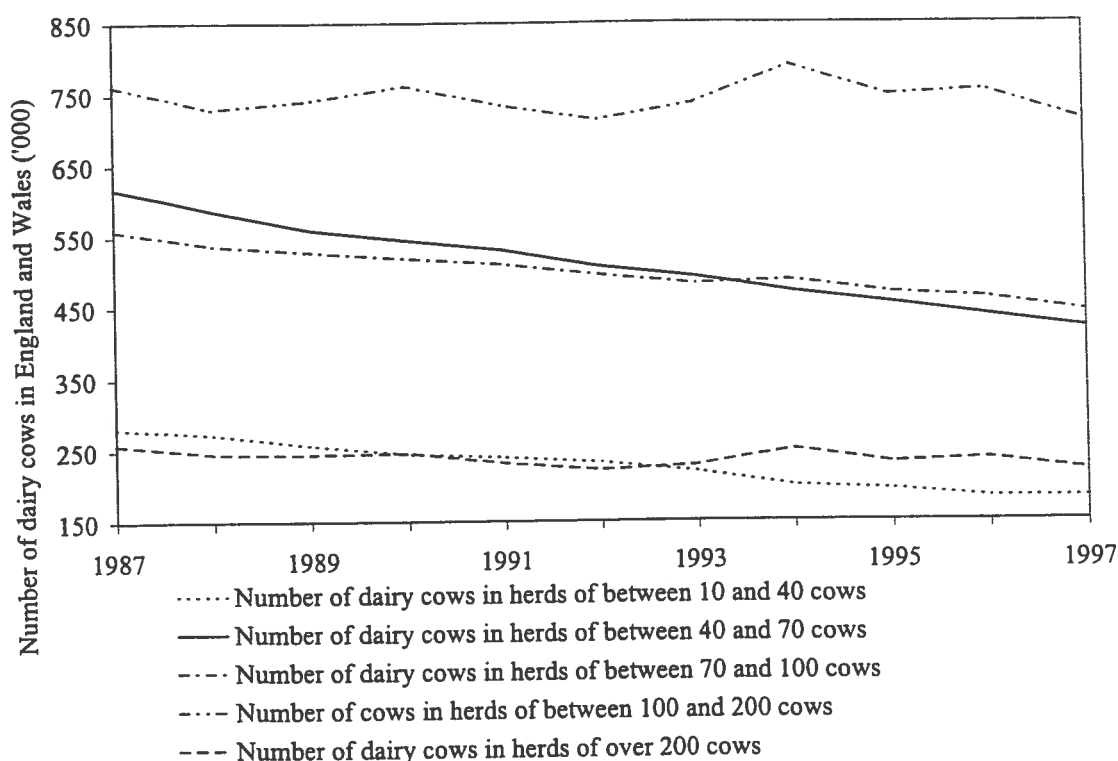
(Source: June Census).

1.3 Trends in the number of dairy holdings

Figures 1.4 to 1.6 and Tables 1.5 to 1.8 detail the number of dairy holdings in England and Wales, and in several English regions.

Figure 1.4 shows the trend in the number of dairy holdings in England and Wales. The estimated regression line indicates that the population of dairy holdings in England and Wales is declining by about 1,132 each year. Figure 1.5 shows that the rate at which the population has declined has slowed in recent years. Table 1.6 shows the annual change in dairy holdings before and after 1994, the average annual percentage fall in dairy holdings was larger in the period after 1994 (3.3% compared with 2.7%).

Figure 1.4 Trends in the number of dairy holdings (England and Wales, 1976 to 1997)
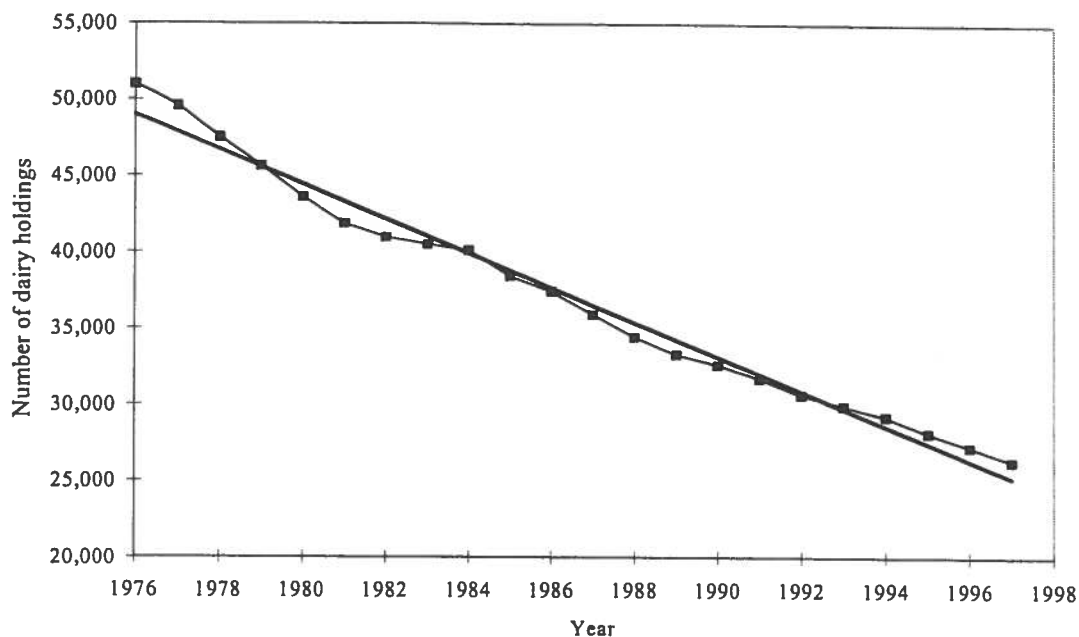
-■- Number of dairy holdings — Linear (Number of dairy holdings)

The estimated coefficient of the linear regression of dairy holdings (y) each year (x) is:

y = 2,000,000 - 1,132.7x.

(Source: June Census (various)).

Figure 1.5 Change in the number of dairy holdings (1976 to 1997)

$$y = -3.3343x^2 + 117.42x - 1940.8$$
$$R^2 = 0.3583$$

—— Change in the number of dairy holdings in England and Wales ('000)
—— Poly. (Change in the number of dairy holdings in England and Wales ('000))
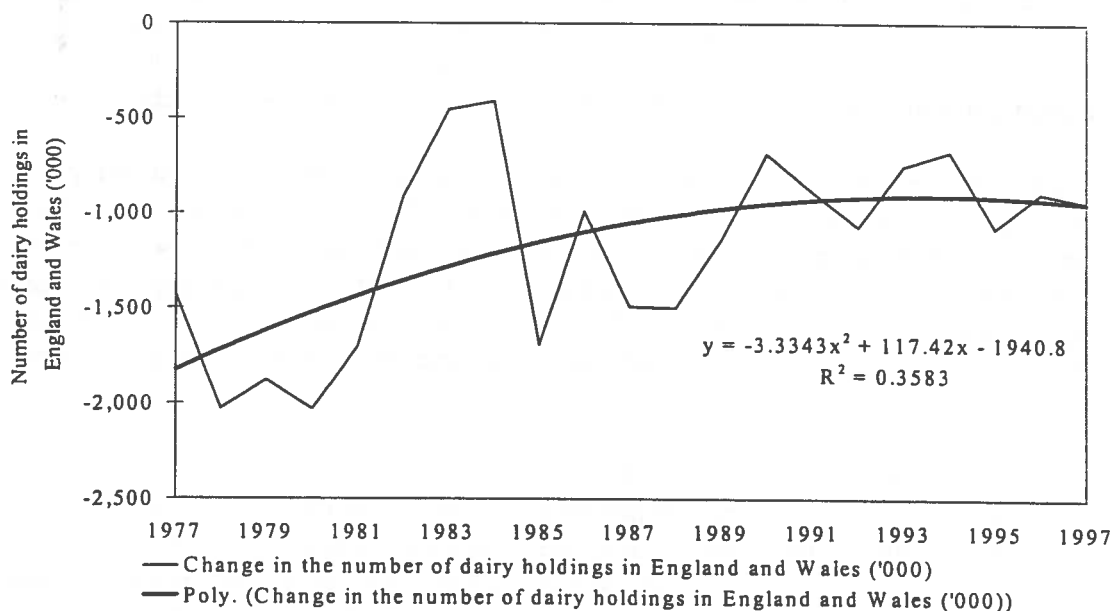
(Source: June Census (various)).

Figure 1.6 Trends in the number of dairy holdings, by holding size (1987 to 1997)

--- · --- Number of holdings between 10 and 40 cows   --- · --- Number of holdings between 40 and 70 cows

· · · · · · Number of holdings between 70 and 100 cows   ——— Number of holdings between 100 and 200 cows

--- --- Number of holdings over 200 cows
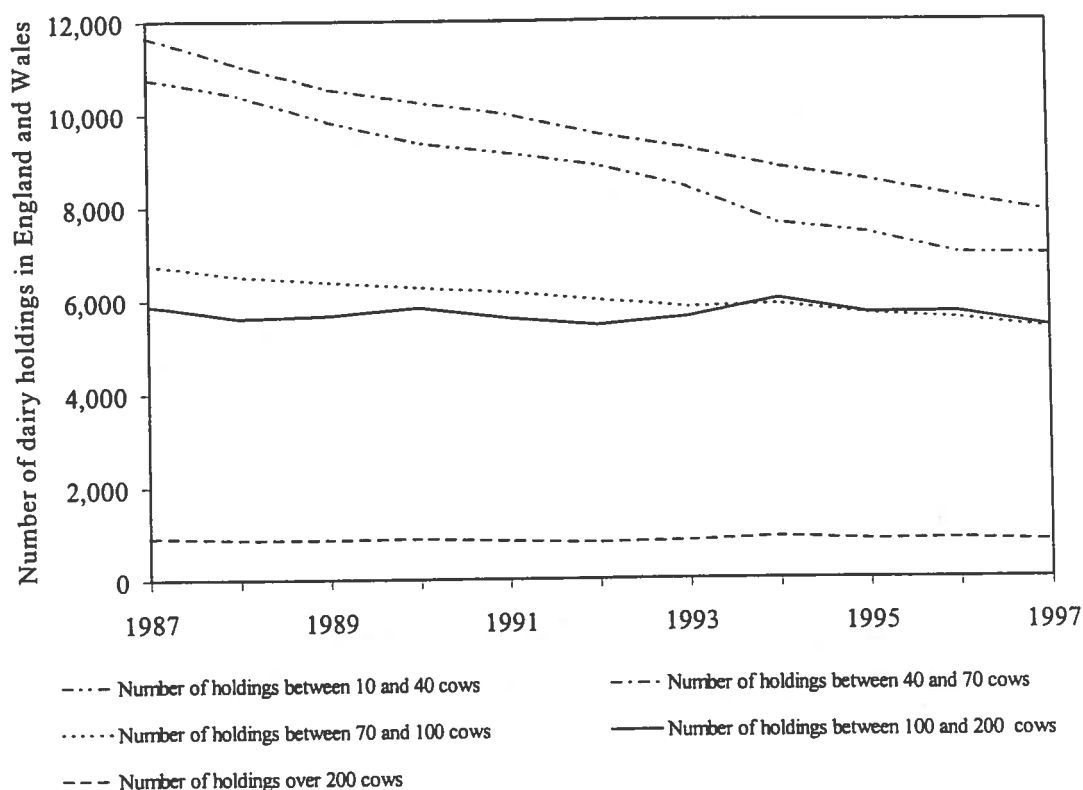
(Source: June Census, various years)

Tables 1.7 and 1.8 show the trends in the number of dairy holdings by herd size and region. Table 1.7 shows that the proportion of smaller holdings to larger holdings fell from 64.1% to 56.3% between 1987 to 1994. Thereafter the proportion has remained steady at around 56%, implying that the percentage of larger dairy farms quitting dairying has increased to equal the percentage of smaller dairy farms quitting.

Table 1.8 confirms this. It shows the similar annual reduction in the number of holdings with less than 70 cows before and after 1994 (3.8% compared with 3.4%), but the much larger percentage reduction in larger herds since 1994 (3.4% compared with 0.3%). The increase in the percentage of larger farms quitting dairying is particularly noticeable in Wales, the North East, North West and South West regions. In Wales for example, the annual reduction in the number of herds of 70 cows or more before 1994 was 0.4%, after 1994 it increased to 2.6%.

Therefore, the percentage loss of smaller farms has remained fairly constant over the ten years, but since 1994 a higher percentage of larger farms have quit milking. It is generally accepted that smaller farms are at a disadvantage vis-à-vis larger farms because they do not capture the economies of scale, i.e. lower unit production costs (particularly fixed costs), associated with larger enterprises. But this change suggests that even farmers of larger dairy units reassessed the economic viability of these units since 1994. Structural changes are also driven by personal preferences and family characteristics, however, with issues such as the age of farmer and succession

important in their motivation to continue to farm. The June Census does not provide information on these issues.

Figure 1.6 shows the number of dairy holdings by five herd size categories. Between 1987 and 1997 the highest proportion of farms to have quit are those with less than 70 cows. However, the number of holdings with between 70 and 100 cows has also decreased steadily since 1987. Prior to 1994 the number of holdings with between 100 and 200 dairy cows increased, but since 1994 this population of dairy farms has also decreased. Taken together, these trends present some evidence to suggest that the optimum size of a dairy herd is greater than 100 cows. Chapters 2 and 3 shows the development of the economics of dairying by nine categories of herd size to identify the source of these apparent economies of scale. But the reduction in the number of holdings with over 100 cows may indicate the presence of systematic factors which affect all dairy enterprises, such as, for example, personal circumstances (age, health) and family circumstances (succession).

1.4   Trend in herd size

The discussion above has shown that the dairy herd in England and Wales declined by an average of 36,000 cows per annum between 1976 and 1997, and the number of holdings at an average of 1,100 per annum over the same time period. Because the proportionate fall in holdings was larger than the proportionate fall in cow numbers the average herd size (of 51 cows in 1976) increased over this period.

Figure 1.7 shows the increase in herd size since 1976. The rapid increase in average dairy herd size during the late 1970s and early 1980s slowed with the introduction of milk quota in 1984 (MAFF, 1988). Since 1984 herd size have continued to increase, but more erratically and at a slower rate. The increasing proportion of larger holding quitting since 1994 is responsible for the slower rate of increase, and even resulted in a decrease in average herd size in 1995 and 1997. Annual changes in herd size are shown in Figure 1.8.

Figure 1.7 Trends in herd size (England and Wales, 1976 to 1997)
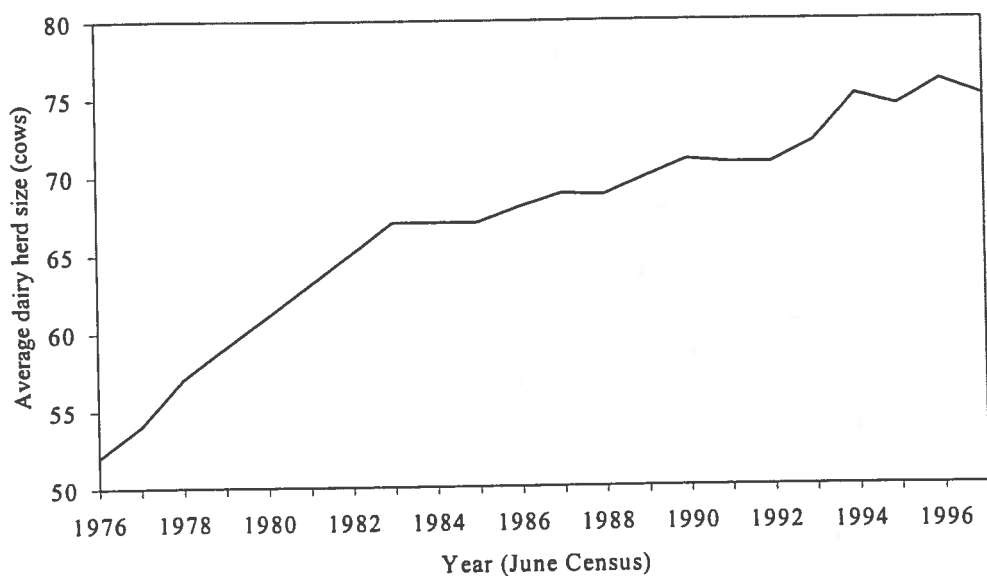
— Trend in average dairy herd size

(Source: June Census (various)).

Figure 1.8 Trends in herd size (England and Wales, 1976 to 1997)
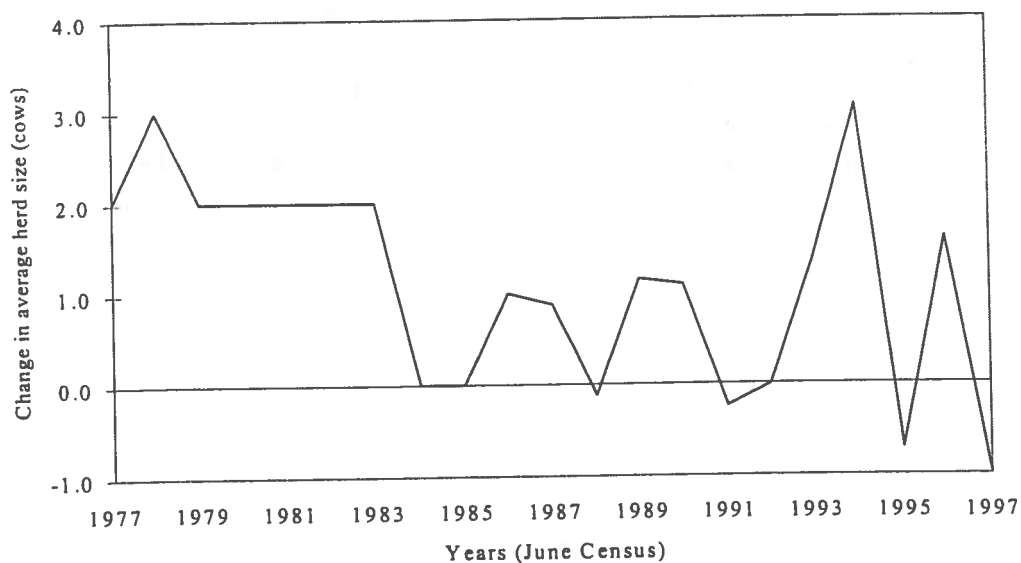
— Change in average dairy herd size

(Source: June Census (various)).

Tables 1.9 and 1.10 show the average herd size by region. Herds in the North West had the fastest increase in average herd size between 1987 and 1997, and in common with all other regions, herds increased more quickly (at about 1.9% per year) before 1994 (compared with an average annual increase of 0.1% thereafter). In the Midlands, the South East and the South West (and for England as a whole) average herd size has decreased since 1994.

1.5 Cows in herds of less than 10 cows

The findings presented in the remaining chapters of this report are based on the DECS and SSEMP surveys; these surveys excluded herds smaller than 10 cows. Table 1.11 shows that a very small proportion of dairy cows are farmed on holdings with less than 10 cows. In 1997 the 5,925 cows farmed on holdings of less than 10 dairy cows represented about 0.3% of all dairy cows in England and Wales. The number has decreased by 43% in the ten years between 1986/87 and 1996/97 (Table 1.12), this compares with the decrease of 20.2% for cows on dairy farms of 10 cows and above.

Table 1.13 shows that the number of holdings with fewer than 10 cows has decreased by 51% over ten years. The percentage change in the number of holdings with less than 10 cows (Table 1.14) is larger than the percentage change in cows kept on these holdings, resulting in an increase in average herd size.

1.6 Trends in milk production and milk yield per cow

Figure 1.9 shows the trend in UK milk production and milk yield per cow between the 1981/82 and the 1996/97 quota years. Since 1984 total milk production has been capped by national milk quotas, the reduction of national quotas is shown in the gradual decrease in total milk produced (shown in Figure 1.9). Between the 1981/82 and 1988/89 quota years milk yield per cow fluctuated about an average of just under 5,000 litres. After 1988/89 yield per cow increased, to stand at about 5,500 litres in 1996/97.

Figure 1.9 Trends in UK milk production and yield per cow (1981/82 to 1996/97)

██ UK production (million litres)   —•— UK average yield (litres per cow)
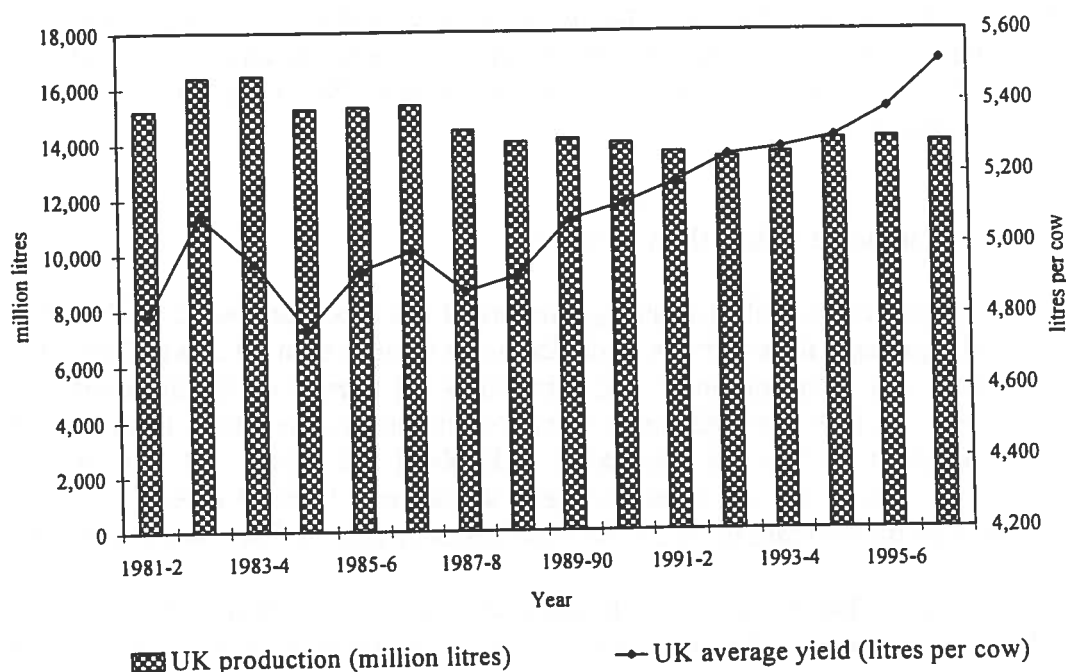
(Source: Table 40, Sales off farms through boards, (MMB, 1994: p 75); Table 45, Sales of milk off farms (NDCP, 1997: p 72)).

1.7   Trend in the genetic improvement of the Dairy herd

Genetic improvement is an important contributor to improved output per cow, efficiency of production and profit. The best way of looking at genetic change in any breed is to calculate the average genetic merit of bulls and cows born in each year, and to monitor the progress of this annual statistic over time. Genetic merit is recorded by predicted transmitting abilities (PTAs) for selected traits.[1] When the PTAs for milk production, fat and protein content are combined using current economic weights (reflecting the protein/fat price ratio, costs of additional food, leasing quota, processing and transport) a simple financial index, called the £PIN, is produced. This index predicts the additional margin over feed and quota costs which the bull/cow is expected to pass on to its progeny per lactation. A £PIN value is based on production traits only, recently interest has been shown in developing a second profitability index which includes a lifespan PTA, and this index is known as £ Profitable Life Index or £PLI.

The £PIN value is expressed relative to the average margin over feed and quota costs per lactation of cows in the 'genetic base' year. In Figure 1.10 the trend in £PIN for Holstein Friesian bulls and cows in the UK takes 1990 as the genetic base year.

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[1] Predicted transmitting abilities indicate the amount of milk and the percentage of fat and protein which an animal is predicted to pass on, or transmit, to its progeny. For example, a PTA of +507 indicates this animal will, on average, pass on 507 kg more milk to its progeny than an animal with a PTA of zero.

Figure 1.10 Trends in £PIN for Holstein Friesian bulls and cows in the UK

··o·· Holstein Friesian cows —□— Holstein Friesian bulls
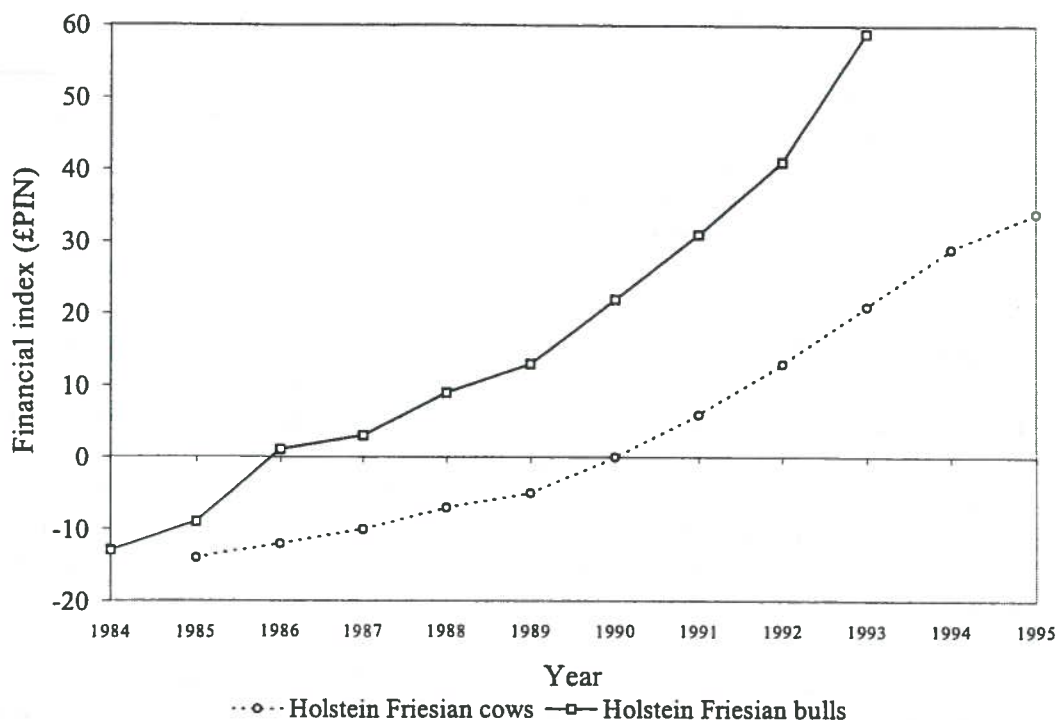
(Source: Animal Data Centre and National Milk Records, 1997/1998).

In the last five years the rate of progress in the Holstein Friesian breed is approximately 2% per year (ADC/NMR, 1997/1998: p32). It is estimated that approximately 60% of the improvement in yields in the Holstein Friesian breed over this period was due to breeding (ADC/NMR, 1997/1998: p. 32).

Figure 1.10 shows that the trend in £PIN for bulls is continuing to increase at a faster rate than that for cows. However, the UK is approximately £PIN 40 below that of the USA and the Netherlands, but the gap is being bridged as the rate of progress in the UK increases faster than in those countries. This implies that the contribution of genetic improvement will continue in the foreseeable future. The DECS/SSEMP did not attempt to collect any information on the genetic merit of the herds surveyed.

1.8   Trends in milk prices

Figure 1.11 shows the trend in UK farm gate milk price (including bonus payments). The UK (simple) average milk price was 21.00 ppl in 1992/93, 22.325 ppl in 1993/94, 23.108 ppl in 1994/95, 25.176 ppl in 1995/96, 24.714 ppl in 1996/97 and 21.148 ppl in 1997/98.   Average UK milk price increased after 1992/93 as sterling devalued. Figure 1.11 shows the seasonal pattern in milk payments. In 1994/95 and 1995/96 the seasonal high milk price was similar to 1993/94 prices, but the seasonal low prices were much higher as the seasonal trend in prices became less pronounced.

The intervention price support mechanism for milk is set by the intervention milk price equivalent (IMPE). The IMPE is determined by the support price for skimmed milk powder and butterfat, and is denominated in ECUs. Therefore, changes in the £/ECU exchange rate may have significant effects on the average farm gate milk price - which is of course expressed in sterling. Shortly after deregulation in 1994 the pound depreciated (which will act to increase the IMPE and therefore milk prices) before strengthening again (which acts to decrease milk prices). The value of the exchange rage was, arguably, more important than market deregulation in influencing milk prices.

But the deregulation of the milk market would also have been expected to have had an impact on the average farm gate milk price and on the distribution of these prices, because of the increased range of contracts and price incentives offered by the newly licensed milk purchasers.

Figure 1.11 Trends in UK farm gate milk prices (including bonus payments)

→ Average UK farm gate milk price (including bonus payments)
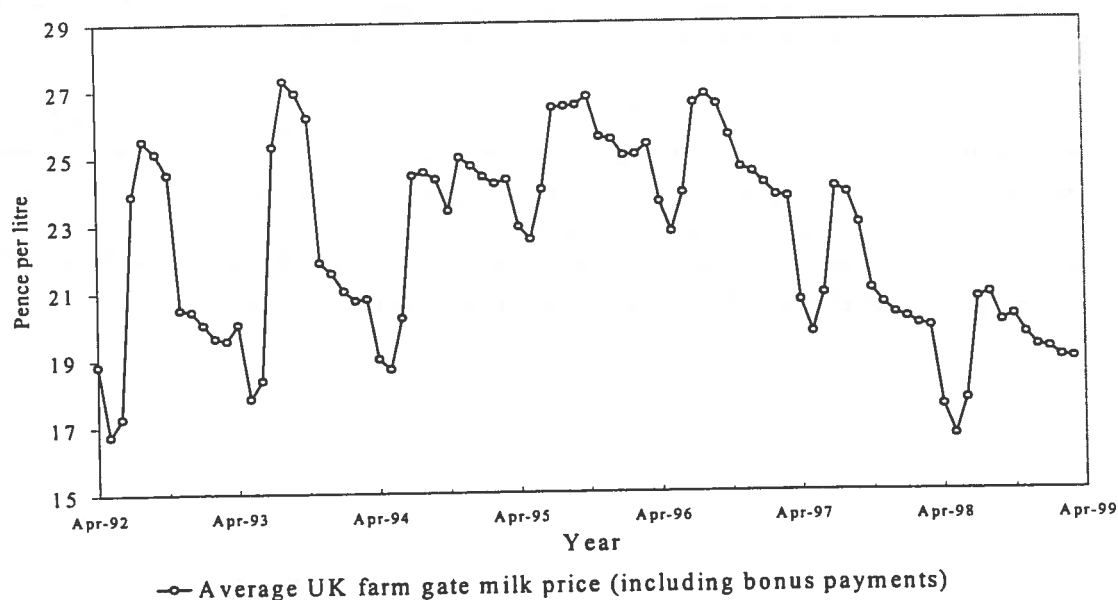
(Source: United Kingdom Milk Prices (MAFF Statistics, various; most recent 10 May 1999)).

In general, the price offered varies between purchasers, but important determinants of the price a farmers might receive for milk include; milk collection charges, volume of milk sold, average butterfat and protein content, milk hygiene, the breed of dairy cattle, and seasonality payments. However, milk league tables clearly demonstrate the range of milk prices offered by different milk purchasers for a standardised litre, i.e. a price for a litre expressed on a consistent basis in terms of milk quality, collection arrangements and the size of the dairy farm. The increased variation in milk price since 1994 is illustrated and discussed further in Chapter 8.

1.9   Summary

Developments in the structure and productivity of dairy farming between 1987 and 1997 can be summarised as follows:

(i) The national quota is being produced by fewer cows on fewer holdings.

(ii) Over the period 1976 to 1997 the national dairy herd has contracted by about 36,000 cows each year. Over the shorter period from 1984 to 1997 the number of dairy cows fell more rapidly, at 51,000 cows per year (or 2.3% year on year). In the two years before 1984 and the year before 1994 the number of dairy cows increased, but fell in every other year since 1978.

(iii) The percentage of dairy cows farmed in herds of less than 70 cows fell from 36 to 30% between 1987 and 1997. The gradual decrease in the proportion of smaller dairy herds shows they have a competitive disadvantage.

(iv) Since 1987 the highest percentage fall in the number of dairy cows occurred in the South East region of England (at 34%). The rate of decrease in dairy cows has increased across all regions since 1994 (from 1.6 to 3.4% per annum).

(v) Between 1987 and 1997 there was a 26.7% reduction in the number of dairy holding.

(vi) The small annual percentage decrease in dairy holdings (at 2.7%) was higher between 1987/88 and 1996/97 than the decline in the number of dairy cows (2%), therefore the average size of dairy herds has increased (from 68.9 to 75.1 cows). However, since 1994 the annual decrease in the number of dairy holdings (at 3.3%) has converged with the annual average decrease in cow numbers (at 3.4%). This has resulted in a slow-down in the average increase in herd sizes, with falls in average herd sizes in both 1995 and 1997.

(vii) Before 1994 the annual change in the number of dairy herds above 70 cows was relatively small. After 1994 the percentage fall in this herd size group increased to that of dairy farms with less than 70 cows (3.4 and 3.2% respectively). After 1994 a large proportion of the reduction in larger dairy farms occurred in herds of 70 to 100 cows, suggesting that the optimum size of the dairy herd had increased since 1994.

(viii) Very few (about 0.3%) of dairy cows are farmed in herds of less than 10 cows.

(ix) For the UK, average milk yield per cow increased from 4,870 in 1987/88 to 5,515 litres in 1996/97: a simple annual increase of 1.3% and an average of each annual increase of 1.4%.

(x) Data compiled by the Animal Data Centre and National Milk Records suggests that genetic improvement in the Holstein Friesian breed contributed about 60% of this improvement in milk yield per cow. Although the £PIN index (a measure of the value of genetic improvement) of bulls is increasing faster than in Holstein Friesian cows, it is still about £40 less than in the USA and the Netherlands. This suggests that the contribution of genetic improvement will continue in the foreseeable future.

(xi) Between 1993/94 and 1996/97 the annual average milk price increased but has fallen back since.

(xii) The reduction in the number of dairy herd in England and Wales slowed in the two years before 1984 and in the two years prior to 1994. It appears that impending changes to milk marketing effected farmers' plans, with a significant number waiting for the outcome to policy changes before acting. This places a high responsibility on policy formers to act promptly and decisively during considerations of policy reform.

(xiii) Two changes to the development of the structure of dairy farming were noted after 1994; a higher proportion of large dairy units quitted dairying and there was a decrease in the regional variation of the change in dairy cows and dairy holdings.

Table 1.1 Number of dairy cows in England and Wales by region (1987 to 1997) [1]

Region	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
England	2,126.1	2,034.8	2,001.0	1,990.8	1,929.8	1,864.5	1,854.7	1,890.4	1,803.1	1,777.8	1,695.8
Wales	349.9	333.9	327.3	324.7	315.2	304.3	301.8	306.1	292.3	294.5	279.0
Midlands	460.8	442.6	438.2	437.9	423.9	412.1	410.7	415.2	397.3	393.5	372.9
North East	361.9	348.7	341.9	341.3	334.8	322.9	320.6	328.3	312.9	311.9	300.2
North West	267.5	255.7	253.4	254.5	251.9	245.7	246.0	250.4	237.5	237.6	227.0
South East	289.2	271.4	260.3	254.4	238.7	225.0	218.9	219.5	207.6	202.3	191.6
South West	745.7	716.4	707.1	702.6	680.5	658.8	658.5	677.0	647.7	632.4	604.1
England and Wales	2,476.0	2,368.7	2,328.3	2,315.5	2,245.0	2,168.9	2,156.5	2,196.5	2,095.4	2,072.3	1,974.8

[1] In herds of 10 cows and over (Source: June Census)

Table 1.2 Change in the number of dairy cows in England and Wales by region (1987 to 1997) [1]

Region	1987-1994		1994-97		1987-1997	
	% change	Average annual % change	% change	Average annual % change	% change	Average annual % change
England	-11.1	-1.6	-10.3	-3.4	-20.2	-2.0
Wales	-12.5	-1.8	-8.9	-3.0	-20.3	-2.0
Midlands	-9.9	-1.4	-10.2	-3.4	-19.1	-1.9
North East	-9.3	-1.3	-8.6	-2.9	-17.1	-1.7
North West	-6.4	-0.9	-9.4	-3.1	-15.1	-1.5
South East	-24.1	-3.4	-12.7	-4.2	-33.7	-3.4
South West	-9.3	-1.3	-10.8	-3.6	-19.1	-1.9
England and Wales	-11.3	-1.6	-10.1	-3.4	-20.2	-2.0

[1] In herds of 10 cows and over

Table 1.3 Number of dairy cows in England and Wales by region and herd size group (1987 to 1997) [1]

Region	Herd size	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
England	10-69 cows	714.9	683.8	651.1	628.9	614.6	588.9	564.7	530.5	512.8	490.7	479.0
	70 cows or over	1,411.3	1,351.0	1,350.0	1,361.9	1,315.3	1,275.6	1,289.9	1,359.9	1,290.3	1,287.1	1,216.7
Wales	10-69 cows	162.7	155.7	147.4	144.1	139.7	135.4	129.3	123.2	118.0	113.2	110.6
	70 cows or over	298.1	286.9	290.8	293.8	284.2	276.7	281.4	292.0	279.4	280.3	262.3
Midlands	10-69 cows	163.8	158.4	152.9	147.2	142.8	136.6	132.9	126.7	123.7	118.8	115.5
	70 cows or over	198.2	190.4	189.1	194.1	192.0	186.3	187.6	201.6	189.2	193.2	184.6
North East	10-69 cows	95.3	89.4	85.4	83.2	81.7	79.1	75.1	70.8	67.8	65.2	63.5
	70 cows or over	172.1	166.3	168.1	171.3	170.2	166.6	170.9	179.6	169.6	172.4	163.5
North West	10-69 cows	48.8	45.9	44.0	42.8	42.5	39.0	38.2	33.8	32.3	30.7	31.8
	70 cows or over	240.4	225.5	216.3	211.6	196.1	186.1	180.7	185.7	175.3	171.6	159.9
South East	10-69 cows	244.3	234.5	221.4	211.5	207.8	198.9	189.2	175.9	171.0	132.8	157.7
	70 cows or over	502.5	481.9	485.8	491.1	472.8	460.0	469.3	501.0	476.7	469.5	446.4
South West	10-69 cows	183.1	174.6	164.9	160.5	155.6	150.3	145.9	138.9	134.8	128.5	122.2
	70 cows or over	166.8	159.2	162.4	164.3	159.6	154.0	156.0	167.2	157.5	166.0	156.9
England and Wales	10-69 cows	897.9	858.5	816.0	789.3	770.1	739.2	710.6	669.4	647.6	619.2	601.2
	70 cows or over	1,578.1	1,510.2	1,512.4	1,526.2	1,474.8	1,429.7	1,445.9	1,527.1	1,447.8	1,453.1	1,373.6
	Total	2,476.0	2,368.7	2,328.4	2,315.5	2,244.9	2,168.9	2,156.5	2,196.5	2,085.4	2,072.3	1,974.8
10-69 as a % of all cows		36	36	35	34	34	34	33	30	31	30	30

[1] In herds of 10 cows and over (Source: June Census)

Table 1.4 Change in the number of dairy cows in England and Wales by region and herd size group (1987 to 1997)[1]

Region	Herd size	1987-1994		1994-1997		1987-1997	
		% change	Average annual % change	% change	Average annual % change	% change	Average annual % change
England	10-69 cows	-25.8	-3.7	-9.7	-3.2	-33	-3.3
	70 cows or over	-3.6	-0.5	-10.5	-3.5	-14	-1.4
Wales	10-69 cows	-24.1	-3.4	-10.2	-3.4	-32	-3.2
	70 cows or over	-2.0	-0.03	-10.2	-3.3	-12	-1.2
Midlands	10-69 cows	-22.6	-3.2	-8.8	-2.8	-29	-2.9
	70 cows or over	+1.7	+0.2	-8.4	-2.8	-7	-0.7
North East	10-69 cows	-25.7	-3.7	-10.3	-3.4	-33	-3.3
	70 cows or over	-4.4	-0.6	-9.0	-3.0	-5	-0.5
North West	10-69 cows	-30.7	-4.4	-5.9	-2.0	-35	-3.5
	70 cows or over	-22.7	-3.2	-13.9	-4.6	-33	-3.3
South East	10-69 cows	-28.0	-4.0	-10.4	-3.6	-35	-3.5
	70 cows or over	-	-	-11.0	-3.6	-11	-1.1
South West	10-69 cows	-24.1	-3.4	-12.0	-4.0	-33	-3.3
	70 cows or over	-	-	-6.1	-2.0	-6	-0.6
England and Wales	10-69 cows	-25.4	-3.6	-10.2	-3.4	-33	-3.3
	70 cows or over	-0.03	-	-10.1	-3.4	-13	-1.3

[1] In herds of 10 cows and over

Table 1.5 Number of holdings with dairy cows in England and Wales by region (1987 to 1997)[1]

Region	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
England	29,398	28,214	27,281	26,752	26,064	25,166	24,576	24,034	23,147	22,393	21,681
Wales	6,552	6,237	6,027	5,866	5,997	5,493	5,329	5,193	5,000	4,860	4,631
Midlands	6,610	6,353	6,168	6,096	5,913	5,727	5,593	5,444	5,262	5,071	4,912
North East	6,030	5,837	5,655	5,522	5,413	5,250	5,128	5,036	4,846	4,702	4,563
North West	3,809	3,636	3,527	3,470	3,407	3,303	3,229	3,154	3,007	2,947	2,849
South East	2,942	2,785	2,646	2,600	2,509	2,362	2,291	2,207	2,111	2,021	1,966
South West	10,007	9,603	9,285	9,064	8,822	8,524	8,335	8,193	7,921	7,652	7,391
England and Wales	35,950	34,451	33,308	32,618	31,731	30,659	29,905	29,227	28,147	27,253	26,312

[1] In herds of 10 cows and over. (Source: June Census)

Table 1.6 Change in the number of holdings with dairy cows in England and Wales by region (1987 to 1997)[1]

Region	1987-1994 % change	1987-1994 Average annual % change	1994-1997 % change	1994-1997 Average annual % change	1987-1997 % change	1987-1997 Average annual % change
England	-18.2	-2.6	-9.8	-3.3	-26.3	-2.6
Wales	-20.7	-3.0	-10.8	-3.6	-29.3	-2.9
Midlands	-17.6	-2.5	-9.8	-3.3	-25.7	-2.6
North East	-16.5	-2.4	-9.4	-3.2	-24.3	-2.4
North West	-17.2	-2.5	-9.7	-3.3	-25.2	-2.5
South East	-25.0	-3.6	-10.9	-3.6	-33.2	-3.3
South West	-18.1	-2.6	-9.8	-3.3	-26.1	-2.6
England and Wales	-18.7	-2.7	-10.0	-3.3	-26.8	-2.7

[1] In herds of 10 cows and over

Table 1.7 Number of holdings with dairy cows in England and Wales by region and herd size group (1987 to 1997)[1]

Region	Herd size	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
England	10-69 cows	17,423	16,719	15,875	15,276	14,930	14,368	13,743	12,787	12,399	11,764	11,559
	70 cows or over	11,975	11,495	11,406	11,476	11,134	10,798	10,833	11,247	10,748	10,629	10,122
Midlands	10-69 cows	4,011	3,843	3,637	3,547	3,445	3,342	3,187	2,991	2,892	2,723	2,687
	70 cows or over	2,599	2,510	2,531	2,549	2,468	2,385	2,406	2,453	2,370	2,348	2,225
North East	10-69 cows	4,185	4,062	3,903	3,730	3,624	3,505	3,385	3,193	3,104	2,952	2,892
	70 cows or over	1,845	1,775	1,752	1,792	1,789	1,745	1,743	1,843	1,742	1,750	1,671
North West	10-69 cows	2,327	2,200	2,100	2,036	1,990	1,915	1,816	1,691	1,618	1,551	1,506
	70 cows or over	1,482	1,436	1,427	1,434	1,417	1,388	1,413	1,463	1,389	1,396	1,343
South East	10-69 cows	1,143	1,080	1,026	1,007	1,017	941	919	816	788	741	771
	70 cows or over	1,799	1,705	1,620	1,593	1,492	1,421	1,372	1,391	1,323	1,280	1,195
South West	10-69 cows	5,757	5,534	5,209	4,956	4,854	4,665	4,436	4,096	3,997	3,797	3,703
	70 cows or over	4,250	4,069	4,076	4,108	3,968	3,859	3,899	4,097	3,924	3,855	3,688
Wales	10-69 cows	4,988	4,748	4,509	4,351	4,201	4,068	3,897	3,675	3,568	3,383	3,232
	70 cows or over	1,564	1,489	1,518	1,515	1,466	1,425	1,432	1,518	1,432	1,477	1,399
England and Wales	10-69 cows	22,411	21,467	20,384	19,627	19,131	18,436	17,640	16,462	15,967	15,147	14,791
	70 cows or over	12,539	12,984	12,924	12,991	12,600	12,223	12,265	12,765	12,180	12,106	11,521
	Total	34,950	34,451	33,308	32,618	31,731	30,659	29,659	29,227	28,147	27,253	26,312
% of dairy holdings 10-69 cows		64.1	62.3	61.2	60.2	60.3	60.1	59.0	56.3	56.7	55.6	56.2

[1] In herds of 10 cows and over (Source: June Census).

Table 1.8 Number of holdings with dairy cows in England and Wales by region and herd size group (1987 to 1997)[1]

Region	Herd size	1987-1994		1994-1997		1987-1997	
		% change	Average annual % change	% change	Average annual % change	% change	Average annual % change
England	10-69 cows	-26.6	-3.8	-9.6	-3.2	-33.7	-3.4
	70 cows or over	-6.1	-0.9	-10.0	-3.3	-15.5	-1.6
Wales	10-69 cows	-26.3	-3.0	-12.1	-4.0	-35.2	-3.5
	70 cows or over	-2.9	-0.4	-7.8	-2.6	-10.5	-1.0
Midlands	10-69 cows	-25.4	-3.6	-10.2	-3.4	-33.0	-3.3
	70 cows or over	-5.6	-0.8	-9.3	-3.1	-14.4	-1.4
North East	10-69 cows	-23.7	-3.4	-9.4	-3.1	-30.9	-3.1
	70 cows or over	-0.1	0	-9.3	-3.1	-9.4	-0.9
North West	10-69 cows	-27.3	-3.9	-10.9	-3.6	-35.3	-3.5
	70 cows or over	-1.3	-0.2	-8.2	-2.7	-9.4	-0.9
South East	10-69 cows	-28.6	-4.1	-5.5	-1.8	-32.5	-3.2
	70 cows or over	-22.7	-3.2	-14.1	-4.7	-33.6	-3.4
South West	10-69 cows	-28.9	-4.1	-9.6	-3.2	-35.7	-3.6
	70 cows or over	-3.6	-0.5	-10.0	-3.3	-13.2	-1.3
England and Wales	10-69 cows	-26.5	-3.8	-10.2	-3.4	-34.0	-3.4
	70 cows or over	-1.8	-0.3	-9.7	-3.2	-8.1	-0.8
	Total	-16.4	-2.3	-10.0	-3.3	-24.7	-2.5

[1] In herds of 10 cows and over

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Table 1.9 Average herd size in England and Wales by region (1987 to 1997) [1]

Region	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
England	72.3	72.1	73.3	74.4	74.0	74.1	75.5	78.7	77.9	79.4	78.2
Wales	53.4	53.5	54.3	55.4	55.6	55.4	56.6	58.9	58.5	60.6	60.2
Midlands	69.7	69.7	71.0	71.8	71.7	71.9	73.4	76.3	75.5	77.6	75.9
North East	60.0	59.7	60.5	61.8	61.8	61.5	62.5	65.2	64.6	66.3	65.8
North West	70.2	70.3	71.8	73.4	73.9	74.4	76.2	79.4	79.0	80.6	79.7
South East	98.3	97.5	98.4	97.8	95.1	95.3	95.5	99.5	98.4	100.1	97.5
South West	74.6	74.6	76.2	77.5	77.1	77.3	79.0	82.6	81.8	82.6	81.7
England and Wales	68.9	68.8	69.9	71.0	70.8	70.7	72.1	75.2	74.4	76.0	75.1

[1] In herds of 10 cows and over (Source: June Census)

Table 1.10 Change in average herd size in England and Wales by region (1987 to 1997) [1]

Region	1987-1994		1994-1997		1987-1997	
	% change	Average annual % change	% change	Average annual % change	% change	Average annual % change
England	8.8	1.3	-0.6	-0.3	8.1	+0.8
Wales	10.4	1.5	2.2	+0.7	12.8	+1.3
Midlands	9.4	1.3	-0.5	-0.2	8.9	+0.9
North East	8.6	1.4	0.9	+0.3	9.6	-1.0
North West	13.1	1.9	0.3	+0.1	13.5	+1.3
South East	1.2	0.2	-2.0	-0.7	-0.8	-0.8
South West	10.7	1.5	-1.1	-0.4	9.5	+0.9
England and Wales	9.1	1.3	-0.1	-	9.0	+0.9

[1] In herds of 10 cows and over

Table 1.11 Number of cows in holdings of less than 10 cows in England and Wales by region (1987 to 1997)

Region	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
England	7,927	7,692	7,153	6,816	6,486	6,803	6,769	6,601	6,196	5,564	4,488
Wales	2,486	2,482	2,162	2,043	1,935	2,098	1,934	1,963	1,690	1,427	1,437
Midlands	1,613	1,596	1,601	1,537	1,458	1,539	1,505	1,528	1,398	1,246	1,027
North East	1,760	1,663	1,437	1,406	1,458	1,411	1,463	1,503	1,341	1,245	1,168
North West	826	8,42	850	777	775	870	834	748	780	634	490
South East	1,202	1,195	1,072	1,091	902	1,026	970	878	911	914	611
South West	2,526	2,396	2,193	2,005	1,893	1,957	1,997	1,944	1,766	1,525	1,192
England & Wales	10,413	10,174	9,315	8,859	8,421	8,901	8,703	8,564	7,886	6,991	5,925

(Source: June Census)

Table 1.12 Change in the number of cows in holdings of less than 10 cows in England and Wales by region (1987 to 1997)

Region	1987 -1994		1994 - 1997		1987 - 1997	
	% change	Annual % change	% change	Annual % change	% change	Annual % change
England	-17	-2.4	-32	-10.7	-43	-4.3
Wales	-21	-3.0	-27	-9.0	-42	-4.2
Midlands	-5	-0.7	-33	-11.0	-36	-3.6
North East	-15	-2.1	-22	-7.3	-34	-3.4
North West	-9	-1.3	-34	-11.3	-41	-4.1
South East	-27	-3.9	-30	-10.0	-49	-4.9
South West	-23	-3.3	-39	-13.0	-53	-5.3
England and Wales	-18	-2.6	-31	-10.3	-43	-4.3

Table 1.13 Number of holdings with less than 10 cows in England and Wales by region (1987 to 1997)

Region	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
England	2,612	2,469	2,211	2,003	1,899	1,914	1,884	1,796	1,531	1,405	1,251
Wales	626	604	560	508	474	510	457	459	370	310	329
Midlands	520	495	473	438	401	427	407	405	347	321	278
North East	481	450	385	363	380	354	375	376	318	289	301
North West	235	221	218	199	184	204	187	169	163	136	130
South East	508	501	425	388	342	359	342	293	265	263	193
South West	868	802	710	615	592	570	573	553	438	396	349
England & Wales	3,238	3,073	2,771	2,511	2,373	2,424	2,341	2,255	1,901	1,715	1,580

(Source: June Census)

Table 1.14 Change in the number of holdings with less than 10 cows in England and Wales by region (1987 to 1997)

Regions	1987 - 1994		1994 - 1997		1987 - 1997	
	% change	Average annual % change	% change	Average annual % change	% change	Average annual % change
England	-31	-4.4	-30	-10.0	-52	-5.2
Wales	-27	-3.8	-28	-9.3	-47	-4.7
Midlands	-22	-3.1	-31	-10.3	-47	-4.7
North East	-22	-3.1	-20	-6.7	-37	-3.7
North West	-28	-4.0	-23	-7.7	-45	-4.5
South East	-42	-6.0	-34	-11.3	-62	-6.2
South West	-36	-5.1	-37	-12.3	-60	-6.0
England and Wales	-30	-4.3	-30	-10.0	-51	-5.1

Chapter 2 Physical performance in dairying 1987/88 - 1996/97

2.1 Introduction

Physical input and output data recorded in the DECS and SSEMP are presented in this chapter, while the economic stimuli which may have given rise to the changes are discussed in Chapter 3. The DECS recording document was enlarged and enhanced in 1993/94, and this allowed additional physical (and financial) information to be collected thereafter. The findings presented here are drawn from between 440 farms (in 1990/91) and 377 farms (in 1996/97), which amount to a little over 1% of the population of all herds in England and Wales. All the results have been raised to represent the population of dairy herds of over 10 cows in England and Wales. Herds with less than 10 cows were excluded from the surveys.

2.2 Review of changes in inputs and outputs

Table 2.1 shows the average results for a range of physical inputs and output variables. These performance measures are raised to the England and Wales level by applying raising factors based on the underlying population of dairy herds.

The average farm size of the surveyed farms increased over the ten years from 79.9 to 88.8 adjusted hectares, though forage area per farm increased by only 2.2 hectares. Milk production per farm increased by 21% (rising from 381,300 to 460,300 litres). This increase resulted from a combination of a 4.8 cow increase in herd size (from 73.1 to 77.9, 6.7%) and a 693 litre (13%) increase in milk yield per cow (to 5,909 litres).

There was little annual variation in forage area per cow, though it was somewhat lower in the three years from 1993/94 to 1995/96. Nitrogen use on grassland was also similar in each of the four years, though phosphate and potassium fertilizer applications appear to have increased in 1996/97 (this result may reflect the change in survey design in 1996/97, and therefore may not be strictly comparable with those obtained from the DECS).

Annual concentrates per cow were only collected for the final four years of the survey period, which is perhaps too short a time period to draw firm conclusions, particularly given the annual variability recorded. However, over the four years annual concentrate use fell from 1,832 kgs to 1,640 kgs, with the use of home grown concentrates also falling. As a result of this and of higher milk yield per cow, the ratio of concentrate per litre of milk (kg/litre) dropped from 0.33 to 0.28.

Total direct labour hours per cow also fell between 1993/94 and 1996/97, from 39.3 to 36.6 hours. However, the proportion and absolute hours of farmer and spouse labour increased.

2.3 Yield per cow

The average milk yield per cow recorded in the three MAFF surveys, (NIEMP/DECS/SSEMP), by the MMBs and by the National Milk Records (NMR) are

presented in Table 2.2. Column A shows average milk yield for those years surveyed by one of NIEMP/DECS/SSEMP. Milk yield increased in most years after 1984/85, but in that year fell markedly. Taken over the twenty-one years from 1976/77 to 1996/97, average milk yield increased by 1,513 litres (34%). This increase is slightly larger than the 29% increase in the UK national average (as reported by the MMB, column D, Table 2.2). This estimate is based on dairy cow numbers and sales off farms plus estimates of milk retained on farms, and therefore will include herd of less than 10 cows.

The twenty-one year 34% increase in yields per cow is similar to the increase reported in 'recorded' herds in England and Wales (33%, column E, Table 2.2). However, milk yields in the 'recorded' herds were always higher than those recorded by the NIEMP/DECS/SSEMP surveys, for example they were 11% higher in 1996/97. The details of the procedure for recording milk yields in the Milk Recording Scheme are presented in Dairy Facts and Figures (MMB annual publication) and are available from National Milk Records which has taken responsibility for this service in England and Wales.

Milk yields per cow by herd size groups recorded in the DECS/SSEMP surveys are reported in Table 2.3. This table shows that the trends reported on in 'Milk Production Before and After Quotas' (MAFF 1988) have continued:
- yields per cow in the largest herd size group (above 200 cows) continues to be higher than yields per cow in the smaller size groups,
- yields per cow was highest in the 150-200 herd size category,
- yields in the 100 to 149 herd size group were similar in most years (particularly before 1992/93 and in 1996/97) to those obtained in the largest herds.

Table 2.3 also shows that the difference in the average yields per cow between the largest and the smallest herds continues to increase, rising from 29% to 41%.

2.4   Physical input use

MAFF (1988) states, 'in general forage area per cow has declined whilst nitrogen usage has increased. The feeding of silage has expanded at the expense of other bulk feed and the level of concentrate use has tended to fall' (p. 21). Unfortunately, this detail of analysis cannot be replicated from the DECS surveys, because physical input use was not recorded in the same degree of detail as in the NIEMP, even after 1992/93 when the DECS was enhanced. Therefore, this report can have less to say on the trend and effects of the changing financial environment on input use.

(1) Forage area

Table 2.4 shows the forage hectare per cow by herd size. Forage area per cow was lower on larger than on smaller herds, and there was a clear trend between larger herd size and higher stocking density. Annual average forage area per cow remained similar over the ten years, though it appeared to fall in the three years from 1993/94. Stocking rates are also affected by seasonal factors, fertilizer use and herd feeding preferences.

(ii) Fertilizer

Table 2.5 shows grassland fertilizer application. It is not possible to say whether the decline in forage area per cow observed in 1993/94 was accompanied by an increase in nitrogen fertilizer application, however, nitrogen fertilizer use did increase in the following year from 169 to 188 kg per ha (10%), before falling to 174 kg per ha in 1996/97.

There was a clear increasing trend between herd size and nitrogen use. Nitrogen use on the smallest herds was 86 kgs per ha in 1996/97, though this itself was an increase from the 71 kg per ha used in 1993/94. Highest nitrogen application rates (238 kg/ha in 1996/97) were observed on farms with herds between 150 and 200 cows, the highest yielding herd size. Higher application of nitrogen fertilizer increase grassland productivity, and clearly are a factor in increasing stocking rates (Table 2.4).

Use of phosphate and potassium per hectare of grassland in 1996/97 appears to be systematically higher than in other years, which may be because of the change in survey design in 1996/97 (i.e. these results are from the SSEMP not the DECS).

(iii) Concentrate use

Table 2.6 shows concentrate use per cow and per litre of milk produced. The amount of (compound and straight, purchased and home grown) concentrate used per cow recorded in 1986/87 in MAFF (1988) was 1,458 kgs, a value consistent with a trend towards using less concentrates at that time. In 1993/94 concentrate use per cow had increased by 374 kgs (26%) to 1,832 kgs (concentrate use before 1993/94 is not available), however, concentrate use was highly variable between 1993/94 and 1996/97.

Although the pattern of concentrate use was not completely regular there is a correlation between concentrate fed per cow and herd size (and higher stocking rates). The statement made in the MAFF (1988) report that this 'tendency is demonstrated in every one of the survey years' (p. 23) remains true.

The pattern of concentrate use per litre of milk produced within herd sizes is also not completely regular. Despite using less concentrates, the lower milk yields per cow achieved by the smallest herds resulted in the highest concentrate/milk produced ratio in three of the four years. For the three years between 1994/95 and 1996/97 the lowest concentrate/milk produced ratio was achieved in herds of between 70 and 100 cows.

(iv) Labour

Table 2.7 shows dairy specific regular labour input by herd size group. The average hours of dairy specific direct labour per cow in the full sample fell from 40.1 in 1993/94 to 37 in 1996/97. Despite an average 18% fall in labour per cow in the smallest herds between 1993/94 and 1996/97, at 69 hours per cow these herds remained the most intensive users of labour, and compares with the annual average of 28 hours per cow on the largest herds and an average annual 37 hours per cow for the full sample.

The consequences of this relatively high labour input on labour cost and net margin are reported for the 1996/97 year in Farrar and Franks (1998). Partial net margins, i.e. gross margin after dairy specific regular labour, for 1993/94 to 1996/97 are presented in Chapter 3.

2.5 Breed, milking and housing

Table 2.8 shows the breeds of dairy cattle in the surveys. The composition of breeds in the sample remained similar between 1993/94 and 1995/96, but changed in the SSEMP sample which surveyed a smaller proportion of '75% or more British Friesians' and more were '75% British Friesian and Holstein and/or British Friesian cross Holstein' herds. There was also a slight increase in the number of herds '75% or more Holstein'. A similar number of Jersey, Guernsey and Ayrshire herds were surveyed each year.

The efficient use of labour is strongly influenced by the housing and milking system. The herringbone parlour was the most common method of milking, with 63% of herds milked in this system in 1996/97. Most herds were housed in cubicles (74% in 1996/97). This shows that the trend identified in the use of herringbone parlours and cubicles in MAFF (1988) has continued.

Only 44% of herds used automatic cluster removal.

2.6 Summary

Measures of the physical quantities of inputs to milk production were recorded for either the ten years between 1987/88 and 1996/97 or for the final four years only. The main findings of the DECS/SSEMP were:

(i) Between 1987/88 and 1996/97 average farm size increased by 8.9 hectares (from 79.9 to 88.8 hectares), rather more than the 2.2 hectare increase in forage area.

(ii) Over the same ten years average annual milk yields per farm increased from 381,300 to 460,300 litres (20.7%). Average milk production per farm increased across all farm size categories.

(iii) For the ten year period, average herd size increased by 4.8 cows (from 73.1 to 77.9 cows). Average annual milk yield per cow increased by 693 litres per cow (from 5,216 litres to 5,909). A simple annual average increase of 1.6%.

(iv) There was a strong relationship between higher milk yield per cow and larger herds. The difference in average milk yield per cow between smaller and larger herds increased over the ten years, from 1,235 to 1,825 litres (29 to 41%).

(v) In the ten years between 1986/87 and 1996/97 average forage area per cow for the full sample remained unchanged at 0.59 hectares. However, smaller herds reduced

forage area per cow from 1.08 to 0.74. There was a clear correlation between lower forage area per cow, higher nitrogen fertilizer application and larger herd size.

(vi) Concentrate use fell from 1,832 to 1,640 kgs per cow in the four years between 1993/94 to 1996/97, though the pattern of use was not regular. Concentrate use per litre of milk produced tended to be highest in small herds.

(vii) In all years the costs of dairy specific regular labour per cow was highest for the smallest herds. Although dairy specific regular labour per cow fell by 18% on the smallest herds (compared with an 8% fall overall) labour input in 1996/97 was 69 hours per cow, 41 hours per cow more than that recorded on the largest herds.

(viii) The predominant breed of the dairy herds were similar in the last three years of the DECS survey. There were some changes in 1996/97, for example, the proportion of '75% or more Holstein' herds increased from 8 to 14%.

(ix) The trend identified in MAFF (1988) towards herringbone parlours and cubical housing has continued. Only 44% of milking parlours has automatic cluster removal fitted.

(x) The analysis of physical quantities can not be as comprehensive as the MAFF (1988) report because the design of the DECS recording document was less comprehensive than those used in the NIEMP surveys. Although the revisions to this survey in 1993/94 (the enhanced DECS) allowed some additional data to be presented, four years to too short a time period from which to draw reliable trends. Particularly as the data for the final year was drawn from a largely different sample.

Table 2.1 Changes of inputs and output over time

Year of survey	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94	1994/95	1995/96	1996/97
Number of farms (unweighted)	411	425	423	440	409	391	381	386	394	377
Number of farms ('000)	33.9	32.4	31.6	31.7	31.0	29.1	30.5	28.2	28.0	27.1
Farm area (adjusted ha)	79.9	79.6	78.3	80.7	81.1	78.3	81.3	83.0	84.1	88.8
Forage area per farm	43.1	42.6	41.1	42.4	42.9	43.7	39.4	40.0	41.2	45.3
Milk produce per farm ('000 litres)	381.3	380.3	391.3	399.3	401.4	418.4	419.9	440.2	458.9	460.3
Average herd size (cows)	73.1	73.2	73.6	73.1	72.5	74.6	74.5	77.4	77.8	77.9
Average annual biological milk yield per cow (litres)	5,216	5,229	5,316	5,463	5,568	5,640	5,636	5,688	5,899	5,909
Forage area per cow (ha/cow)	0.59	0.58	0.56	0.58	0.59	0.59	0.53	0.52	0.53	0.58
Stocking rate (cows / forage ha)	1.7	1.7	1.79	1.73	1.69	1.71	1.89	1.93	1.89	1.72
Nitrogen on grassland (kg/ha)	na	na	na	na	na	na	169	188	185	174
Phosphate on grassland (kg/ha)	na	na	na	na	na	na	13	13	14	27
Potassium on grassland (kg/ha)	na	na	na	na	na	na	23	22	25	47
Concentrate feed:										
Purchased compound (kg/cow)	na	na	na	na	na	na	1,378	1,267	1,342	1,236
Purchased straights (kg/cow)	na	na	na	na	na	na	336	321	385	286
Home grown straights (kg/cow)	na	na	na	na	na	na	119	101	95	100
Total Concentrates (kg/cow)	na	na	na	na	na	na	1,832	1,689	1,822	1,640
Total Concentrates (kg/litre)	na	na	na	na	na	na	0.33	0.30	0.31	0.28
Total direct labour (hr/cow)	na	na	na	na	na	na	39.3	37.4	38.1	36.6
of which farmer and spouse	na	na	na	na	na	na	17.9	16.5	16.9	18.8
of which contract milking	na	na	na	na	na	na	1.1	1.28	1.25	0.8
Total hrs per cow [1]	na	na	na	na	na	na	40.1	38.2	38.9	na

1 Total hours per cow includes casual labour and share of forage casual labour, it excludes regular labour used in forage production and milk processing on farm.

Table 2.2 Milk Yield (litres per cow)

Year	NIEMP/DECS/SSEMP E&W average: (E&W) (A) (l/cow)	E&W average (B)[1] (l/cow)	NIEMP/DECS/SSEMP less E&W National Average (E&W) (C=A-B) (l/cow)	National Average (UK) (D) (l/cow)	Average milk yields in recorded herds[2] (E&W) (E) (l/cow)
1976/77	4,396	4,285	111	4,275	4,908
1980/81	5,107	4,810	297	4,760	5,428
1982/83	5,321	5,085	236	5,055	5,535
1984/85	4,973	4,765	208	4,770	5,533
1985/86	5,186	4,930	256	4,880	5,504
1986/87	5,239	4,985	254	4,945	5,675
1987/88	5,216	4,870	346	4,870	5,691
1988/89	5,229	4,915	314	4,895	5,707
1989/90	5,316	5,070	246	5,050	5,758
1990/91	5,463	5,115	348	5,080	5,887
1991/92	5,568	5,175	383	5,135	5,999
1992/93	5,640	5,250	340	5,200	6,101
1993/94	5,629	5,265	374	5,235 [2]	6,151
1994/95	5,648	na	na	5,300 [2]	6,153
1995/96	5,890	na	na	5,380 [2]	6,269
1996/97	5,909	na	na	5,515 [2]	6,548

[1] Dairy Facts and Figures (various)
[2] Calendar years (January to December)
Recorded herds: these are milk yields per lactation operated by the MMB and subsequently by the National Milk Records (NMR) in England and Wales, and by Livestock services (UK) Limited in Scotland.

Table 2.3 Milk Yield excluding waste (litres per cow) by herd size group

Herd size (cows)	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94	1994/95	1995/96	1996/97
						Yield (litres per cow)				
10 - 29.9 (A)	4,294	4,381	4,286	4,215	4,233	4,371	4,769	4,464	4,777	4,474
30 - 39.9	4,839	4,891	4,874	4,892	5,110	5,370	5,035	5,516	5,222	5,649
40 - 49.9	4,757	4,936	4,986	5,055	5,035	4,936	5,191	5,292	5,381	5,293
50 - 59.9	5,284	5,135	5,245	5,143	5,228	5,336	5,469	5,179	5,556	5,438
60 - 69.9	4,932	5,044	5,205	5,259	5,421	5,460	5,517	5,382	5,708	5,607
70 - 99.9	5,212	5,267	5,392	5,549	5,658	5,641	5,610	5,491	5,739	5,924
100 - 149.9	5,481	5,360	5,561	5,716	5,810	5,854	5,835	5,874	6,078	6,162
150 - 199.9	5,585	5,765	5,575	6,041	6,249	6,130	5,996	6,103	6,618	6,332
200+ (B)	5,529	5,412	5,453	5,734	5,898	6,121	5,968	6,148	6,369	6,299
Full sample	5,216	5,229	5,316	5,463	5,568	5,640	5,629	5,648	5,890	5,909
B-A	1,235	1,031	1,167	1,519	1,665	1,750	1,199	1,684	1,592	1,825
% difference	29	24	27	36	39	40	25	38	33	41

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Table 2.4 Forage area per cow by herd size group

Herd size (cows)	Forage hectares per cow									
	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94	1994/95	1995/96	1996/97
10 - 29.9	1.08	1.09	0.95	0.76	0.84	0.80	0.69	0.74	0.72	0.74
30 - 39.9	0.74	0.72	0.71	0.79	0.66	0.83	0.67	0.63	0.68	0.65
40 - 49.9	0.59	0.60	0.56	0.62	0.62	0.59	0.59	0.61	0.57	0.65
50 - 59.9	0.57	0.58	0.61	0.70	0.68	0.69	0.58	0.49	0.52	0.65
60 - 69.9	0.54	0.55	0.50	0.57	0.65	0.60	0.58	0.57	0.57	0.59
70 - 99.9	0.55	0.55	0.54	0.53	0.57	0.54	0.50	0.51	0.53	0.60
100 - 149.9	0.54	0.53	0.48	0.53	0.54	0.51	0.51	0.49	0.50	0.54
150 - 199.9	0.52	0.45	0.48	0.47	0.47	0.51	0.46	0.48	0.47	0.51
200+	0.46	0.46	0.44	0.44	0.43	0.47	0.44	0.41	0.46	0.56
Full sample	0.59	0.58	0.56	0.58	0.59	0.59	0.53	0.52	0.53	0.58

The methodology used in the DECS for calculating forage area used in the dairy enterprise changed in 1993/94.

Table 2.5 The input of nitrogen, phosphate and potassium fertilizer, by herd size group

Herd size (cows)	Nitrogen on grassland (kg/ha)				Phosphate on grassland (kg/ha)				Potassium on grassland (kg/ha)			
	1993/94	1994/95	1995/96	1996/97	1993/94	1994/95	1995/96	1996/97	1993/94	1994/95	1995/96	1996/97
10 - 29.9	71	92	100	86	12	11	15	20	15	16	17	22
30 - 39.9	99	114	125	125	14	13	16	27	19	20	22	41
40 - 49.9	127	139	159	132	13	15	15	26	24	27	26	42
50 - 59.9	148	177	168	152	14	14	12	25	21	24	21	42
60 - 69.9	154	151	177	197	15	15	18	35	20	23	27	42
70 - 99.9	175	230	195	175	12	15	14	25	21	25	25	47
100 - 149.9	206	199	208	211	17	13	15	27	27	23	26	55
150 - 199.9	220	211	214	238	14	11	15	38	29	19	27	66
200+	201	233	204	181	9	9	13	20	21	20	23	54
Full sample	169	188	185	174	13	13	14	27	23	22	25	47

Table 2.6 Concentrate feed input by herd size group

Herd size (cows)	Concentrate feed (kg/cow)				Concentrate feed (kg/litre)			
	1993/94	1994/95	1995/96	1996/97	1993/94	1994/95	1995/96	1996/97
10 - 29.9	1,600	1,621	1,679	1,270	0.34	0.36	0.35	0.28
30 - 39.9	1,725	1,602	1,573	1,710	0.34	0.29	0.30	0.30
40 - 49.9	1,683	1,585	1,596	1,350	0.32	0.30	0.30	0.25
50 - 59.9	1,552	1,407	1,739	1,570	0.28	0.27	0.31	0.29
60 - 69.9	1,700	1,641	1,756	1,560	0.31	0.30	0.31	0.28
70 - 99.9	2,049	1,597	1,661	1,580	0.37	0.29	0.29	0.27
100 - 149.9	1,813	1,772	1,869	1,700	0.31	0.30	0.31	0.28
150 - 199.9	1,896	1,796	2,173	1,750	0.32	0.29	0.33	0.28
200+	1,912	1,884	2,077	1,810	0.32	0.31	0.33	0.29
Full sample	1,832	1,689	1,822	1,640	0.33	0.30	0.31	0.28

Table 2.7 Dairy specific regular labour input by herd size group

(Herd size cows)	Labour hours per year/cow				Change (1993/94 to 1996/97)	% Change
	1993/94	1994/95	1995/96	1996/97		
10 - 29.9	84.5	71.0	70.0	69	-15.5	-18
30 - 39.9	58.8	50.2	58.9	55	-3.8	-6
40 - 49.9	46.7	47.4	52.3	50	+3.3	+7
50 - 59.9	45.9	42.8	43.7	44	-1.9	-4
60 - 69.9	41.2	43.5	46.5	40	-1.2	-3
70 - 99.9	36.6	35.4	35.4	35	-1.6	-4
100 - 149.9	34.1	33.1	33.2	32	-2.1	-6
150 - 199.9	34.4	32.7	29.3	26	-8.4	-24
200+	30.7	30.9	31.9	28	-2.7	-9
Full sample	40.1	38.2	39.0	37	-3.1	-8

Table 2.8 Breed, method of milking and housing system (1993/94 to 1996/97)

	1993/94	1994/95	1995/96	1996/97
Number of farms	381	386	394	377
		Percentage of herds		
Predominant breed of dairy herd				
>=75% British Friesians	42	41	40	27
>=75% Holsteins	8	8	10	14
>=75% British Friesians and Holsteins and/or Br. Friesians X Holstein	44	46	45	52
>= 75% Jersey	1	2	1	1
>=75% Guernsey	1	1	1	1
>=75% Ayrshire	1	1	1	1
Other/mixed	2	2	2	2
Method of milking				
Parlour: herringbone	68	67	69	63
: rotary	1	1	1	1
: abreast	21	23	22	25
: tandem	1	1	1	1
: other	-	-	-	1
Cowshed: pipeline to bulk tank	7	7	7	9
: bucket machine	1	1	-	-
: hand	-	-	-	-
Bail	1	1	1	-
Other/mixed	-	-	1	-
Has automatic cluster removal	44.6	42.7	43.7	44
Predominant type of housing				
>=75% cubicles / cow kennels	75	76	77	74
>= 75 % covered yard (loose housing)	16	17	17	17
>= 75 % cow shed (tethered)	5	4	3	5
>= 75% outdoor	-	-	-	-
Other / mixed	4	3	4	3
Unweighted				

Chapter 3 Financial performance in dairying, 1987/88 to 1996/97

3.1   Introduction

This chapter outlines the major changes in returns, variable costs and dairy specific regular labour costs (available for the shorter time period from 1993/94 to 1996/97) that have taken place in milk production in England and Wales during the ten years. The total value of dairy production and all variable costs used in the dairy enterprise were recorded in the DECS, as gross margins (total revenue less all variable costs used in the dairy enterprise) are presented for each of the ten years. From 1993/94 to 1995/96 the enhanced DECS estimated the value of dairy specific regular labour used in the dairy enterprise, allowing a margin after labour costs to be presented. Only for 1996/97 can full net margins be presented and as these have been reported in Farrar and Franks (1998) they are not re-presented here.

However, because the DECS (but not the SSEMP) was 'bolted on' to the Farm Business Survey (FBS) it has been possible to identify whole-farm characteristics for the first nine years of the survey period. Where appropriate values extracted from the FBS, such as the value of total output, net farm income, assets and liabilities, are presented.

Table 3.1a summarises the main financial performance indicators of the diary enterprise and whole-farm accounts. The following tables examine individual components in more detail. Some of the changes over time will be due simply to the changing value of money, so some financial indicators are shown in 'real' terms, i.e. corrected for inflation using the Retail Prices Index.[1] Whilst the ten year increase in the value of dairy enterprise output was £560 per cow in current prices, in real terms the value of output increased by £72 per cow. After correcting for the increase in prices, the nominal increase in gross margin of £353 per cow is reduced to £45 per cow (when expressed in 1988 money values).

The total value of dairy enterprise output increased by £48,036 in nominal terms (from £67,201 to £115,237) but this represented a real increase of £9,994. Over the ten years the proportion of dairy enterprise to total farm revenue increased from 62.5% to 67.6% which suggests that the dairy farms became more specialist milk producers. The proportion of revenue earned by the dairy enterprise excludes any income from leasing milk quotas.

Over the nine years between 1987/88 and 1995/96 net farm income increased by £15,789 (from £22,394 to £38,183, or 70% in nominal terms), but by only £3,843 in real terms (17%).

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[1] March 1988 was taken as the base year. The following values were used to adjust current values for the change in the retail prices index: 1.079, 1.166, 1.262, 1.313, 1.338, 1.369, 1.417, 1.455 and 1.493 for years 1988/89 through to 1996/97 respectively.

3.2 Dairy enterprise output and variable costs

The value of output from dairy enterprises consists mainly of receipts from sales of milk and the value of calf sales, less herd replacement costs and superlevy fines. Any income from the leasing out of milk quota is treated as an income to the farm and not to the dairy enterprise. It is therefore excluded from Table 3.2 which shows the trends in the components of dairy enterprise output.

Milk returns is the total value of all milk produced; it is measured as the revenue from milk sales together with the imputed value of milk consumed in the farmhouse, milk supplied as a perquisite to the workers and milk fed to livestock.

Milk returns per cow account for the largest proportion of livestock output. Calf sales rose and fell over the ten years finishing at about the same value as they started, though 1996/97 calf values would have been affected by the introduction of the Calf Processing Aid Scheme which was one of the special measures that was introduced following government announcements on BSE in March 1996. Compensation for the suspension of milk quota also increased and fell over the ten years. Herd replacement costs increased from £45 to £96 per cow (113%).

The largest components of variable cost were concentrate feed and forage variable costs. Total variable costs increased by £208 per cow (61%), which exactly matches the 61% increase in dairy enterprise revenue per cow.

3.3   Milk returns

Average milk returns per cow increased by £617, or 72% over the ten years (Table 3.3). This was due primarily to a 52% increase in milk price (from 16.4 to 25.06 ppl) but milk yields per cow also increased by 13%. Milk returns increased by £617 per cow in nominal terms, and by £129 per cow in real terms.

Table 3.4 shows that milk returns per cow tend to increase with herd size, though highest milk revenues were earned in herds of between 150 and 200 cows. This finding is mirrored by Table 3.3 (p. 33) in MAFF (1988), which covered milk returns for five years between 1976/77 and 1986/87. That table shows that 'the value of milk output is particularly low for the smallest herd size'. Table 3.4 shows that the gap is increasing. In 1987/88 the largest herds earned £178 per cow more than the smallest herds (25%), this difference in revenue increased to 33% in 1992/93 before falling to 26% in 1993/94. However, it has increased in the final three surveyed years to 41%, 35% and 52%.

The explanation for this pattern in the distribution in milk revenues per cow given in MAFF (1988), for the years between 1976/77 and 1986/87, was that it followed 'directly from the higher yield per cow as herd size increases'. The gap in milk yield still applies (Table 2.3), however, there has also been a change in the price per litre of milk sold across herds (Table 3.5). In five of the six years between 1987/88 and 1992/93, smallest herds achieved a higher milk price than largest herds, for example in 1990/91 they earned 1.18 ppl more. *However, in 1993/94 the price difference*

switched in favour of the largest herds (0.07 ppl) and more noticeably so in 1994/95 (0.29 ppl) and thereafter. The largest herds received 1.92 ppl more in 1996/97.

3.4 Concentrate feed costs and margin over concentrates

Concentrate feed costs are the largest proportion of variable costs (Table 3.2); costs of concentrate feed by herd size are shown in Table 3.6. Averaged across all herds, concentrate feed costs per cow have risen in nominal terms by 27%, but because of price inflation this represents a 15% fall in real terms. Concentrate costs increased in nominal terms in most years. For the years after 1993/94 Table 2.6 sets out the tonnage of concentrates fed per cow, the change in total concentrate costs mirror closely the change in concentrates fed. The pattern of expenditure on concentrates across herd sizes is not regular, but the very low expenditure noted by smaller herds in the MAFF (1988) report is not apparent in these findings, though smaller herds did tend to spend less per cow than largest herds. Expenditure on concentrates per cow was highest in the 150-200 cow herds.

Margin over concentrates is a broad indicator of efficiency in milk production, and represents the difference between milk returns and concentrate feed costs. As shown in Table 3.7, average margin over concentrates in real terms increased from £657 to £822 (25%). The increase between 1994/95 and 1995/96 reflects the 12% nominal increase in milk price.

In all years the margin over concentrates has tended to be higher in larger herds, as shown in Table 3.8. This is consistent with information presented earlier that milk yields and milk returns per cow increase with herd size at a faster rate than do concentrate costs (as average concentrate use per litre remained relatively constant across herds). Since 1993/94 the higher milk price received by larger herds also contributed to their relatively higher margin over concentrates.

3.5 Variable costs

Variable costs consist primarily of concentrate feed costs, but include also the costs of bulk feed, straw, veterinary expenses, contract work, quota leasing and forage variable costs. 'Other livestock costs' include recording and consultancy fees, consumables (dairy sundries), AI and bull hire, and miscellaneous costs. Expenditure per cow on these individual items is shown in Table 3.2.

Since 1987/88 average variable costs per cow have increased by £208 in nominal terms, a real increase after allowing for price inflation of £27. As a proportion of total variable costs, concentrate costs have fallen from 58% to 46%, due mainly to an increase in the expenditure on forage variable costs and quota leasing costs. Quota leasing costs have increased from £5 per cow to £61 per cow (from 1.5% of total variable costs to 11%).

There is an increase in variable costs per cow with increasing herd size (Table 3.9), but this increase is not as large as the increase in milk revenue with increasing herd size (Table 3.4). Table 3.9 also shows variable costs per litre of milk produced. For

the whole sample variable costs per litre increased from 6.5 to 9.3 pence, with costs per litre consistently higher on smaller herds.

3.6   Gross Margin

Gross margin is the value of all outputs from the dairy enterprise less the variable costs directly involved in the production of that output. It can usefully be expressed per cow, per forage hectare and per litre of milk produced.

(i) Gross margin per cow

As seen in Table 3.10, in real terms the average gross margin per cow increased by £45. Table 3.11 shows the gross margin per cow for the different herd size groups over the period 1987/88 to 1996/97.

Figure 3.1 compares the gross margin per cow estimated from the NIEMP/DECS/SSEMP for the years between 1985/86 and 1996/97 with estimates produced by the National Farmers Union (NFU). The estimates from the NFU are highly correlated with those produced by NIEMP/DECS/SSEMP, but are systematically lower each year (by a 10 year average of £87).

Figure 3.1   Gross margin per cow as estimated by NIEMP/DECS/SSEMP and the National Farmers Union
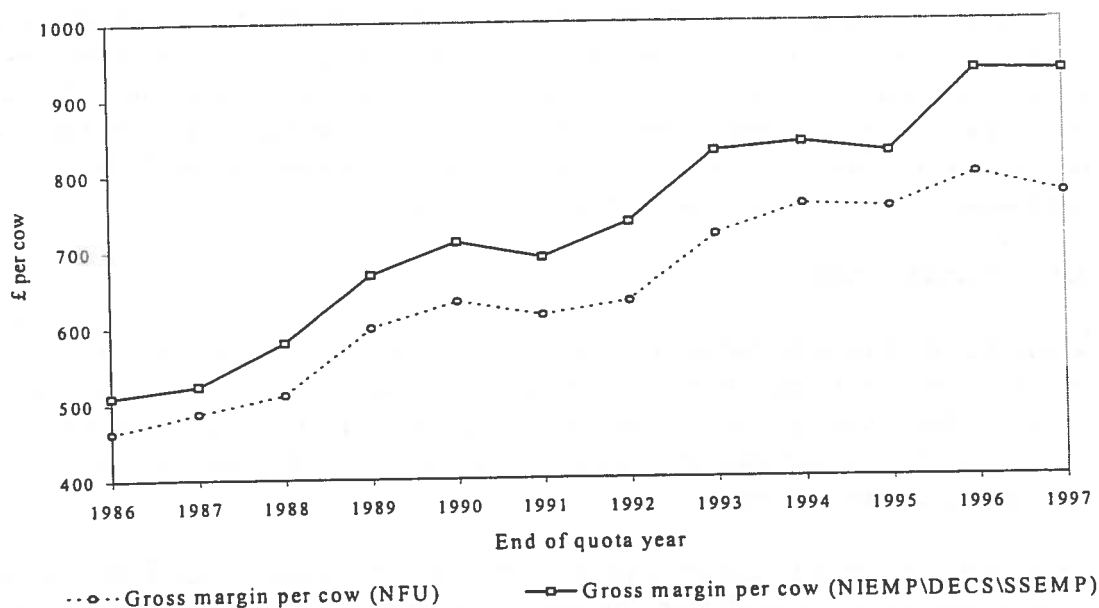
(Source: NFU Briefing, Econ. 14/99, 4 May 1999)

Gross margins per cow differ markedly between small and large herds because the larger herds achieve higher milk returns (Table 3.4) without a proportionate increase in variable costs (Table 3.9). There is some indication that the differential between the smallest and largest herd has increased, particularly since 1994/95. The gross margin per cow achieved by the largest herds was 37% higher in 1987/88, this fell in the following years but in 1994/95 increased to 60% and in 1996/97 the differential

was 53%. Over the ten years gross margin per cow increased by £397 (63%) for the largest herds, but by £210 (45%) for the smallest herds.

(ii) Gross margin per forage ha

Gross margin per forage hectare is obtained by dividing the gross margin by the forage area used by the dairy enterprise, it is equivalent to dividing the gross margin per cow by the forage area per cow. Table 3.12 shows that the average full sample gross margin per forage hectare increased from £984 to £1,602 over the ten year period. Table 2.4 shows the general decrease in forage area per cow in most years, with an increase reported in the final year (1996/97). The decrease was particularly noticeable for the smallest herds, with little change reported for the largest herds. This resulted in an increase in gross margin per forage area of £471 (110%) for the smallest herds compared with an increase of £478 (34%) for the largest herds, as the smallest herds 'caught up' with the largest herds, though a considerable differential remained. Interestingly, this improvement in gross margin per forage hectare of smaller herds was not observed in MAFF (1988), where smaller herds had fallen 'progressively behind larger herds', noticeably because of their higher forage area per cow (lower stocking rates).

(iii) Gross margin per litre

Gross margin per cow do not reveal the effect of different levels of productivity on the survey findings: gross margin per litre has the benefit of removing productivity distortions (as the gross margin per cow on high yielding herds is reduced more than the gross margin per cow on lower yielding herds when expressed in terms of litres produced). These values are shown in Table 3.13. For the years between 1987/88 and 1993/94 gross margin per litre is broadly similar across all herd sizes; in four years gross margin per litre was higher on the smallest herds. However, in 1993/94 the gross margin per litre price differential began to move in favour of larger herds. Given the relative similarity of concentrate fed per litre of milk across herd size groups (Table 2.6) this differential appears to be driven by the higher milk prices received by the larger herds (Table 3.5).

Figure 3.2 compares the gross margin per litre estimated by the NIEMP/DECS/SSEMP for the years between 1985/86 and 1996/97 with those produced by the NFU. The estimates from the NFU are highly correlated with the findings of the NIEMP/DECS/SSEMP, but are systematically lower (by a ten year average of 0.78 ppl).

Figure 3.2 Gross margin per litre as estimated by NIEMP/DECS/SSEMP and the National Farmers Union

X-axis: End of quota year (1986–1997)
Y-axis: Pence per litre (9–16)

Legend:
··o·· Gross margin per litre (NFU)   —□— Gross margin per litre (NIEMP\DECS\SSEMP)
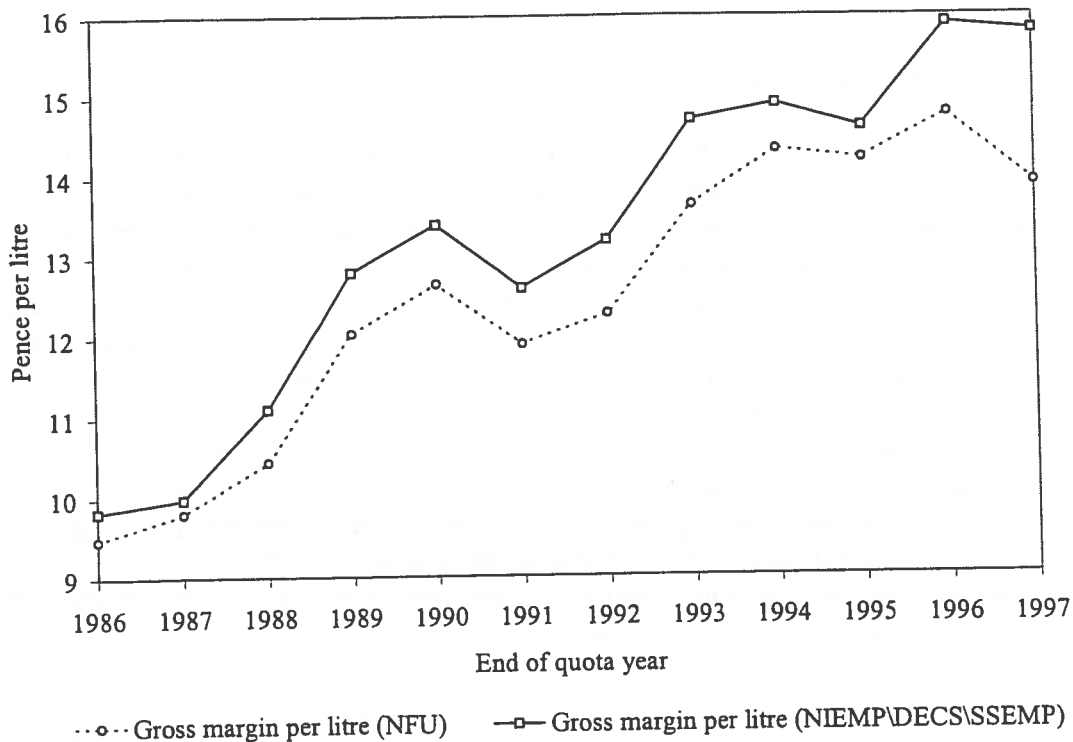
(Source: NFU Briefing, Econ. 14/99, 4 May, 1999)

3.7 Dairy specific regular dairy labour

The DECS was designed to record dairy enterprise performance to the gross margin level, but from 1993/94 dairy specific regular labour was also recorded. This, typically the largest component of fixed costs, includes an imputed value of unpaid labour including unpaid farmer and spouse labour. Dairy specific regular labour cost per cow are presented in Table 3.14 and are much as would be expected given the variation of hours per cow with herd size presented in Table 2.7, namely that dairy labour costs per cow decrease with increasing herd size. The differential between herd size has decreased slightly over the four years (from 64% to 58%) but still remains significant.

3.8 Margins after dairy specific regular labour

As other fixed costs were not recorded in the DECS Tables 3.14 and 3.15 show the margin after 'variable costs and dairy specific regular labour' per cow, per forage hectare and per litre. After allowing for dairy specific regular labour, the competitive disadvantage of small herds is magnified; indeed in 1994/95 smallest herd reported a negative margin per cow (of £14); equivalent to a loss of £18 per forage hectare and 0.3 pence on each litre of milk produced. Even if the margin after labour for the smallest herd is set to one side, the differential in labour costs across the remaining herd size categories is still significant.

The labour costs include the imputed value of unpaid labour which is based on standard costings so the margin after dairy specific regular labour may be increased if farmers place a lower value on their labour than the standard rate used. It should also be noted that the absolute contribution of farmer and spouse labour in total dairy specific direct labour increased between 1993/4 and 1996/97 (Table 2.1).

The theory of decreasing returns to scale suggests that as farm size increases fixed costs tend to decrease per unit of output, up to some optimum size. MAFF (1988) and Farrar and Franks (1998) show that financial benefit in the form of lower fixed costs per unit of output do occur as herd size increases. Therefore, the divergence in returns between small and larger herds is likely to be much larger after allowing for all fixed costs.

3.9 Farm returns and financial stability

A benefit of 'bolting' an enterprise survey on to the FBS is that it allows the financial status of the farm to be presented together with the enterprise specific analysis. For example, Table 3.1 shows the increasing dependence of dairy farms on revenue from the dairy enterprise, with 67.6% of all income generated from the dairy enterprise in 1996/97 compared to 62.5% in 1987/88.

Table 3.16 shows the average net farm income (NFI) and average interest paid by herd size. NFI represents the total remuneration to farmer and spouse for their labour, management and investment in tenant type capital (it assumes that all farms are tenanted and no borrowings or interest payments are made). As such NFI places farms on an equal footing, albeit somewhat different from that faced in the real world, where owner occupiers may not charge themselves a rent and interest payments may be payable. Note, however, that NFI makes no deductions for payment to the farmer and spouse for work done.

It is clear from Table 3.16 that farms with the smallest herds have a significantly lower NFI than farms with larger herds. Indeed, NFI on farms with the smallest herds appear barely sufficient reward for the time, labour and investment required to continue as dairy farmers. The benefits of even a small increase in herd size are clear, with NFI of herds with between 30 and 40 cows often more than double that of the farms with the smallest herds. Although throughout this chapter the returns from the dairy enterprise was generally highest for herds between 150 and 200 cows (rather than the largest herds of 200 cows and above), farms with the largest herds generated the higher NFI per farm in eight of the nine years for which this measure of farm income is available.

Table 3.16 also presents the interest paid. Demands for repayments of bank loans take preference over payments to farmer and spouse for their labour, management and return on investment in tenant type capital. The ratio of interest paid to NFI offers a measure of repayment ability from annual income (and is therefore a measure of financial performance based on annual cash flow). For example, in 1990/91 40.7% of NFI was paid as interest payments. The ratio of interest paid to NFI for farms with the smallest herds was 40.1 and 50.1% in 1994/95 and 1995/96 respectively, which suggests that without non-farm sources of income these farms were under a high

degree of financial stress. However, care should be taken in interpreting financial performance using NFI because of the convention of deducting a rental payment (even on totally owner occupied farms) which acts to decrease the 'real' income position.

Table 3.18 summarises the financial status of farms by herd size. Although the smallest farms appear to be under severe cash flow difficulties, on average they had a net worth of £190,292 in 1995/96 (with dairy quota value included in total farm assets). Larger farms paid considerable more in interest payments, on average, but their higher NFI meant they were able to service this level of borrowings. In addition, larger farms had an average net worth of £1,767,563, which indicates a sound capital basis to their borrowings.

3.10 Analysis of farms ranked by gross margin per cow

This chapter has presented extensive details of relative performance by herd size. This is complemented by Tables 3.19 to 3.21, which presents financial and management returns for the top and bottom 10% of farms ranked by gross margin per cow.

Tables 3.19 and 3.20 shows the top and bottom 10% of farms ranked by gross margin per cow. The differential in gross margin per cow has increased from £471 (44% larger in the top decile) in 1987/88 to £819 (75% larger) in 1996/97. This divergence was caused by a 61% increase in gross margin per cow in the upper decile herds over the ten years, compared to the lower 43% increase achieved by herds in the lower decile over the same time period.

Although average total variable costs per cow were similar for farms in each decile when ranked by gross margin per cow, Table 3.21 shows that milk yield per cow was significantly higher on farms in the top decile. Therefore, when variable costs are expressed per litre of milk produced they are consistently higher on farms in the lower decile. For example, in 1987/88 variable costs per litre were 5.3 pence and 9.0 pence for the higher and lower decile farms respectively. In 1996/97 variable costs per litre had increased to 7.8 and 12.0 ppl for the upper and lower decile respectively.

Top decile farms also benefited from generally higher milk prices, though in 1990/91 they received a smaller average milk price. The differential in milk price had increased since 1993/94; in 1994/95 the best performing 10% of farms earned 0.69 ppl more, and this increased to 1.72 and 2.45 ppl in the following two years.

Upper decile farms were considerably larger than farms in the lower 10% whether measured by farm area, herd size, value of total farm output or the total milk produced per farm. The top performing farms increased milk production in most years, and expanding production is clearly an important requirement for any farm intent on remaining among the top 10% of dairy farms. Whilst these farms increased milk production by 49% productivity remained largely unaltered on lower decile farms. The increase productivity composed a 1,060 litre increase in yield per cow (from 5,957 to 7,017 litres, 18%) and a 22.8 increase in cow numbers (26%). This compares with an increase of only 360 litre per cow (from 3,982 to 4,342 litres, 9%) and a reduction of 3.7 cows (8%) on farms in the lowest ranked 10% of herds.

On a per cow basis, overhead costs are likely to be larger on smaller than larger herds. Therefore farmers in the lowest decile of farms are likely to be placed at an even larger competitive disadvantage at the net margin level.

3.11 Summary

The main findings of the economics of dairy enterprises are;

(i) The average herd size increased by 4.8 cows, from 73.1 to 77.9 over the ten years.

(ii) The average value of output from the dairy enterprise increased in nominal terms by £560 per cow between 1987/88 to 1996/97, an increase in real terms of £72 per cow. There was a nominal increase in gross margin per cow of £353 per cow, an increase in real terms of £45.

(iii) Over the nine years from 1987/88 to 1995/96 revenue from dairy enterprises increased as a proportion of the value of total farm output, from 62.5 to 67.7%.

(iv) In 1987/88 herds of 200 cows and above produced milk to the value of £901 per cow; 25% more than the £723 per cow of the smallest herds. Ten years later this differential had increased to 52% (£1,599 and £1,050 respectively).

(v) The higher rate of increase in milk revenue on large herds was achieved by a combination of higher milk yields per cow and, particularly since 1993/94, higher average milk prices. The change in the differential of milk prices between herd size began in 1993/94 but was more noticeable in the following years - prior to 1993/94 the smallest herds achieved the highest average milk price. Although this trend started before the deregulation of the milk market the price differential became more noticeable from 1994/95 the year the milk market was deregulated.

(v) Expenditure on concentrate feed per cow increased from £198 to £251 (27%) but after allowing for price inflation this represented a fall in real terms of £30 (15%).

(vi) Variable costs per cow increased by £208 in nominal terms and by £27 in real terms. The value of dairy enterprise output increased in real terms by £72 per cow, real gross margin increased by £45 per cow. Expenditure on quota leasing represented the largest absolute and percentage increase in any individual variable costs, increasing from £5 per cow in 1987/88 to £61 per cow in 1996/97. When expressed per litre of milk produced variable costs were largest on the smallest farms.

(vii) Smaller herds achieved a lower margin over concentrates than larger herds.

(viii) Gross margin per forage hectare increased in real terms largely because of higher average stocking rates, a trend that was particularly noticeable on smaller herds. Gross margin per litre increased over the ten years but remained fairly constant across herd sizes until 1994/95. In 1994/95 and thereafter the largest herds achieved a higher gross margin per litre reflecting the higher milk prices they received and their lower variable costs per litre.

(ix) Expenditure on dairy specific regular labour per cow was substantially higher on small herds. The variation of this cost with herd size demonstrated the substantial economies of size associated with larger herds.

(x) Average NFI on farms with the smallest herds was considerably lower than that on farms with larger herds. NFI was highest on farms with the largest herds. In 1995/96 interest payments on farms with the smallest dairy herds averaged 50% of NFI, suggesting these farmers had cash flow difficulties (though NFI can underestimate farm income particularly for farms with a large share of owner occupied land). In addition, household income may be supplemented by non-farming income.

(xi) Farms in the top 10% by gross margin per cow are substantially larger than those in the bottom 10%. Milk production of farms in the top 10% category grew by an average of 5% per year. The differential in gross margin and milk yield per cow, and milk price per litre between the top and bottom 10% categories all increased.

(xii) Overall dairy returns at the gross margin level held up well over the survey period, though the differential between smaller and larger farms has increased in terms of the value of milk sold, milk price per litre produced, gross margin per cow and per litre. This has increased the disadvantage of smaller dairy farms. It would be expected that smaller farms are even more disadvantaged at the net margin level (as was shown in the full report of the 1996/97 data).

(xiii) NFI on farms with the smallest herds was less than £12,000 in each year for which it could be calculated which suggests that other enterprises did not cross-subsidise the milk enterprise. In 1994/95 and 1995/96 interest payments accounted for 40.1 and 50.1% of NFI: it is difficult to see how many of the smaller herds can continue if the full charge for dairy specific regular labour is costed against work done. However, on the smallest farms a higher proportion of labour was carried out by the farmer and spouse, so the farms can remain viable (at least over the short-term) if own labour is valued below its market rate. However, the move in average milk price received in the favour of larger milk producers since 1993/94 has put smaller herds at an even greater disadvantage.

(xiv) Farmers scaling back dairy production can use income from leasing or selling milk quota to reduce borrowings and/or provide investment capital with which to restructure their farming portfolio. For example, if the most profitable alternative enterprise for quitting dairy farmers is suckler beef production it would probably be necessary to invest in suckler cow quota (it is unlikely that dairy grassland would be eligible for arable area payments if it was used to grow eligible crops).

(xv) Because the profitability of alternative enterprises provides an economic incentive to quit dairying it becomes a factor determining the rate of restructuring in the dairy sector.

Table 3.1a Financial performance indicators of dairy enterprise and farm (£/cow, current prices)

	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94	1994/95	1995/96	1996/97
Dairy enterprise output	919	1,023	1,103	1,097	1,147	1,239	1,314	1,336	1,486	1,479
Concentrate feed costs	198	205	224	224	219	230	257	253	272	251
Total variable costs	339	355	392	407	411	410	474	509	551	547
Gross margin	580	668	711	690	736	829	840	827	935	933
Dairy specific regular labour[1]	na	na	na	na	na	na	275	282	293	235
Margin after labour	na	na	na	na	na	na	564	545	642	698
Dairy enterprise output/farm	67,201	74,877	81,196	80,148	83,144	92,367	97,847	103,483	115,638	115,237
Value of total farm output	107,500	116,978	121,409	119,179	127,298	147,633	148,397	152,530	171,047	na
Dairy to total farm output (%)	62.5	64.0	66.9	67.2	65.3	62.6	65.9	67.8	67.6	na
Net farm income (£ per farm)	22,394	29,059	28,048	19,932	26,301	42,283	35,611	31,027	38,183	na
(£ per hectare)	280	365	358	247	324	540	438	374	454	na

Table 3.1b Financial performance indicators of dairy enterprise and farm (£/cow, expressed in real prices 1988 = 100)

	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94	1994/95	1995/96	1996/97
Dairy enterprise output	919	948	946	869	873	926	960	943	1021	991
Concentrate feed costs	198	190	192	177	167	172	188	179	187	168
Total variable costs	339	329	336	322	313	306	346	359	379	366
Gross margin	580	619	610	547	560	620	614	584	642	625
Dairy specific regular labour[1]	na	na	na	na	na	na	201	199	201	157
Margin after labour	na	na	na	na	na	na	412	385	441	468
Dairy enterprise output/farm	67,201	69,410	69,625	63,496	63,316	69,027	71,480	73,034	79,458	77,195
Value of total farm output	107,500	108,436	104,108	94,418	96,940	110,327	108,408	107,650	117,531	na
Dairy to total farm output (%)	62.5	64.0	66.9	67.2	65.3	62.6	65.9	67.8	67.6	na
Net farm income (£ per farm)	22,394	26,937	24,051	15,791	20,029	31,598	26,015	21,898	26,237	na
(£ per hectare)	280	338	307	196	247	404	320	264	312	na

Table 3.2 Dairy enterprise output and variable costs 1987/88 to 1996/97 (£/cow) [1]

	1987/88	1988/89	1989/90	1990/91	1991/92 (£/cow)	1992/93	1993/94	1994/95	1995/96	1996/97
Milk Returns (A)	861	927	1,020	1,050	1,089	1,175	1,242	1,304	1,473	1478
EU superlevy (B)	6	1	2	1	-	-	-	4	10	3
Compensation (for susp' of quota) (C)	18	26	22	21	20	17	14	10	8	10
Herd Replacement Costs (D)	45	39	45	51	48	62	69	88	90	96
Calf sales (E)	91	109	108	77	86	109	128	113	106	90
Industry Development Council Levy (F)	-	-	-	-	-	-	-	-	2	-
Dairy enterprise output (A+C+E-B-D-F)	919	1,023	1,103	1,097	1,147	1,239	1,314	1,336	1,486	1,479
Concentrate feed	198	205	224	224	219	230	257	253	272	251
Bulk feed	4	4	5	4	4	5	9	10	12	15
Straw (bedding and feed)	10	9	12	13	4	4	15	20	25	16
Vet and medicine	18	20	22	23	26	30	33	34	36	35
Non-forage contract work	na	na	na	na	na	na	3	4	3	4
Haulage of untreated milk	na	na	na	na	na	na	-	2	-	-
Non-forage casual labour	na	na	na	na	na	na	2	2	3	1
Other livestock costs	33	39	43	47	51	45	64	63	69	64
Quota leasing costs (adjusted)	5	7	9	13	18	12	19	43	50	61
Forage variable costs [2]	71	73	78	82	90	85	73	79	80	100
Total variable costs	339	355	392	407	411	410	474	509	551	547
Gross Margin	580	668	711	690	736	829	840	827	935	933
Dairy enterprise output (1987/88 £) [3]	919	948	946	869	873	956	960	943	1,021	991
Gross Margin (1987/88 £)	580	619	610	547	560	620	614	584	642	625

[1] Figures may not sum to the total of their components due to rounding. [2] Plus share of contract costs. [3] Real values, deflated by the RPI (March 1988 = 100)

Table 3.3 Milk returns (1987/88 to 1996/97)

	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94	1994/95	1995/96	1996/97
					(£/cow)					
Milk Yield (litres/cow, ex waste)	5,216	5,229	5,316	5,463	5,568	5,640	5,629	5,648	5,890	5,909
Price (ppl)	16.4	17.73	19.19	19.21	19.57	20.83	22.06	23.09	25.01	25.06
Milk Returns (current £)	861	927	1,020	1,050	1,089	1,175	1,242	1,304	1,473	1,478
Milk Returns (1987/88 £)	861	859	875	832	829	878	907	920	1,012	990

Table 3.4 Value of milk sold by herd size group

	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94	1994/95	1995/96	1996/97
					(£/cow)					
10 - 29.9 (A)	723	756	849	843	864	952	1,038	1,018	1,193	1,050
30 - 39.9	799	877	941	956	1,007	1,139	1,131	1,237	1,285	1,380
40 - 49.9	776	876	974	984	1,000	1,019	1,146	1,214	1,341	1,291
50 - 59.9	875	907	1,011	986	1,017	1,103	1,202	1,197	1,377	1,328
60 - 60.9	846	937	1,002	1,006	1,054	1,143	1,209	1,235	1,430	1,408
70 - 99.9	855	926	1,034	1,064	1,100	1,178	1,245	1,271	1,424	1,462
100 - 149.9	902	956	1,067	1,095	1,135	1,213	1,286	1,355	1,529	1,567
150 - 199.9	916	1,002	1,064	1,183	1,249	1,277	1,331	1,428	1,658	1,612
200 + (B)	901	946	1,028	1,078	1,140	1,262	1,305	1,432	1,614	1,599
Full sample	861	927	1,020	1,050	1,089	1,175	1,242	1,304	1,473	1,478
B-A	178	190	178	229	276	310	267	414	421	549
% difference	25	25	21	27	32	33	26	41	35	52

Table 3.5 Pence per litre of milk produced by herd size group

(ppl)

	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94	1994/95	1995/96	1996/97
10 - 29.9 (A)	16.77	17.25	19.73	19.99	20.42	21.78	21.79	22.80	24.98	23.46
30 - 39.9	16.37	17.91	19.27	19.54	19.72	21.21	22.45	22.43	24.61	24.43
40 - 49.9	16.22	17.74	19.50	19.45	19.87	20.65	22.07	22.93	24.93	24.39
50 - 59.9	16.42	17.58	19.24	19.13	19.48	20.68	21.98	23.11	24.79	24.43
60 - 60.9	17.04	18.58	19.15	19.13	19.49	20.92	21.91	22.94	25.05	25.12
70 - 99.9	16.29	17.55	19.14	19.16	19.45	20.89	22.20	23.15	24.81	24.68
100 - 149.9	16.33	17.80	19.14	19.14	19.53	20.71	22.03	23.06	25.16	25.43
150 - 199.9	16.28	17.37	19.08	19.58	19.98	20.84	22.20	23.40	25.06	25.46
200 + (B)	16.21	17.46	18.82	18.81	19.32	20.61	21.86	23.29	25.33	25.38
Full sample	16.39	17.71	19.20	19.21	19.57	20.83	22.06	23.09	25.01	25.01
B-A	-0.56	0.21	-0.91	-1.18	-1.1	-0.47	0.07	0.29	0.34	1.92
% difference	-3.3	+1.2	-4.6	-5.9	-5.4	-2.2	+0.3	+1.3	+1.4	+8.2

Table 3.6 Concentrate feed costs by herd size group

(£/cow)

	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94	1994/95	1995/96	1996/97
10 - 29.9	218	226	227	229	217	219	247	252	268	201
30 - 39.9	196	215	240	219	231	238	259	257	244	264
40 - 49.9	178	196	200	209	212	214	252	246	240	214
50 - 59.9	196	206	223	198	196	201	240	225	269	234
60 - 60.9	186	209	222	193	202	243	254	248	273	249
70 - 99.9	200	205	226	230	215	219	252	239	252	256
100 - 149.9	205	207	231	228	220	231	262	266	278	258
150 - 199.9	225	218	238	257	282	264	282	265	308	263
200 +	183	179	204	226	213	246	260	263	295	255
Full sample	198	205	224	224	219	230	257	253	272	251

Table 3.7 Margin over concentrates 1987/88 to 1996/97[1]

(£/cow)

	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94	1994/95	1995/96	1996/97
Milk returns	861	927	1,020	1,050	1,089	1,175	1,242	1,304	1,473	1,478
Concentrate feed costs	198	205	224	224	219	230	257	253	272	251
Margin over concentrates	657	721	794	826	871	945	985	1,051	1,201	1,226
Margin over concentrates bulk feed, fodder and straw	643	709	777	809	863	936	961	1,021	1,164	1,196
Margin over concentrates (1987/88 £)	657	668	681	654	663	706	720	742	825	822

[1] Figures may not sum to the total of their components due to rounding.

Table 3.8 Margin over concentrates by herd size group

Margin over concentrates (£/cow)

	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94	1994/95	1995/96	1996/97
10 - 29.9	502	530	619	614	648	733	791	766	925	849
30 - 39.9	596	661	699	737	777	901	871	981	1,042	1,116
40 - 49.9	594	679	772	774	789	806	894	967	1,102	1,077
50 - 59.9	672	697	786	786	822	902	962	972	1,108	1,094
60 - 60.9	654	728	774	813	855	899	955	987	1,156	1,159
70 - 99.9	649	720	806	834	886	959	993	1,032	1,172	1,207
100 - 149.9	690	747	833	866	914	982	1,023	1,089	1,251	1,309
150 - 199.9	685	784	826	926	967	1,013	1,049	1,163	1,350	1,349
200 +	713	766	822	852	927	1,016	1,045	1,169	1,319	1,344
Full sample	657	721	794	826	871	945	985	1,051	1,201	1,227

Table 3.9 Variable costs per cow and per litre by herd size group

	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94	1994/95	1995/96	1996/97
					Variable costs (£/cow)					
10 - 29.9	327	334	353	365	349	357	427	460	507	407
30 - 39.9	307	344	375	363	379	392	445	464	457	554
40 - 49.9	297	323	347	387	398	387	426	492	502	440
50 - 59.9	358	366	387	372	388	390	462	511	558	515
60 - 60.9	311	353	385	369	397	415	482	487	558	556
70 - 99.9	342	353	388	407	413	398	468	488	509	549
100 - 149.9	359	370	418	427	426	430	493	535	580	585
150 - 199.9	395	394	425	462	484	460	513	531	585	559
200 +	324	342	387	429	420	413	475	538	608	555
Full sample	339	355	392	407	411	410	474	509	551	547
					Variable costs (ppl)					
10 - 29.9	7.6	7.6	8.2	8.7	8.2	8.2	9.0	10.3	10.6	9.1
30 - 39.9	6.3	7.0	7.7	7.4	7.4	7.3	8.8	8.4	8.8	9.8
40 - 49.9	6.2	6.5	7.0	7.7	7.9	7.8	8.2	9.3	9.3	8.3
50 - 59.9	6.8	7.1	7.4	7.2	7.4	7.3	8.4	9.9	10.0	9.5
60 - 60.9	6.3	7.0	7.4	7.0	7.3	7.6	8.7	9.0	9.8	9.9
70 - 99.9	6.6	6.7	7.2	7.3	7.3	7.1	8.3	8.9	8.9	9.3
100 - 149.9	6.5	6.9	7.5	7.5	7.3	7.4	8.4	9.1	9.5	9.5
150 - 199.9	7.1	6.8	7.6	7.6	7.7	7.5	8.6	8.7	8.8	8.8
200 +	5.9	6.3	7.1	7.5	7.1	6.8	8.0	8.8	9.5	8.8
Full sample	6.5	6.8	7.4	7.5	7.4	7.3	8.4	9.0	9.4	9.3

Table 3.10 Gross margin per cow 1987/88 to 1996/97 [1]

	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94	1994/95	1995/96	1996/97
					Gross margin (£/cow)					
Dairy enterprise output	919	1,023	1,103	1,097	1,147	1,239	1,314	1,336	1,486	1,479
Total variable costs	339	205	392	407	411	410	474	509	551	547
Gross Margin	580	668	711	690	736	829	840	827	935	933
Gross Margin (1987/88 £)	580	619	610	547	560	620	614	584	642	625

[1] Figures may not sum to the total of their components due to rounding.

Table 3.11 Gross margin per cow by herd size group

	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94	1994/95	1995/96	1996/97
					Gross margin (£/cow)					
10 - 29.9 (A)	463	531	566	523	563	670	690	572	711	673
30 - 39.9	565	651	665	638	680	797	755	804	853	805
40 - 49.9	541	653	728	648	664	699	798	776	850	861
50 - 59.9	568	630	705	663	689	774	809	727	863	827
60 - 60.9	584	673	703	694	733	806	808	788	887	836
70 - 99.9	570	666	726	708	746	847	847	816	934	913
100 - 149.9	601	681	734	719	766	848	867	841	935	989
150 - 199.9	581	710	726	766	817	884	900	943	1,084	1,068
200 + (B)	633	697	710	678	774	901	883	914	1,032	1,030
Full sample	580	668	711	690	736	829	840	827	935	933
B-A	170	166	144	155	211	231	193	342	321	357
% difference	37	31	25	30	37	34	28	60	45	53

Table 3.12 Gross margin per forage hectare by herd size group

					Gross margin (£ per forage area)					
	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94	1994/95	1995/96	1996/97
10 - 29.9	427	486	594	690	669	838	992	768	993	898
30 - 39.9	765	905	940	805	1,026	965	1,132	1,286	1,248	1,244
40 - 49.9	913	1,091	1,302	1,043	1,071	1,191	1,347	1,274	1,502	1,316
50 - 59.9	993	1,083	1,154	948	1,015	1,120	1,407	1,475	1,662	1,276
60 - 60.9	1,078	1,232	1,413	1,216	1,131	1,336	1,386	1,393	1,568	1,421
70 - 99.9	1,033	1,209	1,342	1,325	1,310	1,557	1,681	1,592	1,775	1,536
100 - 149.9	1,123	1,282	1,531	1,355	1,407	1,669	1,691	1,722	1,857	1,833
150 - 199.9	1,117	1,568	1,510	1,647	1,727	1,742	1,946	1,954	2,285	2,087
200 +	1,371	1,503	1,615	1,537	1,779	1,909	2,014	2,218	2,233	1,849
Full sample	984	1,147	1,273	1,191	1,242	1,416	1,587	1,600	1,768	1,602

Table 3.13 Gross margin per litre by herd size group

					Gross margin (pence per litre)					
	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94	1994/95	1995/96	1996/97
10 - 29.9	10.8	12.1	13.2	12.4	13.3	15.3	14.5	12.8	14.9	15.0
30 - 39.9	11.7	13.3	13.6	13.0	13.3	14.8	15.0	14.6	16.3	14.3
40 - 49.9	11.4	13.2	14.6	12.8	13.2	14.2	15.4	14.7	15.8	16.3
50 - 59.9	10.8	12.3	13.4	12.9	13.2	14.5	14.8	14.0	15.5	15.2
60 - 60.9	11.8	13.3	13.5	13.2	13.5	14.8	14.6	14.6	15.5	14.9
70 - 99.9	10.9	12.6	13.5	12.8	13.2	15.0	15.1	14.9	16.3	15.4
100 - 149.9	11.0	12.7	13.2	12.6	13.2	14.5	14.9	14.3	15.4	16.0
150 - 199.9	10.4	12.3	13.0	12.7	13.1	14.4	15.0	15.4	16.4	16.9
200 +	11.4	12.9	13.0	11.8	13.1	14.7	14.8	14.9	16.2	16.4
Full sample	11.1	12.8	13.4	12.6	13.2	14.7	14.9	14.6	15.9	15.8

Table 3.14 Dairy specific regular labour costs and margin after variable and dairy specific regular labour costs by herd size groups

	Dairy specific labour costs (£/cow)				Margin after variable and dairy specific regular labour costs (£ per cow)			
	1993/94	1994/95	1995/96	1996/97	1993/94	1994/95	1995/96	1996/97
10 - 29.9	587	585	569	436	103	-14	142	237
30 - 39.9	428	379	433	354	327	426	420	451
40 - 49.9	329	395	403	326	469	380	448	535
50 - 59.9	323	324	341	285	486	404	522	542
60 - 60.9	292	310	344	253	516	478	544	583
70 - 99.9	245	251	255	220	602	565	679	693
100 - 149.9	227	240	252	202	640	601	683	787
150 - 199.9	234	230	223	171	667	713	861	897
200 +	209	219	235	182	674	695	797	848
Full sample	275	282	293	235	564	545	642	698

Table 3.15 Margins after dairy specific labour costs (£ per forage hectare and pence per litre) by herd size group

	Margin after variable and dairy specific regular labour costs (£/forage hectare)				Margin after variable and dairy specific regular labour costs (ppl)			
	1993/94	1994/95	1995/96	1996/97	1993/94	1994/95	1995/96	1996/97
10 - 29.9	148	-18	993	316	2.2	-0.3	3.0	5.3
30 - 39.9	490	681	1,248	697	6.5	7.7	8.0	8.0
40 - 49.9	791	625	1,502	818	9.0	7.2	8.3	10.1
50 - 59.9	845	819	1,662	836	8.9	7.8	9.4	10.0
60 - 60.9	886	846	1,568	991	9.4	8.9	9.5	10.4
70 - 99.9	1,195	1,102	1,775	1,165	10.7	10.3	11.8	11.7
100 - 149.9	1,249	1,230	1,356	1,458	11.0	10.2	11.2	12.8
150 - 199.9	1,441	1,478	1,815	1,753	11.1	11.7	13.0	14.2
200 +	1,538	1,686	1,725	1,522	11.3	11.3	12.5	13.5
Full sample	1,066	1,055	1,215	1,199	10.0	9.7	10.9	11.8

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Table 3.16 Net farm income per farm and interest paid by herd size group

	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94	1994/95	1995/96	1996/97
Net farm income (£/farm)										
10 - 29.9	8,718	10,861	8,356	4,862	7,630	10,715	11,839	5,745	8,409	na
30 - 39.9	15,092	16,812	13,405	8,734	12,548	22,001	11,994	15,766	20,020	na
40 - 49.9	12,784	17,823	17,293	12,352	16,352	23,480	24,459	18,485	23,522	na
50 - 59.9	17,916	23,625	22,354	14,268	17,948	28,942	25,793	17,421	24,365	na
60 - 69.9	19,671	25,687	26,245	17,314	23,680	36,439	28,812	27,902	31,360	na
70 - 99.9	22,092	31,606	31,263	23,417	29,896	46,532	38,040	30,626	43,225	na
100 - 149.9	38,301	47,939	45,074	33,679	44,346	72,876	61,763	51,332	57,016	na
150 - 199.9	43,669	63,039	64,979	60,198	72,376	97,707	81,511	74,013	89,022	na
200 +	86,165	94,025	92,721	57,166	93,065	143,990	123,148	102,259	121,747	na
Full sample	22,394	29,059	28,048	19,932	26,301	42,283	35,611	31,027	38,183	na
Full sample (1987/88 £)	22,394	26,937	24,051	15,791	20,029	31,598	18,710	21,898	26,237	-
Interest paid										
10 - 29.9	1,401	1,502	1,404	1,898	1,392	1,389	1,562	2,345	4,462	na
30 - 39.9	2,459	3,216	3,106	3,439	2,729	2,589	1,840	887	1,196	na
40 - 49.9	2,656	3,193	3,873	3,854	3,846	4,203	1,989	2,335	2,228	na
50 - 59.9	3,163	4,314	4,567	6,010	4,414	3,317	3,368	3,027	4,094	na
60 - 69.9	3,716	4,111	6,996	6,292	6,127	5,652	3,984	3,800	4,139	na
70 - 99.9	4,836	5,800	7,710	9,590	7,873	6,108	5,083	5,600	6,669	na
100 - 149.9	9,256	9,496	13,470	15,584	13,359	13,393	8,931	8,861	9,564	na
150 - 199.9	13,861	12,019	18,526	19,468	20,436	11,046	10,651	10,726	11,809	na
200 +	19,175	23,825	28,116	27,283	26,488	21,569	16,129	16,730	19,714	na
Full sample	4,814	5,541	7,266	8,114	7,040	6,171	4,733	5,058	5,958	-
Interest payments to NFI										
10-29.9 (%)	16.1	13.8	16.8	39.0	18.2	13.0	13.2	40.1	50.1	-
200+	22.5	25.3	30.3	47.7	28.5	15.0	13.1	16.4	16.2	-
Full sample (%)	21.5	19.1	25.9	40.7	26.8	14.6	13.3	16.3	15.6	-

Table 3.17 Net farm income per hectare by herd size group

	1987/88	1988/89	1989/90	1990/91	Net farm income (£/ha) 1991/92	1992/93	1993/94	1994/95	1995/96	1996/97
10 - 29.9	215	288	221	125	182	273	268	129	180	na
30 - 39.9	260	275	237	161	232	419	217	294	356	na
40 - 49.9	258	360	367	235	327	431	413	306	502	na
50 - 59.9	314	445	407	241	309	504	438	315	397	na
60 - 69.9	332	390	393	257	291	468	369	375	422	na
70 - 99.9	266	389	377	283	364	602	493	370	470	na
100 - 149.9	312	384	414	264	348	616	482	430	489	na
150 - 199.9	253	457	410	381	463	754	648	513	601	na
200 +	280	314	323	207	341	581	505	443	532	na
Full sample	280	365	358	247	324	540	438	374	454	-
Full sample (1987/88 £)	280	338	307	196	247	404	320	264	312	

Table 3.18 Summary of the financial status by herd size

		1987/88	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94	1994/95	1995/96	1996/97
10-29.9	Liabilities	11,904	9,410	11,829	13,048	13,642	13,421	19,177	41,466	50,494	na
	Leverage	9.5	7.8	7.2	9.8	8.6	8.4	10.2	18.1	21.0	na
	Net worth	112,969	110,317	151,671	120,003	144,304	146,397	168,893	187,335	190,292	na
30-39.9	Liabilities	22,781	25,645	25,510	25,823	25,307	23,696	20,763	13,893	16,313	na
	Leverage	10.3	9.5	9.6	9.9	8.5	8.9	7.9	5.2	5.3	na
	Net worth	199,405	243,546	239,294	234,425	273,071	243,664	242,435	251,098	292,128	na
40-49.9	Liabilities	25,666	28,127	28,726	34,655	38,219	37,726	27,460	30,900	37,401	na
	Leverage	11.8	11.5	11.0	11.1	13.8	11.3	7.8	8.0	9.8	na
	Net worth	191,261	216,590	265,832	278,221	238,948	295,154	325,929	333,424	344,671	na
50-59.9	Liabilities	29,483	41,506	40,582	47,678	38,051	34,543	47,459	45,771	52,407	na
	Leverage	14.6	14.2	13.2	12.8	11.1	9.8	12.6	12.7	13.4	na
	Net worth	171,789	250,456	267,287	323,345	303,384	318,136	328,110	315,072	339,738	na
60-69.9	Liabilities	41,059	43,127	54,877	54,445	50,955	61,230	65,961	53,288	57,506	na
	Leverage	15.8	15.3	14.6	13.4	12.1	13.9	13.8	10.2	10.6	na
	Net worth	218,006	238,254	320,236	352,228	370,038	380,547	410,473	468,881	487,710	na
70-100	Liabilities	50,122	60,453	64,006	73,333	68,743	65,971	70,547	84,273	93,980	na
	Leverage	14.0	14.4	14.4	14.4	12.8	12.4	12.6	13.6	13.3	na
	Net worth	306,668	358,622	419,034	434,403	470,208	467,436	487,610	533,371	611,909	na
100-149.9	Liabilities	98,855	95,044	101,512	117,486	115,777	129,839	110,741	109,526	124,089	na
	Leverage	17.4	16.4	14.7	15.6	15.5	16.9	13.8	13.4	13.2	na
	Net worth	467,770	484,262	587,548	634,878	632,878	640,148	690,483	709,627	814,522	na
150-199.9	Liabilities	138,650	120,473	165,512	168,822	183,700	112,652	146,591	157,694	152,190	na
	Leverage	19.5	15.2	16.6	15.6	16.2	11.8	13.1	11.8	10.8	na
	Net worth	572,440	672,375	823,005	910,705	947,409	817,730	949,955	1,175,046	1,254,158	na
200+	Liabilities	208,041	364,738	263,126	264,099	264,740	228,981	199,357	242781	268,852	na
	Leverage	20.1	19.0	15.9	16.7	15.0	13.3	11.3	13.0	13.2	na
	Net worth	829,046	1128,525	1,393,719	1,317,109	1,505,986	1,492,677	1,556,802	1,623,295	1,767,563	na
Full sample	Liabilities	49,361	54,762	60,788	65,643	62,984	62,587	62,857	71,557	79,559	na
	Leverage	15.3	14.5	13.6	14.1	13.2	12.8	12.1	12.4	12.5	na
	Net worth	273,758	323,600	387,172	400,295	414,790	426,501	456,110	508,837	558,832	na

Table 3.19 Dairy and whole farm output and dairy variable costs: farms in the highest decile by gross margin per cow [1]

	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94	1994/95	1995/96	1996/97
Milk Returns (A)	1,040	1,107	1,185	1,228	1,304	1,392	1,469	1,562	1,809	1,814
EU superlevy (B)	5	-	1	-	-	-	-	2	3	1
Compensation (for susp' of quota) (C)	18	31	25	23	22	20	15	11	10	10
Herd Replacement Costs (D)	38	31	37	42	31	56	20	64	73	87
Calf sales (E)	96	127	125	92	95	127	149	116	118	94
Industry Development Council Levy (F)	-	-	-	-	-	-	-	-	3	1
Dairy enterprise output (A+C+E-B-D-F)	1,112	1,233	1,298	1,302	1,389	1,484	1,613	1,621	1,858	1,831
Concentrate feed	186	193	226	233	231	241	277	266	308	276
Bulk feed	2	1	3	-	4	7	8	11	11	26
Straw (bedding and feed)	8	7	7	10	2	1	12	15	21	17
Vet and medicine	20	22	23	24	28	30	32	35	41	35
Non-forage contract work	na	na	na	na	na	na	2	2	3	4
Haulage of untreated milk	na	na	na	na	na	na	-	1	-	-
Non-forage casual labour	na	na	na	na	na	na	3	2	3	-
Other livestock costs	28	48	41	43	57	39	87	68	77	121
Quota leasing costs (adjusted)	5	11	15	9	19	13	25	41	52	63
Forage variable costs [2]	64	65	86	80	95	83	67	71	61	166
Total variable costs	314	346	400	399	436	414	511	512	577	544
Gross Margin (£/cow)	798	886	898	903	954	1,070	1,102	1,109	1,281	1,287
Dairy specific labour costs	na	na	na	na	na	na	284	269	250	199
Margin after dairy specific labour costs	na	na	na	na	na	na	818	840	1,031	1,088
Gross Margin (£/ha)	1,161	1,362	1,804	1,677	1,728	2,015	1,507	2,339	2,453	2,401
Gross Margin (ppl)	13.40	15.14	14.86	14.51	14.65	16.10	12.44	16.78	18.15	18.34
Value of farm output (£)	154,288	148,771	147,038	149,554	214,088	235,745	207,156	279,279	278,452	na
Value of dairy enterprise	95,875	95,341	110,269	107,399	140,861	150,482	138,562	198,677	206,726	199,658
% of farm output from dairy enterprise	62.1	64.1	75.0	71.8	65.8	63.8	66.9	71.1	74.2	na
Net Farm Income (per farm) (£ '000)	36,959	36,518	44,557	35,116	53,130	75,946	55,601	69,009	74,773	na
Net Farm Income per ha	361	369	555	395	434	699	465	580	641	na
Herd size	86.2	77.3	84.9	82.5	101.4	101.4	85.9	122.5	111.3	109.0
Forage area per cow (ha/cow)	0.69	0.65	0.50	0.54	0.55	0.53	0.54	0.47	0.52	0.53

[1] Figures may not necessarily add due to rounding.   [2] Plus share of contract costs.

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Table 3.20 Dairy and whole farm output and dairy variable costs: farms in the lowest decile by gross margin per cow [1]

	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94	1994/95	1995/96	1996/97
Milk Returns (A)	655	693	794	745	743	832	889	948	1,081	1,016
EU superlevy (B)	3	-	3	-	-	-	-	4	34	2
Compensation (for susp' of quota) (C)	14	24	16	16	16	13	11	10	7	10
Herd Replacement Costs (D)	47	43	59	65	54	59	108	131	118	120
Calf sales (E)	68	83	91	78	73	98	100	100	92	83
Industry Development Council Levy (F)	-	-	-	-	-	-	-	-	1	1
Dairy enterprise output (A+C+E-B-D-F)	686	757	839	773	777	885	892	924	1,027	987
Concentrate feed	224	222	239	239	226	221	218	236	260	206
Bulk feed	5	6	4	2	5	4	5	4	9	10
Straw (bedding and feed)	17	9	16	23	8	7	14	21	59	17
Vet and medicine	13	17	22	19	18	25	29	33	27	35
Non-forage contract work	na	na	na	na	na	na	2	6	4	34
Haulage of untreated milk	na	na	na	na	na	na	-	3	1	-
Non-forage casual labour	na	na	na	na	na	na	2	1	3	3
Other livestock costs	33	39	49	40	57	43	51	54	74	106
Quota leasing costs (adjusted)	4	4	15	10	8	8	9	23	19	111
Forage variable costs [2]	65	57	65	52	53	84	88	78	83	146
Total variable costs	360	354	410	387	376	392	419	459	537	519
Gross Margin (£/cow)	327	403	428	386	401	493	473	465	490	468
Dairy specific labour costs	na	na	na	na	na	na	355	346	346	319
Margin after dairy specific labour costs	na	na	na	na	na	na	118	119	143	200
Gross Margin (£/ha)	590	529	667	568	532	605	799	760	918	742
Gross Margin (ppl)	9.03	8.80	10.39	10.33	10.14	9.79	11.62	11.26	11.88	10.77
Value of farm output (£)	60,574	67,810	79,886	48,109	48,722	74,268	69,035	76,603	90,322	na
Value of dairy enterprise	30,976	35,683	38,919	23,603	26,866	40,558	39,608	45,170	55,371	40,889
% of farm output from dairy enterprise	51.1	52.6	48.7	49.1	55.1	54.6	57.4	59.0	61.3	na
Net Farm Income (per farm) (£ '000)	5,647	12,997	9,976	3,571	8,191	14,883	10,020	9,214	10,584	na
Net Farm Income per ha	95	199	138	72	177	255	179	128	163	na
Herd size	45.1	47.1	46.4	30.5	34.6	45.8	44.4	48.9	53.9	41.4
Stocking rate (cows per forage ha)	0.61	0.67	0.64	0.68	0.71	0.65	0.59	0.61	0.59	0.63

[1] Figures may not necessarily add due to rounding.   [2] Plus share of contract costs.

Table 3.21 Details of dairy enterprises of farms in the upper and lower decile by gross margin per cow

	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94	1994/95	1995/96	1996/97
Upper gross margin decile										
Number of farms	43	45	54	55	49	45	46	49	50	44
Milk Yield per farm ('000 lts)	513	453	513	513	660	673	566	811	787	765
Milk Yield (ltrs/cow, ex waste)	5,957	5,856	6,044	6,223	6,511	6,644	6,573	6,609	7,056	7,017
Price (ppl)	17.37	18.89	19.60	19.74	20.03	20.95	22.35	23.63	25.63	25.85
Value of milk output (£/cow)	1,040	1,107	1,185	1,228	1,389	1,392	1,469	1,562	1,809	1,814
Concentrate costs (£/cow)	186	193	226	233	231	241	277	266	308	276
Margin over conc' (£/cow)	854	913	959	995	1,073	1,151	1,193	1,296	1,501	1,538
Milk: concentrate price ratio (%)	na	na	na	na	na	na	203	165	177	176
Concentrates use per litre (kg/lt)	na	na	na	na	na	na	0.37	0.28	0.30	0.27
Farm size (ha)	102.3	98.9	80.3	88.8	122.4	108.7	119.7	118.9	116.7	124.7
Forage area (ha)	59.3	50.3	42.3	44.4	55.9	53.8	46.6	58.1	58.1	58.4
Direct regular labour (hrs/cow)	na	na	na	na	na	na	41.1	38.6	34.2	31
Lower gross margin decile										
Number of farms	29	39	32	25	29	33	30	33	33	31
Milk Yield per farm ('000)	180	189	188	114	128	182	181	212	244	180
Milk Yield (ltrs/cow, ex waste)	3,982	3,998	4,122	3,749	3,707	4,002	4,071	4,131	4,523	4,342
Price (ppl)	16.36	17.23	19.18	19.87	20.03	20.79	21.83	22.94	23.91	23.4
Value of milk output (£/cow)	655	693	794	745	743	832	889	948	1,081	1,016
Concentrate costs (£/cow)	224	222	239	239	226	221	218	236	260	206
Margin over conc' (£/cow)	431	471	555	506	517	611	671	712	821	810
Milk: concentrate price ratio (%)	na	na	na	na	na	na	150	147	160	145
Concentrates use per litre (kg/lt)	na	na	na	na	na	na	0.36	0.36	0.38	0.29
Farm size (ha)	59.5	65.2	72.3	19.3	46.3	58.3	55.9	72.2	64.9	51.6
Forage area (ha)	27.5	31.5	29.8	20.8	24.4	29.7	26.3	29.9	31.5	26.1
Direct regular labour (hrs/cow)	na	na	na	na	na	na	48.6	42.6	40.6	52

Chapter 4 Physical and financial performance by Less Favoured Area status

4.1 Introduction

This chapter outlines the major changes in physical performance, returns, costs and margins that have taken place in milk production in England and Wales by less favoured area (LFA) status. Farms are classified into one of three categories: those 'outside or mostly outside' (OMO) a LFA, those 'inside or mainly inside' (IMI) a LFA, and a sub-set of the IMI farms, those 'fully inside' (FI) a LFA.

Tables 4.1 to 4.5 present the physical inputs used and milk produced. Tables 4.6 and 4.7 summarise the financial performance of the dairy enterprises and farms. Tables 4.8 and 4.9 present further details of milk returns and margin over concentrates. Gross margin per cow and per forage hectare are shown in Tables 4.10 and 4.11 respectively. Finally, Tables 4.12 to 4.14 summarise the net farm income and the financial status of the farms.

4.2 Physical performance by LFA status

Table 4.1 compares average physical performance for IMI and OMO farms. The raised estimate of the number of IMI dairy farms fell from 10,200 to 6,500 over the ten years (36%), there was a much smaller reduction in the number of OMO dairy farms (13%). In itself, this strongly suggests that IMI dairy farms have been at a competitive disadvantage vis-à-vis OMO farms.

By 1996/97 IMI farms were on average smaller in area than OMO farms, although in 1987/88 they were similar in size (41 and 42.2 ha respectively). Over the next ten years forage area on OMO farms increased to 48.1 hectares and decreased on IMI farms, to 36.6 hectares. Average herd size increased on IMI farms, resulting in a sharp increase in stocking rates (from 1.2 to 1.6 cows per forage ha). In contrast, average herd size remained largely unchanged on OMO farms, so their expansion of forage area resulted in lower stocking rates.

Milk production per dairy enterprise on IMI farms increased over the ten years by an average of 44%, compared with the 12% increase on OMO farms. The increase on IMI farms was achieved by a combination of a 21% increase in herd size and an 18.7% increase in yield per cow; all the increase in milk yield on OMO farms was generated through higher yield per cow.

Table 4.2 summarises the physical quantities of fertilizer, concentrates and labour used for the four years between 1993/94 and 1996/97 for farms by LFA status and for the full sample. Farms fully inside a LFA (FI) are a sub-sample of IMI farms. IMI farms have increased nitrogen fertilizer applications whereas OMO farms have reduced nitrogen fertilizer use. There is a similar annual pattern in concentrate use across all four categories, though IMI and FI farms used less than the average for the full sample.

IMI farms used more dairy specific regular labour per cow than those OMO in each year between 1993/94 and 1995/96, the findings for 1996/97 may reflect the different

approach to selecting the sample in that year. If the final year is put to one side, IMI farms used about 10% more labour hours per cow than the average for the full sample (a much smaller range than was found between smaller and larger herd sizes in Chapter 2).

Tables 4.3, 4.4. and 4.5 summarise milk yield per cow, concentrate use per cow and per litre of milk produced, and forage area per cow by the four categories. IMI farms had higher forage area per cow and fed slightly less concentrates.

Over the ten years, milk yields increased by 19% on IMI farms and by 21% on FI farms compared to a 13% increase for the entire sample reflecting the increasing use of concentrates per cow on IMI farms. Though still lower than that used by OMO farms, these findings suggest a convergence in feeding patterns. The ratio of concentrate use per litre of milk produced was similar across categories in each year.

There was a decrease in forage area per cow on IMI farms, from 0.83 to 0.61, but, despite this, IMI farms still used 7% more forage area per cow than OMO farms.

4.3   Financial performance by LFA status

Table 4.6 summarises the financial performance of the diary enterprise and the whole farm, Table 4.7 presents further detail of the dairy enterprise, in particular individual components of milk revenue and gross margins (in current and real prices).

Table 4.7 shows the value of the output from the dairy enterprise. This was larger in each year for OMO than IMI farms, reflecting their higher average yield per cow. However, average concentrate feed costs and average variable costs per cow (Table 4.6) were broadly similar for both IMI and OMO farms, which suggests that the lower yielding IMI farms were less efficient in converting inputs into outputs or paid more for their inputs than OMO farms, or both.

As stated above, in each year the value of dairy enterprise output was lower on IMI than on OMO farms. The ratio in dairy enterprise revenues has moved against IMI farms. In 1987/88 it was 0.965, it then fell to 0.916 in 1994/95 before recovering to 0.935 in 1996/97. The ratio of gross margins per cow for IMI and OMO farms fell from a high of 0.983 in 1987/88 to a low of 0.882 in 1994/95, increasing slightly to 0.903 in 1996/97 (Table 4.6). These ratios show that IMI farms were less competitive than OMO farms at the gross margin level and, given their smaller average size, this disadvantage is likely to be magnified at the net margin level.

The dairy enterprise was the largest contributor to the value of total farm output on IMI and OMO farms, its relative and absolute contribution increasing over the ten years. The benefits of larger average OMO farm size shows in the higher average NFI achieved on these farms. NFI on IMI farms was variable, oscillating between a low of £14,503 (in 1990/91) to a high of £28,470 (in 1992/93).

Table 4.7 shows dairy enterprise revenue and variable costs in more detail. The important difference in total revenue is milk sales. Table 4.7 also shows nominal and real values of gross margin per cow. Gross margins per cow increased by £286 (50%)

and £368 (63%) on IMI and OMO farms respectively, but after allowing for price inflation gross margin per cow increased by only £3 on IMI farms, but by rather more, £55, on OMO farms (Table 4.7).

4.4 Milk returns and margin over concentrates

Table 4.8 compares average milk yields per cow and average milk price between IMI and OMO farms. There is evidence to suggest that milk yields per cow has converged over the ten years, as IMI farms increased yields more quickly that OMO farms. A more regular trend has been the erosion of the price advantage enjoyed by IMI farms: in 1987/88 these farms received a price premium of 0.5 ppl over OMO farms, but by 1996/97 they received on average 0.51 ppl *less* than OMO farms. Here, as elsewhere in the report, milk prices are net of haulage and collection charges and unadjusted for any variation in milk quality.

Table 4.9 shows that OMO farms earned higher milk returns, but in eight of the ten years spent less on concentrate feed costs per cow. Milk returns increased by a similar amount on IMI and OMO farms (72 and 71% respectively). IMI farms generated this primarily by a large percentage increase in milk yield per cow, OMO farms from a higher increase in milk price (as the price premium moved in their favour). Total concentrate costs per cow increased by 2.9% per year on OMO farms compared with 1.9% on IMI farms.

The change in milk revenue and concentrate costs resulted in a similar increase in the real value of margin over concentrates; of £169 (from £609 to £778) and £161 (from £670 to £831) per cow for IMI and OMO farms (an average of 27% and 24% respectively).

4.5 Gross margins by LFA status

Tables 4.10 and 4.11 present gross margin per cow and per forage hectare for IMI and OMO farms. The higher growth in milk revenues on OMO farms meant that gross margin per cow increased by £55 in real terms on these farms compared with £3 on IMI farms. However, IMI farms saw a much faster growth in gross margin when expressed in terms of forage area, as the stocking rate on these farms increased whilst it remained static on OMO farms. This resulted in an increase in gross margin of £251 per forage hectare in real terms, compared to a fall of £45 per forage hectare on OMO farms.

4.6 Net farm income and financial structure

As the DECS survey was a 'bolt-on' to the FBS, whole farm financial data can be presented. Tables 4.12 and 4.13 show NFI and interest paid per farm, and NFI per hectare. The difference in NFI between OMO and IMI farms was erratic, falling to 47.4% in 1988/89 and rising to 102.3% in 1994/95. Taken over the nine years the differential increased from £9,756 to £16,473, but because the average NFI of both categories increased the percentage difference remained the same (64.8%).

OMO farms earned a higher NFI than FI farms in each year surveyed. The divergence in NFI is less apparent when expressed in terms of farm area, reflecting the smaller average size of FI farms.

Table 4.12 shows the averaged interest paid per farm. For the full sample this increased from £4,814 to £5,958 over the ten years, with payments by OMO farms always higher than FI farms. Interest payments expressed as a ratio in terms of NFI (to give a measure of payback ability) were generally higher on FI farms, reflecting their lower NFI. NFI is not a perfect measure of the actual profitability or competitiveness of a farm because it imputes a rental charge for all land.

Table 4.14 summarises additional trends in financial structure. Total assets of FI farms increased, but because their liabilities increased more quickly leverage also increased, from 14.5% to 16.3%. A large proportion of the increase in asset values occurred in the last two years of the survey. The average net worth of the full sample was £558,832 per farm.

4.7   Summary

This chapter presents details of physical performance, costs and margins for dairy enterprise, and NFI and other financial variables for the whole farm by less favoured area status. Some of the important findings include:

(i) The number of dairy farms located IMI a LFA decreased by 36% (compared to 13% on OMO farms); suggesting that these farms have been at a competitive disadvantage. In 1996/97 IMI farms were, on average, smaller, their milk yields per cow lower and variable costs per cow similar to OMO farms. This was the case even though the average size of farms remaining IMI had increased over the ten year period.

(ii) For both IMI and OMO farms, revenue from the dairy enterprise was the largest contributor to total farm revenue, and its importance increased over time.

(iii) Milk production per farm grew faster on IMI than on OMO farms (at 44 and 12% respectively). The increase on IMI farms was achieved by an increase in average herd size of 10.5 cow (21%) and a 901 litre (18.7%) increase in milk yield per cow. All the increase in milk production on OMO farms occurred through a 12% increase in yield per cow.

(iv) In 1987/88 IMI farms received an average milk price premium over OMO farms of 0.5 ppl (milk prices are not adjusted for any differences in milk quality), ten years later these farms received, on average, 0.5 ppl *less* than OMO farms.

(v) The value of milk revenue per cow increased at a similar rate on both IMI and OMO farms (72 and 71% respectively). IMI farms increased milk yield per cow more quickly than OMO farms but the milk price premium shifted in the favour of OMO farms.

(vi) Average concentrates used per cow on IMI farms increased, but still remained below that used on OMO farms.

(vii) Over the ten years, average gross margin per cow increased by £286 (50%) and £368 (63%) on IMI and OMO farms respectively. After allowing for price inflation gross margin per cow increase by only £3 on IMI farms and by £55 on OMO farms.

(viii) Forage area per cow decreased from 0.83 to 0.62 on IMI farms, whilst remaining at 0.5 on OMO farms.

(ix) OMO farms generated a higher NFI per farm than IMI and FI farms.

(x) For the sample as a whole liabilities increased but not as quickly as the growth in the value of farm assets, so leverage decreased from 15.3 to 12.5%. However, the IMI farms experiences a stronger growth in liabilities than in assets, which increases leverage from 14.5 to 16.3%. Nevertheless, net worth on IMI farms increased.

(xi) The large decrease in the number of dairy enterprises in LFAs between 1986/87 and 1996/97 suggests that IMI farms had been less competitive than OMO farms. IMI farms which remain in dairying had increased production by expanding herd size and yields per cow: average stocking rates and concentrate use both increased. Notwithstanding this, IMI farms remained less productive than OMO farms. As variable costs per cow were similar between IMI and OMO farms, on a per litre basis they were higher on IMI farms.

(xii) Until 1993/94 IMI farms enjoyed a milk price advantage, since then the average milk price was higher on OMO farms. So whilst the productivity of IMI farms increased, their relative competitiveness has been undermined by the switch in the price premium in favour of OMO farms.

Table 4.1 Details of farms by LFA status

	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94	1994/95	1995/96	1996/97
INSIDE AND MOSTLY INSIDE LESS FAVOURED AREA										
Number of farms (unweighted)	127	134	122	122	111	95	98	91	99	86
Number of farms ('000)	10.2	10.4	9.6	8.5	9.1	7.3	9.3	7.2	7.2	6.5
Farm area (adjusted ha)	68.0	65.8	60.2	65.4	66.5	69.8	73.2	72.2	77.9	78.2
Forage area used in dairy ent'	41.0	39.7	36.3	39.6	37.3	39.9	31.8	33.0	35.9	36.6
Milk produce per farm ('000 ltrs)	236.6	238.4	244.2	248.3	236.1	258.3	274.0	298.1	315.2	341.1
Average herd size (cows)	49.1	49.4	48.3	48.9	46.5	49.8	50.7	54.8	57.4	59.6
Biological milk yield (ltre/cow)	4,818	4,826	5,056	5,078	5,077	5,187	5,405	5,439	5,492	5,719
Forage area per cow (ha/cow)	0.83	0.80	0.75	0.81	0.80	0.8	0.63	0.60	0.63	0.62
Stocking rate (cows / forage ha).	1.2	1.25	1.3	1.2	1.2	1.2	1.6	1.7	1.6	1.6
OUTSIDE AND MOSTLY OUTSIDE LESS FAVOURED AREA										
Number of farms (unweighted)	284	291	301	318	298	296	283	295	295	291
Number of farms ('000)	23.7	22.0	22.0	23.2	21.9	21.8	21.1	20.1	20.8	20.7
Farm area (adjusted ha)	85.1	86.1	86.2	86.3	87.2	81.1	84.9	86.8	86.2	92.1
Forage area used in dairy ent'	42.2	42.2	42.0	41.9	43.6	43.5	42.8	42.4	43.0	48.1
Milk produce per farm ('000 ltrs)	444.0	449.8	455.8	454.9	470.2	474.6	484.3	489.2	509.6	497.4
Average herd size (cows)	83.5	84.4	84.7	82.0	83.2	82.8	85.0	85.2	85.0	83.6
Biological milk yield (ltrs/cow)	5,317	5,330	5,349	5,516	5,651	5,732	5,654	5,742	5,995	5,951
Forage area per cow (ha/cow)	0.51	0.50	0.5	0.51	0.52	0.53	0.50	0.50	0.51	0.57
Stocking rate (cows / forage ha).	2.0	2.0	2.0	2.0	1.9	1.9	2.0	2.0	2.0	1.74

Table 4.2 Changes of inputs and output over time by LFA status

INSIDE & MOSTLY INSIDE LFA

	1993/94	1994/95	1995/96	1996/97
Nitrogen on grassland (kg/ha)	123	168	153	164
Phosphate on grassland (kg/ha)	13	16	18	48
Potassium on grassland (kg/ha)	20	24	26	32
Concentrate feed:				
Purchased compound (kg/cow)	1494	1365	1491	1210
Purchased straights (kg/cow)	254	241	239	275
Home grown straights (kg/cow)	40	43	77	125
Total Concentrates (kg/cow)	1788	1649	1807	1610
Total Concentrates (kg/litre)	0.33	0.31	0.33	0.28
Total direct labour (hr/cow)	43.4	37.7	41.8	37.8
of which farmer and spouse	24.1	20.6	22.4	22.4
of which contract milking	0.2	0.6	0.0	0.2
Total hrs per cow [2]	44.1	38.7	42.7	na

OUTSIDE & MOSTLY OUTSIDE LFA

	1993/94	1994/95	1995/96	1996/97
Nitrogen on grassland (kg/ha)	185	193	194	172
Phosphate on grassland (kg/ha)	13	13	14	49
Potassium on grassland (kg/ha)	23	22	24	27
Concentrate feed:				
Purchased compound (kg/cow)	1,347	1,246	1,307	1,250
Purchased straights (kg/cow)	358	339	420	290
Home grown straights (kg/cow)	139	114	99	100
Total Concentrates (kg/cow)	1,844	1,698	1,826	1,640
Total Concentrates (kg/litre)	0.32	0.30	0.31	0.28
Total direct labour (hr/cow)	38.2	37.3	37.2	36.3
of which farmer and spouse	16.2	15.6	15.6	18.0
of which contract milking	1.3	1.4	1.5	0.9
Total hrs per cow [2]	39.0	38.1	38.1	na

FULLY INSIDE LFA [1]

	1993/94	1994/95	1995/96	1996/97
Nitrogen on grassland (kg/ha)	122	152	163	160
Phosphate on grassland (kg/ha)	13	15	19	46
Potassium on grassland (kg/ha)	22	25	30	31
Concentrate feed:				
Purchased compound (kg/cow)	1477	1369	1491	1170
Purchased straights (kg/cow)	242	235	252	310
Home grown straights (kg/cow)	18	33	38	130
Total Concentrates (kg/cow)	1737	1637	1781	1,610
Total Concentrates (kg/litre)	0.33	0.31	0.32	0.28
Total direct labour (hr/cow)	43.3	37.6	41.9	38.9
of which farmer and spouse	26.9	22.3	24.8	23.5
of which contract milking	0.3	0.4	0	0.1
Total hrs per cow [2]	43.7	38.6	43.1	na

FULL SAMPLE

	1993/94	1994/95	1995/96	1996/97
Nitrogen on grassland (kg/ha)	169	188	185	170
Phosphate on grassland (kg/ha)	13	13	14	49
Potassium on grassland (kg/ha)	23	22	25	28
Concentrate feed:				
Purchased compound (kg/cow)	1,378	1,267	1,342	1,245
Purchased straights (kg/cow)	336	321	385	295
Home grown straights (kg/cow)	119	101	95	100
Total Concentrates (kg/cow)	1,832	1,689	1822	1,640
Total Concentrates (kg/litre)	0.33	0.30	0.31	0.28
Total direct labour (hr/cow)	39.3	37.4	38.1	36.6
of which farmer and spouse	17.8	16.5	16.9	18.8
of which contract milking	1.1	1.3	1.2	0.8
Total hrs per cow [2]	40.1	38.2	38.9	na

[1] Farms fully inside a LFA are a sub-sample of IMI farms. [2] Total hours per cow includes causal labour and share of forage casual labour, it excludes regular labour used in forage production and milk processing on farm.

Table 4.3 Milk Yield excluding waste (litres per cow) by LFA status

LFA status					Yield per cow (litres)						change(%)
	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94	1994/95	1995/96	1996/97	
Fully inside	4,709	4,821	5,039	5,034	5,107	5,270	5,299	5,321	5,548	5,692	983(21)
Inside and mostly inside	4,818	4,863	5,056	5,078	5,077	5,187	5,404	5,379	5,490	5,719	901(19)
Outside and mostly outside	5,317	5,330	5,381	5,547	5,682	5,732	5,688	5,707	5,984	5,951	634(12)
Full sample	5,216	5,229	5,316	5,463	5,568	5,609	5,629	5,648	5,890	5,909	693(13)

Table 4.4 Concentrate feed input by LFA status

LFA status	Concentrate feed (kg/cow)				Concentrate feed, kg/litre			
	1993/94	1994/95	1995/96	1996/97	1993/94	1994/95	1995/96	1996/97
Fully inside	1,737	1,781	1,637	1,610	0.33	0.33	0.31	0.32
Inside and mostly inside	1,788	1,807	1,649	1,610	0.33	0.33	0.31	0.33
Outside and mostly outside	1,844	1,826	1,698	1,640	0.32	0.32	0.30	0.31
Full sample	1,832	1,822	1,689	1,640	0.33	0.33	0.30	0.31

Table 4.5 Forage area per cow (ha) by LFA status

LFA status				Forage area per cow (ha)						
	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94	1994/95	1995/96	1996/97
Fully inside	0.75	0.73	0.68	0.76	0.77	0.76	0.63	0.63	0.61	0.62
Inside and mostly inside	0.83	0.80	0.75	0.81	0.80	0.80	0.63	0.63	0.60	0.63
Outside and mostly outside	0.51	0.50	0.50	0.51	0.52	0.53	0.50	0.50	0.50	0.51
Full sample	0.59	0.58	0.56	0.58	0.59	0.59	0.53	0.53	0.52	0.53

Table 4.6 Financial performance indicators of dairy enterprise and farm (current prices) by LFA status

£/cow

	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94	1994/95	1995/96	1996/97
INSIDE AND MOSTLY INSIDE LFA										
Dairy enterprise output	893	989	1,070	1,067	1,078	1,165	1,269	1,243	1,396	1,400
Concentrate feed costs	206	220	234	218	226	237	270	257	278	245
Total variable costs	322	354	380	380	400	404	471	498	537	543
Gross margin	571	635	690	687	678	761	798	745	859	857
Dairy specific regular labour [1]	na	na	na	na	na	na	275	284	298	247
Margin after labour	na	na	na	na	na	na	523	461	561	610
Dairy enterprise output	43,830	48,863	51,700	52,206	50,108	58,080	64,325	68,077	80,079	83,875
Total farm output	71,961	80,079	76,811	76,216	79,205	97,555	104,334	102,136	121,519	na
Dairy to total farm output (%)	60.9	61.0	67.3	68.5	63.3	59.5	61.7	66.7	65.9	na
Net farm income (£ per farm)	16,806	22,528	19,278	14,503	16,857	28,470	25,513	20,001	27,643	na
(£ per hectare)	247	343	320	222	253	408	349	277	355	na
OUTSIDE AND MOSTLY OUTSIDE LFA										
Dairy enterprise output	925	1,033	1,111	1,103	1,163	1,254	1,326	1,357	1,507	1,497
Concentrate feed costs	196	200	222	225	217	229	254	252	271	253
Total variable costs	344	357	395	413	415	412	475	512	554	548
Gross margin	581	676	716	690	749	842	851	845	953	949
Dairy specific regular labour [1]	na	na	na	na	na	na	276	281	291	232
Margin after labour	na	na	na	na	na	na	575	564	662	717
Dairy enterprise output	77,268	87,141	94,077	90,427	96,801	103,825	112,703	115,676	128,075	125,122
Total farm output	122,816	134,385	140,888	134,992	147,182	164,363	167,928	169,881	188,371	na
Dairy to total farm output (%)	62.9	64.8	66.8	67.0	65.8	63.2	67.1	68.1	68.0	na
Net farm income (£ per farm)	24,802	32,140	31,878	21,931	30,207	46,898	40,087	34,823	41,870	na
(£ per hectare)	291	373	370	254	346	578	472	401	486	na
Ratio between IMI and OMO farms										
Dairy enterprise output	0.965	0.957	0.963	0.967	0.927	0.929	0.957	0.916	0.926	0.935
Variable costs	0.936	0.991	0.962	0.92	0.964	0.981	0.992	0.973	0.969	0.990
Gross margin	0.983	0.939	0.964	0.996	0.905	0.904	0.938	0.882	0.901	0.903

[1] Dairy specific labour excludes labour used in milk processing and in forage production.

Table 4.7 Dairy enterprise output and variable costs 1987/88 to 1996/97 (£/cow) by LFA status [1]

	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94	1994/95	1995/96	1996/97
					£/cow					
INSIDE AND MOSTLY INSIDE LFA										
Milk Returns (A)	815	881	981	1,002	1,014	1,092	1,186	1,217	1,371	1,406
EU superlevy (B)	4	1	2	-	-	-	-	2	9	5
Compensation (for susp' of quota) (C)	17	24	22	20	18	16	12	10	9	11
Herd Replacement Costs (D)	39	32	40	44	47	53	64	97	80	103
Calf sales (E)	104	117	111	90	92	111	135	116	107	91
Industry Development Council Levy (F)	-	-	-	-	-	-	-	-	2	-
Dairy enterprise output (A+C+E-B-D-F)	893	989	1,070	1,067	1,078	1,165	1,269	1,243	1,396	1,400
Concentrate feed	206	220	234	218	226	237	270	257	278	245
Total variable costs [2]	322	354	380	380	400	404	471	498	537	543
Gross Margin	571	635	690	687	678	761	798	745	859	857
Dairy enterprise output (1987/88 £)	893	917	918	845	821	871	927	877	959	938
Gross Margin (1987/88 £)	571	589	592	544	516	569	583	526	590	574
OUTSIDE AND MOSTLY OUTSIDE LFA										
Milk Returns (A)	873	940	1,030	1,061	1,107	1,191	1,257	1,324	1,497	1,494
EU superlevy (B)	7	1	2	1	1	-	-	4	10	3
Compensation (for susp' of quota) (C)	18	27	23	21	20	17	14	10	8	10
Herd Replacement Costs (D)	46	40	47	53	48	63	71	86	92	94
Calf sales (E)	87	107	107	75	84	108	126	113	105	90
Industry Development Council Levy (F)	-	-	-	-	-	-	-	-	2	-
Dairy enterprise output (A+C+E-B-D-F)	925	1,033	1,111	1,103	1,163	1,254	1,326	1,357	1,507	1,497
Concentrate feed	196	200	222	225	217	229	254	252	271	253
Total variable costs [2]	344	357	395	413	415	412	475	512	554	548
Gross Margin	581	676	716	690	749	842	851	845	953	949
Dairy enterprise output (1987/88 £)	925	958	953	874	886	937	969	958	1,036	1,003
Gross Margin (1987/88 £)	581	627	614	547	570	629	622	596	655	636

[1] Figures may not necessarily add due to rounding. [2] Includes share of contract costs.

Table 4.8 Milk returns (1987/88 to 1996/97) by LFA status

	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94	1994/95	1995/96	1996/97
					£/cow					
INSIDE AND MOSTLY INSIDE LFA										
Milk Yield (ltrs/cow, ex waste)	4,818	4,863	5,021	5,078	5,077	5,187	5,404	5,379	5,490	5,719
Price (p/litre) (A)	16.8	18.1	19.4	19.8	20.0	21.0	21.9	22.6	24.9	24.59
Milk Returns (current £)	815	881	981	1,002	1,014	1,092	1,186	1,217	1,371	1,406
Milk Returns (1987/88 £)	815	817	841	794	772	816	866	859	942	942
OUTSIDE AND MOSTLY OUTSIDE LFA										
Milk Yield (ltrs/cow, ex waste)	5,317	5,330	5,381	5,547	5,682	5,732	5,688	5,707	5,984	5,951
Price (p/litre) (B)	16.3	17.6	19.1	19.1	19.5	20.8	22.1	23.2	25.0	25.10
Milk Returns (current £)	873	940	1,030	1,061	1,107	1,191	1,257	1,357	1,497	1,494
Milk Returns (1987/88 £)	873	871	883	841	843	890	918	958	1,029	1,001
Ratios (IMI:OMO)										
Milk price	1.031	1.028	1.016	1.037	1.026	1.01	0.991	0.974	0.996	0.980
Milk yield	0.906	0.912	0.933	0.915	0.893	0.905	0.950	0.942	0.917	0.961
Average milk price premium										
Difference (A-B)	+0.5	+0.5	+0.3	+0.7	+0.5	+0.2	-0.2	-0.6	-0.1	-0.51

Table 4.9 Margin over concentrates 1987/88 to 1996/97 by LFA status [1]

	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94	1994/95	1995/96	1996/97
					£/cow					
INSIDE AND MOSTLY INSIDE LFA										
Milk returns	815	881	981	1,002	1,014	1,092	1,186	1,217	1,371	1,406
Concentrate feed costs	206	220	234	218	226	237	270	257	278	245
Margin over concentrates	609	660	747	784	789	854	916	959	1,093	1,161
Margin over concentrates bulk feed, fodder and straw	596	645	728	771	779	848	895	934	1,064	1,133
Margin over concentrates (1987/88 £)	609	612	641	621	601	638	669	677	751	778
Milk : concentrate price ratio (ppl:kg)	na	na	na	na	na	na	1.480	1.501	1.655	1.62
OUTSIDE AND MOSTLY OUTSIDE LFA										
Milk returns	873	940	1,030	1,061	1,107	1,191	1,257	1,324	1,497	1,494
Concentrate feed costs	196	200	222	225	217	229	254	252	271	253
Margin over concentrates	677	739	808	835	890	963	1,003	1,071	1,227	1,241
Margin over concentrates bulk feed, fodder and straw	663	726	789	817	883	954	978	1,041	1,187	1,209
Margin over concentrates (1987/88 £)	670	685	693	662	678	720	733	756	843	831
Milk: concentrate price ratio (ppl:kg)	na	na	na	na	na	na	1.636	1.599	1.724	1.63

[1] Figures may not necessarily add due to rounding.

Table 4.10 Gross margin per cow 1987/88 to 1996/97 by LFA status [1]

					Gross margin (£/cow)					
	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94	1994/95	1995/96	1996/97
INSIDE AND MOSTLY INSIDE LFA										
Dairy enterprise output	893	989	1,070	1,067	1,078	1,165	1,269	1,243	1,396	1,400
Total variable costs	322	354	380	380	400	404	471	498	537	543
Gross Margin	571	635	690	687	678	761	798	745	859	857
Gross Margin (1987/88 £)	571	589	592	544	516	569	583	526	590	574
OUTSIDE AND MOSTLY OUTSIDE LFA										
Dairy enterprise output	873	1,033	1,111	1,103	1,163	1,254	1,326	1,357	1,497	1,494
Total variable costs	344	357	395	413	415	412	475	512	554	548
Gross Margin	581	676	716	690	749	842	851	845	953	949
Gross Margin (1987/88 £)	581	627	614	547	570	629	622	596	655	636

[1] Figures may not necessarily add due to rounding.

Table 4.11 Gross margin per forage area 1987/88 to 1996/97 by LFA status [1]

					Gross margin (£/forage ha)					
	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94	1994/95	1995/96	1996/97
INSIDE AND MOSTLY INSIDE LFA										
Dairy enterprise output	1,070	1,231	1,423	1,317	1,344	1,456	2,022	2,063	2,228	2,280
Total variable costs	386	441	506	468	499	505	750	827	857	884
Gross Margin	684	791	918	848	845	951	1,272	1,236	1,371	1,396
Gross Margin (1987/88 £)	684	733	787	672	643	711	929	872	942	935
OUTSIDE AND MOSTLY OUTSIDE LFA										
Dairy enterprise output	1,832	2,064	2,239	2,156	2,220	2,385	2,634	2,725	2,979	2,603
Total variable costs	681	713	797	807	792	783	943	1,028	1,095	953
Gross Margin	1,151	1,351	1,442	1,349	1,429	1,602	1,690	1,697	1,884	1,651
Gross Margin (1987/88 £)	1,151	1,252	1,237	1,069	1,088	1,197	1,235	1,198	1,295	1,106

[1] Figures may not necessarily add due to rounding.

Table 4.12 Net farm income per farm and interest paid by LFA status

	Net farm income (£/farm)									
LFA status	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94	1994/95	1995/96	1996/97
Fully inside (A)	15,046	21,755	19,146	14,687	17,155	26,495	21,000	17,216	25,397	na
Inside and mostly inside	16,806	22,528	19,278	14,503	16,857	28,470	25,513	20,001	27,643	na
Outside and mostly outside (B)	24,802	32,140	31,878	21,931	30,207	46,898	40,087	34,823	41,870	na
Full sample	22,394	29,059	28,048	19,932	26,301	42,283	35,611	31,027	38,183	na
B-A	9,756	10,385	12,732	7,244	13,052	20,403	19,087	17,607	16,473	na
% difference	64.8	47.7	66.5	49.3	76.1	77.0	90.9	102.3	64.8	na
Interest paid										
Fully inside	3,058	3,398	4,572	6,065	5,031	4,017	3,247	3,732	5,831	na
Inside and mostly inside	3,211	3,560	4,009	5,409	4,565	4,069	3,207	3,589	5,417	na
Outside and mostly outside	5,505	5,541	8,688	9,109	8,063	6,873	5,409	5,564	6,147	na
Full sample	4,814	6,476	7,266	8,114	7,040	6,171	4,733	5,058	5,958	na

Table 4.13 Net farm income per hectare (£/ha)

	Net farm income (£/ha)									
LFA status	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94	1994/95	1995/96	1996/97
Fully inside	265	378	344	245	281	449	340	280	392	na
Inside and mostly inside	247	343	320	222	253	408	349	277	355	na
Outside and mostly outside	291	373	370	254	346	578	472	401	486	na
Full sample	280	365	358	247	324	540	438	374	454	na

Table 4.14 Summary of financial structure (year closing values)

LFA status	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94	1994/95	1995/96	1996/97
Fully inside										
Assets	197,989	227,748	272,603	283,979	298,282	298,160	323,981	374,273	432,132	na
Total liabilities	28,753	30,578	37,118	45,424	42,315	39,782	44,644	58,156	70,580	na
Leverage	14.5	13.4	13.6	16.0	14.2	13.3	13.8	15.5	16.3	na
Annual change in liabilities	623	3,931	4,066	4,170	2,906	-650	7,406	2,413	5,911	na
Short term liab':total liab'	na	na	57.7	59.1	54.6	52.6	47.3	61.9	59.6	na
Net worth	169,236	197,170	235,486	238,555	255,967	258,378	279,337	316,116	361,552	na
Inside and mostly inside										
Assets	217,540	246,682	281,759	298,282	307,398	332,613	370,988	408,090	470,021	na
Total liabilities	30,320	31,021	32,551	41,004	39,233	39,443	44,475	55,072	65,869	na
Leverage	13.9	12.6	11.6	13.7	12.8	11.9	12.0	13.5	14.0	na
Annual change in liabilities	94	3,006	1,762	4,066	2,651	-1,210	6,440	3,427	5,129	na
Short term liab':total liab'	na	na	61.0	63.2	55.5	51.2	52.9	61.1	59.1	na
Net worth	187,221	215,661	249,210	257,278	268,165	293,170	326,512	353,018	404,153	na
Outside and mostly outside										
Assets	354,113	378,362	520,553	527,644	548,220	541,364	584,558	639,719	697,283	na
Total liabilities	57,567	54,762	73,121	74,711	72,805	70,319	71,005	77,232	84,347	na
Leverage	15.6	15.0	14.0	14.2	13.3	13.0	12.1	12.1	12.1	na
Annual change in liabilities	-843	3,012	5,198	6,324	1,235	-503	3,457	4,170	4,859	na
Short term liab':total liab'	na	na	54.7	58.0	54.9	52.2	53.1	48.9	48.9	na
Net worth	311,051	323,600	447,432	452,932	475,415	471,044	513,553	562,486	612,935	na
Full sample										
Assets	323,119	440,482	447,960	465,938	477,774	489,088	518,967	580,394	638,391	na
Total liabilities	49,361	65,692	60,788	65,643	62,684	62,587	62,857	71,557	79,559	na
Leverage	15.3	14.5	13.6	14.1	13.2	12.8	12.1	12.3	12.5	na
Annual change in liabilities	-561	3,015	4,153	5,717	1,649	-680	4,373	3,980	4,929	na
Short term liab':total liab'	na	na	55.7	58.9	55.0	52.1	53.0	51.2	51.1	na
Net worth	273,758	374,520	387,172	400,295	414,790	426,501	456,110	508,837	558,832	na

Chapter 5 Physical and financial performance by EU region

5.1   Introduction

Chapter 1 presents details of the regional development in the structure of the dairy sector in England and Wales. This chapter presents summaries of the physical performance, costs, margins and financial structure of farms by their EU region (Wales, North, East and West, a map of the EU regions is given in the Appendix A). Whilst the Welsh region is identical, the three English EU regions do not have the same boundaries as regions used to present data in Chapter 1.

The structure of the UK dairy herd does not depend solely on the relative profitability between dairy enterprise; it is also determined by each farmer's opportunity cost, that is their most profitable alternative crop or livestock enterprise. For example, if an alternative enterprise becomes more profitable and if that enterprise is best suited to farmers in a particular region, then gradually less milk will be produced in that region. In addition to the relative profitability of alternative enterprises, the structure of dairy farming will be determined by personal and household preferences and characteristics (which may or may not be related to geographic regions). Unfortunately, the data required to fully explore these particular influences on the structure of dairy farming are not available from the FBS/DECS/SSEMP surveys.

Table 5.1a and 5.1b present descriptive details of the farms by four EU regions, the West, the East and the North of England, and Wales. This is followed by tables of input use, milk yields, forage area per cow and concentrate use. Summaries of the financial performance by the four regions are presented in Tables 5.6a, 5.6b, 5.7a and 5.7b. More detailed analyses of milk returns and margin over concentrates are presented in Tables 5.8 and 5.9. Gross margin per cow and per hectare are shown in Tables 5.10 and 5.11. Information on net farm income, assets, liabilities, leverage and net worth is set out in Tables 5.12 to 5.14.

5.2   Physical performance by EU region

Farms in the Eastern region were the largest in terms of adjusted farm area. Their average herd size (93.2 cows) and average forage area (55.7 hectares) meant that the average size of their dairy enterprise was also the highest of the four regions. The combination of herd size and forage area on Eastern region farms resulted in a consistently high stocking rate, though average regional stocking rates appeared to be converging. In particular, stocking rates in Wales increased from 1.43 to 1.67 between 1987/88 and 1996/97. By 1996/97 stocking rates were similar in Wales, the West and the East of England (at 1.67 cows per forage hectare) but slightly higher in the North of England (at 1.83).

The average increase in milk production per farm for the full sample was 21%. The largest regional increase in milk production per farm occurred in Wales (at 32.4%) followed by the East (24.9%), and the North (23.3%) with the lowest average increase in the West (15%). The increase in production per farm may have occurred because farms remaining in dairying had on average increased the size of their dairy enterprise,

or a higher proportion of smaller dairy units had quit milk production, or a combination of both.

Although the increase in milk production was largest on Welsh farms, the average production of these farms still remained lower (at 370,000 litres) than in any other region. For example, in 1996/97 these farms produced, on average, 219,500 litres less milk than the average farm in the East region.

The increased production on Welsh farms was achieved by an expansion of 8.6 cows in the average herd size (from 57.3 to 65.9 cows, 15%) and a 702 litre (14.3%) increase in milk yields per cow. By contrast, the increased milk production on farms in the North (23%) and the East (24.9%) was more dependent on higher yields per cow (808 litres (15.6%) and 1,141 litres (22.0%) respectively) than increasing herd size (4.5 cows (6.6%) and 2.1 cows (2%) respectively). The smallest average increase in milk production per farm occurred in the West of England, where the increase of 15% was generated by an average increase of 6.7 cows per herd (16.2%) and of 449 litres per cow (8.4%).

Dairy specific regular labour costs are typically a high proportion of total fixed costs. Table 5.2 shows that fewer hours of dairy specific regular labour were used per cow on Welsh dairy farms than on the larger Eastern units, and that a larger proportion of these hours were supplied by the farmer and spouse. The similarity in the estimated dairy specific regular labour hours per cow across the regions is perhaps surprising given their different average herd sizes, and the evidence of the increasing labour hours and costs associated with larger herds presented in Chapters 2 and 3.

Table 5.2 also shows the trends in fertilizer application per hectare and concentrates per cow. Concentrates fed per cow on Eastern region farms was consistently higher than in other regions, but despite higher average milk yield per cow, the concentrate/milk conversion ratio (kgs/litre) was consistently higher than in other regions (Table 5.5). These farms fed on average a slightly higher proportion of home grown concentrates and a much larger proportion of purchased straights per cow. This dependence on concentrates can be explained by a combination of a lower average rainfall and hence grassland and forage production, and its lower cost. Average concentrate prices across regions appeared to be converging.

Tables 5.3, 5.4 and 5.5 set out the average annual milk yield, forage area and concentrate fed per cow by EU region.

5.3   Financial performance by EU region

Tables 5.6a and 5.6b present summary financial performance measures for the dairy enterprise and the whole farm. The proportion of total farm output generated by the dairy enterprise remained similar over the ten years for farms in the West and in Wales (at 68.2%), but increased on farms in the East region (by 5.1% to 61.4%) and farms in the North (by 11.1% to 70.9%). Therefore, dairy enterprises on farms in the Eastern region accounted for a smaller proportion of total farm revenue than in any other region.

Annual net farm income, when expressed on a per hectare basis, was consistently lowest on farms in the Eastern region. On these farms 55.7 hectares (43% of total farm area) was used for the dairy enterprise, this generated 61.4% of total farm revenue which indicates the intensity of the dairy enterprises. Although NFI per hectare on Welsh farms has tended to be higher than on farms in the Eastern region, their lower average size resulted in a consistently lower NFI per farm.

Tables 5.7a and 5.7b present additional details of the dairy enterprise. The value of milk returns per cow grew by 84.7% on Eastern region farms over the ten years, compared to the 72%, 71% and 67% achieved on farms in Wales, the North and the West respectively. This benefit was transmitted into a higher growth in gross margin per cow, which at 83% over the ten years, compared with 71%, 51% and 47% achieved on farms in the North, the West and Wales.

The higher growth in the value of production and gross margin per cow on Eastern farms (farms with dairy enterprises that were on average the largest), resulted in average gross margins increasing from £537 per cow in 1987/88, the lowest average gross margin per cow of the four regions, to £982 per cow, the highest of any region. As pointed out above, this was driven by the substantial increase in yield per cow (22%) rather than an expansion in herd size, though average farm area would appear to indicate that sufficient land was already being farmed to allow this route to have been chosen. These findings indicate that the dairy farms in the Eastern region were improving financial performance by increasing output per farm based largely on higher concentrate use per cow. The generally higher milk/concentrate price ratio on these farms (Table 5.9) suggests the reason for this growth strategy (although this price ratio is only available for the final four of the ten years).

5.4   Milk returns and margin over concentrates

Table 5.8 presents the average milk returns for EU regions. The range between the highest and lowest average regional milk price decreased from 0.5 ppl in 1987/88 to 0.11 in 1991/92, but thereafter began to increase, reaching a maximum differential in 1995/96 of 0.71 ppl. In 1996/97 the range in prices had reduced to 0.64 ppl. In five out of the ten years between 1987/88 and 1996/97 milk prices were lowest in Wales.

Table 5.9 shows the trends in margin over concentrates, margin over 'concentrates and bulk feed', and the milk/concentrate price ratio. The combination of relatively high average milk price and significantly lower concentrate price, shown in the milk/concentrate price ratios, resulted in Eastern region farms replacing those in the West in achieving the highest margin over concentrates.

5.5   Gross margin by EU regions

Tables 5.10 and 5.11 shows the nominal and real (adjusted for price inflation) gross margin per cow and per forage area respectively. Variable costs per cow were initially lowest on Eastern units, but the increased use of concentrate feed (which drove the higher milk yields) also increased variable costs, which were consistently highest on

these farms towards the end of the time series. However, the value of the additional milk produced more than compensated for the higher variable costs.

At the start of the period gross margin per cow was lowest on Eastern region farms. But because of the growth in milk yield per cow (of 22%) these farms finished the period at the top of the ranking by gross margin per cow. Over the ten years gross margin per cow in the Eastern region increased from £537 to £982. Farms in Wales recorded the lowest gross margin per cow in 1996/97 (£873).

The range between the highest and lowest regional gross margin decreased from £63 in 1987/88 to £31 in the following year. Thereafter the gap tended to increase, to £66 in 1992/93 and up to £109 in 1996/97.

When allowance is made for price inflation, the average gross margin per cow on farms in Wales fell (by £7) and only marginally improved on farms in the West; farms in the Northern and Eastern regions achieved a real increase of, on average, £85 and £122 respectively.

Table 5.11 shows the effect of the lower average stocking rates on Welsh farms when gross margin is reported on a per forage hectare basis. Despite the increase in stocking rates on Welsh farms, they were ranked bottom in seven out of the ten years by gross margin per hectare; farms in the East consistently ranked the highest. The relatively lower stocking rates and therefore lower gross margin per forage hectare in Wales are most likely explained by the lower average land prices in Wales compared with average land prices in the East. Moreover, in the East, more than any other region the dairy enterprise has to compete with a wide range of arable enterprises.

5.6   Net farm income and financial structure

Table 5.12 shows the NFI and interest paid per farm by EU regions. On average, NFI increased in every region, though the increase was variable particularly on Welsh farms. The increase in NFI was largest on farms in the Eastern region (113% over nine years), but their larger average size meant that NFI on a hectare basis was the lowest in most years.

The average interest paid per farm increased over the ten years. It peaked in most regions in 1990/91 when it accounted for 28% of NFI on farms in the Northern region and 51% of NFI on farms in the Western region. In 1995/96 interest payments accounted for on average between 19.7% (in Wales) and 11.3% (in the Eastern region) of NFI, a much smaller spread than in 1990/91. Although interest payments in 1995/96 represent a smaller percentage of NFI, they were still relatively large, and there may be important distributional implications hidden by these average values, as it is likely that a proportion of farmers will have no or few borrowings.

The proportion of NFI paid in interest by farms in the Welsh region had decreased from 39% in 1990/91 to 19.7% in 1996/97. Nevertheless 19.7% represents a considerable financial burden, particularly given the higher variability in NFI than in interest payments.

Table 5.14 summarises the end of year financial structure of the surveyed dairy farms. Average total liabilities increased in each region. However, the increase on Eastern region farms was relatively small (at 5%), so, as average farm size and average land prices increased, leverage fell from 16% to 9.7%. Total liabilities on farms in Wales increased the most, by 142% over nine years, compared to the 78% and 49% increase on farms in the Western and Northern regions respectively. Table 5.1a showed that farmers in Wales increased milk production per farm by 31.4% over the ten years, the highest percentage increase of any region. This increase in productivity was assisted by an increase in herd size (of 8.8 cows). It is likely, therefore, that some of the additional borrowing was invested in the quota and livestock needed for the expansion of the diary herd.

Average leverage fell over the nine years in all regions. The largest fall was in the East, where assets values increased and liabilities remained almost unaltered. The smallest fall in leverage occurred on Welsh farms, where a £46,341 (142%) increase in liabilities was only just offset by the £328,849 (147%) increase in asset values.

The average net worth on Northern farms was the lowest in 1996/97 (at £421,611), with average net worth on Welsh dairy farm at £473,933. Average net worth on Eastern region farms was nearly three quarters of a million pounds.

5.7   Summary

This chapter presents details of physical performance, costs and margins by four EU regions, East, West, North and Wales. Some of the key finding are:

(i) Average herd size was largest on farms in the Eastern region (at 93.2 cows) compared with 81.4, 73.1 and 65.9 cows in the West, the North and Wales. This suggests that farms in the Eastern region would benefit most from any economies of scale that exist in the production and marketing of milk.

(ii) Milk production per farm increased in all four regions, but there were important differences in the way the higher production was achieved. The contrasting approaches to expansion can be explained by the relative milk, land and concentrate prices in the regions and the profitability of competing enterprises.

(iii) Farms in Wales increased milk production per farm by a higher percentage than farmers in other regions (31.4% over the ten years, compared with the full sample average of 21%). Nevertheless these dairy enterprises remained on average the smallest. The increased production was achieved by enlarging herds by an average of 8.8 cows (15%) (by increasing forage area per farm and stocking rate), and improving milk yield per cow by 702 litres (14.3%).

(iv) Farms in the Eastern and Northern region increased yield per cow by a larger percentage than they increased herd size. The strategy adopted on farms in the Eastern region was to increase milk yield per cow by feeding more concentrates (which were on average less expensive in the Eastern region than in the other regions). Although this strategy resulted in farms in the Eastern region incurring the largest variable costs per cow, the value of the additional milk produced more than

compensated for this, and moved these farms from the bottom to the top of the regions when ranked by gross margin per cow.

(v) At the start of the ten year period farms in the West consistently returned the highest average gross margin per cow but by the end of the period these farms were towards the bottom of the ranking. Their place at the top of the regional ranking was taken by farms in the Eastern region.

(vi) At the start of the period farms in the Northern EU region ranked top by average milk price but by 1996/97 Eastern region farms consistently recorded the highest milk price: farms in Wales the lowest. The range in average regional prices fell to a low of 0.11 ppl in 1991/92, before increasing to a high of 0.71 ppl in 1995/96. In 1996/97 the regional price gap was 0.64 ppl.

(vii) Gross margin per cow was highest on farms in the Eastern regions in three of the final four years. In 1996/97 the difference in gross margin per cow between the lowest average regional value - reported on Welsh farms (£873) - and the highest reported on Eastern farms (£982) was £109. This represents the largest regional difference over the ten years.

(viii) Between 1987/88 and 1996/97 farmers in the North achieved a real increase in gross margin per cow of £85. This was second only to farmers in the Eastern region (at £121) and significantly better than the £8 real increase earned on farms in the Western region and the loss in real terms of £7 by farms in Wales.

(ix) In 1995/96 average debt per farm (measured as total liabilities) was similar across regions. Northern farms reported the highest leverage (at 14.8%) compared to 14.3, 11.8 and 9.7% on farms in Wales, the West and the East respectively. Average net worth per farm was above £470,000 in each region. A measure of the affordability of borrowing (payback ability) is given by the ratio of interest paid to NFI (though the imputed element of unpaid family labour and rent should be borne in mind when using this measure). In 1996/97 the interest:NFI ratio was highest on farms in Wales (at 19.7%). Welsh farms were further disadvantaged by their relatively high variability in NFI.

(x) Margins on Welsh dairy farms were under the most pressure - and this pressure appeared to be increasing towards the end of the survey period. Despite the largest percentage increase in both milk production per farm and cows per hectare, these farms recorded on average the lowest gross margin per cow and per forage hectare. The competitive disadvantage of dairy farms in Wales - at the gross margin level - was due to, (1) their lower milk yield per cow, (2) the lowest regional average milk price in three of the final four years surveyed, (3) the smaller average farm and herd size, (4) their relatively high (average) leverage, (5) the high interest to NFI ratio, and (6) the large annual variation in NFI.

Table 5.1a Details of farms by EU region (West and Wales)

	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94	1994/95	1995/96	1996/97
WEST										
Number of farms (unweighted)	120	137	132	129	122	125	136	129	133	128
Number of farms ('000)	13.6	12.7	12.6	12.5	12.1	11.7	11.8	11.4	11.4	10.9
Farm area (adjusted ha)	72.8	75.2	76.6	81.2	76.9	76.0	78.1	80.9	83.7	85.5
Forage area used in dairy ent'	41.5	42.4	42.0	43.9	45.0	46.1	42.5	42.8	44.1	48.2
Milk produced per farm ('000 lts)	410.0	420.3	422.6	440.8	434.5	449.7	458.9	470.1	492.9	471.4
Average herd size (cows)	76.7	78.8	78.3	79.3	77.7	78.9	81.1	82.9	82.7	81.4
Biological milk yield (lts/cow)	5,345	5,334	5,397	5,559	5,592	5,700	5,658	5,671	5,960	5,794
Forage area per cow (ha/cow)	0.54	0.54	0.54	0.55	0.58	0.58	0.52	0.52	0.53	0.59
Stocking rate (cows / forage ha).	1.85	1.86	1.86	1.81	1.73	1.71	1.91	1.94	1.88	1.69
WALES										
Number of farms (unweighted)	137	146	144	149	117	122	80	80	84	63
Number of farms ('000)	6.1	6.0	5.7	5.6	5.5	5.2	6.0	5.0	5.0	4.9
Farm area (adjusted ha)	67.2	65.9	68.8	71.9	70.6	76.9	77.8	75.9	81.0	79.1
Forage area used in dairy ent'	40.0	38.4	38.0	38.5	33.8	38.6	31.0	30.9	34.3	39.5
Milk produced per farm ('000 lts)	281.9	273.6	290.1	291.0	295.5	306.6	312.5	330.6	339.4	370.5
Average herd size (cows)	57.3	55.8	57.6	58.1	57.5	58.6	57.9	61.0	61.3	65.9
Biological milk yield (lts/cow)	4,919	4,904	5,037	5,009	5,139	5,232	5,398	5,419	5,536	5,621
Forage area per cow (ha/cow)	0.70	0.69	0.66	0.66	0.59	0.66	0.54	0.51	0.56	0.60
Stocking rate (cows / forage ha).	1.43	1.45	1.51	1.51	1.70	1.52	1.87	1.98	1.78	1.67

Table 5.1b Details of farms by EU region (North and East)

	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94	1994/95	1995/96	1996/97
NORTH										
Number of farms (unweighted)	82	78	80	94	98	80	96	103	102	100
Number of farms ('000)	9.2	9.0	8.7	9.0	9.0	8.1	8.6	7.9	7.8	7.7
Farm area (adjusted ha)	79.0	74.0	65.1	67.1	71.5	66.3	72.3	70.6	70.4	79.8
Forage area used in dairy ent'	44.5	42.2	38.8	40.7	43.9	40.1	37.2	38.3	38.8	40.0
Milk produced per farm ('000 lts)	356.0	349.6	366.7	367.1	380.2	402.7	384.4	413.1	432.5	438.5
Average herd size (cows)	68.6	67.0	68.6	66.4	67.3	70.4	68.3	72.5	74.2	73.1
Biological milk yield (lts/cow)	5,189	5,218	5,387	5,529	5,649	5,720	5,628	5,698	5,829	5,997
Forage area per cow (ha/cow)	0.65	0.63	0.56	0.61	0.65	0.57	0.55	0.53	0.52	0.55
Stocking rate (cows / forage ha).	1.54	1.59	1.77	1.63	1.53	1.76	1.83	1.89	1.91	1.83
EAST										
Number of farms (unweighted)	72	64	67	68	72	64	69	74	75	86
Number of farms ('000)	5.0	4.7	4.6	4.6	4.5	4.1	4.0	3.9	3.9	3.7
Farm area (adjusted ha)	116.7	120.3	119.1	116.4	124.9	110.3	115.4	123.6	115.2	129.9
Forage area used in dairy ent'	45.2	46.0	44.4	43.8	45.4	48.4	47.7	47.0	45.8	55.7
Milk produced per farm ('000 lts)	472.5	483.9	471.3	479.5	498.9	516.3	540.7	548.2	564.6	590.0
Average herd size (cows)	91.1	92.1	89.9	87.3	87.0	90.5	93.0	92.3	91.7	93.2
Biological milk yield (lts/cow)	5,187	5,254	5,242	5,492	5,735	5,705	5,814	5,939	6,157	6,328
Forage area per cow (ha/cow)	0.50	0.50	0.49	0.50	0.52	0.54	0.51	0.51	0.50	0.60
Stocking rate (cows / forage ha).	2.00	2.00	2.03	1.99	1.94	1.87	1.95	1.96	2.00	1.67

Table 5.2 Changes of inputs and output over time by EU region

	WEST				**WALES**			
	1993/94	1994/95	1995/96	1996/97	1993/94	1994/95	1995/96	1996/97
Nitrogen on grassland (kg/ha)	171	184	175	156	168	192	196	182
Phosphate on grassland (kg/ha)	13	12	14	48	16	18	23	50
Potassium on grassland (kg/ha)	24	22	27	27	23	25	27	37
Concentrate feed:								
Purchased compound (kg/cow)	1,301	1,223	1,307	1,196	1,260	1,197	1,406	1,255
Purchased straights (kg/cow)	342	355	420	310	216	160	117	135
Home grown straights (kg/cow)	81	65	51	82	140	121	133	98
Total Concentrates (kg/cow)	1,724	1,644	1,779	1,590	1,616	1,477	1,656	1,490
Total Concentrates (kg/litre)	0.31	0.29	0.30	0.27	0.30	0.27	0.30	0.27
Cost of purchased conc' (£/t)	152	155	153	156	161	162	161	154
Total direct labour (hr/cow)	40.4	39.9	39.2	35.6	39.4	34.9	41.8	36.7
of which farmer and spouse	16.4	15.5	15.2	17.8	23.8	21.2	24.7	23.3
of which contract milking	1.5	1.7	1.8	0.7	0.3	1.3	-	0.3
Total hrs per cow [1]	41.1	40.6	39.9	na	40.1	35.6	42.8	na

	NORTH				**EAST**			
	1993/94	1994/95	1995/96	1996/97	1993/94	1994/95	1995/96	1996/97
Nitrogen on grassland (kg/ha)	164	188	200	193	177	197	178	162
Phosphate on grassland (kg/ha)	15	12	12	54	11	14	12	44
Potassium on grassland (kg/ha)	24	23	23	26	18	20	20	27
Concentrate feed:								
Purchased compound (kg/cow)	1,493	1,396	1,409	1,250	1,501	1,237	1,274	1,325
Purchased straights (kg/cow)	247	243	274	249	574	490	695	449
Home grown straights (kg/cow)	118	78	80	118	195	215	200	128
Total Concentrates (kg/cow)	1,857	1,717	1,763	1,620	2,270	1,942	2,169	1,920
Total Concentrates (kg/litre)	0.33	0.30	0.30	0.27	0.39	0.33	0.35	0.30
Cost of purchased conc' (£/t)	155	156	156	153	108	146	149	151
Total direct labour (hr/cow)	36.1	34.9	34.8	35.8	41.1	37.0	37.4	40.0
of which farmer and spouse	17.8	17.6	17.2	20.0	16.0	13.5	14.2	14.9
of which contract milking	0.5	0.5	0.8	0.5	1.7	1.5	1.6	1.6
Total hrs per cow [1]	37.1	35.8	35.5	na	42.1	38.0	38.8	na

[1] Total hours per cow includes causal labour and share of forage casual labour, it excludes regular labour used in forage production and milk processing on farm.

Table 5.3 Milk Yield excluding waste (litres per cow) by EU region

EU region	Yield per cow (litres)										Change (5)
	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94	1994/95	1995/96	1996/97	
West	5,345	5,334	5,397	5,559	5,592	5,700	5,650	5,616	5,944	5,794	449(8)
Wales	4,919	4,904	5,037	5,009	5,139	5,232	5,398	5,419	5,536	5,621	702(14)
North	5,189	5,218	5,387	5,529	5,649	5,720	5,628	5,649	5,829	5,997	808(16)
East	5,187	5,254	5,242	5,492	5,701	5,705	5,792	5,919	6,141	6,328	1,141(22)

Table 5.4 Forage area per cow by EU region

EU region	Forage area per cow (ha)									
	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94	1994/95	1995/96	1996/97
West	0.54	0.54	0.54	0.55	0.58	0.58	0.52	0.52	0.52	0.59
Wales	0.70	0.69	0.66	0.66	0.59	0.66	0.54	0.51	0.53	0.60
North	0.65	0.63	0.56	0.61	0.65	0.57	0.55	0.53	0.52	0.55
East	0.50	0.50	0.49	0.50	0.52	0.54	0.51	0.51	0.50	0.60

Table 5.5 Concentrate feed use by EU region

EU region	Concentrate feed (kg/cow)				Concentrate feed, kg/litre			
	1993/94	1994/95	1995/96	1996/97	1993/94	1994/95	1995/96	1996/97
West	1,724	1,644	1,779	1,590	0.31	0.29	0.30	0.27
Wales	1,616	1,477	1,656	1,490	0.30	0.27	0.30	0.27
North	1,857	1,717	1,763	1,620	0.33	0.30	0.30	0.27
East	2,270	1,942	2,169	1,920	0.39	0.33	0.35	0.30

Table 5.6a Financial performance indicators of dairy enterprise and farm (current prices) by EU region (West and Wales)

	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94	1994/95	1995/96	1996/97
					(£/cow)					
WEST										
Dairy enterprise output	937	1,033	1,101	1,095	1,149	1,246	1,328	1,337	1,487	1,464
Concentrate feed costs	190	191	217	218	204	222	256	247	267	247
Total variable costs	336	350	389	403	395	391	481	509	549	556
Gross margin	600	683	713	692	755	855	847	828	939	908
Dairy specific regular labour [1]	na	na	na	na	na	na	289	297	304	227
Margin after labour	na	na	na	na	na	na	557	531	635	681
Dairy enterprise output (per farm)	71,852	81,410	86,199	86,866	89,318	98,330	107,626	110,939	123,048	119,102
Total farm output	108,336	121,790	124,570	126,884	132,295	154,924	155,171	158,666	180,079	na
Dairy to total farm output (%)	66.3	66.8	69.2	68.5	67.5	63.5	69.4	69.9	68.3	na
Net farm income (£ per farm)	24,694	32,467	27,788	19,165	27,924	46,069	34,623	31,211	37,849	na
(£ per hectare)	339	432	363	236	363	606	443	386	451	na
WALES										
Dairy enterprise output	887	972	1,071	1,040	1,078	1,177	1,261	1,268	1,473	1,390
Concentrate feed costs	184	196	213	196	190	215	240	238	260	229
Total variable costs	295	320	349	352	356	388	422	468	510	518
Gross margin	592	652	722	689	722	789	839	800	963	873
Dairy specific regular labour [1]	na	na	na	na	na	na	237	233	278	241
Margin after labour	na	na	na	na	na	na	602	567	685	632
Dairy enterprise output (per farm)	50,849	54,202	61,640	60,400	62,044	68,941	73,030	77,395	90,251	91,644
Total farm output	75,733	83,320	86,306	84,622	89,697	110,576	111,302	106,147	132,379	na
Dairy to total farm output (%)	67.1	65.1	71.4	71.4	69.2	62.3	65.6	72.9	68.2	na
Net farm income (£ per farm)	21,296	26,893	23,278	17,000	20,738	34,069	30,180	19,490	35,417	na
(£ per hectare)	317	408	338	236	294	443	388	257	437	na

[1] Dairy specific labour excludes labour used in milk processing and in forage production.

Table 5.6b Financial performance indicators of dairy enterprise and farm (current prices) by EU region (North and East)

	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94	1994/95	1995/96	1996/97
					(£/cow)					
NORTH										
Dairy enterprise output	919	1,034	1,125	1,122	1,160	1,251	1,297	1,325	1,446	1,484
Concentrate feed costs	212	227	234	234	242	241	274	262	269	247
Total variable costs	350	374	402	418	439	445	490	518	535	508
Gross margin	569	660	723	704	720	806	807	807	911	976
Dairy specific regular labour [1]	na	na	na	na	na	na	253	270	268	231
Margin after labour	na	na	na	na	na	na	554	537	643	745
Dairy enterprise output	63,059	69,275	77,189	74,567	78,027	88,100	88,586	96,005	107,251	108,502
Total farm output	106,461	111,335	114,306	106,669	117,155	134,511	137,301	139,504	151,300	na
Dairy to total farm output (%)	59.2	62.2	67.5	69.9	66.6	65.5	64.5	68.8	70.9	na
Net farm income (£ per farm)	20,471	27,108	30,190	21,552	24,860	37,394	35,147	32,074	37,070	na
(£ per hectare)	259	366	464	321	348	564	486	454	526	na
EAST										
Dairy enterprise output	903	1,027	1,101	1,110	1,181	1,197	1,359	1,411	1,556	1,594
Concentrate feed costs	208	212	236	245	240	246	253	269	300	289
Total variable costs	366	371	420	442	454	422	479	532	613	612
Gross margin	537	656	681	668	727	831	880	879	943	982
Dairy specific regular labour [1]	na	na	na	na	na	na	310	300	315	254
Margin after labour	na	na	na	na	na	na	570	579	628	728
Dairy enterprise output (per farm)	82,243	94,588	98,988	96,850	102,717	113,418	126,314	130,234	142,708	148,644
Total farm output	146,102	158,056	169,190	164,531	180,296	199,751	207,324	219,905	232,280	na
Dairy to total farm output (%)	56.3	59.8	58.5	58.9	57.0	56.8	60.9	59.2	61.4	na
Net farm income (£ per farm)	20,999	26,326	30,602	22,424	31,642	51,516	47,556	43,004	44,806	na
(£ per hectare)	180	219	257	193	253	467	412	348	389	na

[1] Dairy specific labour excludes labour used in milk processing and in forage production.

Table 5.7a Dairy enterprise output and variable costs 1987/88 to 1996/97 (£/cow) by EU region (West and Wales) [1]

	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94	1994/95	1995/96	1996/97
					(£/cow)					
WEST										
Milk Returns (A)	875	936	1,023	1,058	1,091	1,179	1,244	1,305	1,479	1,460
EU superlevy (B)	7	2	2	1	1	-	-	5	11	2
Compensation (for susp' of quota) (C)	19	27	23	22	20	17	15	11	9	10
Herd Replacement Costs (D)	44	42	54	58	53	72	71	91	99	93
Calf sales (E)	94	114	111	74	90	122	140	118	111	90
Industry Development Council Levy (F)	-	-	-	-	-	-	-	-	2	2
Dairy enterprise output (A+C+E-B-D-F)	937	1,033	1,101	1,095	1,149	1,246	1,328	1,337	1,487	1,464
Concentrate feed	190	191	217	218	204	222	256	247	267	247
Total variable costs [2]	336	350	389	403	395	391	481	509	549	556
Gross Margin	600	683	713	692	755	855	847	828	939	908
Dairy enterprise output (1987/88 £)	937	958	944	868	875	931	970	944	1,022	981
Gross Margin (1987/88 £)	600	633	611	548	575	639	619	584	645	608
WALES										
Milk Returns (A)	801	858	971	970	1,007	1,098	1,177	1,227	1,412	1,381
EU superlevy (B)	5	2	2	1	1	-	-	10	9	6
Compensation (for susp' of quota) (C)	18	24	22	21	19	16	15	10	9	10
Herd Replacement Costs (D)	28	28	30	39	35	33	45	73	53	87
Calf sales (E)	102	119	110	90	88	96	115	105	113	93
Industry Development Council Levy (F)	-	-	-	-	-	-	-	-	2	-
Dairy enterprise output (A+C+E-B-D-F)	887	972	1,071	1,040	1,078	1,177	1,261	1,268	1,473	1,390
Concentrate feed	184	196	213	196	190	215	240	238	260	229
Total variable costs [2]	295	320	349	352	356	388	422	468	510	518
Gross Margin	592	652	722	689	722	789	839	800	963	873
Dairy enterprise output (1987/88 £)	887	901	918	824	821	880	921	895	1,012	931
Gross Margin (1987/88 £)	592	604	619	546	550	590	613	565	662	585

[1] Figures may not necessarily add due to rounding. [2] Includes share of contract costs.

Table 5.7b Dairy enterprise output and variable costs 1987/88 to 1996/97 (£/cow) by EU region (North and East)[1]

	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94	1994/95	1995/96	1996/97
					(£/cow)					
NORTH										
Milk Returns (A)	871	942	1,040	1,070	1,108	1,195	1,244	1,296	1,445	1,491
EU superlevy (B)	5	1	3	-	-	-	-	3	7	3
Compensation (for susp' of quota) (C)	18	26	23	21	20	17	12	11	9	10
Herd Replacement Costs (D)	57	40	47	53	55	66	87	97	100	110
Calf sales (E)	92	107	112	85	86	104	128	118	102	95
Industry Development Council Levy (F)	-	-	-	-	-	-	-	-	2	-
Dairy enterprise output (A+C+E-B-D-F)	919	1,034	1,125	1,122	1,160	1,251	1,297	1,325	1,446	1,484
Concentrate feed	212	227	234	234	242	241	274	262	269	247
Total variable costs[2]	350	374	402	418	439	445	490	518	535	508
Gross Margin	569	660	723	704	720	806	807	807	911	976
Dairy enterprise output (1987/88 £)	919	958	965	889	883	935	947	935	994	994
Gross Margin (1987/88 £)	569	612	620	558	548	602	590	570	626	654
EAST										
Milk Returns (A)	862	941	1,023	1,067	1,123	1,197	1,295	1,381	1,554	1,592
EU superlevy (B)	7	1	2	-	-	-	-	3	13	3
Compensation (for susp' of quota) (C)	17	28	21	20	18	16	12	9	6	11
Herd Replacement Costs (D)	42	36	34	42	32	53	55	77	82	87
Calf sales (E)	73	95	92	65	72	93	107	101	92	81
Industry Development Council Levy (F)	-	-	-	-	-	-	-	-	1	1
Dairy enterprise output (A+C+E-B-D-F)	903	1,027	1,101	1,110	1,181	1,256	1,359	1,411	1,556	1,594
Concentrate feed	208	212	236	245	240	246	253	269	300	289
Total variable costs[2]	366	371	420	442	454	422	479	532	613	612
Gross Margin	537	656	681	668	727	831	880	879	943	982
Dairy enterprise output (1987/88 £)	903	952	944	879	899	939	993	996	1,069	1,068
Gross Margin (1987/88 £)	537	608	584	529	554	621	643	620	648	658

[1] Figures may not necessarily add due to rounding. [2] Includes share of contract costs.

Table 5.8 Milk returns (1987/88 to 1996/97) by EU region

	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94	1994/95	1995/96	1996/97
					(£/cow)					
WEST										
Milk Yield (lts/cow, ex waste)	5,345	5,334	5,397	5,559	5,592	5,700	5,650	5,616	5,944	5,794
Price (p/litre)	16.36	17.55	18.96	19.03	19.51	20.68	22.02	23.23	24.89	25.2
Milk Returns (current £)	875	936	1,023	1,058	1,091	1,179	1,244	1,305	1,479	1,460
Milk Returns (1987/88 £)	875	868	877	838	831	881	909	921	1,016	978
WALES										
Milk Yield (lts/cow, ex waste)	4,919	4,904	5,037	5,009	5,139	5,232	5,398	5,419	5,536	5,621
Price (p/litre)	16.29	17.51	19.28	19.36	19.59	20.98	21.8	22.64	25.50	24.56
Milk Returns (current £)	801	858	971	970	1,007	1,098	1,177	1,227	1,412	1,381
Milk Returns (1987/88 £)	801	795	833	768	767	821	860	866	970	925
NORTH										
Milk Yield (lts/cow, ex waste)	5,189	5,218	5,387	5,529	5,659	5,720	5,628	5,649	5,829	5,997
Price (p/litre)	16.79	18.05	19.30	19.35	19.62	20.90	22.10	22.95	24.79	24.86
Milk Returns (current £)	871	942	1,040	1,070	1,108	1,195	1,244	1,296	1,445	1,491
Milk Returns (1987/88 £)	871	873	892	848	844	893	909	915	993	999
EAST										
Milk Yield (lts/cow, ex waste)	5,187	5,29	5,219	5,492	5,735	5,705	5,792	5,919	6,141	6,328
Price (p/litre)	16.61	17.90	19.52	19.43	19.59	20.98	22.36	23.33	25.30	25.16
Milk Returns (current £)	862	941	1,023	1,067	1,123	1,197	1,295	1,381	1,554	1,592
Milk Returns (1987/88 £)	862	872	877	845	855	895	946	975	1,068	1,066
Highest less lowest Range in milk prices	0.50	0.54	0.56	0.40	0.11	0.30	0.56	0.69	0.71	0.64

Table 5.9 Margin over concentrates 1987/88 to 1996/97 by EU region [1]

	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94	1994/95	1995/96	1996/97
					(£/cow)					
WEST										
Milk returns	875	936	1,023	1,058	1,091	1,179	1,244	1,305	1,479	1,460
Concentrate feed costs	190	191	217	218	204	222	256	247	267	247
Margin over concentrates	685	744	804	839	888	956	988	1,058	1,212	1,213
Margin over conc' & bulk feed etc. [2]	669	727	783	819	883	851	963	1,026	1,172	1,181
Margin over concentrates (1987/88 £)	685	690	689	665	676	714	722	747	833	813
Milk: conc' price ratio (p/l:p/kg)	na	na	na	na	na	na	1.52	1.58	1.70	1.62
WALES										
Milk returns	801	858	971	970	1,007	1098	1,177	1,227	1,412	1,381
Concentrate feed costs	184	196	213	196	190	215	240	238	260	229
Margin over concentrates	617	660	756	773	817	882	937	989	1,151	1,152
Margin over conc' & bulk feed etc. [2]	615	658	753	768	814	879	927	972	1,130	1,135
Margin over concentrates (1987/88 £)	617	612	648	612	622	659	685	698	791	772
Milk: conc' price ratio (p/l:p/kg)	na	na	na	na	na	na	1.49	1.48	1.64	1.60
NORTH										
Milk returns	871	942	1,040	1,070	1,108	1,195	1,244	1,296	1,445	1,491
Concentrate feed costs	212	227	234	234	242	241	274	262	269	247
Margin over concentrates	659	725	806	835	867	954	970	1,035	1,176	1,244
Margin over conc' & bulk feed etc. [2]	640	699	786	817	852	941	948	1,008	1,144	1,220
Margin over concentrates (1987/88 £)	659	672	692	662	660	713	709	730	808	833
Milk: conc' price ratio (p/l:p/kg)	na	na	na	na	na	na	1.53	1.55	1.66	1.63
EAST										
Milk returns	862	941	1,023	1,067	1,123	1,197	1,295	1,381	1,554	1,592
Concentrate feed costs	208	212	236	245	240	246	253	269	300	289
Margin over concentrates	654	728	785	822	883	951	1,042	1,112	1,254	1,303
Margin over conc' & bulk feed etc. [2]	643	720	773	803	873	938	1,008	1,071	1,200	1,249
Margin over concentrates (1987/88 £)	654	675	673	651	672	711	761	785	862	873
Milk: conc' price ratio (p/l:p/kg)	na	na	na	na	na	na	2.05	1.72	1.86	1.67

[1] Figures may not necessarily add due to rounding. [2] Margin over concentrates bulk feed, fodder and straw

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Table 5.10 Gross margin per cow 1987/88 to 1996/97 by EU region [1]

	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94	1994/95	1995/96	1996/97
					Gross margin (£/cow)					
WEST										
Dairy enterprise output	937	1,033	1,101	1,095	1,149	1,246	1,328	1,337	1,487	1,464
Total variable costs	336	350	389	403	395	391	256	509	549	556
Gross Margin	600	683	713	692	755	855	847	828	939	908
Gross Margin (1987/88 £)	600	633	611	548	575	639	619	584	645	608
WALES										
Dairy enterprise output	887	972	1,071	1,040	1,078	1,177	1,261	1,268	1,473	1,390
Total variable costs	295	320	349	352	356	388	422	468	510	518
Gross Margin	592	652	722	689	722	789	839	800	963	873
Gross Margin (1987/88 £)	592	604	619	546	550	590	613	565	662	585
NORTH										
Dairy enterprise output	919	1,034	1,125	1,122	1,160	1,251	1,297	1,325	1,446	1,484
Total variable costs	350	374	402	418	439	445	274	518	535	508
Gross Margin	569	660	723	704	720	806	807	807	911	976
Gross Margin (1987/88 £)	569	612	620	558	548	602	590	570	626	654
EAST										
Dairy enterprise output	903	1,027	1,101	1,110	1,181	1,254	1,359	1,411	1,556	1,594
Total variable costs	208	371	420	442	454	422	253	532	613	612
Gross Margin	537	656	681	668	727	831	880	879	943	982
Gross Margin (1987/88 £)	537	608	584	529	554	621	643	620	648	658
Range in gross margin/cow [2]	63	31	42	36	35	66	77	79	52	109

[1] Figures may not necessarily add due to rounding. [2] Highest less lowest gross margin per cow

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Table 5.11 Gross margin per forage area 1987/88 to 1996/97 by EU region [1]

	Gross margin (£/forage ha)									
	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94	1994/95	1995/96	1996/97
WEST										
Dairy enterprise output	1,730	1,921	2,052	1,979	1,983	2,134	2,534	2,591	2,790	2,472
Total variable costs	621	652	724	729	681	669	918	986	1,029	940
Gross Margin	1,109	1,270	1,328	1,250	1,302	1,465	1,616	1,605	1,760	1,532
Gross Margin (1987/88 £)	1,109	1,177	1,139	990	992	1,095	1,181	1,133	1,209	1,026
WALES										
Dairy enterprise output	1,272	1,412	1,621	1,569	1,833	1,787	2,355	2,505	2,628	2,322
Total variable costs	423	465	528	530	605	590	788	925	909	865
Gross Margin	849	947	1,093	1,038	1,228	1,197	1,567	1,580	1,718	1,458
Gross Margin (1987/88 £)	849	878	937	822	935	895	1,145	1,115	1,180	977
NORTH										
Dairy enterprise output	1,418	1,643	1,990	1,834	1,776	2,195	2,380	2,505	2,762	2,714
Total variable costs	540	594	712	684	673	780	899	979	1,022	929
Gross Margin	878	1,048	1,279	1,150	1,103	1,415	1,481	1,526	1,739	1,785
Gross Margin (1987/88 £)	878	971	1,097	911	840	1,057	1,082	1,077	1,195	1,195
EAST										
Dairy enterprise output	1,818	2,055	2,229	2,211	2,260	2,341	2,650	2,772	3,113	2,667
Total variable costs	737	742	850	881	869	789	934	1,046	1,227	1,024
Gross Margin	1,081	1,313	1,379	1,331	1,391	1,552	1,716	1,727	1,886	1,643
Gross Margin (1987/88 £)	1,081	1,217	1,182	1,054	1,059	1,160	1,254	1,219	1,296	1,101
Range in gross margins/ha [2]	270	366	286	293	288	355	235	201	168	327

[1] Figures may not necessarily add due to rounding. [2] Highest gross margin less lowest gross margin.

Table 5.12 Net farm income per farm by EU region

EU region	1987/88	1988/89	1989/90	1990/91	Net farm income (£/farm) 1991/92	1992/93	1993/94	1994/95	1995/96	1996/97
West	24,694	32,467	27,788	19,165	27,924	46,069	34,623	31,211	37,858	na
Wales	21,296	26,893	23,278	17,000	20,738	34,069	30,180	19,490	35,417	na
North	20,471	27,108	30,190	21,552	24,860	37,394	35,147	32,074	37,070	na
East	20,999	26,326	30,602	22,424	31,642	51,516	47,556	43,004	44,806	na
Interest paid										
West	4,355	5,898	8,155	9,738	7,880	6,280	5,076	4,836	5,999	na
Wales	4,077	4,060	5,473	6,703	5,589	4,983	3,734	5,204	6,991	na
North	7,777	5,389	5,762	6,116	6,003	6,197	4,413	5,294	5,683	na
East	6,978	6,769	9,858	9,301	8,637	7,316	5,895	5,041	5,083	na

Table 5.13 Net farm income per hectare (£/ha)

EU region	1987/88	1988/89	1989/90	1990/91	Net farm income (£/ha) 1991/92	1992/93	1993/94	1994/95	1995/96	1996/97
West	339	432	363	236	363	606	443	386	451	na
Wales	317	408	338	236	294	443	388	257	437	na
North	259	366	464	321	348	564	486	454	526	na
East	180	219	257	193	253	467	412	348	389	na

Table 5.14 Summary of financial structure (end of year)

EU region	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94	1994/95	1995/96	1996/97
West										
Total asset	336,815	423,370	506,094	538,095	519,435	525,492	565,205	623,930	706,892	na
Total liabilities	47,035	62,265	70,239	78,297	68,321	65,695	70,292	72,009	83,742	na
Leverage	14.0	14.7	13.9	14.6	13.2	12.5	12.4	11.5	11.8	na
Change in liab'	-3,113	5,604	7,341	8,682	-453	-518	6,382	4,239	6,471	na
Short liab':total liab	na	na	54.8	58.9	52.6	51.2	53.4	49.6	46.5	na
Net worth	289,781	361,105	435,855	459,798	451,114	459,797	494,913	551,922	623,150	na
Wales										
Total asset	224,035	221,266	362,716	394,975	404,743	435,337	467,174	508,799	552,884	na
Total liabilities	32,610	24,576	37,429	47,363	42,031	41,054	42,572	66,976	78,951	na
Leverage	14.6	11.1	10.3	12.0	10.4	9.4	9.1	13.2	14.3	na
Change in liab'	-1,037	-703	-194	4,021	805	-4,247	-422	987	2,764	na
Short liab':total liab	na	na	55.9	62.9	45.3	33.6	45.8	52.8	56.5	na
Net worth	191,426	196,689	325,288	347,612	362,712	394,283	424,602	441,823	473,933	na
North										
Total asset	295,959	328,805	337,221	341,990	374,842	392,977	403,808	456,827	494,875	na
Total liabilities	49,221	53,198	49,033	49,885	53,917	63,851	58,368	70,822	73,264	na
Leverage	16.6	16.2	14.5	14.6	14.4	16.2	14.5	15.5	14.8	na
Change in liab'	3,390	3,660	1,552	4,127	4,207	3,351	4,947	8,033	5,152	na
Short liab':total liab	na	na	55.9	57.0	59.9	57.0	55.4	49.6	49.1	na
Net worth	246,738	275,606	288,188	292,105	320,924	329,126	345,440	386,005	421,611	na
East										
Total asset	457,294	553,527	601,389	597,258	661,848	642,793	706,682	794,868	829,782	na
Total liabilities	76,525	76,127	85,692	84,121	92,502	78,551	80,775	77,540	80,608	na
Leverage	16.7	13.7	14.2	14.1	14.0	12.2	11.4	9.8	9.7	na
Change in liab'	-285	-552	5,664	2,811	3,213	-4,513	4,373	-1,173	2,759	na
Short liab':total liab	na	na	57.4	58.4	59.6	58.6	541	57.5	61.8	na
Net worth	380,768	477,400	515,697	513,137	569,346	564,242	625,907	717,328	749,174	na

Chapter 6   Physical and financial performance by farm type

6.1   Introduction

The previous two chapters analysed the DECS/SSEMP/FBS survey findings by less favoured area and EU region, this chapter presents analyses by farm type. Each farm in the FBS is classified into one of twenty farm type categories based on the proportion of their total standard gross margin deriving from different enterprises and geographic location (based on LFA status). To make the presentation of this chapter manageable, these possible twenty categories have been collapsed into four; three of specialist dairy farms, those with less than 60 cows (SDS), and those with 60 cows and above (SDL) and specialist dairy farms inside or mostly inside (SDIMI) LFA; and one for all other farms (O), i.e. those not classified as specialist dairy. The farms classified as SDIMI form almost the same grouping of farms that made up the category IMI in the previous chapter but they are not quite identical as some farms in the IMI group were not categorised as specialist dairy farms.

The information presented in this chapter follows the pattern of the previous chapters. Tables 6.1a to 6.5 present details of physical performance, Tables 6.6a, 6.6b, 6.7a and 6.7b present financial summaries of the whole farm and of the dairy enterprise. Tables 6.8 and 6.9 present further details of milk returns, including yield per cow, average milk price, margin over concentrate and the milk/concentrate price ratio. Tables 6.10 and 6.11 summarise gross margin per cow and per forage hectare. The final set of tables, Table 6.12 to 6.14, outline the net farm income, interest payments and the financial status of the farms.

6.2   Physical performance by farm type

Tables 6.1a and 6.1b show that the number of specialist dairy farms in the underlying population inside LFA (SDIMI) has decreased by 52% in the ten years between 1987/88 and 1996/97, from 10,300 to 5,000. There was a much lower percentage decrease in the number of specialist dairy farms OMO a LFA of about 8% for both the SDS and SDL category of farms. Farms classified as non specialist dairy farms (O) have slightly increased in number.

The ranking of the four categories by herd size remained unaltered in each year. In 1996/97 the average herd size for SDL farms was 111.2 cows, followed by 68.9 cows on O farms, then SDIMI with 65.6 cows, with the smallest herds on SDS farms with an average of 40.1 cows.

Average milk yield per farm increased in each farm type category. However, this increase was achieved through a different combination of change in herd size and increase in milk yield per cow. SDIMI farms achieved the largest increase in average milk yield per farm at 112,600 litres (42%) by an increase in the average herd size of 10.3 cows (from 55.3 to 65.6 cows) and an 20% increase in milk yield per cow (from 4,852 to 5,809 litres). It is likely that this large increase in average herd size represents the effect on the average value of smaller, less productive herds IMI LFAs quitting dairying, or being classified as 'other farm types' when their share of their revenue from dairying fell.

SDL and SDS farms increased milk production per farm by similar amounts, 14.5% and 12.3% respectively. But whereas the average herd size increased on SDL farms by 2.8 cows it decreased on SDS farms, by 1.9 cows. SDS farms compensated for the reduction in average herd size by a 17.5% increase in milk yield per cow, outstripping the 12% average increase in yields on SDL farms. However, average milk yield per cow on SDS farms was 5,459 litres in 1996/97, significantly less than the 6,046 litres per cow achieved on SDL herds. Farms classified as O increased milk production per farm by 6%. This was the smallest average increase of any farm type category, and reflects the decrease in average herd size of 3.8 cows, which was compensated for by a 14% increase in yields per cow.

The increase in yield per cow for each farm type category reduced the range in the highest and lowest average milk yield between the four farm types. However, there remained a difference of 587 litres per cow between the average in the highest yielding SDL herds (6,049 litres) and the average of the lowest yielding SDS herds (5,459) in 1996/97.

The order in which the four categories of farm type are ranked by average milk yield per cow is similar to their order when ranked by average herd size; the order from largest to smallest was SDL, O, SDIMI and SDS.

Tables 6.1a and 6.1b also show different patterns in the development of average herd size and stocking rate. On SDS farms herd size fell slightly but stocking rate decreased by 20% over the ten years. On O farms, in contrast, the slight decrease in herd size was accompanied by fairly regular year-to-year increase in stocking rate, which increased by 26% over the ten years. This provides some evidence to suggest that feeding regimes differed between SDS and O farms, the former developing a higher reliance on own produced grass and silage, the latter depending more on concentrates. Table 6.2 shows that O farms fed more concentrates per cow than SDS farms. SDL farms fed the most concentrates and had the highest stocking rates each year.

The estimated hours of dairy specific regular labour per cow was highest on the smaller farms (SDS) and lowest on the larger (SDL) farms. Labour use on SDIMI farms fell between these two farms types, and was similar to that used on O farms, reflecting their similar average size.

Table 6.3 shows milk yield per cow by farm type. It clearly shows the consistently higher average milk yield per cow on SDL farms. The relatively large increase in milk yield per cow on SDIMI farms (20%) moved these farms off bottom place when ranked by milk yield per cow, which they occupied in 1987/88 and 1988/89; their place at the bottom of the milk yield per cow ranking was taken by SDS farms from 1989/90.

Table 6.5 shows that farms in the O category used most concentrates per cow in 1993/94 (1,905 kg), but in that year achieved the poorest concentrate/milk conversion ratio, at 0.34 kgs per litre. These farms reduced their concentrate use in the following year, and this lowered their concentrate/milk conversion ratio to 0.29. After the reduction in concentrate use on O farms, SDL farms became the largest concentrate

users on a per cow basis, but farmers on these farms managed their concentrate use to achieve a concentrate/milk conversion ratio between that of the average in the other farm type groups.

6.3 Financial performance by farm type

Tables 6.6a and 6.6b show the level and increase in total farm revenue over nine years. Larger farms reported the largest value of total farm revenue. The largest percentage increase in total farm revenue occurred on SDIMI farms, at 60.2%. This was followed by SDL (58.4%), SDIMI (38.5%) and SDS (32%). The average increase in prices over these nine years was 46%, so only farms in the SDIMI and SDL categories achieved a real increase in total farm revenue over this period.

Farms in the SDIMI category also achieved the largest percentage increase in the value of dairy output, of 90.6% over ten years. Farms in the SDL category increased the revenue from their dairy enterprise by 66.2%, those in the O category by 53.4% and those in the SDS category by 46.4%. The increase in prices over the ten years was 49.3%.

Therefore, although all categories recorded a nominal increase in the average value of the total farm and dairy enterprise output, there were real increases in both values on SDL and SDIMI farms only, and a real fall in both values on SDS farms.

The larger farmers benefited by the switch in the milk prices in their favour. The restructuring and growth in the average size of dairy herd on farms in the SDIMI category as more efficient farms expand and less efficient farms cease milking or became classified as non specialist dairy, allowed these farms to improve average dairy enterprise returns.

The increase in the returns of the dairy enterprise was in every case larger than the increase in the value of total farm output, even though the proportion of forage area to total farm area remained fairly constant over the nine years (increasing by an average of 2% on SDL farms, but decreasing by 3% on average on farms in the SDIMI and O category).

Because of the relatively larger growth in dairy enterprise revenues vis-à-vis other enterprises, farms on average became more dependent on the their dairy enterprise as a proportion of total farm revenue. Dairy enterprise revenue increased by 7.1, 6.4, 4.5 and 4.1 percentage points (over nine years) on SDL, SDIMI, O and SDS farms respectively. In 1996/97 the share of total farm output earned from the dairy enterprise was larger than the 70% for SDL, SDS and SDIMI, but only 40.7% on O farms.

During this time period, intervention support prices were lowered for cereal, protein and oilseed crops and arable area compensation payments paid conditional on the setting aside of land. The relative increase in milk revenue vis-à-vis alternative enterprises provides one possible explanation of why the number of farms in the O category has slightly increased over the ten year period.

Tables 6.6a and 6.6b show NFI per farm. For SDS farms NFI per farm remained largely unchanged, increasing by only £2,249 (19%) which was well below the 46% increase in prices, although the year-to-year variation was large. NFI on SDL farms increased by 48.7%, slightly more than price inflation. Although SDIMI farms recorded the largest percentage increase in NFI per farm (of 270% to £28,291), their average NFI remained 42% less than the £48,848 per farm earned on SDL farms in 1996/97.

NFI per farm was highest for farms in the O category. These were the largest farms.

Tables 6.7a and 6.7b focus more closely on the economics of the milk enterprise. Average milk returns were consistently higher on the larger specialist dairy farms. The highest average increase in milk yield per cow occurred on SDIMI farms (20%), followed by SDS (17%), SDL (12%) and O (10%). But the order changes when the categories are ranked by the average increase in milk returns to SDIMI, SDL, O and SDS. This is because the productivity increase achieved on SDS farms did not translate into a similar competitive position with respect to increases in the value of that output. The explanation of this is shown in Table 6.8; the average milk price on SDS farms in 1995/96 and 1996/97 was the lowest, and the range between the highest and lowest average milk price, though variable, stood at 0.84 ppl in 1996/97.

6.4   Milk returns and margin over concentrates

The range in average milk prices between the four farm type categories was variable (Table 6.8). In 1987/88 the gap was 0.48 ppl, this increased to 0.72 in 1990/91 before falling to 0.09 in 1993/94 and then increasing once more to 0.84 in 1996/97. For the first six years of the series SDIMI received the highest milk price, and for five of those six years SDL (the category with the largest average herd size) the lowest. However, the ranking changed after 1994/95 when SDL farms earned the highest average milk price in two of the final three years and SDS farms the lowest in two of the final four years.

In 1996/97, the ranking by average milk price matched that by the size of the dairy enterprise (when measured by either cow numbers or milk produced per farm), namely SDL, O, SDIMI and SDS. One possible reason for the similarity in the order when ranked by milk price and dairy herd size was the deregulation of the milk market in 1994. This led to the introduction of volume related milk payment by some milk purchasers. This development in milk pricing is connected to the choice farmers had in selecting between milk purchaser which is discussed further in Chapter 8.

Margin over concentrate is a broad indicator of the efficiency of milk production, and represents the difference between milk returns and concentrate feed costs. Table 6.9 shows that margin over concentrates in real terms increased on all farms. The average increase in the value of milk returns was larger than the average increase in concentrate feed costs. The trend towards a higher milk/concentrate price ratio is favourable for dairy farmers in the first three of the four years for which this ratio is calculated.

6.5 Gross margin by farm type

Tables 6.10 and 6.11 compare gross margin per cow and per forage hectare. Average variable costs per cow varied very little between farm type categories, though the less productive (in terms of milk yield per cow) SDS farms spent less on variable costs on average than the more productive SDL farms. That average gross margin per cow was lowest on SDS farms in nine of the ten years reflected the lower productivity of cows and lower milk price on these farms. The highest gross margin per cow was achieved by SDL farms, reflecting their high ranking in terms of milk production per cow and milk price and low variable costs per litre of milk produced.

The range in gross margin per cow increased from £70 in 1987/88 to £144 in 1996/97, indicating that smaller dairy farms were becoming less competitive over time. This trend is likely to be the same at the net margin level, as SDS farms were on average the smallest of the four categories.

SDL farms had the highest stocking rate and also the highest gross margin per cow, so, as shown in Table 6.11, they returned the highest gross margin per forage area.

6.6 Net farm income and financial structure

Table 6.12 shows trends in NFI per farm together with the average interest paid per farm. The highest average repayments occurred in 1990/91, when the interest payment to NFI ratio was 56.6%, 38.2%, 37.6% and 29% on O, SDL, SDS and SDIMI farms respectively. After 1990/91 NFI tended to increase whilst interest repayments started to fall (until 1994/95), so interest payments became a smaller proportion of NFI. This was particularly so on farms in the O category. Interest payments increased across each category in 1995/96.

Table 6.14 summarises the financial structure of the farms by farm type. For the full sample interest payments as a percentage of NFI and leverage have declined since 1990/91. In 1995/96 borrowings stood at between 10.7% and 13.3% of assets. Together with the falling trend in the ratio of interest payments to NFI the farms, on average, appear to be increasingly financially stable. However, a relatively high proportion of the borrowing on SDS and O farms has been arranged as short-term loans, which are generally less secure than loans advanced on longer-term arrangements.

However, borrowing on farms has grown by more that the increase in the value of the total farm output. For example, borrowing on SDS farms increased by 38% over the nine years, which is more than the ten year 32% increase in total farm revenue (Table 6.6a). The absolute and relative decrease in interest payments reflects the lower cost of borrowing towards the end of the time period.

Average net worth for farms in each category was positive. The category with the smallest average net worth was the SDS farms (at £247,455), and farms in the O category had the largest average net worth (at £824,434).

6.7 Summary

This chapter presents the findings from the DECS/SSEMP/FBS surveys by four categories of farm type: three categories of specialist dairy; small, less than or equal to 60 cows (SDS); large, greater than 60 cows (SDL); and located inside or mostly inside a LFA (SDIMI): and one category for farms not classified as specialist dairy farms but as others (O). The key finding of this chapter are:

(i) The number of specialist dairy farms in the underlying population located IMI a LFA decreased by 52% between 1987/88 and 1996/97. The percentage decline in specialist dairy farms was about 8%, while farms classified in the O category increased in number.

(ii) Average farm size and average milk yields per farm were highly correlated. For example, in 1996/97 farms in the SDL category were the largest on average (111.2 cows) and achieved the largest yield per cow (of 6,046 litres), O farms averaged 68.9 cows and yielded 5,881 litres per cow, SDIMI farms averaged 65.6 cows and yielded 5,809 litres per cow and farms in the SDS category were the smallest, averaging 40.1 cows and yielding 5,459 litres per cow.

(iii) Average milk yields per farm increased by 42% on SDIMI farms, 14% on SDL farms, 12.3% on SDS farms, and 6% on O farms.

(iv) These increases in farm production were achieved through different combinations of change in herd size and milk yields per cow. Herd size increased by 10.3 and 2.8 cows on SDIMI and SDL farms while milk yields per cow increased by 20% and 12% respectively. Average herd size fell by 1.9 and 2.9 cows on SDS and O farms respectively, but yields per cow increased by 17.5 and 10% respectively.

(v) The range in average milk prices between the four farm type categories was variable. In 1987/88 the range was 0.48 ppl, this increased to 0.72 in 1990/91 before decreasing to 0.09 in 1993/94 and then increasing once more to 0.84 in 1996/97.

(vi) In the first six years farms in the SDIMI category received the highest average milk price and for five of those six years farms in the SDL category - the category with the largest average herd size - the lowest milk price. However, after 1994/95 SDL farms earned the highest average milk price in two of the final three years and SDS farms the lowest in two of the final four years.

(vii) Of the four farm type categories, SDS farms were under the most severe pressure. They had the smallest average herd size and produced less milk per farm and per cow. In 1995/96 and 1996/97 they received the lowest average milk price. Low yields and milk prices resulted in their consistently reporting the lowest margin over concentrate for any farm type category. They reported the lowest gross margin per cow in all ten years and the lowest gross margin per forage hectare in three years between 1993/94 and 1996/97.

(viii) NFI on SDS farms after repayment of interest charges appeared barely adequate to provide what might reasonably be regarded as an acceptable return to farmer and spouse's labour.

(ix) Farms in the O category reduced their average herd size. These farmers recorded the lowest percentage increase in milk produced per cow and per farm. However, the proportion of revenue earned from the dairy enterprise increased even though the share of land used in the dairy enterprise remained largely unchanged.

(x) It is likely that some of the farmers in the O category remained in dairying because of the relative prosperity of dairy enterprises vis-à-vis other enterprises. The evidence for this is the growth in the value of their dairy enterprise which outstripped the growth in the value of other enterprises without a corresponding increase in land used by the dairy enterprise. The relatively stronger growth in dairy revenues compared with the revenue from alternative enterprises may have been affected by the introduction of arable area payments, and linking entitlement to these payment with the requirement to set aside eligible land.

(xi) In 1996/97 the order of the four farm type categories ranked by average milk price was identical to the order when ranked by dairy enterprise size (measured as either herd size or milk production per farm), namely SDL, O, SDIMI and SDS. A possible contributory reason for the similarity in the ordering was the deregulation of the milk market in 1994 which led many milk purchasers to introduce volume related milk payment.

Table 6.1a Details of farms by farm type

	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94	1994/95	1995/96	1996/97
SPECIALIST DAIRY (LESS THAN 60 COWS)										
Number of farms (unweighted)	55	56	50	62	62	65	60	70	71	74
Number of farms ('000)	7.5	6.6	6.1	7.3	6.7	7.2	6.4	6.8	6.7	6.9
Farm area (adjusted ha)	38.5	38.6	34.3	34.9	35.0	35.5	38.3	39.4	37.7	44.4
Forage area used in dairy ent'	21.9	22.4	22.7	22.3	22.9	23.1	23.3	22.1	21.1	26.0
Milk produced per farm ('000 ltrs)	195.1	208.6	211.9	201.6	206.2	208.4	212.7	202.9	204.5	219.0
Average herd size (cows)	42	42.2	42.7	40.0	40.6	40.4	40.8	39.7	38.6	40.1
Biological milk yield (ltre/cow)	4,645	4,943	4,962	5,039	5,080	5,158	5,214	5,112	5,298	5,459
Forage area per cow (ha/cow)	0.52	0.53	0.53	0.56	0.56	0.57	0.57	0.56	0.55	0.64
Stocking rate (cows / forage ha).	1.92	1.89	1.88	1.79	1.78	1.75	1.75	1.80	1.83	1.54
SPECIALIST DAIRY (60 COWS OR MORE)										
Number of farms (unweighted)	173	174	182	180	172	176	165	182	175	176
Number of farms ('000)	12.0	10.8	10.6	10.3	10.5	10.5	10.3	10.3	10.7	10.9
Farm area (adjusted ha)	90.2	92.1	87.8	87.9	87.6	87.6	88.4	92.2	94.1	100.0
Forage area used in dairy ent'	54.1	54.5	54.2	54.8	55.7	57.4	56.6	55.0	57.3	62.1
Milk produced per farm ('000 ltrs)	587.1	606.6	612.8	650.0	654.9	662.1	669.1	665.3	708.7	672.3
Average herd size (cows)	108.4	111.5	111.9	113.6	112.2	112.7	115.3	113.2	115.6	111.2
Biological milk yield (ltrs/cow)	5,416	5,440	5,476	5,722	5,837	5,875	5,803	5,877	6,131	6,046
Forage area per cow (ha/cow)	0.50	0.49	0.49	0.48	0.50	0.51	0.49	0.49	57.3	0.56
Stocking rate (cows / forage ha).	2.0	2.05	2.06	2.07	2.02	1.96	2.04	2.06	2.02	1.79

Table 6.1b Details of farms by farm type

	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94	1994/95	1995/96	1996/97
DAIRY FARM INSIDE LFA										
Number of farms (unweighted)	130	137	91	84	74	65	67	78	86	71
Number of farms ('000)	10.3	10.2	6.8	5.3	5.3	5.2	6.0	6.0	6.0	5.0
Farm area (adjusted ha)	62.6	61.8	51.8	55.6	55.5	57.4	57.5	62.1	66.8	67.9
Forage area used in dairy ent'	37.5	37.1	35.0	40.4	36.1	35.7	33.7	33.2	36.3	38.5
Milk produced per farm ('000 ltrs)	268.3	271.2	277.2	308.4	298.2	291.8	312.8	320.8	341.0	380.9
Average herd size (cows)	55.3	55.4	54.4	59.2	57.0	55.3	58.4	58.7	62.0	65.6
Biological milk yield (ltre/cow)	4,852	4,895	5,096	5,210	5,232	5,276	5,357	5,465	5,500	5,809
Forage area per cow (ha/cow)	0.68	0.67	0.64	0.68	0.63	0.65	0.58	0.57	0.59	0.59
Stocking rate (cows / forage ha).	1.48	1.50	1.55	1.46	1.58	1.55	1.73	1.77	1.71	1.70
OTHER FARM TYPES										
Number of farms (unweighted)	53	58	100	114	101	85	89	56	62	56
Number of farms ('000)	4.1	4.8	8.1	8.8	8.5	6.2	7.8	4.0	4.6	4.3
Farm area (adjusted ha)	169.6	145.1	121.5	125.3	125.4	130.4	125.3	163.3	151.0	156.2
Forage area used in dairy ent'	55.2	48.3	39.9	41.8	42.6	45.8	34.2	38.5	39.2	42.1
Milk produced per farm ('000 ltrs)	382.4	354.6	326.1	322.1	314.5	363.3	340.9	391.3	405.2	405.3
Average herd size (cows)	71.8	67.2	63	61.1	58.2	65.4	60.3	69.1	68.0	68.9
Biological milk yield (ltrs/cow)	5,326	5,277	5,219	5,272	5,404	5,555	5,654	5,663	5,959	5,881
Forage area per cow (ha/cow)	0.77	0.72	0.63	0.68	0.73	0.70	0.57	0.56	0.58	0.61
Stocking rate (cows / forage ha).	1.30	1.39	1.58	1.46	1.37	1.43	1.76	1.79	1.73	1.64

Table 6.2 Changes of inputs and output over time by farm type

	1993/94	1994/95	1995/96	1996/97	1993/94	1994/95	1995/96	1996/97
	SPECIALIST DAIRY (LESS THAN 60 COWS)				SPECIALIST DAIRY (60 COWS OR MORE)			
Nitrogen on grassland (kg/ha)	133	148	157	142	198	206	202	179
Phosphate on grassland (kg/ha)	14	13	13	40	13	13	14	52
Potassium on grassland (kg/ha)	21	23	19	24	24	22	26	29
Concentrate feed:								
Purchased compound (kg/cow)	1,411	1,388	1,470	1,368	1,347	1,242	1,308	1,238
Purchased straights (kg/cow)	74	70	91	113	424	412	483	328
Home grown straights (kg/cow)	88	77	73	77	119	96	83	97
Total Concentrates (kg/cow)	1,573	1,535	1,633	1,560	1,890	1,750	1,875	1,670
Total Concentrates (kg/litre)	0.30	0.30	0.31	0.29	0.33	0.30	0.31	0.28
Average price of purchased conc' (£/t)	152	154	154	156	146	155	154	160
Total direct labour (hr/cow)	53.0	51.0	53.4	54.3	34.2	34.3	33.3	32.2
of which farmer and spouse	38.6	36.5	38.4	45.4	12.4	12.3	12.1	13.3
of which contract milking	0.8	0.8	1.2	0.7	1.6	1.8	1.9	0.9
Total hrs per cow [1]	54.3	51.7	54.6	na	35.0	35.0	34.1	na
	DAIRY FARM INSIDE LFA				OTHERS			
Nitrogen on grassland (kg/ha)	139	185	166	179	151	158	174	156
Phosphate on grassland (kg/ha)	13	16	18	50	14	12	14	46
Potassium on grassland (kg/ha)	21	25	27	32	20	20	20	26
Concentrate feed:								
Purchased compound (kg/cow)	1,425	1,341	1,492	1,214	1,402	1,171	1,228	1,185
Purchased straights (kg/cow)	272	247	264	383	306	240	385	279
Home grown straights (kg/cow)	34	48	86	85	197	217	170	166
Total Concentrates (kg/cow)	1,731	1,636	1,812	1590	1,905	1,628	1,783	1,630
Total Concentrates (kg/litre)	0.32	0.30	0.33	0.27	0.34	0.29	0.30	0.28
Average price of purchased conc' (£/t)	157	152	154	160	134	157	157	191
Total direct labour (hr/cow)	39.4	36.9	40.1	36.8	44.5	39.4	41.0	37.5
of which farmer and spouse	22.8	20.0	22.3	22.2	16.5	12.2	11.8	12.2
of which contract milking	0.3	0.7	0.0	0.2	0.7	0.1	0.3	1.0
Total hrs per cow [1]	40.2	37.8	41.7	na	44.9	40.1	41.8	na

[1] Total hours per cow includes causal labour and share of forage casual labour, it excludes regular labour used in forage production and milk processing on farm.

Table 6.3 Milk Yield excluding waste (litres per cow) by farm type

Farm type	Yield per cow (litres)										Change (%)
	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94	1994/95	1995/96	1996/97	
Dairy farm (<60 cows)	4,949	4,943	4,962	5,039	5,080	5,158	5,200	5,081	5,287	5,459	510(10)
Dairy farm (60 cows or more)	5,416	5,440	5,504	5,722	5,837	5,875	5,797	5,838	6,120	6,046	360(12)
Dairy farm inside LFA	4,852	4,895	5,096	5,210	5,232	5,276	5,357	5,397	5,497	5,809	957(20)
Others	5,326	5,277	5,219	5,272	5,404	5,555	5,643	5,645	5,948	5,881	555(10)

Table 6.4 Forage area per cow (ha) by farm type

Farm type	Forage area per cow (ha)									
	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94	1994/95	1995/96	1996/97
Dairy farm (<60 cows)	0.52	0.53	0.53	0.56	0.56	0.57	0.57	0.56	0.55	0.65
Dairy farm (60 cows or more)	0.50	0.49	0.49	0.48	0.50	0.51	0.49	0.49	0.50	0.56
Dairy farm inside LFA	0.68	0.67	0.64	0.68	0.63	0.65	0.58	0.57	0.59	0.59
Others	0.77	0.72	0.63	0.68	0.73	0.70	0.57	0.56	0.58	0.61

Table 6.5 Concentrate feed input by farm type

Farm type	Concentrate feed (kg/cow)				Concentrate feed (kg/litre)			
	1993/94	1994/95	1995/96	1996/97	1993/94	1994/95	1995/96	1996/97
Dairy farm (<60 cows)	1,573	1,535	1,633	1,560	0.30	0.30	0.31	0.29
Dairy farm (60 cows or more)	1,890	1,750	1,875	1,670	0.33	0.30	0.31	0.28
Dairy farm inside LFA	1,731	1,636	1,812	1,590	0.32	0.30	0.33	0.27
Others	1,905	1,628	1,783	1,630	0.34	0.29	0.30	0.28

Table 6.6a Financial performance indicators of dairy enterprise and farm (current prices) by farm type

(£/cow)

	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94	1994/95	1995/96	1996/97
SPECIALIST DAIRY FARM (LESS THAN 60 COWS)										
Dairy enterprise output	873	958	1,035	1,006	1,049	1,128	1,151	1,208	1,329	1,339
Concentrate feed costs	194	190	210	207	204	207	237	235	252	238
Total variable costs	340	335	376	389	405	409	446	484	511	515
Gross margin	533	623	658	617	644	719	771	724	818	824
Dairy specific regular labour [1]	na	na	na	na	na	na	418	413	451	350
Margin after labour	na	na	na	na	na	na	353	311	366	474
Dairy enterprise output (farm)	36,691	40,431	44,164	40,211	42,621	45,586	49,583	47,914	51,327	53,720
Total farm output	53,682	58,142	57,771	51,051	55,849	65,601	67,408	65,735	70,895	na
Dairy to total farm output (%)	68.3	69.5	76.4	78.8	76.3	69.5	73.6	72.9	72.4	na
Net farm income (£ per farm)	12,085	16,873	15,841	9,524	12,259	20,166	15,736	13,075	14,334	na
(£ per hectare)	314	437	462	272	350	568	411	332	380	na
SPECIALIST DAIRY FARM (60 COWS OR MORE)										
Dairy enterprise output	943	1,052	1,133	1,090	1,189	1,284	1,349	1,390	1,540	1,528
Concentrate feed costs	192	199	221	231	219	233	262	260	278	257
Total variable costs	340	360	401	427	435	450	492	529	573	559
Gross margin	603	692	732	706	754	834	857	861	967	968
Dairy specific regular labour [1]	na	na	na	na	na	na	242	225	259	205
Margin after labour	na	na	na	na	na	na	615	606	708	763
Dairy enterprise output (farm)	102,197	117,258	126,747	128,821	133,470	144,715	155,484	157,335	178,083	169,870
Total farm output	143,980	160,605	166,524	164,372	174,392	205,478	202,327	202,788	228,122	na
Dairy to total farm output (%)	71	73.0	76.1	78.4	76.5	70.4	76.8	77.6	78.1	na
Net farm income (£ per farm)	32,849	42,686	42,009	29,617	39,317	63,049	50,274	41,662	48,848	na
(£ per hectare)	364	463	478	337	449	723	569	452	519	na

[1] Dairy specific labour excludes labour used in milk processing and in forage production.

Table 6.6b Financial performance indicators of dairy enterprise and farm (current prices) by farm type

	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94	1994/95	1995/96	1996/97
					(£/cow)					
DAIRY FARM INSIDE LFA										
Dairy enterprise output	889	984	1,076	1,092	1,113	1,181	1,257	1,220	1,396	1,430
Concentrate feed costs	208	218	227	209	221	236	262	255	275	244
Total variable costs	328	355	372	371	415	417	467	497	532	558
Gross margin	562	629	704	721	699	763	789	752	863	872
Dairy specific regular labour [1]	na	na	na	na	na	na	261	280	294	241
Margin after labour	na	na	na	na	na	na	528	472	570	631
Dairy enterprise output (farm)	49,173	54,543	58,524	64,622	63,429	65,245	73,443	73,403	86,482	93,762
Total farm output	74,633	83,153	79,416	82,790	84,938	96,399	103,726	100,432	119,556	na
Dairy to total farm output (%)	65.9	65.6	73.7	78.1	74.7	67.7	70.8	73.1	72.3	na
Net farm income (£ per farm)	7,636	23,488	21,874	19,564	19,444	28,902	27,364	20,400	28,291	na
(£ per hectare)	287	380	422	352	350	504	476	328	423	na
OTHER										
Dairy enterprise output	920	1,043	1,087	1,068	1,122	1,227	1,245	1,325	1,509	1,470
Concentrate feed costs	213	214	238	225	224	234	252	239	361	251
Total variable costs	359	366	398	395	399	411	450	461	517	514
Gross margin	561	678	689	673	723	816	871	864	992	956
Dairy specific regular labour [1]	na	na	na	na	na	na	292	277	293	238
Margin after labour	na	na	na	na	na	na	580	588	699	718
Dairy enterprise output (farm)	65,998	70,078	68,535	65,256	65,376	80,191	79,707	91,572	102,571	101,277
Total farm output	182,207	171,188	145,872	144,457	151,829	187,242	177,401	237,501	252,305	na
Dairy to total farm output (%)	36.2	40.9	47.0	45.2	43.1	42.8	44.9	38.6	40.7	na
Net farm income (£ per farm)	21,808	26,954	24,158	17,250	25,594	43,779	38,763	47,695	61,236	na
(£ per hectare)	129	186	199	138	204	336	309	292	405	na

[1] Dairy specific labour excludes labour used in milk processing and in forage production.

Table 6.7a Dairy enterprise output and variable costs 1987/88 to 1996/97 (£/cow) by farm type[1]

	1987/88	1988/89	1989/90	1990/91	1991/92 (£/cow)	1992/93	1993/94	1994/95	1995/96	1996/97
SPECIALIST DAIRY FARM (LESS THAN 60 COWS)										
Milk Returns (A)	821	872	962	978	996	1,075	1,151	1,171	1,310	1,331
EU superlevy (B)	7	2	3	1	2	-	1	2	5	3
Compensation (for susp' of quota) (C)	19	25	21	19	19	15	14	10	8	9
Herd Replacement Costs (D)	50	40	52	71	52	68	71	87	89	90
Calf sales (E)	90	103	107	81	85	106	123	116	107	91
Industry Development Council Levy (F)	-	-	-	-	-	-	-	-	2	-
Dairy enterprise output (A+C+E–B–D–F)	873	958	1,035	1,006	1,049	1,128	1,217	1,208	1,329	1,339
Concentrate feed	194	190	210	207	204	207	237	235	252	238
Total variable costs[2]	340	335	376	389	405	409	446	484	511	515
Gross Margin	533	623	658	617	644	719	771	724	818	824
Dairy enterprise output (1987/88 £)	873	888	888	797	799	843	889	853	913	897
Gross Margin (1987/88 £)	533	578	564	484	490	537	563	511	562	552
SPECIALIST DAIRY FARM (60 COWS OR MORE)										
Milk Returns (A)	886	955	1,048	1,090	1,133	1,219	1,279	1,355	1,534	1,525
EU superlevy (B)	7	1	2	-	1	-	-	4	10	2
Compensation (for susp' of quota) (C)	18	27	23	22	21	18	14	11	8	11
Herd Replacement Costs (D)	43	39	45	52	49	64	70	85	96	95
Calf sales (E)	89	110	110	74	84	11	127	113	109	89
Industry Development Council Levy (F)	-	-	-	-	-	-	-	-	2	-
Dairy enterprise output (A+C+E–B–D–F)	943	1,052	1,133	1,134	1,189	1,284	1,349	1,390	1,540	1,528
Concentrate feed	192	199	221	231	219	233	262	260	278	257
Total variable costs[2]	340	360	401	427	435	450	492	529	573	559
Gross Margin	603	692	732	706	754	834	857	861	967	968
Dairy enterprise output (1987/88 £)	943	975	972	898	905	960	985	981	1,058	1,024
Gross Margin (1987/88 £)	603	641	628	559	574	623	626	608	664	648

[1] Figures may not necessarily add due to rounding. [2] Includes share of contract costs.

Table 6.7b Dairy enterprise output and variable costs 1987/88 to 1996/97 (£/cow) by farm type [1]

	(£/cow)									
	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94	1994/95	1995/96	1996/97
DAIRY FARM INSIDE LFA										
Milk Returns (A)	817	887	988	1,030	1,046	1,110	1,181	1,220	1,371	1,428
EU superlevy (B)	5	1	2	1	-	-	-	2	9	5
Compensation (for susp' of quota) (C)	17	24	22	21	19	16	12	10	8	11
Herd Replacement Costs (D)	40	37	41	46	46	59	71	96	80	97
Calf sales (E)	100	111	109	88	94	113	135	118	108	92
Industry Development Council Levy (F)	-	-	-	-	-	-	-	-	2	-
Dairy enterprise output (A+C+E-B-D-F)	889	984	1,076	1,092	1,113	1,181	1,257	1,250	1,396	1,430
Concentrate feed	208	218	227	209	221	236	262	255	275	244
Total variable costs [2]	328	355	372	371	415	417	467	497	532	558
Gross Margin	562	629	704	721	699	763	790	752	863	872
Dairy enterprise output (1987/88 £)	889	912	923	865	848	883	918	882	959	958
Gross Margin (1987/88 £)	562	583	604	571	532	570	577	531	593	584
OTHER										
Milk Returns (A)	879	942	1,009	1,014	1,062	1,162	1,245	1,306	1,493	1,478
EU superlevy (B)	5	1	1	-	-	-	-	3	10	4
Compensation (for susp' of quota) (C)	19	30	23	21	18	17	15	10	9	9
Herd Replacement Costs (D)	58	36	46	43	44	53	64	91	81	105
Calf sales (E)	84	108	103	76	85	101	126	103	101	91
Industry Development Council Levy (F)	-	-	-	-	-	-	-	-	2	-
Dairy enterprise output (A+C+E-B-D-F)	920	1,043	1,087	1,068	1,122	1,227	1,321	1,325	1,509	1,470
Concentrate feed	213	214	238	225	224	234	252	329	261	251
Total variable costs [2]	359	366	398	395	399	411	450	461	517	514
Gross Margin	561	678	689	673	723	816	871	864	992	956
Dairy enterprise output (1987/88 £)	920	967	932	846	854	917	965	935	1,037	985
Gross Margin (1987/88 £)	561	628	591	533	551	610	636	610	682	640

[1] Figures may not necessarily add due to rounding. [2] Includes share of contract costs.

Table 6.8 Milk returns (1987/88 to 1996/97) by farm type

	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94	1994/95	1995/96	1996/97
					(£/cow)					
SPECIALIST DAIRY FARM (LESS THAN 60 COWS)										
Milk Yield (ltrs/cow, ex waste)	4,949	4,943	4,962	5,039	5,080	5,158	5,200	5,081	5,287	5,459
Price (p/litre)	16.58	17.65	19.28	19.38	19.64	20.83	22.13	23.06	24.77	24.38
Milk Returns (current £)	821	872	962	978	996	1,075	1,151	1,171	1,310	1,331
Milk Returns (1987/88 £)	821	808	825	775	758	803	841	526	900	892
SPECIALIST DAIRY FARM (60 COWS OR MORE)										
Milk Yield (ltrs/cow, ex waste)	5,416	5,440	5,504	5,722	5,837	5,875	5,797	5,838	6,120	6,046
Price (p/litre)	16.36	17.56	19.04	19.04	19.42	20.75	22.06	23.22	25.06	25.22
Milk Returns (current £)	886	955	1,048	1,090	1,133	1,219	1,279	1,355	1,534	1,525
Milk Returns (1987/88 £)	886	885	899	864	863	911	934	956	1,054	1,022
DAIRY FARM INSIDE LFA										
Milk Yield (ltrs/cow, ex waste)	4,852	4,895	5,096	5,210	5,232	5,276	5,357	5,397	5,497	5,809
Price (p/litre)	16.84	18.11	19.35	19.76	20.00	21.04	22.04	22.60	24.94	24.59
Milk Returns (current £)	817	887	988	1,030	1,046	1,110	1,181	1,220	1,371	1,428
Milk Returns (1987/88 £)	817	822	847	816	797	830	863	861	942	957
OTHER										
Milk Yield (ltrs/cow, ex waste)	5,326	5,277	5,219	5,272	5,404	5,555	5,643	5,645	5,948	5,881
Price (p/litre)	16.51	17.85	19.31	19.23	19.66	20.91	22.07	23.14	25.10	25.14
Milk Returns (current £)	879	942	1,009	1,014	1.062	1,162	1,245	1,306	1,493	1,478
Milk Returns (1987/88 £)	879	873	865	803	809	868	910	822	1,026	990
Highest less lowest										
Range in Milk prices	0.48	0.55	0.31	0.72	0.58	0.29	0.09	0.62	0.33	0.84

Table 6.9 Margin over concentrates 1987/88 to 1996/97 by farm type [1]

(£/cow)

	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94	1994/95	1995/96	1996/97
SPECIALIST DAIRY FARM (LESS THAN 60 COWS)										
Milk returns	821	872	962	978	996	1,075	1,151	1,171	1,310	1,331
Concentrate feed costs	194	190	210	207	204	207	237	235	252	238
Margin over concentrates	627	680	751	771	794	868	914	936	1,057	1,093
Margin over conc, & bulk feed	611	666	733	752	776	851	899	916	1,030	1,064
Margin over concentrates (1987/88 £)	611	617	629	596	591	636	657	646	708	713
Milk: conc' price ratio (ppl:ppkg)	na	na	na	na	na	na	1.51	1.54	1.66	1.60
SPECIALIST DAIRY FARM (60 COWS OR MORE)										
Milk returns	886	955	1,048	1,090	1,133	1,219	1,279	1,355	1,534	1,525
Concentrate feed costs	192	199	221	231	219	233	262	260	278	257
Margin over concentrates	695	755	827	859	915	986	1,017	1,096	1,256	1,268
Margin over conc, & bulk feed	681	742	809	839	897	969	991	1,064	1,213	1,237
Margin over concentrates (1987/88 £)	681	688	694	665	683	724	724	751	833	829
Milk: conc' price ratio (ppl:ppkg)	na	na	na	na	na	na	1.62	1.60	1.72	1.64
DAIRY FARM INSIDE LFA										
Milk returns	817	887	988	1,030	1,046	1,110	1,181	1,220	1,371	1,428
Concentrate feed costs	208	218	227	209	221	236	262	255	275	244
Margin over concentrates	609	667	761	821	825	874	918	965	1,095	1,185
Margin over conc, & bulk feed	596	653	747	808	812	863	894	939	1,067	1,159
Margin over concentrates (1987/88 £)	596	605	641	640	618	645	653	663	733	776
Milk: conc' price ratio (ppl:ppkg)	na	na	na	na	na	na	1.48	1.51	1.67	1.61
OTHER										
Milk returns	879	942	1,009	1,014	1,062	1,162	1,245	1,306	1,493	1,478
Concentrate feed costs	213	214	238	225	224	234	252	239	261	251
Margin over concentrates	666	727	771	789	839	928	993	1,067	1,231	1,227
Margin over conc, & bulk feed	656	718	756	775	828	916	970	1,034	1,195	1,188
Margin over concentrates (1987/88 £)	656	666	648	614	631	685	709	730	821	796
Milk: conc' price ratio (ppl:ppkg)	na	na	na	na	na	na	1.70	1.61	1.75	1.64

[1] Figures may not necessarily add due to rounding.

Table 6.10 Gross margin per cow 1987/88 to 1996/97 by farm type [1]

	Gross margin (£/cow)									
	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94	1994/95	1995/96	1996/97
SPECIALIST DAIRY FARM (LESS THAN 60 COWS)										
Dairy enterprise output	873	958	1,035	1,006	1,049	1,128	1,217	1,208	1,329	1,339
Total variable costs	340	335	376	389	405	409	446	484	511	515
Gross Margin	533	623	658	617	644	719	771	724	818	824
Gross Margin (1987/88 £)	533	578	564	484	490	537	563	511	562	552
SPECIALIST DAIRY FARM (60 COWS AND MORE)										
Dairy enterprise output	943	955	1,048	1,134	1,189	1,219	1,349	1,390	1,540	1,528
Total variable costs	340	360	401	427	435	450	492	529	573	559
Gross Margin	603	692	732	706	754	834	857	861	967	968
Gross Margin (1987/88 £)	603	641	628	559	574	623	626	608	664	648
DAIRY FARM INSIDE LFA										
Dairy enterprise output	817	984	1,076	1,092	1,113	1,181	1,181	1,220	1,396	1,430
Total variable costs	328	355	372	371	415	417	467	497	532	558
Gross Margin	562	629	704	721	699	763	714	752	863	872
Gross Margin (1987/88 £)	562	583	604	571	532	570	577	531	593	584
OTHER										
Dairy enterprise output	879	1,043	1,087	1,068	1,122	1,162	1,321	1,306	1,509	1,470
Total variable costs	359	366	398	395	399	411	450	461	517	514
Gross Margin	561	678	689	673	723	816	871	864	992	956
Gross Margin (1987/88 £)	561	628	591	533	551	610	636	610	682	640
Highest less lowest										
Range in gross margin	70	69	74	104	110	115	157	140	174	144

[1] Figures may not necessarily add due to rounding.

Table 6.11 Gross margin per forage area 1987/88 to 1996/97 by farm type [1]

					Gross margin (£/forage ha)					
	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94	1994/95	1995/96	1996/97
SPECIALIST DAIRY FARM (LESS THAN 60 COWS)										
Dairy enterprise output	1,674	1,807	1942	1,800	1,865	1,971	2,129	2,169	2,426	2,066
Total variable costs	652	632	706	697	719	715	780	869	932	795
Gross Margin	1,022	1,175	1,236	1,103	1,145	1,256	1,348	1,300	1,493	1,271
Gross Margin (1987/88 £)	1,022	1,089	1,060	874	872	939	985	917	1,026	851
SPECIALIST DAIRY FARM (60 COWS AND MORE)										
Dairy enterprise output	1,889	2,153	2,336	2,351	2,397	2,521	2,747	2,860	3,109	2,734
Total variable costs	681	736	827	886	877	883	1,001	1,088	1,156	1,001
Gross Margin	1,207	1,417	1,510	1,465	1,520	1,638	1,746	1,772	1,953	1,733
Gross Margin (1987/88 £)	1,207	1,314	1,295	1,161	1,158	1,224	1,275	1,251	1,342	1,161
DAIRY FARM INSIDE LFA										
Dairy enterprise output	1,313	1,472	1,671	1,600.0	1,759	1,825	2,177	2,207	2,380	2,436
Total variable costs	484	531	578	544	655	645	810	879	908	951
Gross Margin	829	941	1,094	1,056	1,104	1,178	1,367	1,329	1,472	1,485
Gross Margin (1987/88 £)	829	872	938	837	841	880	999	938	1,011	995
OTHER										
Dairy enterprise output	1,195	1,452	1,718	1,562	1,534	1,751	2,195	2,376	2,614	2,407
Total variable costs	466	509	629	578	546	587	794	826	896	841
Gross Margin	729	943	1,089	984	988	1,165	1,536	1,549	1,718	1,565
Gross Margin (1987/88 £)	729	874	934	780	752	871	1,122	1,093	1,180	1,048

[1] Figures may not necessarily add due to rounding.

Table 6.12 Net farm income per farm by farm type

Farm type	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94	1994/95	1995/96	1996/97
						Net farm income (£/farm)				
Dairy farm (<60 cows)	12,085	16,873	15,841	9,524	12,259	20,166	15,736	13,075	14,334	na
Dairy farm (60 cows or more)	32,849	42,686	42,009	29,617	39,317	63,049	50,274	41,662	48,848	na
Dairy farm (inside LFA)	17,978	23,488	21,874	19,564	19,444	28,902	27,364	20,400	28,291	na
Other	21,808	26,954	24,158	17,350	25,594	43,779	38,763	47,695	61,236	na
Interest paid										
Dairy farm (<60 cows)	2,067	2,367	2,793	3,281	2,677	2,183	1,790	1,906	2,108	na
Dairy farm (60 cows or more)	6,189	7,699	10,060	11,315	10,185	9,034	6,935	7,214	8,492	na
Dairy farm (inside LFA)	3,350	3,888	4,286	5,683	5,407	4,367	3,622	3,101	3,994	na
Others	9,521	8,543	9,505	9,820	7,616	7,433	5,075	7,309	8,267	na

Table 6.13 Net farm income per hectare (£/ha)

Farm type	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94	1994/95	1995/96	1996/97
						Net farm income (£/ha)				
Dairy farm (<60 cows)	314	437	462	272	350	568	411	332	380	na
Dairy farm (60 cows or more)	364	463	478	337	449	723	569	452	519	na
Dairy farm (inside LFA)	287	380	422	352	350	504	476	328	423	na
Others	129	186	199	138	204	336	309	292	405	na

Table 6.14 Summary of financial structure (end of year)

	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94	1994/95	1995/96	1996/97
Dairy farm (<60 cows)										
Total assets	179,177	208,675	239,204	238,708	250,416	248,221	254,768	259,921	277,157	na
Total liabilities	21,477	23,370	26,528	26,335	25,039	22,532	25,122	27,019	29,702	na
Leverage	11.5	11.2	11.1	11.0	10.0	9.1	9.9	10.4	10.7	na
Annual change in liabilities	-187	1,328	4,647	2,006	-143	-12	1,707	2,245	3,175	na
Short term liab': total liab'	na	na	51.1	58.3	58.4	66.4	59.1	57.9	59.8	na
Net worth	166,002	185,304	212,676	212,373	225,376	225,690	229,646	232,902	247,455	na
Dairy farm (60 cows or more)										
Total assets	410,169	487,093	584,762	609,557	618,342	652,839	681,167	766,086	843,980	na
Total liabilities	64,509	79,161	84,314	92,871	87,904	92,933	89,343	100,688	112,004	na
Leverage	15.7	16.3	14.4	15.2	14.2	14.2	13.1	13.1	13.3	na
Annual change in liabilities	-3,369	4,008	4,331	8,702	810	360	3,054	10,437	5,759	na
Short term liab': total liab'	na	na	51.8	55.1	55.0	50.4	53.0	47.4	47.6	na
Net worth	345,660	407,932	500,448	516,686	530,438	559,906	591,824	665,398	731,976	na
Dairy farm (inside LFA)										
Total assets	216,014	250,365	280,658	321,469	319,512	316,801	359,666	388,735	449,188	na
Total liabilities	31,819	37,208	35,115	43,535	46,052	44,437	48,098	45,456	52,971	na
Leverage	14.7	14.9	12.5	13.5	14.4	14.0	13.4	11.7	11.7	na
Annual change in liabilities	441	4,228	3,118	3,238	2,315	-251	5,231	5,444	4,722	na
Short term liab': total liab'	na	na	55.4	51.1	54.8	53.9	54.8	53.2	48.7	na
Net worth	184,195	213,157	245,545	277,933	273,460	272,362	311,568	343,279	396,517	na
Others										
Total assets	586,716	637,680	568,037	572,722	581,791	634,091	642,114	892,703	936,695	na
Total liabilities	100,351	80,125	77,564	79,546	72,681	72,596	69,947	104,738	106,517	na
Leverage	17.1	12.6	13.7	13.9	12.5	11.4	10.9	11.7	12.0	na
Annual change in liabilities	4,468	487	4,426	6,778	3,677	-3,591	7,643	-13,549	5,833	na
Short term liab': total liab'	na	na	62.6	66.9	54.2	49.6	50.4	57.9	57.3	na
Net worth	486,351	557,555	490,473	493,176	509,109	561,495	572,167	787,965	824,434	na

Chapter 7 Milk Quotas

7.1 Introduction

Milk quotas were introduced in 1984 to limit the milk produced in Europe. A comprehensive account of the background to the introduction of milk quota is given in MAFF (1988). Table 7.1 summarises the history of milk quota regulation (adapted from Table 2.2, Colman *et al.* 1998).

Table 7.1 Calendar of the history of milk quota regulations

Date	Development
1984	Quotas introduced as a temporary measure with a five year life. Superlevy applied at 100 per cent of target price for wholesale deliveries and 75% for direct sales.
1986	Butterfat base introduced for wholesale quota.
1987	Superlevy extended to 100% of target price for direct sales.
1988	Quotas extended until 1992.
1990	Superlevy raised to 115% of target price for wholesale deliveries.
1992	Quota extended until 2000.
1994	Superlevy raised to 115% of target price for direct sales. Quota transfer permitted throughout the UK (with the exception of a few small ring-fenced areas)
1997	Proposed that milk quotas be extended to 2006.
1998	Agenda 2000 extends milk quota to 2005 and implies continuation until 2007.

The superlevy penalty is applied to individual farmers who remain over-quota once any unused quota has been redistributed. In 1984 the penalty varied for wholesale and direct sale over-quota, but by 1994 the superlevy charged on both types of over-quota litre had been harmonised to 115% of the target price.

Source: Adapted from Table 2.2, Colman *et al.* (1998)

Quotas work by placing a ceiling on the amount of butterfat that can be produced profitably. Each dairy farmer and an increasing population of former dairy farmers (called non-producing quota holders NPQHs) own milk quota, which has a specified butterfat content. Farmers need to match their (butterfat) adjusted milk production to their effective milk quota plus any entitlement to the redistribution of unused quota to avoid paying superlevy; superlevy is set at a level that makes it unprofitable to produce over-quota milk. The effective quota is the quota owned or leased in or which has been used prior to selling as used. NPQHs are an increasing population of former dairy farmers who no longer produce milk and who chose to lease rather than sell quota when they ceased milk production.

Farmers can match their milk production to their effective quota by adjusting their milk output and/or by transferring milk quota. Milk quota is usually leased for one year, but there is a small market in leasing contracts which cover several years, alternatively it can be transferred permanently by purchase. Assuming transaction costs are ignored and both the quota and land markets are working efficiently, the introduction of milk quota does not increase total dairy asset value *ceteris paribus*. Therefore total dairy assets have become more liquid following the introduction of milk quotas, and this may have assisted the restructuring of the dairy sector because it

has allowed dairy farmers to free-up a larger proportion of dairy specific capital when scaling back production without having to sell fixed assets such as land. However, expansion requires additional quota and this imposes a direct cost. Quotas also impose a cost to farm planning, because of the uncertainty which surrounds their future and their likely terminal value should the quota regime be abandoned.

The rules governing the transfer of milk quota have changed since 1984, and these changes have had an effect on the efficiency of the milk quota market, and therefore on the rate of restructuring in the sector. Because of the need for quota to be transferred for there to be any restructuring of dairy production this chapter starts with a review of milk quota trading at the national level, and the key criteria that determine the efficiency of the quota transfer market. This is followed by an analysis of milk quota at the farm level.

7.2   Milk Quota at the national level

Table 7.2 summarises the UK's annual milk quota, milk production, superlevy paid and the volume of quota transferred. In the 1987/88 quota year UK national quota was 14,331 million litres, a fall of 6.55% from the 1984/85 level.

Between 1986/87 and 1996/97 the volume of quota leased and transferred permanently with the lease of land increased by 957 million litres (from 218 million to 1,175 million) and by 216 million litres (from 464 million to 680 million litres) respectively, a combined increase of 272% (Table 7.2). In 1987/88 the estimated value of permanently and temporarily transferred quota was £116 million and £10.8 million respectively (Colman *et al.* 1998). By 1996/97 the combined value of permanently transferred and leased quota (£393 million and £120.2 million respectively) had risen by 305% (Colman *et al.* 1998).

Between 1993/94 and 1994/95 there was a 38% increase in the volume of milk quota leased and permanently transferred, the largest annual increase in the transfer of quota. Figure 1.1 shows the relatively large decrease in the number of dairy cows between the June 1994 and June 1995, the period when most quota transactions recorded for the 1994/95 quota year occurred. The rate at which the dairy herd was restructured in the two years prior to the June 1994 census decreased (Figures 1.1 and 1.4).

It is likely that this pattern reflects several influences. The slow down in the restructuring of the dairy sector may have been caused by uncertainty associated with the deregulation of the milk market, as farmers postponed plans to expand or contract, or delayed exit until the marketing arrangements that would supersede the MMBs were finalised and in place. Alternatively, permanent transfer of quota within the existing geographical trading region may have slowed if farmers intending to expand had gradually accumulated the quota they required by purchases in previous years.

1994/95 saw the start in the gradual switch in milk price premium between herd size category and geographical regions; the effect this had on marketing economies of scale will be discussed in chapter 8, but this may have been responsible for the restructuring. However, it is perhaps more likely that at this stage the full effects of the price differential between milk purchasers and the advantage of large dairy size

were not yet realised (given that the changes occurred more than half way through the 1994/95 quota year), whereas the extension of the geographic boundary to include the average lower costs producers in Northern Ireland could be the immediate cause of this surge in quota transfer activity in the 1994/95 quota year.

Table 7.2 Summary Statistics for Milk Quota at the UK level

Year	Milk Quota	Production with respect to quotas	Super-levy rate	Super-levy paid	Quota transferred (UK)	
					Leased	Permanently transferred
	million lt.	million lt.	ppl.	£ million	million lt.	million lt.
1984/85	15,335	under	-	-	-	-
1985/86	15,335	+8	0.212	1.46	-	-
1986/87	15,321	+96	3.489	17.1	218	464
1987/88	14,331	+55.9	19.1	10.7	289	421
1988/89	14,055	+77.9	19.6	15.3	378	450
1989/90	14,350	+148	-	na	511	417
1990/91	14,324	+388	24.1	9.2	647	400
1991/92	14,083	+15	25.5	3.8	744	350
1992/93	14,079	under	na	1.8^2	749	370
1993/94	14,091	+74	31	21	886	273
1994/95	14,167	+171	28.42	42	1,038	562
1995/96	$14,167^3$	+166	31.43	44	1,143	600
1996/97	$14,167^3$	+69	27.23	14	1,175	680
1997/98	$14,167^3$	$+151^1$	25.53	38^1	$1,252^1$	

The UK butterfat standard base is 3.97 per cent. The system of charging superlevy changed to the current threshold (system B) for wholesale milk in 1987/88.

[1] Provisional.

[2] Levy on direct sales only.

[3] of which 14,158 million litres is allocated between producers.

Source: adapted from Colman *et al.* (1998) and Table 1.3, Farrar and Franks (1998).

Quota transfer regulations affect the efficiency with which high milk price-low cost milk producers are matched with low milk price-high cost milk producers. This market will be more efficient if:

1   Monitoring of production levels leads to clear market signals about (i) the current and cumulative milk production at the national level and (ii) milk production within the farmer's quota holding group. Together, this will give each farmer a clearer idea of surplus or deficient quota at any point, and therefore reduce any unnecessary acquisition of milk quota by farmers and lessen the number of farmers who end the year with unused quota (which is redistributed to over-quota producers free of charge).

2   No barriers to trade exist between low and high cost producers, i.e. no regional boundaries to transfer (either within a country or between EU member states). This maximises the pool of farmers seeking to lease in and lease out quota.

3   Zero/minimal transaction costs. Transaction costs for the permanent transfer of quota are larger than those for leasing, largely because of the requirement that quota be attached to land.

4   An extension of the deadline on quota trading to the end of the quota year. By extending the deadline there is less chance of unnecessary intervention into the quota market, any intervention can be better judged at the end of the quota period when own production levels are more clearly know. This will also limit the need to use innovative contracts to transfer quota e.g. so-called 'back to back' transfers, when used quota is sold to help finance the purchase of clean (and thereby in effect 'leasing' quota after the quota leasing deadline). An extension of the transfer deadline is hindered by the need to keep precise records of ownership of the right to use quota, but can be facilitated if the paper trail associated with quota transactions is minimised.

Table 7.3 outlines the development in milk quota transfer regulations. There are some clear trends:

1   a removal of 'ring-fences', which had restricted the size of the pool of farmers eligible to trade quota. In 1993 quota transfer was permitted between the five MMB areas, though restrictions were retained on transfer with some ring-fenced areas in Scotland, and between the mainland and Northern Ireland. In 1994 permanent transfer between the mainland and Northern Ireland was permitted.

2   a gradual extension to the deadline for quota transfer. Initially quota transfer was allowed up to 31 July, this was extended up to December 31 in 1990.

Chapter 8 lists and discusses the changes to milk quota management and trading regulations proposed in Agenda 2000. Some effects of these being adopted by the UK are discussed there, in particular, how these changes may affect the efficiency of the quota market.

Table 7.3 Calendar of major changes in quota transfer regulations

Date	Development in transfer regulations
1984	Quotas introduced with a five year life. Quota attached to land.
1986	EC approved quota leasing, but leasing not permitted after 31 July in any quota year. Immediate emergence of non-producing quota holders.
1988	Quotas extended until 1992.
1990	Quota leasing deadline extended to September 31, and then to December 31
1992	Quota extended until 2000.
1993	Permanent transfer of quota permitted between MMB areas, previously quota could only be traded within each of 5 MMB and 4 Scottish ring-fences. Still not permitted between Great Britain and Northern Ireland.
1994	End of MMBs in November. Over 80 registered milk purchasers took the place of the 5 MMBs, and the Intervention Board took over responsibility for management of quota. Quota transfer permitted throughout the UK.
1996	Modified quota arrangements for producers who registered in advance, to off set some effects of culling due to BSE. Unused quota can be leased out passed the 31 December deadline.
1997	Proposed that milk quotas be extended to 2006. Western Isles ring fence terminated, inward leasing of quota allowed on other ring fence areas.
1999	Agenda 2000. The Berlin conference in 1999 diluted the initial Agenda 2000 proposals, several discretionary changes to quota management arrangements have been proposed for the 2000/2001 quota year. These include; extending the leasing deadline to 31 March (from 31 December), introduce a siphon on _permanent_ (c.f. leased) quota transfer, allow quota transfer independently of land, a provision that if at least 70% of quota is not used against milk production on the farm the part unused will revert to the national reserve, and therefore be lost to the farmer (i.e. limit quota leasing out on each farm to a maximum of 30% of effective quota).

Source: Adapted from Table 2.2, Colman _et al._ (1998).

7.3 Milk quotas at the farm level

Table 3.2 presents a summary of dairy enterprise output and variable costs per cow for each year. This summary shows individual variable costs, including the expenditure on quota leasing, but excludes revenue from leasing out quota which the Special Studies methodology does not include as dairy enterprise income. Quota leasing costs amounted to £5 per cow in 1987/88 (1.5% of variable costs) but increased in most years, and by 1996/97 stood at £61 per cow (11% of variable costs). The largest annual increase in quota leasing costs occurred between 1993/94 and 1994/95.

Table 7.4 summarises the intervention of surveyed farmers in the quota market between 1987/88 and 1996/97. This data has not been raised to represent the underlying population of dairy farmers in England and Wales. There was a steady and

pronounced annual increase in the volume of quota leased in. In 1987/88, 5,006 thousand litres of quota were leased in by 75 farmers (18.2% of the surveyed farmers), an average of 66,750 litres per farm. Ten years later 18,659 thousand litres were leased in, an increase of 273%, by 192 farmers (over 50% of the sample), averaging 97,182 litres per farm.

Although the volume of quota leased out remained below that leased in, it also increased; from 637 thousand to 3,925 thousand litres over the same time period.[1] The proportion of the sample leasing out quota also increased, from 3.6 to 15%. Interestingly, the number of farmers who both leased in and leased out quota increased: it is not possible to determine whether this is the result of farmers miscalculating their quota requirements or whether the increase represents speculative trading, and is therefore seen by the farmer as a separate actively to milk production.

Despite this level of involvement in the quota market, milk production was greater than effective quota in six of the seven years for which reliable data are available. This may represent an efficient outcome, because the over production was often within 1 to 1.5%, which is generally the volume of unused quota that is redistributed from the national reserve and from farmers who under-utilised their quota.

Table 7.5 shows expenditure and revenue from leasing and permanent transfer of milk quota. The average cost of leased quota recorded in the DECS/SSEMP is in line with the estimated annual average cost of leased quota presented in Colman et al. (1998, their Table 2.4: p. 11). On average, the sample of farmers in the survey earned more for each litre leased out than they paid on each litre leased in (though these values have not been adjusted to an equivalent butterfat basis).

Table 7.5 also shows expenditure on the purchase of and the revenue from sales of milk quota. The net expenditure increased to a high in 1990/91 of £2,198 thousand, before falling to £1,033 thousand in 1994/95, then increasing in the final two years. The FBS did not record the volume of milk quota bought and sold, but an approximation of the volume permanently traded is given by dividing net expenditure by an estimate of the annual average value of permanently transferred clean quota which is given in Colman et al. (1998, their Table 2.3: p 10).

Using these values the estimated net volume of quota purchase in all nine years between 1988/89 and 1996/97 is 30,194 thousand litres (equivalent to an average annual net purchase of 3,355 thousand litres), compared to the net lease in of 84,102 thousand litres over ten years (an annual average of 8,410 thousand litres).

The proportion of milk quota asset value in the value of all farm assets increased from 16.7% in 1989/90 to 27.5% in 1995/96.

Table 7.6 shows the number of farmers in the sample who purchased and sold milk quota. There is an increasing trend in both series. Interestingly, the number of

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[1] The volume leased in would be expected to be larger than the volume of quota leased out because the DECS recorded details of dairy enterprises, and an increasing proportion of milk quota is leased out by NPQHs.

farmers both buying and selling quota has increased from 3 in 1991/92 to 15 in 1996/97.

Details of superlevy liability and payments are presented in Table 7.7. The percentage of farmers paying superlevy has varied from zero in 1992/93 to 49 in 1987/88. Care must be taken when interpreting this table because the superlevy fine is recorded in the year it was paid and not for the quota year in which the over-production occurred. Also, the sample of farms changed annually so it is not possible to estimate the average superlevy fine per litre of milk on which superlevy was charged.

7.4 Summary

This chapter has reviewed quota transfer at the national and farm level. The main findings are:

(i) For restructuring of the dairy sector to take place milk quota has to be transferred from those scaling back or quitting milk production to those increasing milk production or entering dairying. At the national level the quantity of milk quota transferred between 1986/87 and 1996/97 increased by 272%.

(ii) In this sample of farmers, the largest annual increase in quota transfer activity occurred between 1993/94 and 1994/95. This coincided with the deregulation of the milk market and the enlargement of the pool of farmers who could exchange quota by dropping the ring fence restriction on quota trading between the mainland and Northern Ireland. Both events are likely to have influenced this increased activity; though it is likely that the enlargement in the trading area had the more pronounced short-term effect as existing price/cost differentials were the incentive for immediate transfers. The effect of market deregulation on the spread in milk prices has increased in the two years following 1994/95, if the price differential between farmers continues it will have an important, long-term impact on quota transfers.

(iii) Survey findings show that dairy leasing costs increased from £5 per cow in 1987/88 to £61 per cow in 1996/97 (Table 3.2) when they represented 11% of total variable costs.

(iv) An increasing proportion of surveyed farmers leased or permanently transferred quota. In 1996/97, 51% leased in quota, 15% leased out quota, 9% purchased quota and 5% sold quota.

(v) The number of farmers both leasing in and leasing out quota, or buying and selling quota in the same year increased. It is not possible to say whether this activity was being treated as a speculative venture separate from the dairy enterprise or was the result of unforeseen circumstances which resulted in the previous acquisition or release of too much quota.

(vi) The estimated net purchase of 30,194 thousand litres of quota (an average annual net purchase of 3,355 thousand litres) compared with the net lease in of 84,102 thousand litres (an annual average of 8,810 thousand litres).

(vii) The proportion of milk quota asset value to total asset value increased from 16.7% in 1989/90 to 27.5% in 1995/96.

(viii) Increasing the size of the quota transfer pool would be expected to bring together farmers with a wider range of milk price/cost differentials and therefore increase the trade in milk quota. This is because quota transfer is driven by the distribution of the difference between milk price and marginal costs. Therefore, selling milk at the highest possible milk price (for any given production costs) increases the price farmers can afford to bid for quota.

Table 7.4 Trade in quota 1987/88 to 1996/97 [1]

					Quota year					
	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94	1994/95	1995/96	1996/97
Number of farmers	411	425	423	440	409	391	381	386	394	377
Quota traded										
Quota awarded ('000 lts) [2]	13,354	19,554	19,761	16,372	14,605	10,535	15,558	6,750	737	-
% of farmers awarded quota	100	99	98	99	98	98	82	65	9.6	-
Quota leased in ('000 lts)	5,006	6,323	7,029	9,420	11,349	10,159	13,018	13,687	16,301	18,659
Number of farmers leasing in quota	75	102	107	128	158	159	170	159	191	192
% of farmers leasing in quota	18.2	24	25	29	39	41	45	41	48	51
Quota leased out ('000 lts)	637	529	1,041	2,121	4,010	2,238	3,089	2,456	3,528	3,925
Number of farms leasing out quota	15	5	9	17	40	37	63	50	60	57
% of farmers leasing out quota	3.6	1.2	2	4	10	9	17	13	15	15
Number of farmers leasing in and out	1	2	-	1	10	3	14	11	15	19
Total effective quota (million lts)	792.7	na[3]	200.5	214.4	205.1	198.1	na[3]	na[3]	216.4	210.9
Total effective quota ('000 lts/farm)	468.9	na[3]	474.0	487.3	501.4	506.7	na[3]	na[3]	549.3	559.4
Total milk produced ('000 lts/farm)	488.9	473.1	494.0	498.8	506.0	512.1	527.1	201.4	554.3	547.5
% milk produced over quota	+4.2	na[3]	+4.2	+2.4	+1.0	+1.1	na[3]	na[3]	+0.9	-2.0
Net quota leased (NQL) ('000 lts)	4,369	5,794	5,988	7,299	7,640	7,921	9,929	11,231	12,773	14,734
NQL (lts/all farm)	10,631	13,633	14,157	16,589	18,679	20,258	26,060	29,100	32,400	39,082
NQL (lts farmers leasing in)	58,256	56,805	55,965	57,026	48,352	49,818	58,406	70,635	66,874	76,739
Net quota leased (lts/cow)	114	151	153.3	183	208	225	282	319	350	421
Net quota leased, % EOYEQ	2.3	na	3.0	3.4	3.7	4.0	na	na	5.9	7.0

[1] These results have not been adjusted for butterfat.   [2] It has been assumed that these entries were recorded in hectolitres in the FBS document for all years.   [3] The values recorded for end of year effective quota are unreliable in these years.
Unweighted

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Table 7.5 Volume and value of quota traded 1987/88 to 1996/97 [1]

	Quota year									
	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94	1994/95	1995/96	1996/97
Litres of quota leased in ('000 lts)	5,006	6,323	7,029	9,420	11,349	10,159	13,018	13,687	16,301	18,659
Value of leased in quota (£ '000)	228.4	292.9	364.5	532.0	758.0	440.3	688.8	1,510	1,913	2,345
Average cost (ppl)	4.6	4.6	4.2	5.6	6.7	4.3	5.3	11.0	11.7	12.6
Litres of quota leased out ('000)	637	529	1,041.2	2,121	4,010	2,238	3,089	2,456	3,528	3,925
Value of quota leased out (£ '000)	29.3	26.0	58.6	135.8	268.8	100.5	172.1	347.2	435.7	509.0
Average revenue from leased out quota (ppl)	4.6	4.9	5.6	6.4	6.7	4.5	5.6	14.1	12.3	13.0
Opening milk quota value (£ '000)	na	na	36,366	42,630	42,209	44,442	43,516	48,628	70,106	na
Annual investment (all £ '000)										
Value of quota purchased by landlord	na	-	1,070	1,951	1,547	1,252	1,020	1,780	2,311	2,385 [2]
Value of quota purchased by owner	na	657.4	233.3	416.9	250.0	169.1	190.6	336.5	1,000	-
Value of quota purchased by tenant	na	261.9	-	-	-	-	-	-	-	508
Value of total grant	na	233	129.5	169.5	75.6	162.5	156,6	1,083	1,406	na
Occupiers total sales (£ '000)	na	na	na	na	na	na	48,189	62,937	76,857	na
Occu' milk quota value (closing) (£ million)	na	na	39.4	44.9	43.7	45.7	na	na	na	na
Net expenditure on milk quota ('£ '000)	na	686.3	1,174	2,198	1,721	1,259	1,054	1,033	1,905	1,877
Average costs of milk quota (ppl) [3]	na	34	35	38	35	30.8	48	60	65.5	61.5
Estimated net litres purchased ('000 lts)	na	2,018	3,354	5,785	4,918	4,186	2,196	1,777	2,908	3,052
Total asset value (closing) (£ million)	163.2	182.4	235.3	254.2	240.8	231.8	224.3	262.4	279.4	na
Milk quota assets to total assets (%)	na	na	16.7	17.7	18.2	19.7	21.5	24.0	27.5	na

[1] Figures may not necessarily add to the sum of their total due to rounding.
[2] This value comprises total purchases by landlord, owner and tenant.
[3] These estimated average annual values for the transfer of clean milk quota are taken from Colman et al. (1998, Table 2.3: p 10)

No information is available for the litres of quota purchased, or on the butterfat content of milk quota.

Table 7.6 Number of purchases by purchaser category, 1987/88 to 1996/97 (£/cow) [1]

					Quota year					
	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94	1994/95	1995/96	1996/97
Percentage of purchases										
Number of landlord purchases	na	-	-	-	-	-	-	-	-	-
Occupiers investment										
Number of owner purchases	na	34	58	77	75	72	44	56	66	33²
Number of tenant purchases	na	13	12	17	10	12	11	7	34	-
Number receiving grants	na	-	-	-	-	-	-	-	-	-
Number of farmers selling milk quota	na	4	6	4	4	4	4	22	25	20
% of farms on which quota sold	na	1	1	1	1	1	1	5.7	6.3	5.3
Number of purchase and sales	na	1	-	-	3	1	1	9	17	15

Figures may not necessarily add to the sum to their total due to rounding. [2] This value represents total purchases by landlord, owner, tenant

No information is available on the litres of quota purchased, or on the butterfat content of milk quota.

Table 7.7 Details of superlevy liability and payments 1987/88 to 1996/97 [1]

					Quota year					
	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94	1994/95	1995/96	1996/97
Number of farmers	411	425	423	440	409	391	281	386	394	377
Number of farmers charged superlevy	202	33	61	13	11	-	4	44	98	52
% of farmers paying superlevy (%)	49	8	14	3	3	-	-	11	25	14
Litres superlevy charged ('000 lts)	6,897	411.9	980.2	607.2	41.6	-	97.2	6,925	1,189.2	375
Total superlevy fine paid (£ '000) [1]	237.4	52.9	77.5	17.9	9.3	-	5.2	124.8	311.4	99.7

The litres over superlevy apply to the appropriate quota year. However, with the exception of 1996/97, the superlevy fines are recorded in the year they were paid and not the year the overproduction occurred. In addition, because the sample of farms changed each year the fine paid cannot be related to the over production in the previous year.

Chapter 8 The future structure of dairy farming

8.1   Introduction

This chapter summarises the review of the structure of dairy farming and trends in milk production reported in Chapter 1 and the findings of the DECS/SSEMP surveys. Chapter 1 showed that the rate of restructuring of dairy farms at the national and region level slowed in the two years before and increased after 1984, and that a similar slow down in the rate of restructuring occurred in the two years before and increased after 1994. MAFF (1988) suggested that the introduction of milk quotas in 1984 was the likely cause of the changes that occurred around that time. This report has suggested that the decrease and increase in restructuring in the two years before and in the years immediately after 1994 may have been influenced by a change in milk quota trading regulations and the well signalled deregulation of the milk market.

Chapter 7 discussed the importance of changes in milk quota trading regulations on the flow of milk quota from low milk price-high cost producers to high milk price-low cost producers. It was suggested that changes to the rules of quota trading may be responsible for the surge in quota transferred in 1994/95, but that changes in market deregulation would most likely have more important longer-term effects should a price differential continue to be offered by competing milk purchasers, as this will affect inter-farm competitiveness.

The deregulation of the milk market has been discussed in Chapter 1. The MMB of England and Wales had discriminated between the liquid and processing market, and offered each farmer an identical contract, with their individual milk price based on the pooled revenue from both markets (after making adjustments for the quality of milk received from each farmer). After 1994 farmers became free to sell milk to anyone they chose at whatever price was attainable. Many purchasers designed contracts which were individually tailored to their intended use of the milk, this allowed each to offer a different package of price incentives. Many of the newly licensed milk purchasers offered volume related payments (VRP) and offered alternatively costed milk collection arrangements, most continued to link milk prices to milk butterfat, protein and hygiene (e.g. cell count), as well as to characteristics of the dairy enterprise such as the breed of dairy herd.

Section 8.2 brings together some of the key conclusions from each chapter to give an overview of production, costing and margins between 1987/88 and 1996/97 at the national and the farm level. Section 8.3 presents results from a modelling exercise (the Colman report 1998) and some linear extrapolations of national trends to compare two contrasting approaches to forecasting the future structure of dairy farming in England and Wales over the next eight to ten years. As predictions based on historical trends are prone to error if policy is subsequently revised, the current Agenda 2000 proposals (following the Berlin summit in the spring of 1999) are presented and their impact on the future structure of the dairy sector discussed in Section 8.4. Finally, the impact of compatibility with the Uruguay Round of the GATT and pressure from the Millennium Round of the WTO is considered in Section 8.5.

8.2   Summary and overview

(i) June Census information

Chapter 1 presents June Census data showing the pattern of structural change in dairy farming in five English regions and Wales. The impact of the introduction of milk quotas in 1984 is clear, and has been discussed in MAFF (1988). Figure 1 shows that dairy cow numbers remained similar at around 2.7 million between 1976 and 1984, but fell in every year between 1984 and 1994.

Although the size of the national dairy herd was similar in each year between 1976 and 1983, the average herd size increased because of the reduction in dairy holdings. After 1983 herd size increased though somewhat erratically as the dairy cow population started to fall and the number of farmers exiting dairy farming remained relatively unchanged. After 1994 the reduction in dairy cow numbers continued but as the proportion of dairy farms quitting milk production increased by such an extent that the average herd sizes actually fell in two of the three years between 1994/95 and 1996/97.

Between 1987 and 1997 the number of dairy holdings fell by 26.7%. Between 1987 and 1994 a higher proportion of smaller than larger herds (i.e. those of less than 70 cows) ceased dairying. After 1994 the proportion of larger herds quitting increased whilst the proportion of smaller herds quitting remained constant. After 1994 most of the increased loss of larger farms came from 70 to 100 cow herds (though there was also a noticeable decrease in dairy holdings of between 100 and 200 cows). This suggests that the changes which occurred in 1994 altered the economics of scale in dairy farming and the optimum size of dairy herds in England and Wales may have increased.

Important regional changes in cow numbers and holdings also occurred after 1984. In England the highest proportion of dairy cows are farmed in the South West, where the ten year percentage decrease in dairy cows was 19.1%, similar to the average over England and Wales (20.2%). The South East region saw the highest percentage fall in dairy cow numbers (at 33.7%), the North West and North East regions lost the lowest percentage of dairy cows (15 and 17% respectively). The average decrease in dairy cows in Wales was similar to that for England as a whole. After 1994 the annual percentage fall in cows and holdings increased at England and Wales level. There was also less variation between regions in terms of the annual rate of fall than there had been prior to 1994.

It is generally accepted that economies of scale can occur in production and marketing. This review has shown some of the sources of the economies of scale in dairying, particularly after 1992/93 when the enhanced DECS collected data on dairy specific regular labour. However, the full economies of scale cannot be shown because not all fixed and overhead costs were recorded (it is accepted that most economies of scale occur because fixed and overhead costs do not increase in the same proportion as an increase in herd size).

The review has, however, clearly shown that economies of scale have developed in milk marketing. The increased loss of 70 to 100 cow herds after 1994 coincided with changes to milk collection and haulage charges and volume related payments (VRP) offered by many

newly licensed milk purchasers. These changes to milk price incentives - from the MMBs pooled price philosophy - following market deregulation increased the economies of scale with respect to milk marketing. Milk Marque, the largest farmer owned co-operative and the body that emerged from the old MMB of England and Wales, moved to VRP in January 1997.

In summary, after the 1994 deregulation of the milk market, the effect of herd size on the restructuring of the dairy sector increased whilst the regional effect decreased.

(ii) Findings from the DECS/SSEMP surveys - herd size

Between 1987 and 1997 the June Census data shows a larger percentage reduction in the number of smaller than larger dairy herds (defined as smaller or larger than 70 cows). This in itself is indicative of the economic disadvantage suffered by smaller dairy enterprises. The DECS/SSEMP analysis presented here confirms the competitive fragility of smaller farms.

Over the ten years, average milk yields per farm increased by 20.7% and the nominal value of dairy enterprise output increased by £560 per cow. The real increase (after allowing for the general rise in prices) was somewhat less at £72 per cow. Farmers in the sample as a whole had to work harder to achieve a relatively modest increase in their standard of living. Smaller farmers fared less well than the sample average.

Average milk yield per cow was lowest in the smallest herds. In 1987/88 the difference in the average milk yield per cow between the smallest and largest herds was 1,235 litres, by 1996/97 it had increased to 1,825 litres. This divergence in yield per cow between the smallest and the largest herds was caused by the smaller increase (4.2%) in milk yield per cow in herds of between 10 and 30 cows, compared to the 14% increase on the largest herds (200 cows and above).

Table 3.5 shows that up to and including 1992/93 the smallest herds had received the highest average milk price, whereas, from 1993/94 and more noticeably in 1994/95 and thereafter larger herds achieved the highest milk price. By 1996/97 the average milk price on the largest herds was 25.38 ppl, 8.2% higher than that achieved on the smallest dairy farms (of 23.46 ppl). Between 1987/88 and 1996/97 the average milk price increased by 6.69 ppl (39.9%) on the smallest herds but by 9.17 ppl (56.6%) on the largest herds. (These milk prices are net of haulage and collection charges, and have not been adjusted for any variations in milk quality).

In 1987/88 the value of milk sold per cow off the smallest farms was 25% less than that achieved on the largest herds. But the combination of lower average yield and milk price resulted in this gap increasing to 52% in 1996/97, despite a 45.2% increase in the value of milk sold off the smallest herds.

Smaller farms did attempt to reduce costs. On average they used less concentrates and there is evidence that they turned towards higher grassland utilisation, applying more nitrogen fertilizer and reducing forage area per cow from 1.08 to 0.74 ha, although even after this forage area per cow still remained higher than the full sample average of 0.58 ha. After

reducing concentrate use their ratio of kilograms of concentrates used to litres of milk produced improved (though this data was only available a short time period between 1993/94 and 1996/97). However, variable costs per cow were not noticeably smaller than for other herd sizes (with the exception of the largest herd category). The relatively low increases in milk revenue and little benefit from lower variable costs resulted in the gap in the gross margin per cow between smallest and largest herds increasing from 37% in 1987/88 to 53% in 1996/97.

Moreover, higher dairy specific direct labour costs per cow on smaller farms further reduced their economic competitiveness. In 1994/95 the smallest farms recorded a loss after variable and dairy specific labour costs of £14 per cow. Although this margin increased to £237 per cow in 1996/97, it is still somewhat lower than the average for the full sample of £698 (and of £848 on farms with the largest herds). When all fixed and overhead costs are included smaller farmers are likely to be at an even larger competitive disadvantage (see Farrar and Franks (1998) for a full net margin by herd size for the 1996/97 year).

At the farm level, net farm income on the smallest dairy enterprise was less than £12,000 in any year. In 1994/95 interest payments accounted for 50.1% of NFI. Though this average may conceal considerable variation in interest payments and even if a high proportion of land on the small farms was owned, it is difficult to see how these small dairy farms can continue to produce milk *if* the full charge for dairy specific regular labour is costed against the enterprise.

On the positive side, smaller farms benefit from the higher proportion of dairy specific direct labour undertaken by the farmer and spouse. Only if this labour is costed at less than a realistic market price (a traditional belt-tightening exercise on family farms) can the smallest farms continue to produce milk. Stocking rates increased more rapidly on smaller farms, so gross margin per forage hectare increased by 110% compared with the 35% increase on the largest herds. The return expressed in terms of area may be attractive compared to possible alternative activities.

The long-term impact of farm size is clearly shown in Tables 3.19 to 3.21. These Tables show the difference in size between farms in the top and bottom decile ranked by gross margin per cow. The average size of the top decile farms increased by 50%, while that of farms in the bottom decile remained largely unchanged. Noticeably, the difference in milk price received by farms in the top and bottom decile has increased from 1.01 ppl to 2.45 ppl between 1987/88 and 1996/97 in favour of the top decile. Farms in the upper decile also benefit from lower variable costs when expressed in terms of litres of milk produced; in 1996/97 this gave them a 4.2 ppl advantage over farms in the lower decile.

(iii) Findings from the DECS/SSEMP - less favoured area status

The number of dairy farms inside or mostly inside (IMI) LFA decreased by 36%, compared to the 13% fall in the number of dairy farms outside or mostly outside (OMO) LFA between 1987/88 and 1996/97. This suggests that farms farming within a LFA are at a disadvantage, however the disadvantage may be a result of other factors besides their location, such as their smaller average size.

Those remaining dairy enterprises IMI LFAs increased milk production per farm by 44% by a combination of expanding herd size by an average of 10.5 cows (21%) and an increase in milk yield per cow of 901 litres (18.7%). This compares to the increase in milk yield per farm of 12% on OMO farms, achieved almost entirely by increasing milk yield per cow.

Although those remaining farms IMI LFAs have increased production and productivity, they still yielded less on average than OMO farms, but this is not reflected in lower variable costs. Moreover IMI farms have been disadvantaged by the shift in milk prices in favour of OMO farms. In 1987/88 farms IMI received an average milk price of 16.8 ppl, 0.5 ppl more than farms OMO LFAs, in 1996/97 the average price they received was 0.51 *less* than farms OMO LFAs (Table 4.8).

Variable costs per cow on farms IMI LFAs were broadly similar to those on farms OMO LFAs. Because of the lower milk yield per cow and lower milk prices, gross margin per cow increased in real terms by only £3 compared with the real increase of £55 on OMO farms. Despite increasing productivity, the shift in the milk price premium in favour of OMO LFA dairy farms has presented IMI farms with another obstacle to their long-term economic viability.

(iv) Findings from the DECS/SSEMP surveys - EU region

The June Census showed that the average decrease in the number of dairy cows in England and Wales was similar (at 2 % per year on average), but that there was a slightly higher reduction in the percentage of dairy holding in Wales (2.9 compared to 2.6% per year on average).

Milk production on Welsh farms increased by 31.4% over the ten years by the combined effects of increasing average herd size by 8.8 cows and milk yield by 14.3% per cow. The percentage increase was higher than the average achieved in the three English EU regions. However, dairy farms and units in Wales remained on average the smallest by EU region.

Farmers in Wales reduced forage area per farm and stocking rates increased from 1.43 to 1.67. Farmers in the Eastern EU region, already stocking at around 2 cows per forage hectare, raised milk yield per cow by feeding more concentrate (which was, on average, less expensive in the Eastern region than in the other regions). The economic stimuli behind the contrasting change in feeding patterns and stocking rates are clearly linked to the difference in the average milk price, and the relative cost of land and concentrates in Wales and the Eastern region. Table 5.8 shows that the average milk price in Wales was the lowest in three of the final four years, and highest in two of these four years on Eastern region farms. On average, land prices were higher in the Eastern region than in Wales and concentrate prices lower. Compared to the other regions, it is likely that the greater choice of competing alternative enterprises in the Eastern region provides a stimulus for higher economic performance amongst dairy farms in the region.

The economic results of these management responses to relative prices boosted average gross margin per cow in the Eastern EU region to the highest regional average in three of the last

four years surveyed. In 1996/97 Eastern region farms achieved a £109 gross margin per cow advantage over farms in Wales. Over the ten years farms in the Eastern region achieved a real increase in gross margin per cow of £121, whilst gross margin per cow fell by £7 in real terms on farms in Wales.

This report shows that farmers in Wales have come under increasing financial pressure over the ten years. Despite the largest percentage increase in milk production per farm and in stocking rates, these farms reported the lowest average regional gross margin per cow and per forage area. Part of the competitive disadvantage at the gross margin level was due to their still lower milk yield per cow, but Welsh farms received the lowest average milk price in three of the final four years, and could make no significant decreases in their variable costs.

Interestingly, full net margin data for 1996/97 suggests that the economic disadvantage in Wales versus the East only seems to apply at the gross margin level, despite their lower average herd size. Table 2.3 (p 121) in Farrar and Franks (1998) shows that the net margin per cow in Wales (at £305) was only £27 per cow less than in the East.

Despite this relative disadvantage vis-à-vis dairy enterprises in the East, the rate of loss of dairy farms in Wales was similar to that in England as a whole. This shows the importance in any economic analysis of assessing the relative profitability of alternative crop and livestock enterprises. These findings indicate that the opportunity cost on Welsh farms is likely to be even lower than the profitability of the dairy enterprise, otherwise one could have expected more farmers in Wales to have quit dairy farming.

(v) Findings from the DECS/SSEMP surveys - farm type

Of the four farm type categories considered in Chapter 6, small specialist dairy farms (SDS) were under the most severe pressure. These farms had the smallest average herd size and the lowest milk yield per farm. In 1995/96 and 1996/97 they received the lowest average milk price. Low yields and milk prices resulted in their consistently reporting the lowest margin over concentrates of the four farm types. *SDS farms reported the lowest gross margin per cow in all ten years and the lowest average gross margin per forage hectare in three of the four years between 1993/94 and 1996/97. Net farm income after interest payments appear to be barely adequate to provide what might reasonably be considered as an acceptable return for the farmer and spouse's labour.*

In the first six years of the survey specialist dairy farms located inside or mostly inside a LFA (SDIMI) achieved the highest average milk price and for five of those six years farms in the specialist dairy large (SDL) category - the category with the largest average herd size - the lowest milk price. However, the ranking by milk price changed after 1994/95, when SDL farms achieved the highest average milk price in two of the final three years and SDS farms the lowest in two of the final four years.

The average size of farms classified as non-specialist dairy farms (O) decreased, however the proportion of total farm revenue from the dairy enterprise on these farms increased, even though the share of land used in the dairy enterprise remained largely unchanged. It is likely that some of the farmers in the O category remained in dairying because of the relative

profitability of their dairying enterprise vis-à-vis their other enterprises. This was a period in which set-aside was introduced and a high proportion of total revenue became attached to arable area payments on eligible crops grown on eligible land. Land that was permanent grassland prior to 1991 was not eligible land and therefore was not entitled to arable area payments if converted to arable cropping.

(vi) Summary - economies of scale in milk marketing and the deregulation of the milk market

In 1994 the milk market was deregulated. The MMB of England and Wales was disbanded and their statutory right to act as sole purchaser of milk from farmers and sole seller to milk processors was replaced by over 100 potential milk purchasers. Following deregulation about 56% of farmers chose to sell milk to Milk Marque (Bates 1996), which was and remains the largest producer-owned co-operative and which emerged from the old MMB of England and Wales. Other farmers contracted to sell directly to purchasing dairies (PD), others preferred to join together as 'producer groups' to jointly market their milk (MC). Because many milk purchasers offered different price incentives league tables of milk prices standardised for a similar litre of milk have been published to compare milk prices on the basis of a 'standardised' litre, produced from a standardised dairy enterprise (in terms of farm size and collection arrangements).

An important finding that has emerged from the analysis of the DECS/SSEMP has been the change in relationship in the average milk price between (i) the smallest and largest herds (Table 3.5), (ii) farms with different LFA status (Table 4.8), (iii) farms in different EU region (Table 5.8) and (iv) farm type (Table 6.8) that occurred in 1993/94, and grew in significance in 1994/95 and thereafter. During 1994/95 and, more noticeably through 1995/96 and 1996/97, the average milk price moved in favour of the largest farms, OMO LFAs, in the Eastern region of England and classified as other farm types.

Figures 8.1 and 8.2 show the relationship between average net milk price (unadjusted for milk quality), herd size and LFA status recorded in the DECS 1993/94 survey and in the SSEMP 1996/97 survey respectively. A comparison between these two Figures shows that:

- The average milk price was lower in 1993/94.
- In 1993/94 the variance in average milk price across all farms was 1.44 ppl, in 1996/97 the variance in milk price increased to 2.34 ppl.

The trend lines illustrate the relationship between milk price and milk produced:

- On average, prices were higher for farms OMO LFAs, though the average difference as indicated by the regression lines, was small.
- Both the IMI and OMO trends are downward sloping in 1993/94, indicating a price penalty on larger units. However, both trend lines slope upward in 1996/97, indicating a price benefit on larger dairy units (i.e. volume related payments).
- The large dispersion of values around the trend lines show that milk price can vary widely on farms producing a similar volume of milk. This suggests that other factors influence milk price, as one would expect from inspection of the contracts offered by milk purchasers.

Figure 8.1 Relationship between average milk price, herd size and LFA status, 1993/94

o   Farms inside or mostly inside LFA

■   Farms outside or mostly outside LFA

- - - Linear (Farms inside or mostly inside LFA)

——— Linear (Farms outside or mostly outside LFA)
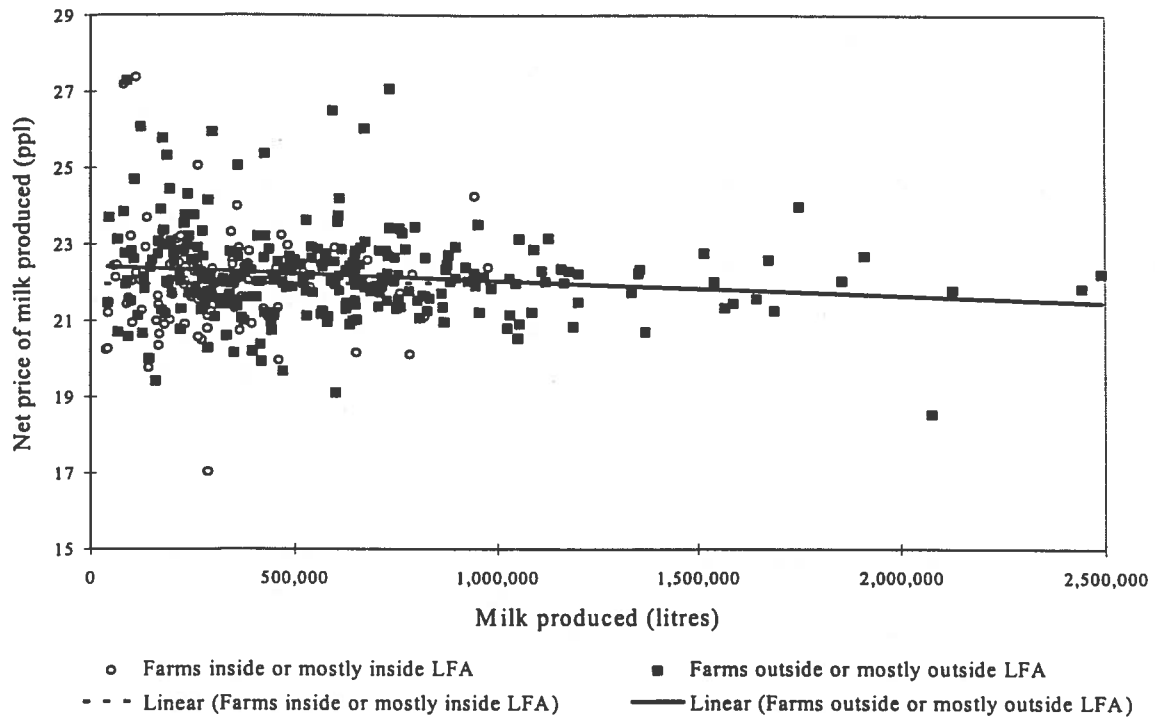
Figure 8.2 Relationship between average milk price, herd size and LFA status, 1996/97

o   Farms inside or mostly inside LFA

■   Farms outside or mostly outside LFA

- - - Linear (Farms inside or mostly inside LFA)

——— Linear (Farms outside or mostly outside LFA)
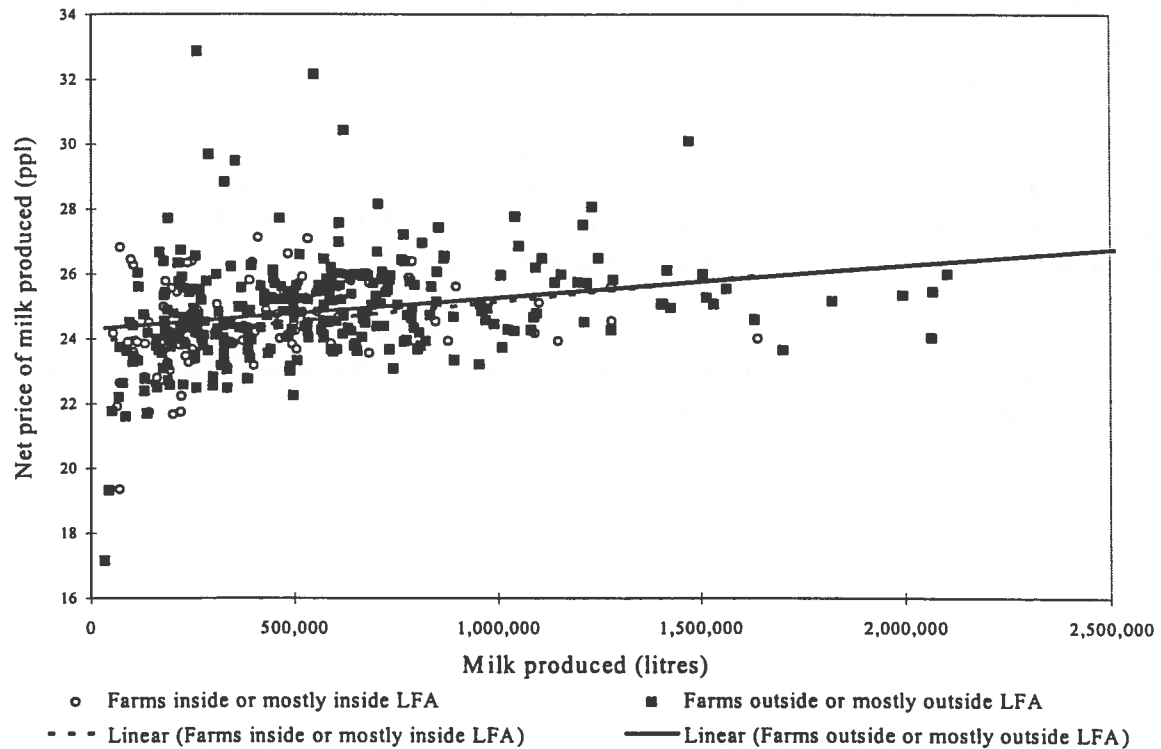
Impact of milk purchaser

Table 8.1 summarises the characteristics of farms and dairy enterprises by category of milk purchaser. The SSEMP survey (used in Figure 8.2) recorded the values of those characteristics of milk and the dairy enterprise that influenced milk prices, it also recorded any bonus payments received for milk produced during the 1996/97 quota year. Therefore, the volume related component of milk price can be determined by controlling for variation in butterfat and protein content, milk hygiene, farm location and the breed of the dairy herd. An analysis of this data shows that farmers who sold 1.5 million litres received on average 0.8 ppl more that farmers who sold 1 million litres. It also confirmed milk league tables which showed that farmers who sold to Milk Marque in 1996/97 received, on average, about 1.5 ppl less than they would have received by selling to an alternative milk purchaser, *ceteris paribus* (Franks 1999).

However, some farmers may not have an effective choice of milk purchaser, others may have been prepared to accept the lower average price, influenced by their familiarity with Milk Marque personnel and the financial security they associated with Milk Marque (Farrar and Franks 1998). Others still may have decided to support Milk Marque because of their longer-term view of the benefits of a strong marketing organisation (Bates and Pattisson 1997).

There is evidence that a larger proportion of smaller producers tended to join Milk Marque (Farrar and Franks 1998: Pattisson 1995) whilst a higher proportion of larger producers sold milk directly to milk processors or through producer groups. Initially Milk Marque followed the MMB's practice of pooling revenue from milk sales and offering farmers the same (quality adjusted) pooled milk price. This practice would have benefited small producers who were effectively being subsidised by larger producers.

However, Milk Marque's share of the milk market has fallen steadily since 1994 in part, no doubt, because they consistently appeared towards the foot of the league price tables. In response to their loss of market share, Milk Marque have responded by adjusting their pricing policy, most noticeably by introducing a volume related payment.

Therefore, besides size of enterprise, the choice of milk purchaser and approach to marketing milk (either individually or collectively) had an important influence on the price achieved for milk and therefore on relative profitability of dairy farms.

Table 8.1 Characteristics of farms by category of milk purchaser [1]

	1994/95 [2]			1995/96			1996/97		
	MM	MC	DP	MM	MC	DP	MM	MC	DP
% of farms in sample	74	9	10.5	79.0	12.2	8.3	69.2	3.6	23.9
% of these farms in a LFA	25.8	18.6	16.9	27.4	28.2	9.6	na	na	na
Farm size (adjusted ha)	81.1	130.7	68.0	79.9	122.0	68.6	79.9	147.0	106.5
Forage area/farm (ha)	39.6	50.1	39.7	40.0	47.6	42.2	42.3	59.5	52.1
Herd size (cows)	74.4	104.8	86.1	74.7	88.6	89.3	71.5	108.1	90.6
Stocking rate (cows/forage ha)	1.88	2.09	2.17	1.87	1.86	2.12	1.69	1.82	1.74
Biological milk yield per cow (lts)	5,621	5,990	5,852	5,806	6,143	6,226	5,747	6,230	6,140
Average price of milk produced (ppl) [3]	22.99	23.46	23.34	24.89	25.44	25.36	24.5	25.9	26.0
Margin over concentrates (£/cow)	1,032	1,138	1,099	1,179	1,264	1,273	1,164	1,368	1,327
Gross margin per cow (£)	815	899	858	927	951	975	885	1,079	1,004
Gross margin per litre (£)	14.63	15.03	14.70	15.99	15.52	15.66	15.42	17.33	16.35
Gross margin per forage ha (£)	1,531	1,880	1,857	1,733	1,770	2,062	1,496	1,962	1,747
Margin over VC and DSRL (£/cow)	520	676	584	622	701	720	649	892	769
NFI (£/farm)	29,057	51,342	38,355	36,032	45,665	46,765	na	na	na
Interest paid (£)	4,477	7,862	6,743	5,550	6,572	8,336	na	na	na
Total assets (£)	514,029	902,620	580,488	613,548	747,624	632,708	na	na	na
Total liabilities (£)	65,330	93,713	100,514	73,371	91,252	116,649	na	na	na
Leverage	11.8	10.4	17.3	12.0	11.6	18.4	na	na	na
Net worth (£)	489,219	808,907	479,974	540,177	696,072	516,059	na	na	na

[1] The categories of milk purchasers are; MM, Milk Marque; MC, member cooperatives; and DP, direct purchasers. Farmers who switched category during the year are excluded.

[2] In 1994/95 a high proportion of milk from all farms would have been sold the MMB.

[3] Milk prices are recorded on an as due basis and therefore milk returns for any quota year include any bonus/loyalty payments received after 31 March in that year

8.3 Future structure of dairy farming

The DECS/SSEMP surveys show the impressive increase in productivity per cow and per farm, but that these gains did not increase real gross margin per cow to the same extent. The variation in performance across herd size, geographical location (LFA and EU region) and farm type have all had an effect on the reduction in the dairy herd and the number of dairy enterprises.

Although there are still many small dairy units, they have come under increased pressure in recent years and it is increasingly difficult to see how they can continue to compete with the larger enterprises unless farmer and spouse value their labour below its market wage. The sentiments of Rickard (1999) are often applied to structural change in agriculture, 'the only route to greater prosperity is continuing structural change' (p. 6); he continues 'structural change is central to increasing competitiveness, though it necessarily involves a reduction in the number of dairy farmers'. Any future restructuring of the dairy herd depends on the relative competitiveness of individual dairy enterprises, the profitability of alternative enterprises within or outwith agriculture, and the motivation of the dairy farmer.

Section 8.3.1 sets out two views of the possible future structure of the dairy sector. The first is taken from the Colman et al. (1998) model, which is based on an econometric model using the data collected in the SSEMP. The second is based on simple linear extrapolations of June Census data.

8.3.1 Estimations of future structure of dairy production

Colman et al. (1998) used the SSEMP data as a basis of a modelling exercise which considered the impact on the structure of milk production of alternative policy scenarios for the post-2000 period. Several of the scenarios examined in that report were rejected in the final rounds of the Agenda 2000 discussions, however, the baseline scenario remains relevant and instructive.

This scenario suggests that dairy enterprise size will be considerably increased and producer numbers reduced (their report, Figures 7.2 and 7.3: p 64). The modelling exercise suggested that about 11,000 of the 33,641 dairy farmers in the UK (33%) would exit the sector over the next 8 to 10 years, that the largest percentage fall in producer numbers would occur in the East of England and the smallest in the North-North East. Most of the 11,000 farmers predicted to exit dairy farming had a herd size less than 70 cows in 1996/97 (9,697, 88%). The Colman report predicts a regional average herd size of 100 cows in the North-North East, 134 in the North West, 150 in the East, 161 in the South, 124 in the South West and 129 in Wales. This would give an average UK herd size of 116 cows and an average England and Wales herd size of 129 cows (derived from Colman et al. (1998), their Table 7.3: p 66).

Table 8.2 presents some estimates derived from the linear extrapolating of the number of dairy holdings and cows in England and Wales for 2007. The estimated number of farms with dairy cows and dairy cows is seen to depend on the time period used to estimate the linear trends. As the time period used to extrapolate a linear trend decreases the estimate of

the remaining number of farms with dairy cows and dairy cows falls because of the increased rate of restructuring since 1994.

In 1997 there were 26,312 dairy holdings and 1,974.8 thousand dairy cows in England and Wales. If linear predictions are made using data from the 1983-97 time period there would be 16,093 dairy holdings and 1,467 thousand dairy cows, giving an average herd size of 91.2 cows in ten years time. If national quota remain unchanged then average yield per cow will be 9,657 litres, and average milk produced per farm 880,321 litres (compared to the 1996/97 average yield per cow of 5,909 litres and production per farm of 460,300 litres).

Table 8.2 Extrapolations on national data recorded in the June Census

Time period	Dairy holdings		Cow numbers	
	Estimated coefficient	10 year change in dairy holdings	Estimated coefficient	10 year change in cow numbers
1976- 1997	-1,132.7	-11,327	-36.342	-363,420
1983-1997	-1,021.9	-10,219	-50.767	-507,670
1994-1997	-963.9	-9,639	-62.05	-620,500
Herd size (1987/88 to 1996/97)				
10-39.9	-403.6	-4,036	-10.594	-105,940
40-69.9	-364.1	-3,641	-18.908	-189,080
70-99.9	-128.2	-1,282	-10.43	-104,300
100-199.9	-15.9	-159	+0.5776	+5,776
200+	-6.92	-69.2	-2.3698	-236,980
Total		-9,187		-630,524

There are likely to be regional changes within these national estimates. The findings of the surveys reported here indicate that the most vulnerable farms are small, inside or mostly inside LFA, and are in Wales. Smaller specialist dairy farms are less competitive than (the larger on average) specialist dairy farms IMI LFA. Table 8.3 presents extrapolations based on regional changes recorded in the June census.

Once again the time period upon which the predictions are made is critical to the estimate of future change in dairy holdings and in the dairy cow population: the estimated reduction in holdings and cow numbers is larger when extrapolated over four years from 1994/97 than over ten years from 1987/97. Using the shorter time period increases the expected loss of dairy cows over the next ten years by 259,558 cows. If the shorter time period trends are used, this implies that in 2007 average herd size will be 77 cows, yielding an average of 11,000 litres per cow. Extrapolations at the regional level would suggest that the dairy cow population will decrease most in the South West.

This large increase in yields per cow with no increase in cows per herd over the present UK average would need to be accompanied by technological and marketing innovations that were scale neutral which allows smaller herds to compete more successfully.

Table 8.3 Extrapolations on regional data recorded in the June Census

	Dairy holdings			
Time period	1987/1997		1994/1997	
Region	Estimated coefficient	10 year change in holdings	Estimated coefficient	10 year change in holdings
Midlands	-163.27	-1,632.7	-178.7	-1,787
North East	-141.45	-1,414.5	-156.3	-1,563
North West	-90.236	-902.4	-97.5	-975
South East	-95.864	-958.6	-81.3	-813
South West	-247.32	-2,473.2	-267.5	-2,675
Wales	-180.71	-1,807.1	-182.6	-1,826
Total		-9,188		-9,639

	Dairy cows			
Time period	1987/1997		1994/1997	
Region	Estimated coefficient	10 year change in dairy cows	Estimated coefficient	10 year change in dairy cows
Midlands	-7.4301	-74,301	-13.059	-130,590
North East	-5.3026	-53,026	-8.540	-85,400
North West	-3.0611	-30,611	-7.0157	-70,147
South East	-9.1964	-91,964	-8.9017	-89,017
South West	-11.826	-118,260	-23.408	-234,080
Wales	-6.0616	-60,61.6	-7.9102	-79,102
Total		-428,778		-688,336

8.3.2 Determinants of the future structure of the dairy sector in England and Wales.

Technological changes (i) genetic potential

The views of Robin Turner, the chief executive of National Milk Records (NMR), are particularly apposite here. He suggests that 'improved breeding decisions will have the greatest impact on long-term profitability and improve [the UK dairy farmer's] competitiveness' (Farmers Weekly, 11 September 1998: p. 93). He continues that the average genetic merit for recorded herds in the UK is £19 of PIN (see Chapter 1.7) but in Holland this value is £56, with the difference of £37 of PIN equivalent to £277 margin over purchased feed per cow (each £1 PIN being equivalent to £7.59 gain in margin over concentrates). Put another way, *there is £27,000 of additional margin and efficiency in 100 cows for Dutch farmers due to the better genetic merit of their herds.*

The four reasons cited by Mr. Turner to explain the UK lagging behind its international competitors are,
- UK producers have too many sires to choose from,
- there is no national breeding strategy,
- not enough co-operation between organisations, and
- too much interest in the look of animals and not enough in production efficiency.

Mr Turner suggests that only the top 1% of the bull population should be used, those with a £PIN of plus 100 and a minimum type merit of plus 1 (which still gives a choice of about 100 Holstein Friesians). Using only these bulls would improve the £PIN of the national herd to £PIN 44 in five years, an achievement he estimated to be worth an estimated £375 million in additional margins.

Clearly the impact of the diffusion of genetic improvements will have distributional consequences. However, improved breeding strategies are essentially scale neutral. The international comparison is important as this is an indication of the productive efficiency of the UK herd vis-à-vis our international competitors.

Technological change (ii) sexing semen

The first heifer calves born from sexed semen in the UK were delivered this year. In the nine months since insemination this technology has advanced to the point where it is likely to become commercially available in 2000. The uptake and diffusion of this technology is likely to have far reaching effects on dairy replacement strategies and income from calves. Replacement heifers could be bred only from the best cows, with poorer performers crossed with beef bulls to produce male steers. In principle this technology is scale neutral, particularly if frozen semen can be used. The cost of this technology has not yet been determined.

When this technology comes to the market it is likely to have far reaching consequences for meat production world wide. As such, its impacts are extremely difficult to estimate, but are of such potential importance as to be an area worthy of an economic modelling exercise.

Technological change (iii) Bovine Somatotrophine growth hormone (rBST)

Bovine Somatotrophine (BST) occurs naturally in the cow but is also commercially produced (known as rBST) for administration to cattle to increase milk yield. In 1990 the EU imposed a moratorium on the marketing and use of rBST. The current moratorium on importing milk produced using rBST ends in 2000. Evidence from use suggests rBST could increase milk yield per cow by 20% without any change in feeding practices.

However, studies referred to in the Farm Animal Welfare Council report on the Welfare of Dairy Cattle (FAWC 1997) confirmed that cattle treated with rBST were more likely to have mastitis or lameness and possibly other metabolic disorders. As a consequence of these studies FAWC believe that 'the use of rBST was unacceptable on welfare grounds' (FAWC 1999: p. 6). Therefore, although the moratorium on importing milk treated with rBST ends in 2000 it is by no means clear that it will not be extended, or that use of rBST on UK farms will be permitted.

International competitiveness: importance of exchange rate (ECU/£)

The international competitiveness of the UK dairy sector is governed to an increasing extent by the exchange rate. Rickard (1999) states that the 'economic position facing dairy farmers could be rapidly improved if the government was to make it clear that it intended to recommend, in a referendum, that the UK join EMU at say a rate of 75-80 pence per ECU. This would encourage a weakening in sterling's current overvalued rate, bringing relief to all sectors of agriculture and much of UK manufacturing' (p. 9).

Changes to milk marketing

It is clear that the larger variation in milk prices between dairy farms has had a significant impact on the restructuring of the dairy enterprises in England and Wales since deregulation. In January 1997 Milk Marque followed its competitors by introducing volume related payments, so the effect of this will not have been fully captured in the 1996/97 survey because the change occurred more than half way through the survey year. This implies that small farms will be at an even greater price disadvantage than that shown by the 1996/97 analysis.

The future relationship between buyers and sellers of raw milk is likely to be influenced by the reaction of the industry to the Monopolies and Mergers Commission Report (1999) into the supply of raw milk. This report examined the market power of Milk Marque and the effect on milk prices of Milk Marque developing and owning milk processing capacity. It is too early to comment on the possible impacts of their findings and the response to these findings by the Secretary of State for Trade and Industry, Stephen Byers, in this report.

Whatever the outcome, it is likely that the gradual reduction in the number of potential milk purchasers and rationalisation in the raw milk processing capacity will continue. Already take-overs and closures together with liquidations, have resulted in the ownership of milk processing capacity becoming concentrated into the hands of fewer companies (see DIN UK Milk Report, 1997: p. 78 for a review of industry restructuring). One might suppose that the remaining companies would gain more market power. Farmers can respond to this by joining producer groups to jointly market their milk (horizontal integration) or for the producer groups to purchase their own milk processing capacity (vertical integration).

Changes in agricultural policy

Agricultural policy in general and dairy policy in particular will influence restructuring. These factors together affect the profitability of competing dairy enterprises and the profitability of dairy vis-à-vis alternative farming enterprises and activities. The pace of restructuring could also be affected if capping/modulation of support payments were introduced, and by policies such as retirement pensions. These topics are discussed in Section 8.4 below.

8.4 Implications of Agenda 2000 on dairy enterprises.

The Agenda 2000 round was heralded as an opportunity to reform the CAP to make it a more appropriate tool for supporting farm incomes whilst being compatible with the Uruguay Round agreement, and to help overcome some of the potential difficulties faced by expansion of the EU to include Eastern European countries. Some commentators also hoped that these reforms would move further towards decoupled agricultural support measures in advance of the Millennium Round of the WTO. In the event many of the discussed changes were not adopted, and this applies particularly to the dairy sector. Some of the original proposals are summarised in Farrar and Franks (1998), many of these have not been adopted following the revision made to the 11 March compromise at the Berlin European Council on 24- 26 March.

This section draws on a MAFF document which summarises the agreement reached by Heads of Government at the Berlin European Council on 24-26 March 1999 on the CAP Reform component of the Agenda 2000 package which in particular will affect dairy farmers (MAFF 1999). The agreement on CAP Reform comprised compulsory changes that need to be implemented and some discretionary options for Member States to decide upon. This summary does not indicate any preference for any options at this stage.

8.4.1 Dairy regime

After initially discussing several revolutionary changes to the CAP, including national envelopes and wider use of national funding, major reforms of the dairy sector were delayed until 2005, with a major review in 2003. *Several areas that will affect the restructuring of the dairy sector remain discretionary and have still to be decided upon.* The key aspects of the dairy reforms are presented here, with a summary of the reforms in all sectors presented in Appendix B.

Dairy Regime - Compulsory elements

- Quota regime extended to the year 2006.
- reduction in support prices, starting on 1 July 2005 to be phased in over three years in equal instalments (5% cut each year).
- Community-funded compensation for reductions in support prices expressed in ECUs per tonne of milk quota held by the producers on 31 March each year, phased in over three years commencing in the calendar year 2005 (building up to 17.24 ECUs per tonne of quota in 2007).
- Provision of additional national envelope for topping up the basic payments.
- Specific quota increases allocated to certain member states, including 19,700 tonnes to Northern Ireland, 64% of which will be allocates in the 2000/2001 quota year and 36% in the subsequent year.
- linear increase in milk quotas for all other Member States including the UK, with phased allocation in equal instalments over three years starting on 1 April 2005.
- Mid-term review of quota regime - including the prospects for ending quota after 2006.

Given the time before the proposed price cuts, any forward prediction of these changes in dairy enterprise margins would have to be based on extremely strong assumptions relating to

milk price, milk yields, calf values, feed and other costs, national envelope compensation payments and quota leasing costs. The reduction in cereal intervention support price (see arable reforms, Appendix B) may lead to a reduction in concentrate prices - though even this depends on the cereal world market price.

Perhaps of more interest is the impact of these changes on the cost of export restitution payments - the major source of expenditure for the dairy regime. The volume of subsidised exports is constrained by the Uruguay Round of GATT and if these reforms are not sufficient to meet the EU commitments to this agreement then intervention prices could still be reduced regardless of the Agenda 2000 deal, as there will still be annual price fixing. If this were to happen then farmers would not receive any compensation for price cuts, which they would have done before the Berlin revisions to the original Agenda 2000 deal. If this was the outcome of Agenda 2000 then there may be pressure to return to dairy sector reforms before 2003.

Dairy Regime - discretionary elements

The dairy regime discretionary elements of the Agenda 2000 package refer only to alterations in the leasing and permanent transfer of milk quota. In an attempt to introduce additional flexibility into quota management arrangements from April 1 2000, i.e. for the 2000/2001 quota year, the following alterations are being considered:

- Decide on a national leasing deadline before 31 March rather than 31 December.
- To provide for transfers of quota independently of land.
- To introduce a siphon on permanent quota transfers effected by lease of land (quota to feed into the national reserve).
- To introduce a provision that if a producer does not make use of at least 70% of his/her quota within a 12 month period either through deliveries or direct sales, all or part of the unused quantity shall revert to the national reserve.

These amendments could have substantial impacts on:

- the ability of farmers to fully utilise UK quota and on the quota transfer market,
- the efficiency of the milk quota market,
- quota market values and therefore the strategy of quota management after quitting milk production, and
- the timing of the exit of holdings from dairying.

The important criteria for an efficient milk quota market are listed in Chapter 7. Moving the transfer deadline back in the quota year towards 31 March would allow farmers to match end of year effective quota to milk production more effectively and may reduce unnecessary intervention into the quota market. Removing the link between the permanent transfer of quota and land would lower transaction costs, and therefore increase the volume of quota traded *ceteris paribus*, though some safeguards may be needed to protect tenant user rights.

The proposal for a siphon on the permanent transfer of quota is likely to cause the largest interest because its impact on milk quota value is somewhat unpredictable. The economics of

a siphon, or a sales tax levied in kind, are set out by Swinbank and Peters (1990). They suggest that the effect on the quantity of quota traded and its market price depends on the elasticities of supply and demand. Swinbank and Peters (1990) conclude that suppliers of quota can gain and that the more inelastic is demand the greater the gain. Because the supply of quota is restrained by a tax in kind, if purchasers are keen to obtain quota (i.e. demand is inelastic) then total revenue from the sale of quota will be larger than if no siphon was applied. However, when demand elasticity is greater than unity (i.e. elastic) both supplier and purchasers of quota will be adversely affected: *both the selling price and the volume traded will be below the free market equilibrium price.* Swinbank and Peters conclude that these conclusions 'should make us wary of regarding a siphon mechanism as a straightforward policy instrument' (p. 127).

Therefore under certain circumstances the efficiency of the quota market would appear to be lowered, and the value of quota altered by a siphon. The latter effect would certainly be expected to alter the timing of farmers leaving the dairy sector.

The fourth discretionary regulation the *'provision that if a producer does not make use of at least 70% of his quota within a 12 month period either through deliveries of direct sales, all or part of the unused quantity shall revert to the national reserve'* is likely to alter the strategy of farmers leaving the dairy sector because this regulation would limit each farmer to leasing out a maximum of 30% of their quota. Therefore, at a stroke, it would reduce the attractiveness of the strategy adopted by an increasing proportion of dairy farmers who when they quit milk production lease out all their quota to join the growing ranks of the non-producing quota holders (NPQHs). The Colman report (1998) established that 725 million litres of quota were leased by NPQHs in 1997/98, or about 57% of all leased quota, this increased to 870 million litres (68% of quota leased in 1997/98) if quota leased by near-NPQHs is included.

If the siphon and/or a 'use it or lose it' policy are adopted there is likely to be a gradual increase in quota administered from the national reserve. *The rules for this reallocation would need to be clearly understood by farmers, so that they can plan production to take advantage of a larger threshold.* The quota in the national reserve could be allocated to deserving farmers for use only. If this was done then any eventual cost of compensation of milk producers should dairy quota be removed in 2006 or later would be lowered.

The rules on quota transfer would need to clearly spell out how current NPQHs would be treated. NPQHs currently lease out all their quota. If they had to use 70% of quota themselves or lose it there would be an economic incentive for NPQHs to sell their quota before the regulations came into effect. However, the timing of the sale may be difficult to manage, particularly if the siphon were to be introduced at the same time. If a large proportion of NPQHs and near-NPQHs decided to sell before the 2000/01 quota year they would need to act before 31 December 1999. Given the large proportion of quota owned by NPQHs and near-NPQHs this is likely to depress the market price of quota towards the end of 1999.

However, the milk quota market is nothing if not innovative. For example, quota can be leased for more than one year. If these (currently to be decided) discretionary changes are

introduced the status of these multi-period contracts would need to be determined: it is possible that NPQHs would choose to lease through these contracts rather than to sell at lower 1999 market prices if this preserves the value of these assets.

8.4.2 Reforms in other sectors

Modulation of payments has long been an objective of the EU Commission. They have been retained in the proposals but as a discretionary element. One of three options could be used to limit payments: employment (the whole farm rather than specifically dairy enterprise presumably), some measure of overall prosperity (similar to an income supplement/insurance scheme) or by some absolute measure of whole farm support payments.

An interesting horizontal measure is the option for early retirement schemes. Figure 8.3 shows the distribution of age of farmers recorded in the 1996/97 SSEMP grossed up to the population level.

Figure 8.3 Distribution of age of dairy farmers (recorded in 1996)

Age (year recorded in 1996)

�** Age of farmers, recorded in 1996
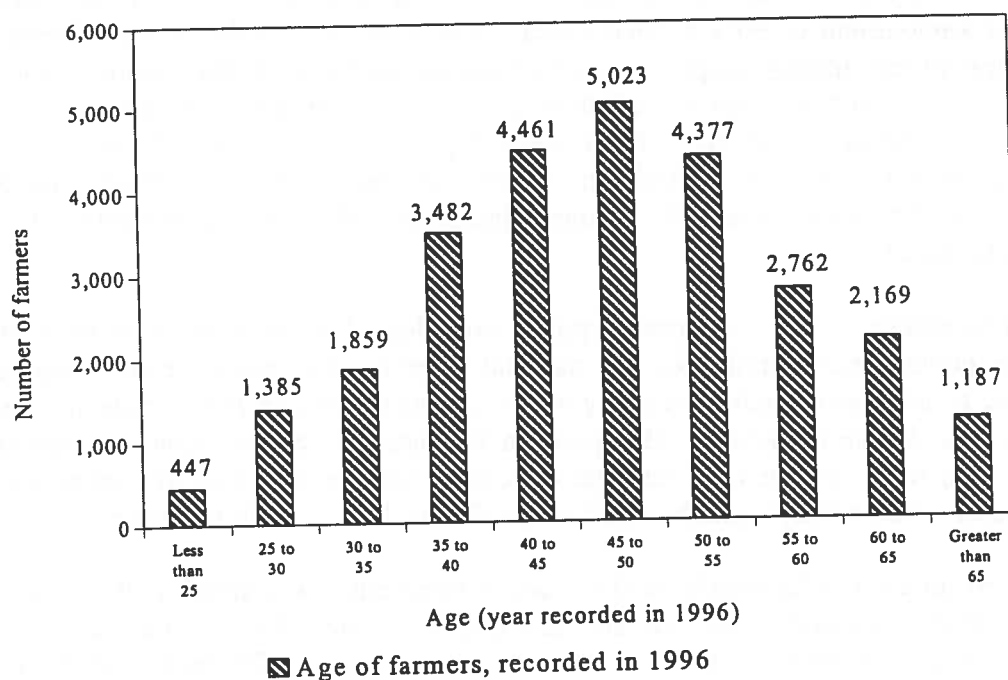
(Source: Derived from the SSEMP)

Of the population of 27,152 farmers, 1,187 (4.4%) were beyond retirement age when asked in 1996 (as part of the 1996/97 SSEMP); and 3,358 (12.4%) were older than sixty. This indicates that a relatively large proportion of dairy farmers may be eligible for any early retirement scheme that may be proposed. Apart from age, other factors, such as health, wealth, profitability of the farm and family succession may also motivate retirement decisions (Farrar and Franks 1998: Table 9.4: p. 99).

Impact of Agenda 2000 on the opportunity cost of dairy farming

The change in relative profitability of alternative enterprises will affect the rate of restructuring of dairy production. For example, compensation for the reduction in the beef intervention support price will be paid through a higher suckler cow premium (SCP), which suggests that the price of suckler cow quota will increase. As this payment will make up an even larger proportion of revenue, dairy farmers quitting milking to produce beef from suckler herds will almost certainly need to use income from the sale of milk quota to purchase SCP quota.

Few detailed analyses of the Agenda 2000 agreement have been published. One by MAFF (1999) notes that the combined proposals will have 'very different impact upon the different commodities' (p. 12). It estimates that losses to the UK dairy sector will be broadly £80 million (before any restructuring, implications of EU enlargement, or the impact of rural development measures), but after allowing for additional quota and assuming lower feed costs.

The increase in headage payments means that beef producers incomes will be fully protected (MAFF 1999: p. 12). Again assuming cereal prices fall in line with the lower intervention support price, pig, egg and poultry sectors will all benefit from lower feed costs (p. 12).

MAFF (1999) provisionally estimate net farm income for dairy farms in 1998/99 at just over £10,000. This is reduced to around £7,000 if the Agenda 2000 agreement had been in place. Net farm income on cereal farms would also be expected to fall (from £8,000 to just over £6,000), whilst it would be expected to increase on LFA cattle and sheep farms (from about £4,200 to £7,000) and on lowland cattle and sheep farms (from a loss of £2,000 to a break-even position). Should milk prices be lowered in the annual price fixing round without off-setting compensation then the sectors that have received full compensation are likely to be attractive alternatives to the lower dairy incomes anticipated under Agenda 2000.

8.5 Implications for dairy enterprises of the forthcoming WTO Millennium Round.

Because the major reforms of the dairy sector have been delayed until 2005, the March 26 agreements by the European Council are expected to have little effect on domestic and world markets. They are unlikely to have an effect on the EU's competitive position in international dairy markets, only a limited range of dairy products, notably some speciality cheeses, can be exported without the use of export subsidies, and quota restrictions prevent an expansion in production should world demand increase.

Latest forecasts indicate that the export of butter is likely to exceed GATT agreed guidelines, so without changes in the quotas or support prices the EU will be forced to adjust prices and export restitution payments for dairy products. However, it is possible that policy makers may choose to rebalance internal support prices and try to maintain the same milk price by reducing the support price for the commodity for which the tariff becomes effective in allowing imports and increase the support price for the commodity where the domestic price remains below the world price plus tariff. For example, the EU may increase the skim milk powder support price and reduce the butter support price.

It can be assumed that the main effect of the Millennium Round will be to continue the process of tariff reduction begun under the URA, and that minimum access agreements are likely to be increased.

8.6   Summary

This chapter has drawn together the findings from national and farm level surveys to explore their implications for the future structure of dairy farming in England and Wales. The survey findings regarding herd size, location and farm type have been summarised at the end of their respective chapters so only key summary points are re-presented here.

(i) The DECS/SSEMP findings show that smaller dairy enterprises are less competitive at the gross margin level than larger dairy enterprises. Economies of scale exist in both production and marketing.

(ii) Variable costs per cow were similar across all herd size categories, but smaller herds yielded less milk on average so variable costs per litre of milk produced were larger. In addition, dairy specific regular labour costs per cow were considerably higher on smaller herds. This shows that smaller herds were less efficient and also suffered from diseconomies of scale in production.

(iii) After deregulation, smaller farms paid on average higher collection and haulage charges per litre of milk produced, and this was one contributor to their lower than average farm gate milk price. Another was a price incentives offered by many milk purchasers which linked farm sales to milk price (volume related payments). This contrasts with the situation before market deregulation, when MMBs pricing policy had insulated smaller dairy enterprises from their diseconomies of scale in milk marketing: in effect larger farms had been subsidised the smaller farms.

(iv) In addition to a deterioration in profitability and competitiveness, the smallest farms were under increasing pressure as farm businesses. In 1994/95 and 1995/96 their average NFI was £5,745 and £8,409 respectively, of which the share of interest payments was 40 and 50.1% respectively

(v) Variable costs per cow on farms IMI LFAs were broadly similar to those on farms OMO LFAs. Despite increasing productivity IMI farms still lagged OMO farms in terms of milk yield per cow and milk prices, this meant that gross margin per cow increased in real terms by

only £3 compared to £55 on OMO farms. The shift in the milk price premium in favour of OMO LFA farms presented IMI farms with a further obstacle securing long-term viability.

(vi) In the ten years covered by the DECS/SSEMP, farms in the Eastern region achieved a real increase in gross margin per cow of £121, whilst gross margin per cow fell by £7 in real terms on farms in Wales. Assessed at the gross margin level *dairy farms in Wales have come under increasing pressure over the ten years*. Farms in Wales reported the lowest average regional gross margin per cow and per forage area. Part of the competitive disadvantage at the gross margin level was due to their still lower milk yield per cow, but Welsh farms received the lowest average milk price in three of the final four years, and could make no significant off-setting reduction in their variable costs.

(vii) Despite this relative disadvantage vis-à-vis dairy enterprises in all the other English regions, the rate of loss of dairy farms in Wales was similar to that in England as a whole. This shows the importance in any economic analysis of (a) assessing the relative profitability of alternative crop and livestock enterprises and (b) non-economic motivations. Findings from these surveys suggest that the opportunity cost on Welsh farms is likely to be even lower than the profitability of the dairy enterprise, otherwise one could have expected more farmers in Wales to have quit dairy farming. Information on non-economic motivations for dairy farming were recorded in the SSEMP and are presented in Farrar and Franks 1998.

(viii) Specialist dairy small (SDS) farms reported the lowest gross margin per cow in each of the ten years and the lowest average gross margin per forage hectare in three of the four years between 1993/94 and 1996/97. Net farm income after interest payments appear to be barely adequate to provide what might reasonably be considered as an acceptable return for the farmer and spouse's labour.

(ix) *The findings of the surveys reported here indicate that the most vulnerable farms are that that are small, located inside or mostly inside LFA and are in Wales. Smaller specialist dairy farms are less profitable at the gross margin level than specialist dairy farms IMI LFA. This indicates that after the deregulation of the milk market, the effect on the restructuring of the dairy sector of herd size increased whilst the regional effect decreased.*

(x) The econometric modelling exercise referred to in this chapter estimated the population of dairy holdings in England and Wales in eight to ten year to be 16,369, a reduction of 10,784 (40%) from the 1996 population. This corresponds reasonably well with trends derived from simple linear extrapolations of June Census data for England and Wales which indicate between 9,000 and 9,700 farms will exit the dairy sector in the next ten years, a reduction of 33-36%.

(xi) Any restructuring that even approaches these levels will result in billions of litres of quota being traded: it is therefore even more essential that the milk quota market works efficiently. Extending the quota leasing transfer deadline and allowing transfer independently of land would both increase efficiency, but under certain circumstances a siphon would be expected to reduce the selling price and the volume traded to below the free market equilibrium price.

(xii) A siphon will alter the value of milk quota and therefore affect the *timing* of farmers quitting dairy farming. A 'use it or lose it' policy will alter the *strategy* adopted by many farmers who on quitting dairying had leased rather than sold their quota, and of many who have already quit dairy farming and retained their quota (the so-called NPQHs).

(xiii) Either a siphon or a 'use it or lose it' policy would increase the quota held in the national reserve. The rules for the allocation of national reserve quota would need to be clearly set out so that farmers could take advantage of a larger threshold allocation in their quota management. Central reallocation of quota based on social rather than economic criteria may reduce the efficiency of milk production.

(xiv) The actual restructuring that takes place will be principally determined by:
      (a) the economies of scale with respect to production,
      (b) economies of scale with respect to marketing,
      (c) changes to policy relating to milk and other commodities and revision to rural policy.

(xv) Technological changes to production systems are likely to include more rapid genetic improvement and semen sexing and may include the use of rBST. These technologies are essentially scale neutral, in that they would have a similar cost across all herds regardless of herd size. However, new technologies do tend to favour larger farms which are usually better placed to assess the potential usefulness of a new technique and are more likely to have access to the capital for investment in training and equipment. The effects of these new technologies on restructuring will depend on their costs and benefits, and on their differential impacts across farm size.

(xvi) The Monopolies and Mergers Commission report on the supply of raw milk may lead to changes in the milk selling system and restrict Milk Marque from owning processing capacity. The report may lead to the break-up of Milk Marque into regional cooperatives, which would allow each cooperative to purchase processing capacity. Future changes to the structure of dairy farming may depend on farmers developing co-operatives which are integrated with milk processing, either through ownership of the processing capacity or through joint ventures.

(xvii) The structure of milk marketing organisation in America (Dairy Industry Newsletter, December 1, 1998) illustrates the potential for cooperative marketing of milk and the potential for further expansion of the average herd size. The Dairy Farmers of America control 14,000 million litres i.e. approximately equal to the total UK production but representing only 23% of total US milk. It has 18,860 members with an average farm size of 750,000 litres, and is therefore similar to the 6,400 members of Land O'Lakes who average 550,000 litres a farm. Members of both cooperatives compare in average size to UK dairy enterprises supplying producer groups. These two cooperatives are, however, dwarfed by the largest Californian co-operatives: Californian Milk Producers has 336 members who average over 8.8 million litres each: Secunty Milk Producers has 40 members who average nearly 13.9 million litres each: and Select Milk Producers, Artesia, New Mexico has 30 members who average 18 million litres each (i.e. herds of 1,800 cows at an average of yield of 10,000 litres a cow).

(xviii) The merger of four marketing groups, Camelot, Stourvale, United Milk Producers and Wessex to form the new body United Milk plc. to handle 850 million litres (Farming News, March 5, 1999: p 3) represents a step by their members towards securing additional market power.

(xix) The delay in the reform of the dairy sector until 2005 (with a review scheduled in 2003) may make dairy produce vulnerable to the volume and expenditure constraints previously agreed in the Uruguay Round of the GATT if compliance requires the annual price review to cut or rebalance milk support prices. Farmers will not now receive any compensation through direct payments for such a cut in price.

(xx) As Agenda 2000 has fully compensated price cuts in other sectors, dairy farmers with skill to enter these sectors, such as beef production from suckler cows, may be attracted to leave the dairy sector, increasing the restructuring of the dairy herd.

(xxi) The age structure of dairy farmers suggests there would be considerable interest in retirement schemes.

(xxii) Forecasts of the future are always prone to error, those presented in this chapter are no exception. Not only is it likely that dairy reforms will come under discussion before 2005, but technological innovations will soon come on stream which are likely to have important economic implications. The genetic potential of the UK herd lags behind that of America and Holland, but is catching up. This will increase average yields per cow as pedigrees improve, a development that will be boosted by semen sexing, an innovation that will alter livestock production systems world wide. If rBST is allowed to be used and produces the 20% increase in milk yields then the predictions presented in this chapter are likely to be wrong on both their magnitude and timing.

(xxiii) The World Trade Organisation are due to start in November 1999. The Uruguay Round started a move towards free trade in agricultural goods, but major reforms to the dairy support regime were avoided. If agriculture features strongly in the Millennium Round of the WTO then any further movement towards free markets will most likely make a proper start to recoupling European and world market prices for dairy products. Should this be the outcome then the technology used on, and the structure of dairy farms in England and Wales will need to be based on economic competitiveness. This would imply further and massive restructuring of dairy holdings in England and Wales.

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Appendix A: EU regions: England and Wales

Figure A.1 EU regions: England and Wales
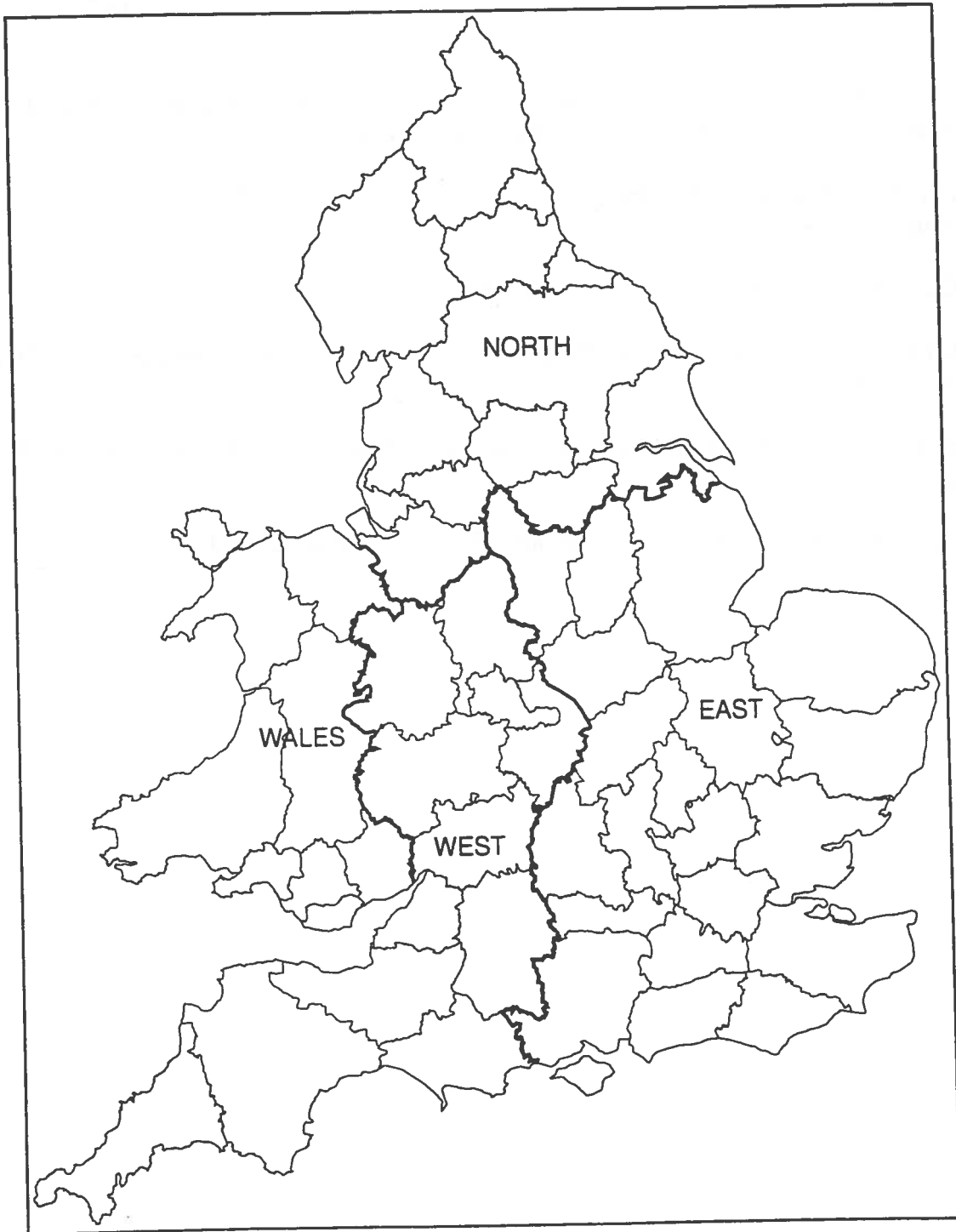
(Source : MAFF)

Appendix B: Summary of Agenda 2000 reforms

Dairy regime

Compulsory elements

- Quota regime extended to the year 2006
- reduction in support prices, starting on 1 July 2005 to be phased in over three years in equal instalments (5% cut each year)
- Community-funded compensation for reductions in support prices expressed in ECUs per tonne of milk quota *held* by the producers on 31 March each year, phased in over three years commencing in the calendar year 2005 (building up to 17.24 ECUs per tonne of quota in 2007).
- Provision of additional national envelope for topping up the basic payments
- Specific quota increases allocated to certain member states , including 19,700 tonnes to Northern Ireland, 64% of which will be allocates in the 2000/2001 quota year and 36% in the subsequent year.
- linear increase in milk quotas for all other Member States including the UK, with phased allocation in equal instalments over three years starting on 1 April 2005
- Mid-term review of quota regime - including the prospects for ending quota after 2006.

Discretionary elements

The discretionary elements of the Agenda 2000 package refer entirely to the management of the market in the leasing and the permanent transfer (with land) of milk quota. The additional flexibility introduced in the quota management arrangements from April 1 2000, i.e. for the 2000/2001 quota year, includes discretion to:
- decide on a national leasing deadline before 31 March rather than 31 December,
- to provide for transfers of quota independently of the land,
- to introduce a siphon on permanent quota transfers effected by lease of land (quota to fed into the national reserve), and
- to introduce a provision that if a producer does not make use of at least 70% of his quota within a 12 month period either through deliveries of direct sales, all or part of the unused quantity shall revert to the national reserve.

Arable regime

Compulsory elements most relevant to dairy farming

- Cereal intervention price will be reduced by 15% in two steps starting on 1 July 2000, and the Agricultural Council will consider the need for a further cut thereafter.

Discretionary elements

- retention the option of having separate base areas for maize (England and Wales currently have such areas).

- possible new option of making area payments on grass silage in Member States where maize in not a "traditional" crop (not yet clear whether this option is available to the UK).

Beef regime

Compulsory elements most relevant to dairy farming

- The beef intervention price is reduced by 20% over three years, starting on 1 July 2000.
- Reduction in intervention price by 25% from 2002 onwards.
- Price reduction are compensated for by increases in direct payment premia in 2002: beef special premium bulls and steers, suckler cow premium, calf slaughter premium and adult cattle (more than 8 months of age) slaughter premium of ECU 80 per head.

Discretionary elements

- the limit of 120,000 kgs milk quota which currently limits eligibility of dairy products for Suckler Cow Premium is made optional
- Member states are empowered to make additional payments to producers as headage payments on male cattle, suckler cows dairy cows and heifers, either broadly within the terms of the basic premium schemes or as supplements to the Slaughter Premium for adult cattle. They may also make area payments in respect to pasture land (to be defined by Member States) which is not used to support a claim for additional payments on calf but is used for rearing cattle. In 2002, the UK's share of these additional funds will by ECUs 63.8 million.

Rural development

Compulsory elements

- Member states are required to draw up seven-year Rural Development Plan beginning on 1 January 2000. The agri-environment schemes are compulsory: Member States are required to introduce them in relation to "their specific needs". All other measures are optional. Member States must "ensure the necessary balance between the difference support measures".

Discretionary elements

- Introduction of a number of measures, such as, establishment aid for young farmers training for farmers early retirement for farmers/farmworkers processing and marketing of agricultural products.
- A continued discretionary option to support farmers in the Less Favoured Areas, but these payments must switch from a headage to an area basis. (This is subject of the separate consultation of support for hill farming).

Horizontal measures

Discretionary elements

- Reductions of direct payments by up to 20% according to labour force criteria, overall prosperity criteria, and/or the total amount of aids received by farmers.
- Savings arising from horizontal measures can be used for agri-environmental and forestry measures, HLCAs and early retirement schemes.

Appendix C: Recent publications issued in the series Special Studies in Agricultural Economics

These publications are available from the University/College concerned at the address shown in Appendix E.

No 29	Wheat and Barley Production in Great Britain, 1994/95: Year Two of CAP Reform by Geoff Davidson University of Cambridge March 1996	£12.00
No 30	Linseed by M.R.Lewis Askham Bryan College April 1996	£10.00
No 31	Lowland Sheep 1994: Production Economics and Management by Mark Fogerty and Martin Turner University of Exeter April 1996	£10.00
No 32	Hardy Nursery Stock Production in England and Wales by R Crane and C Barahona University of Reading March 1996	£12.50
No 33	The Structure of Pig Production in England and Wales: The Results of the National Survey of Pig Production Systems, 1 February 1996 by Andrew Sheppard University of Exeter June 1996	£8.00
No 34	Economics of Wheat and Barley Production in Great Britain: 1995/96 by Carol Asby and Ian Sturgess University of Cambridge January 1997	£13.00
No 35	Economics of the UK Sugar Beet Industry by Alan Renwick University of Cambridge June 1997	£15.00
No 36	Lowland Beef: 1995 and 1996 Production by Tim Jenkins, Euryn Jones, Iain Mcdougall and Huw Williams University of Wales, Aberystwyth May 1998	£13.00
No 37	Wheat and Barley Production in Great Britain 1995/96 by Carol Asby University of Cambridge December 1997	£13.00

No 38	Oilseed Rape: 1996 Crop by M.R. Lewis Askham Bryan College March 1998	£12.00
No 39	Pig Production 1996/97: The Results of the National Survey of the Economics of Pig Production by Andrew Sheppard University of Exeter June 1998	£8.00
No 40	The Structure of Pig Production in England and Wales: The Results of the National Survey of Pig Production Systems by Andrew Sheppard University of Exeter June 1998	£8.00
No. 41	Economics of Milk Production England and Wales 1996/97 by John Farrar and Jeremy Franks University of Manchester July 1998	£18.00
No. 42	Economics of Wheat and Barley Production in Great Britain 1997/98 by Carol Asby University of Cambridge January 1999	£13.50
No. 43	Economics of Mushroom Production: 1997 Crop Year by Jeremy Franks and John Farrar University of Manchester January 1999	£15.00
No. 44	Pig Production 1997/98 by Andrew Sheppard University of Exeter July 1999	£8.00
No. 45	Dairy Enterprise Costs Survey: A review of the structure and economics of milk production 1987/88 to 1996/97 by Jeremy Franks University of Manchester August 1999	£15.00

Appendix D: Provincial centres of agricultural economics

NEWCASTLE	Department of Agricultural Economics and Food Marketing University of Newcastle-upon-Tyne Newcastle-upon-Tyne, NE1 7RU.	Tel 0191 222 6903
ASKHAM BRYAN	Rural Business Research Unit Askham Bryan College Askham Bryan York, YO2 3PR	Tel. 01904 702121
MANCHESTER	The Farm Business Unit, CAFRE School of Economic Studies University of Manchester Oxford Road Manchester, M13 9PL.	Tel 0161 275 4799
NOTTINGHAM	Rural Business Research Unit Division of Agriculture and Horticulture University of Nottingham Sutton Bonington Campus Loughborough, Leics. LE12 5RD	Tel 0115 9516057
CAMBRIDGE	Rural Business Unit Department of Land Economy University of Cambridge 19 Silver Street Cambridge, CB3 9EP	Tel. 01223 337147
WYE	Farm Business Unit Department of Agricultural Economics Wye College (University of London) Wye, Ashford, Kent, TN25 5AH	Tel. 01233 812401
READING	Department of Agricultural and Food Economics University of Reading 4 Earley Gate Whiteknights Road PO Box 237, Reading, RG6 2AR.	Tel. 01734 318966
EXETER	Agricultural Economics Unit University of Exeter Lafrowda House St German's Road Exeter, EX4 6TL.	Tel 01392 263839
ABERYSTWYTH	Welsh Institute of Rural Studies The University of Wales Llanbadarn Campus Ceredigion, Aberystwyth, SY23 3AL.	Tel. 01970 622253