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MILK PRODUCTION 1984–85

J. WRIGHT
F. WILKS

Miscellaneous Study No. 74
1986

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DEPARTMENT OF AGRICULTURAL ECONOMICS & MANAGEMENT

MILK PRODUCTION 1984-85

Results of a survey carried out in Central Southern England and the South West Midlands as part of the National Investigation into the Economics of Milk Production in England and Wales 1984-85.

J. Wright

F. Wilks

Miscellaneous Study No.74 Price £3.00

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FOREWORD AND ACKNOWLEDGEMENTS

The National Investigation into the Economics of Milk Production, which forms part of a continuing programme of studies in agricultural economics, is sponsored and financed jointly by the Milk Marketing Board of England and Wales and the Ministry of Agriculture, Fisheries and Food. Collection of the data at farm level is the responsibility of investigational staff in Departments of Agricultural Economics at nine centres in England and Wales and the national results are presented in a joint M.M.B./Ministry publication.

The latest survey to be undertaken covered the period April 1984 to March 1985, and this report summarises the results relating to sixty-five dairy farms situated in the Reading province, which covers the counties of Avon, Berkshire, Buckinghamshire, Gloucestershire, part of the Greater London Council area, Hampshire, Hereford and Worcester, the Isle of Wight, Oxfordshire, Warwickshire, the West Midlands and Wiltshire.

The field work was carried out by the following members of the investigational staff: Mrs. E. I. Harland, Miss F. Wilks, and Messrs. M. Lewis, A. K. Martin, R. L. Vaughan and J. Wright. Mr. Wright supervised the study and was responsible, with Miss Wilks, for the preparation of the report, which was typed by Mrs. C. Card.

However, neither the survey nor this report would have been possible but for the help received from the farmers in the region who co-operated in the exercise, and the Department is indebted to them and their staff, not only for supplying the basic information, but for the degree of patience and the hospitality shown to field staff on the occasion of their visits.

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SUMMARY

1. This report summarises the results of a survey carried out in the Reading province as part of the National Investigation into the Economics of Milk Production 1984-85.

2. The province, which covers eleven counties in Central Southern England and the South West Midlands, contains 16% of the cows and 13% of the milk producers in England and Wales.

3. The 65 farmers who co-operated in the survey farmed a total of 12,000 hectares, and the farms carried almost 8,000 cows in 71 herds. The Friesian was the dominant breed comprising over 70% of the cows in the survey.

4. The main climatic feature of the 1984-85 farming year was the late summer drought which resulted in a shortage of grass for both grazing and conservation and contributed substantially to a shortfall in national milk production.

5. April 1984 saw the introduction of milk quotas and this feature has, no doubt, had a marked effect on the results of the survey as producers attempted to come to terms with this restraint on their businesses.

6. For the group of dairy farmers involved in this survey, 1984-85 proved to be a very poor trading period with an average net margin of just over £40 per cow. This compares with a figure of almost £120 per cow recorded in 1980-81 when the last milk costs investigation was undertaken. However, the margin achieved by the most profitable herds in 1984-85 was well above the average level and was achieved by a combination of higher returns and lower total costs.

7. The costs of milk production, when examined in some detail, reveal that concentrates accounted for 27% of total production costs. This was followed by miscellaneous costs (23%), bulk food (19%) and labour (17%). The proportion of total costs accounted for by concentrates had fallen considerably since 1980-81 and reflects the reduced level of concentrate feeding adopted by most milk producers in response to quotas.

8. In an attempt to identify factors affecting profitability, the results gave an indication of the financial pressure owners of small herds are under. Although there was a strong correlation between average yield and margin per cow, with the introduction of milk quotas the emphasis has shifted away from maximising yield per cow, and in a situation where over-quota production was penalised, the higher yielding herds may lose some of their financial advantage. Under the prices and conditions prevailing in 1984-85, there was no apparent financial advantage to be gained from winter milk production, reflecting the narrowing of the differential between winter and summer milk prices. For the producers involved in this survey, there appeared to be a strong correlation between the level of margin over concentrates and net margin per cow.

1. DAIRYING IN THE REGION

This section of the report will establish a background to the survey results, by illustrating the importance and structure of dairying in the region. The Reading province covers eleven counties in Central Southern England and the South West Midlands, and accounts for 17% of the total area of crops and grass in England and Wales. The province contains nearly 16% of the country's cows, and 13% of total milk producers. These farms and cows produce nearly 17% of the total milk output of England and Wales. Table 1 shows the importance of dairying in the Reading province, and changes in its structure over a ten-year period to 1984. Where available, some figures for the 1984/85 year are included, to illustrate changes in structure in the first year after the imposition of milk quotas.

Milk Producers

Over the ten year period to 1984, the number of registered milk producers in England and Wales fell by 40%, and this trend was matched by a 39% drop in the Reading province, varying from 31% in Wiltshire to 49% in Hampshire.

Dairy Cows

Although the number of milk producers in the province has declined by slightly less than the national average, the number of dairy cows in the region has fallen by twice the national average, and in June 1984 the province contained 16.0% of the national herd.

Milk Sales

In 1984/85 the Reading province provided 16.8% of the total milk production of England and Wales. The fall in dairy cow numbers in the region is reflected in sales of milk, national production increasing by 13% over the ten years to March 1985, while sales in the province only rose by 4%.

Average annual milk sales and herd size

The figures in this section of Table 1 have been calculated from those in the previous three sections. They should, therefore, not be read as absolute figures, but are intended for use as comparison between regional and national figures.

In the ten years to 1984, average annual milk sales per cow were consistently higher in the Reading province than the national average, although the gap between the two narrowed from 8.2% in 1974/75 to 5.1% in 1984/85. The province showed a 15.6% increase in average yield over the ten years, compared with 19.4% for England and Wales.

The 39% fall in the number of milk producers, coupled with only a 10% decline in cow numbers, has obviously resulted in an increased average herd size, as illustrated in Table 1. Nationally, however, a fall in cow numbers of only 5%, and a decline of 40% in producer numbers, has led to a significantly larger increase in average herd size of 60.5% compared with the figure of 47.4% for the Reading province.

Table 1 Milk production trends and the importance of dairying in the Reading province

	Reading province	England & Wales	Proportion in the Reading province
Number of registered producers			%
March 1974	8401	65634	12.8
March 1979	6113	46972	13.0
March 1984	5132	39287	13.1
March 1985	4940	37815	13.1
Percent change (1974-1984)	-39%	-40%	-
Dairy cow numbers ('000's)			
June 1974	478	2839	16.8
June 1979	457	2734	16.7
June 1984	430	2696	16.0
June 1985	411	2580	15.9
Percent change (1974-1984)	-10%	-5%	-
Milk sales off farms (Million litres)			
April 1974 - March 1975	2038	11115	18.3
April 1979 - March 1980	2293	12774	18.0
April 1984 - March 1985	2119	12605	16.8
Percent change (1974-1984)	+4%	+13%	-
Average annual milk sales (litres per cow)			
1974 - 75	4263	3915	-
1979 - 80	5021	4673	-
1984 - 85	4927	4675	-
Percent change (1974-1984)	+15.6%	+19.4%	-
Average size of dairy herd (cows per herd)			
1974	57	43	-
1979	75	58	-
1984	84	69	-
Percent change (1974-1984)	+47.4%	+60.5%	-

Table 2 Dairy herd size distribution in England & Wales

Herd size (cows)	Herds (as a % of the total)			Cows (as a % of the total)		
	1974	1979	1984	1974	1979	1984
Less than 20	27.2	17.1	12.2	7.0	3.5	2.2
20 - 39	30.2	26.3	24.1	19.7	13.8	11.3
40 - 69	25.5	29.5	29.0	30.1	27.7	23.9
70 - 99	10.1	14.7	17.5	18.8	21.6	22.5
100 - 199)			14.8			29.6
200 & over)	7.0	12.4	2.4	24.4	33.4	10.5
Total	100.0	100.0	100.0	100.0	100.0	100.0

Source: M.M.B. Dairy Facts & Figures 1980 & 1985

Table 3 Dairy herd breed distribution in England & Wales

Breed	1973	1978	1983
Friesian	81.0	88.6	86.8
Holstein[1]	-	2.3	6.6
Ayrshire	3.6	3.4	2.1
Guernsey	2.8	2.4	1.9
Jersey	2.2	2.0	1.6
Other	10.4	1.3	1.0
Total	100.0	100.0	100.0

Source: M.M.B. Dairy Facts & Figures 1985.

1. Includes Holstein/Freisian crosses.

Table 2 shows changes in herd size distribution between 1974 and 1984, and demonstrates a significant trend in the structure of the national herd. In 1974, 57% of all herds, and 26% of all cows, were in herds of less than 40 cows. By 1984, these figures had fallen to 36% and 13% respectively. In contrast, herds of over 100 cows represented only 7% of herds and 24% of cows in 1974, but by 1984 accounted for 17% of herds, and 40% of cows.

Table 3 shows the national distribution of dairy breeds between 1973 and 1983. In the 1978 and 1983 surveys, cross-bred cattle were included with the breed they most closely resembled, whereas in 1973 mixed breeds and crosses were included under "other", which explains the high proportion in this category in that year.

2. BACKGROUND TO THE SURVEY

Introduction

When the Milk Marketing Board was established in 1933, the need to monitor the costs of milk production was recognised, and in 1934 the first national milk costs investigation took place. From that date until the early 1950's the costings took the form of continuous surveys, but in 1952 the system was changed and surveys became intermittent, covering pairs of years up to and including 1960/62 and single years thereafter. Since 1965 the survey has been carried out every three or four years using a randomly selected sample of farms to ensure that all types of milk producers are represented, and that the results are representative of the industry as a whole. Nationally, 400 farms stratified by herd size and selected in this way are considered sufficient to provide an acceptable level of accuracy and to ensure overall representation.

The sample

For the purposes of the 1984-85 investigation, the national sample was drawn at ramdom from a list of farms with at least 10 dairy cows at the time of the June 1983 census. Lists of reserves were also prepared to provide replacements in the event of unsuitability or non-co-operation in the case of the initially selected farms.

The Reading province had a quota of 65 farms. A number of these farms carried more than one dairy herd and in some cases it proved more convenient and meaningful to cost the herds separately. This approach resulted in records from a total of 71 herds being available for inclusion in the analysis.

The farms in the survey

Structural features of the farms, together with a summary of rents are shown in Tables 4 and 5 respectively. The total area farmed by the 65 farmers was almost 12000 hectares, giving an average farm size of 183 hectares with a range from 19 to just over 1240 hectares. Over the sample as a whole, 36.5% of the total farm area was devoted to dairy cows; the ratio varying from almost 90% in the smallest farm size group to 25% on the largest farms. Of particular interest in Table 4 is the ratio of temporary to permanent grassland where the trend was towards increased reliance on short terms leys as farm size increased.

In order to cost all the herds on the same basis, it was necessary to apply a rental value figure to those owner occupied farms in the sample. In addition, on rented farms, an allowance was made to cover the annual value of tenant right as applied to buildings erected by the tenant. The average figures used, together with rents actually paid on the tenanted farms, are shown in Table 5.

Table 4 Distribution of dairy cows and land use by farm size

	Farm size (hectares)				
	Less than 50	50-100	101-200	More than 200	All farms
Number of farms	21	16	10	18	65
Average farm size (hectares)	33.3	74.1	165.3	386.8	183.2
Average number of cows per farm	50.7	95.1	133.5	214.9	119.8
Number of cows as a proportion of the total sample (%)	13.7	19.5	17.1	49.7	100.0
Percentage of total farm area devoted to dairy cows	89.4	70.3	46.9	25.2	36.5
Stocking rate (hectares per cow)	0.62	0.58	0.61	0.58	0.59
Land use	%	%	%	%	%
Arable crops[1]	6.0	14.2	26.1	56.4	45.0
Fodder crops	3.3	0.5	2.1	0.9	1.2
Temporary grass	28.0	39.3	30.1	22.9	25.8
Permanent grass	58.9	41.0	32.5	13.4	21.5
Other areas[2]	3.8	5.0	9.2	6.4	6.5
Total	100.0	100.0	100.0	100.0	100.0

1. Cereals, cash crops and fallow
2. Rough grazing, buildings, roads, etc.

Table 5 Summary of tenure & rents by farm size

	Farm size (hectares)				
	Less than 50	50-100	101-200	More than 200	All farms
Tenanted land					
Proportion of total (%)	40.1	41.8	38.7	32.3	34.6
Average rent paid (£ per ha.)	104.8	95.0	88.0	95.7	95.0
Value of tenant right (£ per ha.)	6.4	10.3	7.3	9.5	9.4
Owner occupied land					
Proportion of total (%)	59.9	58.2	61.3	67.7	65.4
Rental value (£ per ha.)	108.0	115.5	105.7	99.8	102.4
Overall average rent[1] (£ per ha)	109.3	111.3	101.7	101.7	103.1

1. In this context, "rent" is a combination of rents actually paid, tenant right and imputed rental value figures.

The herds in the survey

The geographical location of the herds in the survey is shown in Table 6, which also gives some indication of the herd size distribution. This table reinforces earlier remarks regarding average herd size in the province. For example, 52% of the herds were of 100 cows and over, compared with a national average in 1984 of 17%.

The farms carried a total of 7789 cows - an average of 120 cows per farm and 110 per herd. The smallest herd had 17 cows and the largest individual herd was one of 441 cows. Several holdings carried large numbers of cows, but they were in two or more separate herds and, as indicated earlier, were costed separately.

An indication of the breed distribution in the survey is given in Table 7. As might be expected, the Friesian was the dominant breed, comprising 72% of the herds and the same proportion of the cows in the survey.

Table 8 shows housing and milking systems employed, and labour hours per cow. As might be expected, the 3% of herds using a yard and cowshed system had the smallest average herd size and the greatest labour use.

The table also illustrates the popularity of the cubicle, 58% of the herds in the survey using this system.

Herds in the "other/various" category did not readily fit into the broad classification used, and comprised those herds employing a combination of housing systems, together with a few herds using minority systems of housing or milking, e.g. outwintering, bail milking, etc. Looking in detail at milking location, 65 of the 71 herds were milked through parlours, 77% herringbone, and 23% abreast.

A summary of the climatic conditions

The spring of 1984 was better than average, and first cut silage was of excellent quality. However, lack of rain and higher than average temperatures resulted in a shortage of grass late in the summer, both for grazing and for subsequent cuts of silage. This shortage of grass due to the weather in the summer of 1984 contributed substantially to a shortfall in national milk production.

The winter of 1984/85 was colder than normal, especially in January and February but good quality silage enabled most farms in the Reading province to get through the winter without too many problems.

Table 6 Distribution of herds by county and herd size

County \ Herd size (cows)	Less than 60	60-100	101-150	More than 150	All herds
Avon	3	2	2	-	7
Berkshire	-	-	1	-	1
Buckinghamshire	1	2	2	1	6
Gloucestershire	4	3	2	3	12
Hampshire & the Isle of Wight	1	1	3	3	8
Hereford & Worcester	2	4	2	4	12
Oxfordshire	2	1	1	1	5
Warwickshire & the West Midlands	1	3	4	2	10
Wiltshire	2	2	5	1	10
Total	16	18	22	15	71

Table 7 Breed distribution by herds and by cows

Breed[1]	Herds		Cows	
	Number	%	Number	%
Friesian	51	72	5585	72
Friesian/Holstein	9	13	1231	16
Channel Island	8	11	722	9
Other/Mixed	3	4	251	3
All herds	71	100	7789	100

1. Eighty per cent of the herd or over in the breed.

Table 8 Distribution of herds by type of housing and place of milking

Type of housing	Milking location	% of all herds	Average herd size	Labour hours per cow
Yard	Cowshed	3	40.5	57.0
Yard	Parlour	25	91.8	42.1
Cubicles	Parlour	58	133.9	32.1
Other	Various	14	45.7	45.7
All herds		100	109.7	37.3

3. A SUMMARY OF THE FINANCIAL RESULTS

The costing method

As its title suggests, the milk costs investigation was designed to establish the economics of milk production, and thus the survey related solely to the dairy herd. Dairy followers were excluded and home bred heifers were transferred into the herd at estimated market value as though they had been purchased. Calves were credited to the herd either at actual sale price or estimated value at a few days old, and this figure was added to the value of milk produced to arrive at total returns. To enable all the herds in the investigation to be costed on a comparable basis, standard accounting methods and definitions were used, and these are shown in detail in Appendix 2.

The financial results

The results of the 1984-85 survey are shown in Table 9, alongside those recorded in 1980-81, when the last milk costs investigation was undertaken. Coincidentally, the commencement of the 1984-85 survey (April 1984) also saw the introduction of milk quotas, together with some fundamental changes made by the M.M.B. to the producer payment system. The imposition of milk quotas has, no doubt, had a marked influence on the survey as producers attempted to come to terms with this restraint on their businesses.

With this consideration in mind, the picture in 1984-85 was rather different to that recorded four years earlier . Although the average herd size had increased, the increase was rather less than would have been expected without the influence of quotas. Indeed, the majority of producers reduced the size of their herds between the beginning and end of the survey period as one means of staying within their quota. Average milk yields were also undoubtedly lower than they would otherwise have been, and the increase in co-responsibility levy, from April 1984, had the effect of lowering producer prices which led to a further erosion of output per cow. In absolute terms , both average herd size and yield per cow of the costed herds were higher than the provincial averages, particularly the average herd size. The trend towards winter milk production that has been evident in previous surveys continued, although the situation in 1984-85 may have been distorted in that production over the April to September period was adversely affected by the initial response to quotas and by the late summer drought. Additionally, by the autumn, when it became evident that, nationally, milk production was well below quota, many producers attempted to rectify deficiencies earlier in the year and produced more milk over the winter period than would have been the case under more normal circumstances. Not surprisingly, concentrate consumption in 1984-85 was lower than it had been in 1980-81, with reductions of 15% and 10% in terms of tonnes per cow and kilogrammes per litre respectively. The continued uptake of modern technology in the milking and housing of dairy cows is reflected in the improvement in labour productivity as measured in terms of labour hours per cow.

In spite of the fall of almost 400 litres per cow in average yield, the return from milk was almost £70 per cow higher than that recorded in 1980-81 which reflects an increase of 19% in the average milk price over the four year period. Together with higher calf

Table 9 Changes in performance & margins between 1980-81 & 1984-85

	1980-81	1984-85
Physical features		
Number of herds	76	71
Herd size	104.2	109.7
Dry cows - %	15.6	16.9
Yield per cow - litres	5378	4986
Winter milk % (Oct-March inc.)	50.4	52.7
Concentrates - tonnes per cow	1.66	1.41
- kg. per litre	0.31	0.28
Labour hours per cow	40.7	37.3
Financial details	£ per cow	£ per cow
Output		
Value of milk produced	668.5	738.0
Value of calves	45.6	62.6
Total	714.1	800.6
Costs		
Concentrates - purchased	192.2	199.0
- home grown	14.9	7.1
Bulk food - purchased	10.1	13.4
- home grown	78.5	128.3
Grazing	43.5	66.1
Labour	104.1	127.1
Herd depreciation	27.1	40.6
Miscellaneous	126.4	176.4
Total costs	596.8	758.0
Net Margin	117.3	42.6

Forage hectares per cow	0.55	0.59
Net margin per forage hectare - £	226.3	82.8

values, the total output per cow was up by just under £90 per cow. Although the increase in total costs per cow of just over £160 per cow represents an average rise of 27%, this figure is distorted by the reduction in total concentrate costs. The average increase in items other than concentrates since 1980-81 was, in fact, almost 42%. In percentage terms, the largest increases had been in the cost of homegrown bulk feed and grazing, where rises of 63% and 52% respectively were recorded. Herd depreciation charges per cow were up by almost 50% reflecting a higher turnover of cows and the fall in cull cow values, both a direct result of the introduction of milk quotas. The net margin, at just over £40 per cow, was well down on that recorded four years earlier, and, bearing in mind the fall in the value of the pound over the same period , in real terms, the reduction in profitability was greater than the figures suggest.

Average figures can be notoriously misleading, and a significant feature of most farm surveys is the tremendous variation in results. Milk production, by its very diverse nature, tends to exhibit a wider variation than most enterprises, and it could be argued that, bearing in mind the random nature of the initial selection, herds included in this particular survey would produce an exceptionally wide spectrum of results. Some indication of this can be gauged by looking at the range in average yields, where the lowest figure recorded was just under 2,800 litres per cow, compared with almost 6,800 litres at the other end of the scale.

In an attempt to identify factors that may be associated with profitable milk production, the relationship between the average results and those achieved by the most profitable herds (as measured in terms of net margin per forage hectare) is shown in Table 10. The herds within the top 25% were larger, produced more milk per cow and fed concentrates at a slightly lower rate per litre than the average. The herds also used considerably less labour, and achieved a better stocking rate. In financial terms, their total returns were over £100 per cow higher, but, significantly, most of the cost items were below average, and, in total, costs were almost £30 per cow less than the "all herds" average, resulting in a net margin that was almost £140 per cow higher than the average for the whole sample.

While the enhanced profitability could mainly be attributed to the extra returns from milk, the fact that the herds also had a lower cost structure should not be overlooked - indeed, over 20% of the higher margins recorded on the top 25% of herds could be attributed to lower costs.

Finally, it is perhaps worth noting that the difference between the margin per cow of the most profitable herds and that of the average was considerably different to that recorded in 1980-81. At that time, the top 25% achieved an average margin that was just over 60% above the all herd average compared with a figure of over 300% in 1984-85.

Table 10 Performance & margins achieved by the most profitable herds in 1984-85, compared with the average results.

	All herds	Top 25% of herds[1]
Physical features		
Number of herds	71	18
Herd size	109.7	125.5
Dry cows - %	16.9	17.0
Yield per cow - litres	4986	5739
Winter milk % (Oct-March inc.)	52.7	53.1
Concentrates - tonnes per cow	1.41	1.56
- kg. per litre	0.28	0.27
Labour hours per cow	37.3	30.6
Financial details	£ per cow	£ per cow
Output		
Value of milk produced	738.0	834.3
Value of calves	62.6	74.8
Total	800.6	909.1
Costs		
Concentrates - purchased	199.0	214.5
- home grown	7.1	10.1
Bulk food - purchased	13.4	14.7
- home grown	128.3	116.1
Grazing	66.1	64.2
Labour	127.1	103.5
Herd depreciation	40.6	44.5
Miscellaneous	176.4	161.9
Total costs	758.0	729.5
Net margin	42.6	179.6

Forage hectares per cow	0.59	0.53
Net margin per forage hectare - £	82.8	340.0

1. Based on net margin per forage hectare.

4. THE COSTS AND RETURNS OF MILK PRODUCTION

Under this heading the aim is to examine the costs and returns of milk production in 1984-85 rather more closely using Table 11 as a guide to the relative importance of the elements in each section. The 1980-81 figures are included for interest and to amplify points made in the text. The opportunity has also been taken to examine some of the physical features of the herds in the survey.

For the purpose of analysis, the non-Channel Island herds were grouped according to herd size, since a classification based on cow numbers approximates to a division by scale of operation, and probably provides a more satisfactory basis for comparison of dairy farms than any other readily available measure.

The results relating to the Channel Island herds have been omitted from the tables in this section of the report in recognition of the rather different costs and returns structure associated with Channel Island herds in general. Consequently, certain total figures shown in Tables 12 to 20 may not tally with the totals shown in Table 11 and elsewhere in the report where the results relate to all seventy one herds.

Table 11 Composition of costs and returns 1980-81 and 1984-85

	1980-81		1984-85	
	£ per cow	%	£ per cow	%
Returns				
Milk	668.5	93.6	738.0	92.2
Calves	45.6	6.4	62.6	7.8
Total	714.1	100.0	800.6	100.0
Costs				
Concentrates - purchased	192.2)		199.0)	
- home grown	14.9)	34.7	7.1)	27.2
Bulk food - purchased	10.1)		13.4)	
- home grown	78.5)	14.9	128.3)	18.7
Grazing	43.5	7.3	66.1	8.7
Labour	104.1	17.4	127.1	16.8
Herd depreciation	27.1	4.5	40.6	5.3
Miscellaneous	126.4	21.2	176.4	23.3
Total costs	596.8	100.0	758.0	100.0
Net margin	117.3	-	42.6	-

Returns

Milk

The 8,000 cows included in the survey produced a total of almost forty million litres of milk over the twelve month period. Of this, 94% was sold wholesale, 4% was retailed, 1% was fed to livestock and the balance consumed by staff and members of the farmhouse in almost equal proportions. The average yield per cow of 5161 litres conceals a considerable range of from 3249 to 6766 litres per cow, although almost 75% of the non-Channel Island herds had average yields between 4,500 and 6,000 litres per cow.

Table 12 Summary of milk output by herd size

Herd size	Average yield	Average price	Milk returns	Winter milk production[1]
	Litres per cow	Pence per litre	£ per cow	%
Less than 60 cows	4393	14.52	637.9	48.6
60 - 100 cows	5297	14.61	773.7	53.9
101 - 150 cows	5391	14.48	780.5	54.1
More than 150 cows	5320	14.55	774.2	55.3
All herds	5161	14.54	750.2	53.2

1. October - March inclusive.

The general trend was for yields to increase with herd size, which led to higher returns per cow. The average milk price shows little relationship with the varying proportions of milk produced over the winter period but, given the narrowing differential between winter and summer prices and the fact that price is also influenced by milk quality this is not so surprising.

The emphasis on winter milk production in the larger herds is well illustrated in the above table, although the seasonal distribution of milk production is shown in more detail in Table 1 of the appendix. More milk was produced in May than in any other month of the year and from this peak, production fell throughout the summer, and in all of the groups monthly production was at its lowest in August and September, before increasing again as autumn calving cows made their contribution to the monthly production figures.

Calf returns and breeding policy

The contribution made to total returns by calves in 1984-85 was just under 8%, compared with just over 6% in 1980-81. A summary of the disposal and average value of calves born in the herds during the 1984-85 survey is shown in Table 13. A more detailed analysis by herd size appears in the appendix (Table 2).

Table 13 Calf disposals, retentions and average values

	Number	Per cent	Average value per head £
Sold	3466	43.3	66.5
Retained - dairy	1916	24.0	60.0
- other	2072	25.9	68.5
Deaths	541	6.8	-
Total	7995	100.0	61.0

Compared with previous surveys, the proportion of calves sold within a week or so of birth had fallen significantly and there had been a corresponding increase in the number of "other" retentions. This trend was most noticeable among the herds in the smallest herd size group, suggesting that these producers were considering calf rearing and/or beef production as one way of attempting to minimise the impact of milk quotas on their businesses. The proportion of dairy retentions was slightly lower than previous surveys, although, as in the past, there was a tendency for this figure to increase with herd size. Among the non-Channel Island herds, the lowest level of dairy retentions (17%) was recorded among the herds with less than 60 cows, with the two groups of herds with over 100 cows retaining almost 30% of their calves as potential herd replacements. The calf mortality rate in three of the four groups of non-Channel Island herds was remarkably consistent at between seven and eight per cent, and only in the largest herd size group did it fall below six per cent.

There was a marked difference in the average price received for calves sold, with the two groups of herds with less than 100 cows obtaining 25% more for their calves than those herds with over 100 cows. The most likely explanation for this differential is that the lower demands for heifer replacements enabled the owners of the smaller herds to make more use of beef bulls, whereas the replacement policy of the larger herds meant that the majority of the calves sold were of a pure bred nature. The timing of sales would also have an effect on the average price, and calf prices were certainly at their lowest in the autumn and early winter, when the calving pattern would suggest the majority of sales fron the larger herds took place. After staying bouyant in the spring and early part of the summer, market prices for calves fell sharply in October, and remained depressed until the turn of the year when there was a partial recovery.

There was considerable variation in the value placed on dairy heifers and on "other" calves (i.e. bull calves and non-dairy heifers) and while some of the difference may be due to the factors outlined earlier, no doubt the figures also reflect different attitudes by farmers to the value of calves. For example, the value placed on dairy heifer calves by the owners of the largest herds was significantly higher than that recorded on the smallest herds.

Method of service and calving patterns

Of the 71 herds in the survey, 39 (55%) used artificial insemination as the sole means of getting cows in calf, 9 (13%) used a bull only, and 23 herds (32%) used a combination of A.I. and natural service. The corresponding figures for heifers were 28%, 62% and 10% respectively.

The monthly distribution of cow and heifer calvings is shown in Table 14, and this feature, together with the proportion of heifer calvings in relation to total calvings is shown in more detail in Table 3 of the appendix.

Table 14 Distribution of calvings

Month	Cows	Heifers	Total
	%	%	%
April	4.6	1.6	4.0
May	3.1	1.9	2.8
June	2.2	1.4	2.0
July	2.4	1.8	2.3
August	8.0	9.5	8.3
September	17.3	23.5	18.6
October	16.4	22.9	17.7
November	14.3	18.6	15.2
December	11.6	9.3	11.1
January	7.7	5.0	7.2
February	6.6	2.9	5.9
March	5.8	1.6	4.9
Year	100.0	100.0	100.0

Overall, the peak month for calvings of both heifers and cows was September, although there was considerable variation between groups. In most groups, however, calvings were at their lowest in June. Calvings were most evenly distributed in the smallest herd size group, whereas the concentration of calvings in the autumn in the larger herds was very evident. For example, 63% of all calvings in the group with over 150 cows took place during the period August to November. The late summer and autumn was also favoured by all groups as a time to calve heifers, and almost 75% of the total heifer calvings took place over that same four month period. Heifer calvings accounted for almost 21% of total calvings and the general tendency was for this proportion to increase with herd size.

Costs

Concentrates

As Table 11 demonstrates, concentrates accounted for just over 27% of the total costs of milk production in 1984-85, a lower figure than that recorded four years earlier and reflecting the reduction in the level of concentrate feeding made by most producers in response to the introduction of milk quotas. In the non-Channel Island herds surveyed in 1984-85, an average of 1.43 tonnes was fed per cow, of which the majority (95%) was purchased and cost an average of £147 per tonne. The balance was made up of home grown cereals, valued at their ex-farm selling price which averaged £111 per tonne. The analysis of concentrate usage and prices by herd size is tabulated below.

Table 15 Concentrate usage and cost according to herd size

Herd size	Concentrates fed		Average price (£ per tonne)		
	Tonnes per cow	Ratio of purchased to home grown	Pur-chased	Home Grown	Total
Less than 60 cows	1.17	100 : 0	155.4	-	155.4
60 - 100 cows	1.43	95 : 5	148.5	110.8	146.8
101 - 150 cows	1.50	93 : 7	145.6	111.1	143.3
More than 150 cows	1.56	96 : 4	141.3	111.1	140.1
All herds	1.43	95 : 5	147.0	111.0	145.4

Previous surveys in this series have consistently revealed a low proportion of home grown cereals in the rations of dairy cows and 1984-85 proved no exception - indeed, at 5%, the figure was significantly less than the 9% recorded in 1980-81. As supply does not appear to have been the limiting factor - on the farms in the survey over 40% of the total acreage was used for cereal cropping - it must be assumed that the milk producers involved had reservations concerning the technical possibilities and/or economic advantages of retaining more home grown cereals for feeding to dairy cows. Although conventional calculations appear to suggest significant savings for cereal producers with dairy herds through home milling and mixing, there was clearly a strong preference in favour of selling cereals off the farm and buying back compounds.

Not suprisingly, the average cost per tonne was highest in the smallest herd size group and there was definite evidence of economies of scale in respect of prices paid for purchased concentrates. The differential of over £14 per tonne represents a saving of £22 per cow at the consumption level recorded in the largest herd size group.

Purchased bulk food

At less than 2% of total production costs in both 1980-81 and

1984-85, this item was not of very great importance for the majority of herds in the survey.

There are, of course, some producers, usually the owners of small and medium sized herds, who rely heavily on purchased bulk foods and are thus able to carry more cows than if they relied solely on home grown forage and, as a means of expanding a business, the approach has much to commend it. There was, however, little evidence from the analysis by herd size that any particular group in this survey relied heavily on purchased bulk feed.

Home-grown forage crops and grazing

The combined cost of these two items amounted to almost £200 per cow and represented over 25% of the total production costs in 1984-85, compared with only 20% in the 1980-81 survey. Although this would suggest that producers were placing more reliance on grazing and home-grown forage, evidence from the costings would also suggest that the unit costs of items involved in forage production have increased at a rather higher rate than most other milk cost items. Among the non-Channel Island herds, there was a tendency for the cost of these two items per cow to increase with herd size, although as a proportion of total production costs the figures were suprisingly consistent at between 25% and 27%.

With grazing, hay and silage costs, samples were sufficient to permit a classification by herd size and these are summarised in Table 16. In this instance, in particular, attention is drawn to the crop costing methods outlined in Appendix 2, since the conventions particularly in respect of rent, may differ from those used in other costings of this type.

Table 16 Grazing and forage crop costs by herd size

Herd size	Grazing		Hay		Silage	
	£ per hectare	£ per cow	£ per hectare	£ per tonne	£ per hectare	£ per tonne
Less than 60 cows	193.5	62.8	377.8	54.4	450.8	16.1
60 - 100 cows	241.4	66.9	483.7	64.7	418.4	14.4
101 - 150 cows	257.4	70.8	531.0	71.0	468.7	16.0
More than 150 cows	260.1	65.2	461.0	48.9	447.5	13.8
All herds	241.5	66.1	473.6	62.0	446.7	15.0

The tendency with grazing was for costs per hectare to increase with herd size. This was a reflection not only of higher variable costs (seed, fertilizer, etc.) but also of the higher fixed costs (rent, labour, power and machinery, etc.) associated with this group of farms. However, the larger herds also achieved better stocking rates with the result that the differences in grazing costs per cow were far less than those seen in grazing costs per hectare. The figures would suggest that the owners of the largest herds were stocking their cows at four to the hectare over the grazing season,

compared with only three per hectare among the smallest herds.

There was no particular trend with hay and silage costs, although there was far less variation in silage costs (both per hectare and per tonne) than was the case with hay costs, and there is evidence of some economy of scale, particularly among the largest herd size group, which exhibited the lowest production costs per tonne for both hay and silage. Totally against the trend, however, is the group of herds with between 101 and 150 cows where production costs per tonne were above average as a result of high costs per hectare and somewhat below average yields. At £62 per tonne, the cost of producing hay was very high and was over four times that of silage, which compares with factors of between 3 and 3.5 suggested by the results of recent previous surveys.

Information on production costs and yields of various forage crops grown on the sample farms is shown in Table 17. As some of the figures are based on relatively small samples they should be treated with due caution. An important point to bear in mind is that with crops such as stubble turnips, and, to a lesser extent, kale, adjustments were made to overhead costs (notably rent) having regard for the length of time the crop occupied the ground.

Table 17 Forage crop costs

Crop	Number of records	Cost per hectare	Average yield per hectare	Average cost per tonne
		£	Tonnes	£
Hay[1]	48	473.6	7.7	62.0
Grass silage[1]	58	446.7	30.4	15.0
Maize silage	6	543.3	35.7	18.6
Arable silage	4	390.2	22.5	17.8
Kale	11	291.2	-	-
Fodder beet	5	672.7	66.9	10.9
Catch crops[2]	9	198.2	-	-

1. Costs and yields are calculated on adjusted hectares not on hectares cut.
2. Mainly stubble turnips.

One of the most interesting features of the table is the fact that the average cost per hectare of growing and harvesting maize for silage was considerably higher than that recorded for grass silage and, although average yields were also higher, maize silage cost almost £4 per tonne more to produce than its grass counterpart. Seed and spray costs associated with maize were considerably higher than those for grass and, in the smaller herds, high contract charges also increased the average costs. Labour and power and machinery costs were also higher, and the fact that many of the maize crops received liberal dressings of farmyard manure or slurry, while no doubt resulting in savings of inorganic fertiliser, further increased production costs.

Although arable silage cost less to grow and harvest than grass

silage, the lower average yield associated with the crop resulted in a more expensive form of silage in terms of cost per tonne. However, arable silage is often used as a means of establishing a ley and, in a direct reseed situation, has the advantage that production from a given area will be greater than if the seeds were sown without a cover crop.

Labour

In the context of this survey, the labour element is defined as that associated directly with the dairy herd, and does not include labour used, for example, in forage crop production which is included in crop costs as appropriate.

Recent years have seen a significant decline in labour requirements per cow, mainly as a result of the adoption of new technology. While the effect of this capital-labour substitution has been most marked in the larger herds, many small herds have also benefited. For example, the introduction of pipeline milking to a cowshed and the installation of a bulk tank has brought significant savings in labour requirements over the traditional bucket plant and churns. The reduction in overall labour hours per cow has also arisen as a result of structural changes in the industry, notably the substantial decline in the number of small herds, accompanied by compensating increases in both the number and size of large herds.

In spite of the improvement in labour productivity (as measured in terms of man hours per cow) between the two surveys, as a proportion of total costs, the labour element in 1984-85 was at a similar level to that recorded four years earlier. Although for the sample as a whole, labour costs accounted for just under 17% of total production costs, there were significant differences in the proportion between herd size groups. For the smallest herd size group, the direct labour cost accounted for almost 23% of total costs, a figure which diminished to 13% for the group with the largest herds.

Another feature highlighted by the analysis of labour requirements was the relative importance of family labour in milk production which is illustrated in Table 18.

Table 18 Labour in milk production

Herd size	Labour per cow				
	Paid		Unpaid		Total
	Hours	%	Hours	%	Hours
Less than 60 cows	5.2	10	46.7	90	51.9
60 - 100 cows	13.4	38	21.9	62	35.3
101 - 150 cows	26.8	81	6.1	19	32.9
More than 150 cows	27.0	98	0.6	2	27.6
All herds	19.1	53	17.0	47	36.1

In the survey, labour was recorded as paid or unpaid according to the presence or absence of a "contract of employment", and unpaid labour, usually consisting of that supplied by the farmer and his family, was charged at an hourly rate equivalent to that of paid labour. As one might expect, the proportion of unpaid labour decreased with increasing herd size, although even on the larger herds the contribution made by the family to the total supply of manual labour was not insignificant and, in fact, on over a third of the 34 herds with over 100 cows there was some element of unpaid labour.

The figures in Table 18 do illustrate the clear advantage large herds have in terms of total labour requirements. Economies in this particular area arise for two main reasons. Firstly, there are economies of scale in that it does not take proportionately longer to bring in more cows, to clean the parlour and milking equipment or to perform many of the other jobs that are a part of the daily routine of a milking herd. Secondly, the owners of large herds are able to introduce labour-saving technology that would be too expensive for smaller herds.

Herd depreciation and replacement policy

The average herd depreciation charge in 1984-85 accounted for just over 5% of total production costs; a relatively small component in comparison with the other items. This is not to say, though, that the subject of herd replacement is unimportant; rather the very opposite, in fact, since less reliance on replacements reduces the uncertainties associated with either the home-bred heifer or the bought-in replacement. In general, a lower replacement rate will lead to an increase in the average age of cows in the herd, which in turn should lead to an increase in average yields. This generalisation would not, of course, necessarily be true in circumstances where the genetic potential of the replacements was above the level of existing members of the herd. In the whole-farm context, where the reliance is on home-bred stock, a lower replacement rate means less young stock have to be carried, and the land thus released could be put to more profitable use.

Table 19 Replacement rates, self-sufficiency and changes in herd size

Herd size	Outgoing cows as a % of the opening valuation	Herd deprec'n	Home reared as a % of in-coming cows and heifers	Percentage change in cow nos.[1]
	%	£ per cow	%	%
Less than 60 cows	25.1	30.5	65.1	-3.5
60 - 100 cows	23.0	38.4	88.7	-1.8
101 - 150 cows	26.4	42.5	98.2	-7.0
More than 150 cows	28.3	51.5	97.4	-4.4
All herds	26.4	41.0	93.9	-4.8

1. Between April 1984 and March 1985.

Over the sample as a whole, the replacement rate was 26% with a general tendency for the rate to increase with herd size. The overall rate was considerably higher than that recorded in the province in 1980-81, when the corresponding figure was 21%. Bearing in mind the marked increase in dairy cow slaughterings following the introduction of milk quotas this feature is, perhaps, not so surprising.

The depreciation charge per cow shows some correlation with replacement rate, but, in addition to turnover, this figure is also influenced by the relationship between the average cull cow price and the valuation placed on the cows. In this respect, the depreciation charge incurred on the herds with between 60 and 100 cows is rather higher than the below-average turnover would suggest, and arises principally as a result of a higher proportion of casualities and deaths among the disposals, which reduced the average price of outgoing cows.

Over the sample as a whole, deaths and casualties accounted for 8% of all cow disposals; a figure which varied from 4% among the smallest herds to 12% in the herds with between 60 and 100 cows. A feature of cow disposals from the herds with over 100 cows was that a relatively high proportion (over 12%) of outgoing cows were classified as "transfers", implying that the herd owners had either beef suckling herds into which "problem cows" could be transferred, or that additional milking herds, not necessarily being costed as part of the survey, were available to receive (and, presumably, supply) such transfers.

Almost 95% of all herd replacements and additions in 1984-85 were home-bred, with the accent on increased self-sufficiency with increasing herd size. This is the relationship one might expect, bearing in mind that the owners of small herds are, in the main, the occupiers of small farms where the scope for rearing replacements is limited. On the other hand, the bigger herds tend to be found on larger farms where ample resources exist for heifer rearing.

Changes in herd size

All herd size groups showed a decrease in cow numbers between the beginning and end of the survey year, with an overall decrease of 5%. Again, this feature can be attributed to milk quotas, with many herd owners seeing fewer cows as the main way of keeping within their quota.

Miscellaneous costs

At over 23% of total production costs, this item was the second most important element of the cost structure, although it was made up of a large number of relatively small items. The items included under this heading are shown in Table 20, together with the variation between herd size groups.

Service fees and veterinary charges tend to increase with herd size, probably reflecting greater reliance on nominated bulls and more in the way of routine veterinary visits. Consumable stores include bedding and such items as teat dip, detergents, milk filters, etc. The figures for both rental value of dairy buildings and for dairy

Table 20 Miscellaneous costs by herd size

Herd size group	Less than 60 cows	60 - 100 cows	101 - 150 cows	More than 150 cows	All herds
Number of herds	12	17	21	13	63
Average herd size	39.5	78.7	120.4	209.8	112.2
Cost Item	£ per cow				
A.I. fees	9.4	9.4	11.7	11.6	10.6
Vet. and medicine	9.8	13.6	18.0	16.1	14.9
Consumable stores	26.0	22.6	20.5	20.8	22.2
Herd insurance & recording fees	5.2	7.4	7.4	5.8	6.6
Rental value of dairy buildings	13.4	17.9	22.2	18.6	18.6
Dairy equipment repairs & depreciation	12.6	12.7	16.1	19.1	15.1
Miscellaneous tractor costs	28.6	15.1	16.1	11.6	17.3
Share of farm overheads	90.2	74.2	65.3	57.8	71.0
Total	195.2	172.9	177.3	161.4	176.3

equipment repairs and depreciation reflect the additional capital investment by the owners of large herds. By far the biggest single cost item in this category is the share of farm overhead expenses, which itself covers an aggregation of many sundry individual items. Economies of scale in this particular area are well-illustrated by the figures in the table.

Total miscellaneous costs per cow were highest on the smallest herds and lowest among the herds with over 150 cows, where the lower overhead costs per cow offset the higher variable costs and those costs associated with capital investment.

Investment in cows and dairy equipment

It is perhaps appropriate at the end of this section to examine the capital invested on the surveyed farms in dairy cows and in dairy equipment. In Table 21 the cow valuation was taken as the average of the opening and closing values in the herd stock account. The valuation of dairy equipment was the average of the opening and closing inventories, valued at replacement cost and not at current prices. The values shown are thus considerably below what would be required to set up a new unit at any given size level.

The figures in the table do not purport to measure the total amount of capital invested in dairy enterprises. Dairy equipment refers only to such items as bulk tanks, milking equipment, etc. and does not include buildings. No account has been taken of the machinery required on a dairy unit for grass conservation etc., nor of the working capital required to finance the running of the enterprise.

Table 21 Capital invested in dairy cows and dairy equipment by herd size

Herd size	Capital invested per cow		
	Dairy Cows	Dairy Equipment	Total
	£	£	£
Less than 60 cows	474	65	539
60 - 100 cows	503	79	582
101 - 150 cows	510	87	597
More than 150 cows	525	111	636
All herds	512	85	597

The average investment per cow was just under £600, of which £512 was in the cow and £85 in its associated dairy equipment. The lower average cow values associated with the smallest herds may reflect poorer quality stock (if average yield is taken as the criterion this was indeed the case), but could also reflect differing farmer attitudes to cow valuations. There was no evidence of economies of scale in respect of investment in dairy equipment and the implications are that capital requirements per cow increase significantly as herd size increases.

5. FACTORS AFFECTING PROFITABILITY

This section is concerned with the presentation of average results for groups of herds classified according to different criteria. The variables chosen were herd size, yield and seasonality of milk production. The opportunity has also been taken to examine margin over concentrates as a measure of profitability. It should be borne in mind though, that although useful for descriptive purposes, this method of analysis has limitations. For example, the value of a particular item such as milk yield or labour-use will be affected by factors other than the one chosen for the classification.

For the purposes of this analysis, results relating to the Channel Island herds have been excluded, because of their rather different costs and returns structure, and the results thus relate to herds which consist almost wholly of Friesians. The tables shown in this section merely summarise the financial situation; full details of the costs and returns are set out in Appendix 3, together with additional physical data relating to the same group of herds (Tables 4-11 inclusive).

1. Herd size

Table 22 A summary of returns, costs and margins per cow by herd size

Herd size	Number of herds	Total returns (milk & calves)	Costs	Net margin
		£	£	£
Less than 60 cows	12	711.1	781.8	-70.7
60 - 100 cows	17	844.8	747.8	97.0
101 - 150 cows	21	842.0	777.0	65.0
More than 150 cows	13	841.8	733.0	108.8
All herds	63	817.8	760.9	56.9

Although the lowest margins were recorded on the smallest herds, and the largest herds achieved the highest margin, the correlation between net margin per cow and herd size was not absolute, with high margins evident in the group of herds with between 60 and 100 cows. The cost structure of the largest herd size group was the lowest of the four groups and was significantly lower than the other group of herds with over 100 cows.

Average milk yield increased with herd size up to the group with between 101 and 150 cows. The large herds also produced a higher proportion of their milk in the winter months (October-March inclusive). Concentrate usage per cow increased with herd size, although in terms of kilogrammes per litre the average rates were very similar.

The main area where the large herds did have a clear advantage was in terms of labour, where the herds with over 150 cows used almost 50% less labour hours per cow than was recorded in the smallest herd

size group. Another area where the largest herds achieved a significant advantage was in their stocking rates, which despite their higher costs per hectare, meant that forage and grazing costs per cow were below average. As a result, the average net margin per forage hectare on the largest herds was significantly higher than that recorded in any other group.

2. Yield

Table 23 A summary of returns, costs and margins per cow by yield

Yield group (Litres per cow)	Number of herds	Total returns (milk & calves)	Costs	Net margin
		£	£	£
Less than 4,500	10	649.2	719.9	-70.7
4,500 - 5,000	15	752.9	755.6	-2.7
5,001 - 5,500	18	830.0	741.6	88.4
More than 5,500	20	939.8	803.0	136.8
All herds	63	817.8	760.9	56.9

Returns, costs and margins increased with higher yields, and the net margin per cow on the highest yielding herds was significantly higher than that achieved by any other group. Although the lowest yielding herds also had the lowest cost structure, the average yield of just over 4,000 litres was insufficient to cover costs and the end result was a large negative margin.

In the main, the higher yielding herds were larger than average, and produced a greater proportion of their milk in the winter period. Although concentrate usage per cow and per litre was higher in the herds with an average of over 5,500 litres per cow, the additional milk output was sufficient to give them an appreciably higher margin over concentrates.

At 0.55 hectares per cow, the stocking rate achieved on the highest yielding herds was significantly better than that in the other groups, with the result that their financial advantage in terms of £ per cow was even more striking when measured in terms of £ per forage hectare.

3. Seasonality

Table 24 A summary of returns, costs and margins per cow by seasonality of production

Proportion of winter milk	Number of herds	Total returns (milk & calves)	Costs	Net margin
Less than 50%	19	757.3	719.9	37.4
50.0 - 55.0	17	878.5	794.1	84.4
55.1 - 60.0	17	807.7	768.9	38.8
More than 60%	10	846.7	769.6	77.1
All herds	63	817.8	760.9	56.9

1. Proportion of milk produced in the winter period (October to March inclusive).

While herds producing less than 50% of their milk over the winter period appeared to be at a financial disadvantage, the same could be said for those herds producing between 55% and 60% between October and March, and there was no clear relationship between seasonality of production and net margin per cow. The average milk price in the three groups producing less than 60% of their milk over the winter period was very similar and only when the proportion of winter milk exceeded 60% was there a significant increase in the average price.

4. Margin over concentrates

Although little reference has been made to it in this report, margin over concentrates is widely used in the dairy industry as a performance measure. Margin over concentrates (M.O.C.) is simply the value of milk produced per cow per year minus the cost of purchased and home-grown concentrates fed per cow in the same year. Its main advantage as an efficiency indicator lies in the fact that it is a relatively easy measure to calculate. The main didsadvantage, however, is that it only goes part of the way towards assessing the overall profitability of the dairy enterprise; gross margins take the process a stage further, with net margin the ultimate objective.

In an attempt to assess the relationship between M.O.C. and overall profitability, the survey results have been analysed according to the level of M.O.C. and are shown in summarised form in Table 25. The implications are that, for this particular group of milk producers, there appeared to be a strong correlation between M.O.C. and net margin per cow.

Table 25 A summary of returns, costs and margins per cow by margin over concentrates

Level of margin over concentrates	Number of herds	Total returns (milk & calves)	Costs	Net margin
Less than £500 per cow	21	708.0	747.9	-39.9
£500 - £550 per cow	11	802.3	770.0	32.3
£551 - £600 per cow	15	862.6	741.9	120.7
More than £600 per cow	16	930.5	789.8	140.7
All herds	63	817.8	760.9	56.9

Summary

Of particular interest in Tables 22 to 25 is the fact that at the lowest end of the scale for each variable, the margin per cow is significantly lower than the one achieved by herds in the next group.

The results achieved by the smallest herd size group give some indication of the financial pressure owners of small herds are under and, in fact, negative margins were recorded on nine of the twelve herds in that group. While the results would indicate that increasing herd size and spreading the overheads over more cows would help the situation, farm size and buildings often place limitations on the maximum number of cows that a farm will carry.

The accent in dairy farming in recent years has been on increasing individual cow yields, and while Table 23 demonstrated that the highest yielding group produced the highest margin per cow, analysis in a previous section showed that the most profitable herds earned their "top 25%" status by a combination of moderately high yields and below average costs. However, following the introduction of milk quotas, the emphasis has shifted away from maximising yield per cow and it may be that in a situation where over-quota production was penalised, the higher yielding herds would lose some of their financial advantage.

Under the prices and conditions prevailing in 1984-85, there was no apparent financial advantage to be gained from winter milk production, reflecting, no doubt, the narrowing of the differential between winter and summer milk prices following the introduction of seasonality payments in April 1984.

Although the limitations of the margin over concentrates calculation are recognised, the results obtained from this survey would suggest that it can provide a reliable guide to the relative profitability of dairy herds.

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APPENDIX 1 Map showing the location of farms in the survey

APPENDIX 2

Costing methods, definitions and terms used

Returns

Milk

The revenue from wholesale milk sales, together with the value of milk consumed in the farmhouse, milk supplied as a perquisite to workers and milk fed to livestock. The supplementary payment paid in July 1985 which related to the 1984-85 milk year was included.

Calves

The net value of calves sold within a week of birth, together with the estimated value, at seven days old, of calves retained.

Costs

Purchased feed

Purchased concentrates and bulk feeds were charged at the net cost delivered to the farm.

Home grown feed

Home grown cereals were charged at the average market price at the time of feeding.

Forage crops and grazing were charged at cost of production. The cost of each crop was calculated on a per hectare basis and apportioned to the cows in accordance with the proportion of the crop consumed by them. With hay and grass silage, adjustments were made for aftermath grazing.

Labour used in forage crop production was charged at a standard rate of £3.00 per hour, and tractors at rates of between £3.50 and £10.70 per hour depending on size. Depreciation of machinery and equipment was calculated on the replacement cost basis, together with an allowance to cover repairs.

The rent used in the crop costings was that portion of the gross rent applicable to the land. To arrive at this figure, the estimated rental value of all buildings (including the farmhouse and farm cottages) was deducted from the total rent paid (or imputed rental value) and the remainder divided by the total area of crops and grass to give a net field rent per hectare. Where applicable, adjustments were made to take the cost of grass keep into account.

APPENDIX 2 CONT

Labour

Relates to all manual labour associated directly with the dairy herd and takes account of time spent milking, feeding and otherwise looking after the herd, cleaning dairy equipment, etc. Paid labour was charged at the actual cost to the farmer, including allowances for holidays, insurance contributions, etc., together with the value of perquisites. Unpaid family labour was charged at the average rate for paid labour.

Herd depreciation

The difference between the opening valuation of the herd plus the value of animals purchased or transferred in and the closing valuation of the herd plus the value of animals sold or transferred out.

Miscellaneous costs

Includes service fees, veterinary charges and medicines, consumable dairy stores, herd insurance, recording fees, repairs to dairy equipment, and tractor and machinery costs associated directly with the dairy herd. Also included under this heading is a rental charge for the dairy buildings, a dairy equipment depreciation charge and a share of general farm overheads.

Net margin

Per cow

Total returns minus total costs divided by the average herd size.

Per hectare

Total returns minus total costs divided by the total forage hectares used by the dairy herd.

Margin over concentrates

Milk returns less the cost of purchased and home grown concentrates.

APPENDIX 2 CONT

Terms used

Averages

The averages used in this report are the average of the individual herd results and each of the 71 herds carried equal "weight".

Herd size

The number of cows (in milk and dry) were recorded monthly and herd size based on the average of the twelve monthly figures.

Dry cow percentage

The average number of dry cows expressed as a percentage of the average of the total cows in the herd.

Average milk yield

Total annual milk production divided by the average number of cows in the herd.

Winter milk (seasonality)

Milk production in the period October to March inclusive expressed as a percentage of annual production.

Forage hectares

The total area devoted to providing grazing and forage crops for the dairy herd.

Stocking rate

The total forage hectares used by the dairy herd divided by the average herd size.

APPENDIX 3

Table 1

Distribution of milk production by herd size
(Non-Channel Island herds)

Month	Less than 60 cows	60-100 cows	101-150 cows	More than 150 cows	All Herds
	%	%	%	%	%
April	9.2	9.9	10.3	10.8	10.5
May	11.1	10.2	10.5	10.3	10.6
June	9.5	8.5	8.6	8.2	8.7
July	8.2	6.7	6.7	6.4	6.8
August	6.9	5.3	4.9	4.5	5.1
September	6.5	5.5	4.9	4.5	5.1
Summer total	51.4	46.1	45.9	44.7	46.8
October	7.6	7.2	6.9	6.8	6.8
November	7.6	7.9	8.0	8.2	7.8
December	8.3	9.3	9.5	9.6	9.4
January	8.6	9.9	10.0	10.4	9.8
February	7.8	9.2	9.4	9.7	9.2
March	8.7	10.4	10.3	10.6	10.2
Winter total	48.6	53.9	54.1	55.3	53.2
Year	100.0	100.0	100.0	100.0	100.0

APPENDIX 3

Table 2 Calf disposals, retentions and average values per head by herd size
(Non-Channel Island herds)

	Less than 60 cows		60-100 cows		101-150 cows		More than 150 cows		All Herds	
	%	£	%	£	%	£	%	£	%	£
Sold	43	98.3	33	81.6	43	66.2	46	71.2	42	73.0
Retained - dairy	17	55.2	21	55.3	27	60.1	26	67.8	25	62.2
- other	32	72.5	39	75.3	22	70.2	23	69.2	26	71.5
Deaths	8	-	7	-	8	-	5	-	7	-
Total	100	75.1	100	68.3	100	59.9	100	66.2	100	65.0

APPENDIX 3

Table 3 Distribution of calvings (cows & heifers) by herd size
(Non-Channel Island herds)

Month	Less than 60 cows	60-100 cows	101-150 cows	More than 150 cows	All Herds
	%	%	%	%	%
April	7.2	3.7	3.9	3.0	3.7
May	4.8	2.0	2.7	2.0	2.5
June	4.8	2.3	1.0	1.6	1.7
July	3.9	1.6	1.7	1.8	1.9
August	9.6	8.0	7.4	8.8	8.2
September	15.7	18.3	19.7	19.4	19.0
October	10.3	17.3	18.6	19.4	18.1
November	12.2	16.4	16.7	15.1	15.8
December	10.9	11.1	11.1	11.8	11.3
January	6.3	8.5	6.9	7.0	7.2
February	6.6	6.1	5.4	5.8	5.8
March	7.7	4.7	4.9	4.3	4.8
Year	100.0	100.0	100.0	100.0	100.0

Heifer calvings as a percentage of total calvings	15.3	19.2	19.9	23.8	21.0

APPENDIX 3

Table 4

Average returns, costs and margins by herd size
(Non-Channel Island herds)

	Less than 60 cows	60-100 cows	101-150 cows	More than 150 cows	All Herds
Number of herds	12	17	21	13	63
Herd size (cows)	39.5	78.7	120.4	209.8	112.2
	£ per cow				
Returns					
Milk	637.9	773.7	780.5	774.2	750.2
Calves	73.2	71.1	61.5	67.6	67.6
Total	711.1	844.8	842.0	841.8	817.8
Costs					
Concentrates - purchased	181.6	201.7	204.1	212.1	200.8
- home grown	-	7.4	11.3	6.9	7.2
Bulk food - purchased	7.1	9.6	13.6	19.1	12.4
- home grown	129.0	133.7	141.5	121.7	132.9
Grazing	62.8	66.9	70.8	65.2	67.0
Labour	175.6	117.2	115.9	95.1	123.3
Herd depreciation	30.5	38.4	42.5	51.5	41.0
Miscellaneous	195.2	172.9	177.3	161.4	176.3
Total costs	781.8	747.8	777.0	733.0	760.9
Net margin	-70.7	97.0	65.0	108.8	56.9

APPENDIX 3

Table 5 The main physical and financial features by herd size
(Non-Channel Island herds)

	Less than 60 cows	60-100 cows	101-150 cows	More than 150 cows	All Herds
Number of herds	12	17	21	13	63
Herd size (cows)	39.5	78.7	120.4	209.8	112.2
Dry cows (%)	16.6	16.4	17.0	17.5	16.9
Milk output - Litres per cow	4393	5297	5391	5320	5161
- £ per cow	637.9	773.7	780.5	774.2	750.2
Winter milk (%)	48.6	53.9	54.1	55.3	53.2
Concentrates - tonnes per cow	1.17	1.43	1.50	1.56	1.43
- kg. per litre	0.26	0.27	0.28	0.30	0.28
- £ per cow	181.6	209.1	215.4	219.0	208.0
Margin over concentrates - £ per cow	456.3	564.6	565.1	555.2	542.2
Labour - hours per cow	51.9	35.3	32.9	27.6	36.1
Total costs - £ per cow	781.8	747.8	777.0	733.0	760.9
Stocking rate - ha. per cow	0.70	0.60	0.58	0.51	0.59
Net margin - £ per cow	-70.7	97.0	65.0	108.8	56.9
- £ per ha.	-78.5	165.0	118.0	216.1	113.5

APPENDIX 3

Table 6 Average returns, costs and margins by yield group
(Non-Channel Island herds)

	Less than 4500 litres	4500-5000 litres	5001-5500 litres	More than 5500 litres	All Herds
Number of herds	10	15	18	20	63
Average yield per cow (litres)	4005	4738	5254	5973	5161
	£ per cow				
Returns					
Milk	578.7	689.1	764.7	868.7	750.2
Calves	70.5	63.8	65.3	71.1	67.6
Total	649.2	752.9	830.0	939.8	817.8
Costs					
Concentrates - purchased	158.1	177.0	195.6	244.8	200.8
- home grown	3.8	4.2	4.6	13.5	7.2
Bulk food - purchased	6.1	13.6	11.7	15.4	12.4
- home grown	136.9	133.6	139.7	124.3	132.9
Grazing	63.9	66.8	63.3	72.2	67.0
Labour	145.9	130.8	116.0	113.0	123.3
Herd depreciation	37.6	40.1	39.1	45.1	41.0
Miscellaneous	167.6	189.5	171.6	174.7	176.3
Total costs	719.9	755.6	741.6	803.0	760.9
Net margin	-70.7	- 2.7	88.4	136.8	56.9

APPENDIX 3

Table 7

A summary of the main physical and financial features by yield group
(Non-Channel Island herds)

	Less than 4500 litres	4500-5000 litres	5001-5500 litres	More than 5500 litres	All Herds
Number of herds	10	15	18	20	63
Herd size (cows)	75.7	96.7	124.8	130.7	112.2
Dry cows (%)	18.4	17.0	16.6	16.3	16.9
Milk output - Litres per cow	4005	4738	5254	5973	5161
- £ per cow	578.7	689.1	764.7	868.7	750.2
Winter milk (%)	50.8	51.6	55.1	54.1	53.2
Concentrates - tonnes per cow	1.09	1.27	1.38	1.78	1.43
- kg. per litre	0.27	0.27	0.27	0.30	0.28
- £ per cow	161.9	181.2	200.2	258.3	208.0
Margin over concentrates - £ per cow	416.8	507.9	564.5	610.4	542.2
Labour - hours per cow	43.6	38.8	33.8	32.3	36.1
Total costs - £ per cow	719.9	755.6	741.6	803.0	760.9
Stocking rate - ha. per cow	0.71	0.60	0.58	0.55	0.59
Net margin - £ per cow	-70.7	- 2.7	88.4	136.8	56.9
- £ per ha.	-98.8	13.7	152.2	259.7	113.5

APPENDIX 3

Table 8 Average returns, costs and margins by seasonality of production
(Non-Channel Island herds)

Proportion of winter milk	Less than 50%	50.0-55.0%	55.1-60.0%	More than 60%	All Herds
Number of herds	19	17	17	10	63
Winter milk % (Oct-March inc.)	45.1	52.8	57.5	62.3	53.2
	£ per cow				
Returns					
Milk	688.8	806.8	745.9	777.9	750.2
Calves	68.5	71.7	61.8	68.8	67.6
Total	757.3	878.5	807.7	846.7	817.8
Costs					
Concentrates - purchased	162.6	232.5	200.1	220.8	200.8
- home grown	3.6	10.4	8.4	6.8	7.2
Bulk food - purchased	9.4	17.6	12.8	8.8	12.4
- home grown	131.7	129.5	134.1	139.1	132.9
Grazing	66.2	73.7	66.8	57.8	67.0
Labour	129.8	116.6	128.1	114.4	123.3
Herd depreciation	39.0	45.9	38.5	40.6	41.0
Miscellaneous	177.6	167.9	180.1	181.3	176.3
Total costs	719.9	794.1	768.9	769.6	760.9
Net margin	37.4	84.4	38.8	77.1	56.9

APPENDIX 3

Table 9 A summary of the main physical and financial features by seasonality of production
(Non-Channel Island herds)

Proportion of winter milk	Less than 50%	50.0-55.0%	55.1-60.0%	More than 60%	All Herds
Number of herds	19	17	17	10	63
Herd size (cows)	85.5	128.7	127.8	108.3	112.2
Dry cows (%)	16.9	15.4	17.5	18.3	16.9
Milk output - Litres per cow	4758	5558	5143	5282	5161
- £ per cow	688.8	806.8	745.9	777.9	750.2
Winter milk (%)	45.1	52.8	57.5	62.3	53.2
Concentrates - tonnes per cow	1.14	1.64	1.45	1.63	1.43
- kg. per litre	0.25	0.30	0.28	0.31	0.28
- £ per cow	166.2	242.9	208.5	227.6	208.0
Margin over concentrates - £ per cow	522.6	563.9	537.4	550.3	542.2
Labour - hours per cow	38.7	33.6	37.5	33.0	36.1
Total costs - £ per cow	719.9	794.1	768.9	769.6	760.9
Stocking rate - ha. per cow	0.65	0.57	0.58	0.57	0.59
Net margin - £ per cow	37.4	84.4	38.8	77.1	56.9
- £ per ha.	96.9	159.5	73.9	134.1	113.5

APPENDIX 3

Table 10

Average returns, costs and margins by margin over concentrates
(Non-Channel Island herds)

Margin over concs.	Less than £500	£500-£550	£551-£600	More than £600	All Herds
Number of herds	21	11	15	16	63
Av. margin over concs. -£ per cow	447.9	524.5	579.4	643.1	542.2
	£ per cow				
Returns					
Milk	639.9	731.5	798.7	862.4	750.2
Calves	68.1	70.8	63.9	68.1	67.6
Total	708.0	802.3	862.6	930.5	817.8
Costs					
Concentrates - purchased	187.1	206.9	207.3	208.7	200.8
- home grown	4.9	0.1	12.0	10.6	7.2
Bulk food - purchased	8.7	4.3	16.2	19.4	12.4
- home grown	128.3	145.0	127.6	135.7	132.9
Grazing	67.0	59.0	65.9	73.7	67.0
Labour	139.0	127.5	102.8	119.2	123.3
Herd depreciation	34.9	45.2	42.0	45.0	41.0
Miscellaneous	178.0	182.0	168.1	177.5	176.3
Total costs	747.9	770.0	741.9	789.8	760.9
Net margin	-39.9	32.3	120.7	140.7	56.9

APPENDIX 3

Table 11 A summary of the main physical and financial features by margin over concentrates
(Non-Channel Island herds)

Margin over concs.	Less than £500	£500-£550	£551-£600	More than £600	All Herds
Number of herds	21	11	15	16	63
Herd size (cows)	100.7	105.8	116.7	127.4	112.2
Dry cows (%)	16.7	16.9	17.8	16.3	16.9
Milk output - Litres per cow	4439	5069	5513	5842	5161
- £ per cow	639.9	731.5	798.7	862.4	750.2
Winter milk (%)	50.5	56.7	53.9	53.9	53.2
Concentrates - tonnes per cow	1.31	1.41	1.51	1.54	1.43
- kg. per litre	0.29	0.28	0.27	0.27	0.28
- £ per cow	192.0	207.0	219.3	219.3	208.0
Margin over concentrates - £ per cow	447.9	524.5	579.4	643.1	542.2
Labour - hours per cow	41.2	37.7	29.7	34.3	36.1
Total costs - £ per cow	747.9	770.0	741.9	789.8	760.9
Stocking rate - ha. per cow	0.64	0.57	0.59	0.56	0.59
Net margin - £ per cow	-39.9	32.3	120.7	140.7	56.9
- £ per ha.	-50.7	77.8	211.9	261.3	113.5

APPENDIX 3

Table 12

Heifer, cull cow and calf prices[1] 1984-85

Month	Accredited Friesian heifers in milk	Cull cows	Calves
	£	£	£
April	595	358	80
May	505	368	100
June	500	373	102
July	513	356	97
August	539	356	90
September	537	353	83
October	528	347	76
November	576	353	77
December	598	365	74
January	596	428	77
February	609	389	88
March	560	404	88
Year	555	371	86

1 Averaged from selected markets in the Reading province

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