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ECONOMIC ASPECTS OF MILK PRODUCTION IN SOUTH WEST ENGLAND 1968|69

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by

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and

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FOREWORD

The 1968/69 investigation into the economics of milk production is the second survey of the milk enterprise conducted on a random sample, the first being in 1965/66. It is a nationally co-ordinated investigation in which 10 Universities with agricultural economics departments take part and a report on the results for England and Wales has already been published jointly by the Milk Marketing Board and the Ministry of Agriculture, Fisheries and Food.

This report has been produced to give some greater detail for the sample in Cornwall, Devon and Dorset with certain comparisons with the national sample and with the 1965/66 investigation. Subject to the willingness and ability of farmers to co-operate in a random sample there is no doubt that the technique improves the overall representativeness of the investigation regarding dairy farming in England and Wales as a whole and allows well tried statistical measures to be applied to the averages to test their reliability and significance. It is therefore an important step forward in this type of work. However, the need to adhere to the nationally drawn sample does, to some extent, impose limitations on the usefulness of the provincial samples in which the numbers within say herd size groups are too small to yield statistically reliable results. For local purposes, and particularly for management purposes larger samples for particular dairying systems may be desirable, and with small samples, there is some advantage in using identical farms over time. The limitations of the local sample should therefore be borne in mind when interpreting the results, particularly with trends over time.

The dairy enterprise is the most important single enterprise in South West farming and it continues to grow in importance. It is the most profitable livestock enterprise for the utilisation of the grassland crop in the South West and allows intensification in order to increase the output of the land, a vital consideration where farm size tends to be

small. It is gratifying therefore that 61 of the 97 farmers contacted were able to undertake for a year the time consuming and meticulous recording required to complete this survey. Among those who did not participate, very few refused without good reason and in many cases the reasons for non participation were completely outside the control of the farmer concerned, a number for instance had already given up milk production before being approached. By co-operation in this investigation these farmers have contributed to a fund of information which is of great value to the dairy industry at large. It is to be hoped that from the experience of recording they have themselves gained something of value to aid them in the successful running of their own dairy enterprises.

On behalf of the staff of the Agricultural Economics Unit of the University of Exeter I would like to thank all co-operators in the scheme for the time and effort they have given and for the hospitality which has been extended to visiting field staff.

S. T. Morris.
Director
Agricultural Economics Unit.

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SUMMARY

1. This report presents the results of the 1968/69 investigation into the economics of milk production in Cornwall, Devon and Dorset on a random sample of 61 farms. Some comparisons are made with the 1965/66 investigation and with the national investigation of which the South West sample was a part. Some provincial and national statistics are also included as a background to the investigation.

2. Although the gap between the standard quantity and total milk production in England and Wales has been widening over recent years, the average producer price has risen each year since 1958/59 and the total value of milk sales has continued to rise reaching nearly £1 million per day in 1968/69. There is evidence, however, that average producer prices in the South West fell marginally between 1967/68 and 1968/69. The differential between winter and summer milk prices has narrowed appreciably over the past decade with an improvement in summer prices. Costs of variable inputs have continued to rise as also have fixed costs, particularly labour.

3. The 1968/69 season was difficult climatically. Grazing conditions were not good and a wet harvest resulted in low quality winter fodder.

4. Since 1958 some 6,000 farmers gave up milk production in the South West, but the reduction has been slower than in England and Wales as a whole so that the proportion of total milk producers located in the South West has risen.

5. Similarly the proportion of the total national herd located

in the South West is rising because cow numbers are increasing at a faster rate than in England and Wales as a whole.

6. The total output of milk from the South West is again rising faster than nationally and the proportion of the total output for England and Wales produced in the South West has risen from 11·8% in 1958/59 to 14·0% in 1968/69.

7. Estimates of milk sales per cow suggest that average yield per cow in the South West was increasing in line with average national yields up to 1967/68. In 1968/69 the South West yield fell as opposed to a small rise for England and Wales. It is probable the weather conditions in the South West were largely responsible for the drop in yield.

8. Average herd size in the South West is estimated at 29 cows compared with 32 for England and Wales in 1968/69, the difference also being similar in 1960, but the herd size distribution in the South West is improving in the direction of larger herds.

9. Of the total number of farms drawn at random and contacted as possible participants 61, or 62·9%, completed the recording for the year against a target of 70 farms. The comparative national response was 60·5%.

10. Although the farms for the investigation were drawn at random, the average size of herd in the final sample was appreciably higher than the average for all herds in the South West. This was due to a number of factors including chance, inability to find sufficient co-operators among the very small herds and rapid growth in herd size during the time which elapsed between the date of the census data on which the sample was drawn and the date of commencing

recording. However the results have been weighted to correct for the size of herd factor in order to improve the representativeness of the sample.

11. In the South West sample the weighted average returns were £140·7 per cow, total costs £109·8 and the margin £30·9 per cow. In the England and Wales sample a higher average return per cow of £147·8 was obtained at a comparatively greater cost of £120·9 leaving a margin of £26·9, £4 per cow lower than in the South West sample. The average yield per cow of 789 gallons for the South West was 40 gallons lower than the national average.

12. Because of differences in costing methods, particularly in relation to homegrown feed, a full comparison cannot be made with the 1965/66 investigation. However some comparisons can be made, on the basis of margin over variable costs, excluding the variable costs of homegrown feed. In the South West sample the margin over variable costs fell from £98·0 per cow in 1965/66 to £92·6 in 1968/69 due to a rise in variable costs and a drop in gross output because of a lower yield per cow. In the England and Wales sample the margin over variable costs rose by just over £2 per cow in spite of a similar cost rise as occurred in the South West sample. The important difference was a higher yield in 1968/69 than in 1965/66 in the national sample giving rise to an increased gross output as opposed to a reduced gross output on the South West farms.

13. Although there was a set back in yield in the South West in 1968/69, which was most likely the result mainly of climatic conditions, the margin per cow compared favourably with the national average. Cow numbers are rising, the herd size structure is improving and the South West is increasing its share of the national milk market. Milk production is the most important enterprise in

South West agriculture and is the most profitable means of utilisation of grass, the main crop in the region. The prosperity of dairying is of vital importance to farmers in the South West and natural advantages must be fully exploited to maintain profitability. The improvement in summer milk prices relative to winter prices should be an advantage to South West producers who rely heavily on grass for milk production.

I. NATIONAL AND REGIONAL CONSIDERATIONS

(A) GENERAL

Government policy and guaranteed prices

Guaranteed prices for milk are determined at the Annual Price Review for the year ahead. Since 1954 these have related to a standard quantity on which the full amount is paid while supplies in excess of that quantity receive a lower price based on the returns from milk for manufacturing.

Table 1. Guarantees for milk in England and Wales

Year	Guaranteed price	Standard quantity	Actual total production	General milk subsidy	Total cash value of milk*	Average producer price* (wholesale)
	d.per.gal.	mill.gal.	mill.gal.	£ mill.	£ mill.	d.per.gal.
1958/59	37·75	1654·5	1,765	3·5	267·8	36·56
1964/65	40·90	1778·3	1,990	- 11·0ø	318·1	38·21
1965/66	41·90	1779·9	2,069	- 7·2ø	333·0	38·45
1966/67	42·40	1843·0	2,040	- 1·1ø	336·9	39·48
1967/68	43·71	1853·9	2,141	- 8·2ø	358·0	39·96
1968/69	44·91	1846·1	2,163	- 8·4ø	363·3	40·13
1969/70	45·31	1826·0+	n.a.	n.a.	n.a.	n.a.

Source: Milk Marketing Board Statistics.

* Before adding Special Service premiums and before deducting transport.
ø Repayment.
\+ Provisional.

The above table shows the figures for 10 years ago and for the last six years. The standard quantity reached its peak in 1967/68 and since then has been reduced, while the guaranteed price has increased steadily. Actual production of milk has also increased steadily and the gap between this and the standard quantity has been widening. Nevertheless, the average price to producers has continued to rise and the total value of milk sold has exceeded the forecast amount so that in the last five years there has been a

repayment instead of a subsidy. It is interesting to note that in 1968/69 the total cash value of milk sold was very nearly £1 million a day.

Monthly milk prices

When the guaranteed price has been determined, the Milk Marketing Board works out a seasonal schedule of prices aimed at encouraging an optimum seasonal pattern of production. At one time the emphasis was all on winter production and as late as 1958/59 there was a difference of 1s. 8d. between midsummer and midwinter prices. By 1968/69 that difference was down to 1s. 2d. due mainly to improved summer prices. Table 2. shows the changes in monthly producer prices for the Far West region over the last ten years. It should be noted that the later figures are for the basic quality band. Milk with more than 12% total solids received correspondingly higher prices.

Table 2. Changes in monthly producer prices*, 1958/59 to 1968/69
Far West region

Month	1958/59	1968/69+	Difference
	Pence per gallon		
April	30•37	37•81	+ 7•44
May	22•37	28•93	+ 6•56
June	22•15	28•71	+ 6•56
July	26•37	32•75	+ 6•38
August	32•82	37•52	+ 4•65
September	36•37	40•29	+ 3•92
October	38•37	41•18	+ 2•81
November	39•15	41•85	+ 2•70
December	42•15	42•24	+ 0•09
January	37•37	42•90	+ 5•53
February	37•63	41•82	+ 4•19
March	35•63	43•06	+ 7•43

* After deduction of transport.
\+ Basic price for 12% total solids.

Costs of inputs

In Table 3. are shown the trends over 10 years of some of the main inputs in milk production.

Table 3. Indices of change in the cost of some inputs

Year*	Labour ø	Feedingstuffs		Fertilisers+	Fuel
		Barley meal	Compounds		
	Index - average of 1954/57 years = 100				
1958/59	120	91	90	92	104
1964/65	157	92	97	89	118
1965/66	170	93	100	92	122
1966/67	179	91	100	95	127
1967/68	188	91	102	108	135
1968/69	198	92	105	111	142

Source: Annual Abstract of Statistics.

* Harvest (June-July) years.
ø April to March years.
\+ Fertilisers are net of subsidy.

By far the greatest increase has been in the cost of labour, while fuel is another item that has cost progressively more. Fertilisers for a while were below the mid 50's level, but have risen in net cost over the last few years. Ten years ago compound feeds were also below the mid 50's average but their cost too has been rising steadily. The only input to remain fairly constant in price is barley meal.

(B) SOME CHANGES IN THE SOUTH WEST

Number of producers

In the 11 years between March 1958 and March 1969 over 6,000 farmers in the South West left milk production. Over the last five years the

decline in the South West has been at a slower rate than in England and Wales as a whole where it has fallen steadily at 3% per year. Cornwall has lost the largest percentage of producers being down to 64% of the 1958 figure while Devon and Dorset are at 73% and 70% respectively. This is a continuation of the previous trend towards a gradually greater proportion of the country's milk producers being found in the South West.

Table 4. Number of registered milk producers in the South West

Year	Cornwall	Devon	Dorset	South West	South West as a % of England and Wales
	Numbers				%
1958	7,600	9,290	2,690	19,580	14•8
1965	5,720	7,670	2,180	15,570	15•5
1966	5,460	7,340	2,110	14,910	15•5
1967	5,240	7,100	2,020	14,360	15•6
1968	5,060	6,970	1,950	13,980	15•7
1969	4,830	6,750	1,880	13,460	15•9
Year	Cornwall	Devon	Dorset	South West	England and Wales
	Indices of change 1958 = 100				
1958	100	100	100	100	100
1965	75	83	81	80	76
1966	74	79	78	76	73
1967	69	76	75	73	70
1968	67	75	72	71	67
1969	64	73	70	69	64

Source: Milk Marketing Board Statistics.

Output of milk

In contrast to the decline in numbers of producers, the output of milk continues to rise in the whole country but to a greater extent in the South West and most especially in Devon where there has been a 59% growth between 1958/59 and 1968/69 compared with 23% in England and Wales.

Cornwall and Dorset increased rather less rapidly at 40% and 31% respectively but the three counties combined provide an increasingly greater proportion of the England and Wales output.

Table 5. Milk sales off farms in the South West

Year	Cornwall	Devon	Dorset	South West	South West as a % of England and Wales
	Million gallons				%
1958/59	55·7	90·5	62·6	208·8	11·8
1964/65	63·6	115·6	68·6	247·8	12·5
1965/66	67·7	125·2	74·8	267·7	12·9
1966/67	70·6	126·9	75·2	272·7	13·4
1967/68	76·4	139·6	80·1	296·1	13·8
1968/69	78·0	143·4	82·1	303·9	14·0
Year	Cornwall	Devon	Dorset	South West	England and Wales
	Indices of change 1958/59 = 100				
1958/59	100	100	100	100	100
1964/65	114	128	110	119	113
1965/66	122	138	119	128	117
1966/67	127	140	120	131	116
1967/68	137	154	128	142	121
1968/69	140	159	131	146	123

Source: Milk Marketing Board Statistics.

Number of cows

Greater output is achieved either by increasing the number of cows or by improving their yield or by a combination of both. Table 6. shows that cow numbers have increased far more in the South West than in England and Wales in recent years, particularly in Devon.

Yield per cow

Although figures are available for recorded herds, it is difficult

to obtain them for the majority of herds. By dividing total milk sales by total numbers of cows in each region it is, however, possible to arrive at an average yield, but it may tend to be an underestimate since the cow numbers include some animals kept for rearing calves.

Table 6. Number of dairy cows in the South West (at 4th June each year)

Year	Cornwall	Devon	Dorset	South West	South West as a % of England and Wales
	Thousand cows				%
1958	86	130	83	299	11·8
1965	98	160	91	349	13·2
1966	98	162	92	352	13·4
1967	105	169	95	369	13·7
1968	108	179	99	386	14·3
1969	112	182	102	396	14·4
Year	Cornwall	Devon	Dorset	South West	England and Wales
	Indices of change 1958 = 100				
1958	100	100	100	100	100
1965	114	123	110	117	105
1966	114	125	111	118	104
1967	122	130	114	123	106
1968	126	138	119	129	107
1969	130	140	123	132	109

Source: Ministry of Agriculture. These numbers refer to cattle kept mainly for producing milk or rearing calves for the dairy herd.

The figures thus obtained show that there has been a steady improvement and that Devon yields now equal the national average with Dorset higher and Cornwall lower. In the last named county the larger proportion of Channel Island cows could account for the lower average yield.

Table 7. Estimated average milk sales per dairy cow in the South West

Year	Cornwall	Devon	Dorset	South West	England and Wales
		Gallons per cow			
1958/59	648	696	754	698	699
1964/65	663	746	762	727	764
1965/66	691	783	822	767	781
1966/67	720	783	817	775	775
1967/68	728	826	843	802	797
1968/69	722	803	829	787	803
		Indices of change 1958/59 = 100			
1958/59	100	100	100	100	100
1964/65	102	107	101	104	109
1965/66	107	113	109	110	112
1966/67	111	113	108	111	111
1967/68	112	119	112	115	114
1968/69	111	115	110	113	115

Calculated by dividing the total milk sales off farms by the number of cows in each region.

Size of herd

With a rise in cow numbers and a fall in producer numbers it is clear that average herd size has increased. Table 8. shows the change in distribution of herds by size between 1960 and 1965, the latest year for which published figures are available.

The trends in average herd size are given in Table 9. The figures for 1960 and 1965 having been obtained from Milk Marketing Board statistics, the 1969 figures were estimated by dividing the numbers of cows from Table 6. by the numbers of producers in each region. The average herd sizes suggest that the upward trends have continued, with a somewhat greater increase in Dorset than in Cornwall and Devon with the increase in the South West being larger than for England and Wales.

Table 8. Distribution of herds by size in the South West

	Cornwall		Devon		Dorset		South West	
	1960	1965	1960	1965	1960	1965	1960	1965
	Per cent of herds							
Under 10 cows	33·8	22·0	20·9	15·5	11·8	10·5	24·5	17·2
10 & under 20 cows	46·0	44·0	46·4	37·1	23·9	15·9	43·0	36·5
20 " " 30 "	14·1	22·1	23·3	27·5	19·6	21·9	19·3	24·7
30 " " 40 "	4·2	5·3	6·2	11·3	16·7	16·0	6·9	9·8
40 " " 50 "	1·0	3·9	1·5	4·5	9·5	11·2	2·5	5·3
50 cows & over	0·9	2·7	1·7	4·1	18·5	24·5	3·8	6·5
Total	100·0	100·0	100·0	100·0	100·0	100·0	100·0	100·0

Source: Milk Marketing Board Statistics.

Table 9. Trends in herd size 1960 - 1969
South West and England and Wales

	Cornwall	Devon	Dorset	South West	England and Wales
1960	14·0	17·1	31·8	18·0	21·1
1965	18·0	21·3	38·1	22·5	26·4
1969+	23·2	27·0	54·1	29·4	32·4

+ Estimated.

Breed

An indication of the changes in popularity of the various breeds is given by the figures published by the main A.I. centres in the South West, Honiton Clyst, Praze, Sturminster Newton, Torrington and Dartington Hall. Over a ten year period from 1959/60 the use of Friesian bulls has been nearly doubled and now over 50% of all inseminations are of that breed. Of the other dairy breeds Ayrshires have been greatly reduced but the two Channel Island breeds have remained fairly static.

Table 10.

Number of cows inseminated at A.I. centres in the South West
(Clyst Honiton, Praze, Sturminster Newton, Torrington and Dartington Hall)

Indices of Change 1959/60 = 100 (Charolais 1961/62 = 100)

Year	Dairy					Dual Purpose				Beef						Total
	Fr.	Gu.	Ayr.	Jer.	Total Dairy	Sht.	S.Dv.	Other*	Total D.P.	H'ford	A.A.	Ch.	Dv.	Other	Total Beef	
1959/60	100	100	100	100	100	100	100	100	100	100	100	-	100	100	100	100
1960/61	116	105	103	134	113	76	93	87	86	119	89	-	89	77	94	103
1961/62	118	115	110	150	118	58	91	74	78	190	93	100	93	39	109	110
1962/63	92	117	109	163	103	39	87	64	68	288	102	165	94	5	132	107
1963/64	105	113	99	169	109	30	83	46	61	338	104	142	87	3	137	111
1964/65	131	109	87	166	122	22	77	35	54	318	78	135	69	2	117	111
1965/66	148	103	68	157	128	16	73	27	49	320	74	216	56	1	111	112
1966/67	167	102	64	164	139	13	67	15	44	298	80	302	52	2	108	117
1967/68	192	95	59	169	153	10	60	18	39	284	81	298	50	3	104	122
1968/69	193	76	54	156	148	9	53	20	35	350	83	314	46	6	115	122

Sources: Milk Marketing Board and Dartington Hall.

* Mainly Red Poll.

Table 11.

Insemination by breed at A.I. centres in the South West
(Clyst Honiton, Praze, Sturminster Newton, Torrington and Dartington Hall)

Year	Dairy					Dual Purpose				Beef						Total
	Fr.	Gu.	Ayr.	Jer.	Total Dairy	Sht.	S.Dv.	Other*	Total D.P.	H'ford	A.A.	Ch.	Dv.	Other	Total Beef	
	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
1959/60	34.0	12.0	7.0	2.1	55.1	5.0	7.6	0.8	13.4	5.5	7.4	-	17.9	0.7	31.5	100.0
1960/61	38.2	12.2	7.1	2.6	60.1	3.7	6.8	0.7	11.2	6.4	6.4	-	15.4	0.5	28.7	100.0
1961/62	36.6	12.6	7.1	2.8	59.1	2.7	6.3	0.5	9.5	9.6	6.3	0.1	15.2	0.2	31.4	100.0
1962/63	29.3	13.2	7.2	3.1	52.8	1.8	6.1	0.5	8.4	14.9	7.0	1.2	15.7	n	38.8	100.0
1963/64	32.2	12.3	6.3	3.1	53.9	1.3	5.6	0.3	7.2	16.8	7.0	1.0	14.1	n	38.9	100.0
1964/65	40.0	11.8	5.5	3.1	60.4	1.0	5.2	0.3	6.5	15.8	5.2	0.9	11.2	n	33.1	100.0
1965/66	44.8	11.1	4.3	2.9	63.1	0.7	4.9	0.2	5.8	15.8	4.9	1.5	8.9	n	31.1	100.0
1966/67	48.6	10.5	3.8	2.9	65.8	0.6	4.3	0.1	5.0	14.1	5.1	2.0	8.0	n	29.2	100.0
1967/68	53.3	9.3	3.4	2.8	68.8	0.4	3.7	0.1	4.2	12.9	4.9	1.9	7.3	n	27.0	100.0
1968/69	53.4	7.5	3.1	2.6	66.6	0.4	3.3	0.1	3.8	15.8	5.0	2.0	6.8	n	29.6	100.0

Sources: Milk Marketing Board and Dartington Hall.

* Mainly Red Poll.
n = less than 0.1%.

The greatest reduction has been in the dual purpose breeds especially the Shorthorn and Red Poll, while use of the native South Devon has been reduced by nearly a half.

For beef breeds a peak period was in 1963/64 when Herefords were approaching their maximum popularity at the expense of Aberdeen Angus and more especially Devons. After that there was a decline in demand for beef breeds until 1968/69 when Herefords in particular began to be used more. In 1968/69, the latest years for which figures are available, pure dairy breeds accounted for 66% of all inseminations, beef for 30% and dual purpose for only 4%.

II. RESULTS OF THE 1968/69 INVESTIGATION

(A) GENERAL

The sample

During the year ending 31st March 1969 an investigation was made into the economics of milk production in Cornwall, Devon and Dorset as part of a national scheme undertaken by ten University Departments in England and Wales. As in the previous scheme (1965/66) a random sampling technique was used. A report+ on the national investigation in which certain regional comparisons have been made has already been published. The purpose of this report is to give the results for Cornwall, Devon and Dorset farms in some greater detail with a somewhat more locally slanted emphasis.

The aim was for a national sample of about 500 farms. Three random samples, each of about 500 farms, stratified by size of herd with sampling fractions chosen so as to minimise the expected sampling error of cost per cow, were drawn by the Ministry of Agriculture for use by the University departments. If a farmer in the first list did not co-operate for any reason, a replacement from the second list was visited and then, if need be, one from the third list. A quota of 70 farms was laid down for the South West and its size distribution is shown in Table 12.

In all 106 producers were visited of which nine had either sold or were about to sell all their dairy stock. The biggest problems were in the 6 to 9 cow group for in addition to several of the producers in that group having already gone out of milk, it was not possible to find replacements for three of these. In the end 67 farmers out of a possible 97 agreed to co-operate giving a response rate of 69% compared with 71%

+ Costs of Milk Production in England and Wales April 1968 to March 1969. Completed on behalf of the Milk Costs Sub-Committee of the Technical Committee of Provincial Agricultural Economists.

in the national sample. During the year one producer died, two others sold their farms and three others went out of milk so that completed records were obtained finally for 61 herds, or 62·9% as against 60·5% nationally. Their size distribution is shown in the second column of Table 12.

Table 12. Herd size distribution in proposed and final samples

Herd size groups	Proposed sample	Final sample
	Number of herds	
6 - 9 cows	5	2
10 - 19 "	15	15
20 - 29 "	15	13
30 - 49 "	16	14
50 - 69 "	10	4
70 - 99 "	3	8
100 cows & over	6	5
	70	61

The chief discrepancies, notably in the 50 to 69 and 70 to 99 groups were caused by several herds of just under 70 cows at the time of the original sampling having increased to over 80 by the time the scheme started.

Costing technique

The costing scheme related only to the milking herd and excluded any young stock. All calves, irrespective of destination, were valued at a week old, before they incurred any appreciable rearing costs, and their value was added to that for milk produced to give a figure for total returns. Grazing and all homegrown bulk feeds were costed in detail on each farm and charged at cost of production but homegrown concentrates were valued at market prices using standards based on average prices received for the 1968 harvest. All purchased foods were charged at actual cost

delivered at the farm. Notes on accounting methods and definitions are set out in Appendix III.

The 1968/69 year

One of the chief features was the prolonged wet spell at haymaking time which resulted in a shortage of good quality hay. The early part of 1969 was unusually mild but this was followed by frost and snow in late February and in March which held back the early grass and lengthened the winter housing and feeding period.

(B) FINANCIAL RESULTS

In this section the financial results for the 1968/69 investigation are presented with some comparisons with 1965/66. The size distribution of herds within the sample gives rise to some problems in computing averages for the whole sample so for much of the analysis averages are given only for the individual herd size groups. Where overall averages are calculated the group sample averages have been weighted according to the total number of cows within each size group for the whole province in order to improve the representativeness of the averages in relation to dairying in the South West. In the South West sample, for instance, although there are only five out of the 61 herds with over 100 cows each, these five herds account for nearly 30% of all cows in the sample. The weighting technique is designed to correct the excessive influence of these farms on the overall averages. Several comparative data for the South West and England and Wales samples for 1968/69 are given in Table 13.

Table 13. General data 1968/69 sample. Weighted averages+

	South West	England & Wales
Number of herds	61	426
Herd size (cows)	45•8	33•3
Range (cows)	7-265	n.a.
Farm size (acres)	156	116
Yield per cow (gallons)	789	829
Percentage winter milk	45•4	46•0
Forage acres per cow	1•7	1•6
Direct labour per cow (hours)	78	73
Average value cows entering herd (£)	93•0	96•3
Average value cows leaving herd (£)	54•1	58•5
Concentrates per cow (cwt)	20•1	24•2
Concentrates per gallon (lb)	2•9	3•3
Margin* per:-		
Cow (£)	30•9	26•9
Gallon (d)	9•3	7•8
Forage acre (cows only) (£)	18•3	16•9
100 hours direct labour (£)	43•5	36•8

* Margin in this report is essentially management and investment income i.e. the income available after charging for all manual labour including that of the farmer and wife. The term 'margin' has been retained here for convenience of expression.

\+ The averages for the various herd size groups within the South West sample have been weighted by the total cow numbers within each group to give a weighted average for the South West.

In Table 14. the appropriately weighted financial results for the two samples are compared. It will be noticed that although returns were higher in the England and Wales sample costs were even higher so that the resulting margin per cow was better in the South West sample. Even after allowing for the rather higher stocking rate in the national sample, the margin per acre was still rather better for the South West farms, £18•3

Table 14. Returns, costs and margins per cow, weighted averages+

	South West	England & Wales
	£	£
RETURNS:		
Milk	129·5	137·6
Calves	11·2	10·2
Total	140·7	147·8
COSTS:		
Foods:		
Purchased	32·4	36·2
Homegrown	12·4	14·5
Grazing	10·4	10·7
Total	55·2	61·4
Direct labour:		
Paid	4·7	8·2
Unpaid	19·8	17·4
Total	24·5	25·6
Miscellaneous	23·7	25·8
Herd replacement	6·4	8·1
Total costs	109·8	120·9
MARGIN	30·9	26·9
Family income*	50·7	44·3

* Before charging unpaid family labour.
+ See footnote Table 13.

compared with £16·9. The higher national returns were due to a yield advantage of 40 gallons per cow for the England and Wales sample, but calves contributed £1 more per cow in the South West, the overall difference in returns amounting to £7·1 per cow in favour of the England and Wales sample.

Total costs, however, were £11·9 per cow higher in the national sample, all cost items contributing to the higher level and food costs accounting for more than one half of the difference. The margin per cow was therefore £4 higher on the South West farms which was equivalent to £1·4 per forage acre. As a rather greater proportion of the total labour was family labour in the South West, the family income per cow was also higher than in the national sample.

Returns, variable costs and gross margins 1965/66 and 1968/69

The results for the South West and for the national sample for the two costing years are set out in Table 15.

Table 15. Margin over variable costs (excluding homegrown feeds) South West and England and Wales 1965/66 and 1968/69 Per cow

	South West				England & Wales			
	1965/66		1968/69		1965/66		1968/69	
Gross output	£	£	£	£	£	£	£	£
Milk	128·1		129·5		129·7		137·6	
Calves	11·0	139·1	11·2	140·7	10·1	139·8	10·2	147·8
Less herd depreciation		3·7		6·4		6·7		8·1
Total		135·4		134·3		133·1		139·7
Variable costs								
Purchased feed		29·2		32·4		33·1		36·2
Miscellaneous		8·2		9·3		7·1		8·4
Total		37·4		41·7		40·2		44·6
Margin over variable costs (excluding homegrown foods)		98·0		92·6		92·9		95·1
Yield per cow (gal)		802		789		809		829
Concs. per cow (cwt)		19·8		20·1		22·8		24·2
Price per gallon (d)		38·3		39·4		38·5		39·8

A comparison of the full costs between 1965/66 and 1968/69 is complicated by the fact that somewhat different methods were used in costing homegrown foods and in arriving at an annual charge for the use of dairy buildings and equipment. The gross margin technique has, therefore, been used in which returns and variable costs, excluding homegrown feed variables, have been compared. In the South West samples the average yield per cow was 13 gallons lower in 1968/69 than in 1965/66. This is in contrast to the national sample and to the estimated yield for the South West as a whole where in both cases the average yield increased by some 20 gallons per cow. The South West sample yield in 1968/69 was almost identical with the estimated yield for the South West as a whole, 789 compared with 787 gallons per cow. The 1965/66 South West sample average however, was some 35 gallons per cow greater than the estimated average for the province, 802 compared with 767 gallons per cow. It is most likely that the 1965/66 South West sample, although drawn at random, contained rather too many of the higher yielding herds. Mainly because of the yield difference the milk sales per cow increased by only £1·4 compared with £7·9 for the England and Wales sample. Average calf prices changed little between the two years for both samples but herd depreciation rose particularly in the South West. The net result was a small decline of just over £1 per cow in total gross output for the South West samples compared with an increase of £6·6 per cow in the national samples. National and South West yield increases up to 1967/68 had kept pretty well in line but in 1968/69 average yields in the South West fell whereas for England and Wales the increase continued although at a reduced rate. Variable costs rose in the South West and nationally, the extent of the increase being £4·3 and £4·4 per cow respectively. Purchased feed accounted for approximately £3 and miscellaneous variable costs for £1 per cow of the increase. The overall result was that while in the England and Wales samples there was an improvement of £2·2 per cow in the margin over variable costs, there was a drop of £5·4 per cow in the South West. As there was little difference in the variable cost changes, the main reason for the reduced margin was the decline in gross output due to the

reduced yield per cow. The price per gallon realised increased both in the South West and nationally, but rather less in the former, 1·1d per gallon compared with 1·3d in the latter. The decline in yield in the South West could well have resulted mainly from the poor quality of the forage conserved during the wet 1968 summer and the difficult grazing conditions during the 1968 autumn. It would not appear that the roughage quality factor was taken into account in the concentrate feeding which was only fractionally higher in 1968/69 than in 1965/66.

Some comparisons, England and Wales and South West samples, 1968/69

In addition to comparing the figures for the two years for the

Table 16. Returns, costs, margins and other measures by herd size for England and Wales and the South West, 1968/69

		Under 20 cows	20 and under 40	40 and under 60	60 and under 100	100 cows and over
Number of herds	E & W	73	144	86	83	40
	S.W.	17	20	9	10	5
Returns per cow (£)	E & W	134·2	147·0	149·2	159·1	148·0
	S.W.	134·7	142·9	139·5	156·0	130·1
Costs per cow (£)	E & W	127·9	121·6	117·8	122·6	114·8
	S.W.	110·9	108·0	108·9	111·2	114·1
Margin per cow (£)	E & W	6·3	25·4	31·4	36·5	33·2
	S.W.	23·8	34·9	30·6	44·8	16·0
Forage acres per cow	E & W	2·0	1·6	1·5	1·5	1·4
	S.W.	1·8	1·7	1·9	1·7	1·6
Margin per forage acre (£)	E & W	3·7	15·8	21·6	24·8	20·6
	S.W.	13·6	21·1	16·4	26·9	16·0
Margin per gallon (d)	E & W	2·0	7·3	9·2	9·8	9·8
	S.W.	7·8	10·3	9·3	12·0	5·3
Yield per cow (gallons)	E & W	746	832	837	893	813
	S.W.	736	809	793	893	726
Concentrates per cow (cwt)	E & W	20·6	25·4	24·8	25·0	23·1
	S.W.	15·8	20·0	20·6	24·5	23·8
Hours per cow	E & W	122	81	62	53	51
	S.W.	101	78	61	50	51

provincial and national samples it is of interest to see how the South West compares with England and Wales in 1968/69. Table 16. lists some of the chief features for the national sample and for the South West. In both cases the "60 and under 100 cows" group achieves the best results while in the national sample there is a distinct upward trend in both returns and margins as herd size increases up to the fourth group, with a decrease when the largest group is reached. This would seem to bear out the frequently suggested theory that the optimum size for a herd is 70 to 80 cows.

(C) ADDITIONAL ANALYSIS OF THE MAIN COSTS SOUTH WEST SAMPLE 1968/69

Feed

The number of herds receiving each of the main categories of feed are set out in Table 17. Average cost per ton is also given in parentheses. Standard dairy cake was by far the most popular purchased food followed by dried sugar beet pulp and grazing nuts. Prices on the whole were higher than in 1965/66 but there were variations between groups due no doubt to varying transport costs according to location and to reduced rates in some cases for bulk buying. The effect of the poor summer of 1968 is reflected in the price paid by some farmers for hay most of which was bought towards the end of the winter when it was realised that the grazing was going to be later than usual. Homegrown concentrates, as has been stated, were all charged at average market prices regardless of yield, but homegrown bulk feed costs reflect the effects of yield and conditions. Detailed costs of production of these foods will be found in Appendix II. Homegrown hay was fed to 58 out of the 61 herds thus maintaining its popularity. Kale was fed by comparatively fewer farmers than in 1965/66 but silage was more widely used, being fed on 41% of the farms.

Table 17. Analysis of the number of herds receiving each food and the average cost per ton, by herd size, 61 herds, 1968/69

	Under 20 cows	20 and under 40	40 and under 60	60 and under 100	100 cows and over
Number of herds	17	20	9	10	5
	Number of herds receiving each food*				
Purchased:					
Concentrates:					
Standard dairy cake	16 (36·1)	19 (36·0)	9 (34·0)	10 (35·4)	4 (34·2)
High quality dairy cake	1 (41·6)	3 (40·3)	-	2 (40·3)	1 (37·2)
High protein and grain or straw balancer	3 (45·7)	2 (46·2)	2 (39·1)	2 (40·3)	1 (32·6)
Grazing nuts	7 (35·8)	12 (34·9)	8 (30·4)	6 (32·6)	3 (30·3)
Straight oil cakes and meals	-	-	-	-	1 (55·9)
Grains	5 (30·7)	7 (27·4)	3 (25·9)	-	3 (24·7)
Dried sugar beet pulp	10 (24·9)	12 (23·7)	5 (23·8)	7 (24·4)	3 (22·6)
Other foods:					
Hay	5 (18·7)	2 (13·8)	3 (15·8)	1 (23·0)	2 (12·4)
Straw	4 (9·3)	3 (3·9)	3 (6·3)	2 (3·5)	2 (5·6)
Homegrown:					
Concentrates:+					
Barley	2 (21·0)	8 (21·0)	2 (21·0)	4 (21·0)	-
Oats	2 (18·2)	1 (18·2)	1 (18·2)	1 (18·2)	-
Dredge	2 (19·6)	2 (19·6)	-	2 (19·6)	-
Other foods:					
Hay	17 (6·3)	19 (5·2)	9 (5·9)	9 (5·3)	4 (6·0)
Kale	7 (2·0)	10 (1·6)	4 (1·2)	4 (2·9)	4 (1·6)
Silage	2 (1·6)	7 (2·2)	4 (2·4)	8 (1·7)	4 (2·5)

* Figures in parentheses give the average cost per ton (£).
\+ Homegrown concentrates valued at average market prices for 1968 harvest.

An analysis of forage acres used by the milking herd is given in Table 18. The largest herds appear to be making the best use of their land with only a little over one acre per cow for grazing while the middle group used the most acres. The reason for this higher figure of 1·86 acres may be that four of the farms in that group had a greater number of other grazing stock than did the five more specialised dairy farms. Apart from the smallest group, however, all the South West herds used more forage acres than did the national sample.

Table 18. Analysis of forage acres used, by herd size
61 herds, 1968/69

	Under 20 cows	20 and under 40	40 and under 60	60 and under 100	100 cows and over
	Acre equivalents per cow				
Grazing	1·21	1·18	1·25	1·08	1·04
Hay and silage	0·44	0·41	0·54	0·51	0·44
Kale and cabbage	0·08	0·06	0·07	0·06	0·08
Roots and other	0·02	-	-	0·01	-
Total	1·75	1·65	1·86	1·66	1·56

Labour

A distribution of 59 herds according to herd size and place of milking and housing is given in Table 19. Two herds have been excluded as they were multiple herds and made use of more than one system. They were each treated as one herd for costing purposes as holdings, not herds, were selected for the sample.

The traditional cowshed is still the most popular method of housing and milking for the smaller herd, for the "shed" of the second category is usually a traditional cowshed with too few standings for all the cows to be milked at once so that a relay system has to be used. Frequently a

farm may have two or three small cowsheds, one being modernised and used for relay milking while the others are kept solely for housing. Parlours and bails appear to be the rule for the larger herds with yards and cubicles for housing. There is a continued downward trend in hours per cow with increased herd size. Parlour or bail milking combined with yard or cubicle housing seem to be the system most economical of labour use.

Table 19. Classification of herds according to place of housing and milking and the direct labour hours per cow, by herd size, 59* herds, 1968/69

Place of Housing/ Milking	Herd size					Total herds	Average hours per cow
	Under 20 cows	20 and under 40	40 and under 60	60 and under 100	100 cows and over		
	Number of herds						
Cowshed/Cowshed	11	6	1	-	-	18	96
Cowshed/Shed	4	6	1	-	-	11	87
Yard/Parlour	-	1	5	5	3	14	54
Yard/Bail	-	-	1	2	-	3	53
Yard/Shed	1	2	-	-	-	3	83
Cubicles/Parlour	-	-	1	2	1	4	49
Cubicles/Shed	-	1	-	-	-	1	81
Outlying/Shed	1	4	-	-	-	5	77
Total herds	17	20	9	9	4	59	-
Average hours per cow	104	79	61	50	50	-	-

* Two multiple herds excluded.

The distribution of paid and unpaid labour is shown in Table 20. The proportion of paid labour increases with herd size as does the cost per hour of that labour reflecting possibly the greater degree of responsibility expected of cowmen in charge of larger herds. This, however, is largely offset by the fewer hours worked per cow in these herds.

Table 20. Hours of paid and unpaid labour per cow and the cost of labour per hour, by herd size, 61 herds, 1968/69

	Under 20 cows	20 and under 40	40 and under 60	60 and under 100	100 cows and over
Paid labour					
Hours per cow	-	9	25	29	45
Cost per hour (shillings)	-	6·2	6·8	6·7	7·2
Unpaid labour					
Hours per cow	104	70	36	21	5
Cost per hour (shillings)	6·3	6·3	6·4	6·3	6·3
Total labour					
Hours per cow	104	79	61	50	50
Cost per hour (shillings)	6·3	6·3	6·6	6·5	7·2

Further details of labour hours and place of milking are given in Appendix II.

Herd replacement

Details of opening and closing valuations and of incoming and outgoing cows are given in Table 21. Compared with 1965/66 farmers appear to be putting a higher value on their cows and to be paying more for those they buy. Barreners have maintained their value, Friesians in particular fetching over £60 after several lactations. The lower values and lower purchase prices in the smallest size group may be due in part to the fact that a quarter of the cows in that group were Channel Island whereas Friesians predominate in all other groups. The higher values and higher purchase prices in the largest herds would suggest that their owners are aiming at better quality cows. This is not borne out by the average yield of that group but may be explained by the fact that most of the purchases shown were made by one herd whose average yield was nearly 900 gallons per cow.

Table 21.

Milking herd stock account by herd size groups at 31st March, 1969, 61 herds

	Under 20 cows	20 and under 40	40 and under 60	60 and under 100	100 cows and over		Under 20 cows	20 and under 40	40 and under 60	60 and under 100	100 cows and over
No. of herds	17	20	9	10	5	No. of herds	17	20	9	10	5
	Number of cows*						Number of cows*				
Opening valuation	258 (81•2)	570 (88•1)	438 (91•8)	723 (90•3)	722 (92•5)	Sales: In milk	2 (47•0)	20 (84•5)	15 (93•9)	14 (97•4)	2 (89•0)
Purchases:						Barreners	28 (52•6)	105 (56•4)	75 (61•2)	84 (63•0)	64 (58•9)
Cows) Heifers)	12 (87•7)	43 (109•0)	42 (104•9)	32 (95•5)	58 (120•8)	Casualties	9 (24•0)	6 (5•5)	15 (12•4)	22 (9•3)	52 (25•8)
Transferred in	30 (85•5)	94 (88•6)	77 (91•4)	189 (92•2)	107 (94•3)	Transferred out	2 (60•0)	1 (100•0)	1 (80•0)	16 (78•1)	2 (40•0)
						Closing valuation	259 (82•3)	575 (89•9)	451 (93•0)	808 (90•3)	767 (94•9)
Total	300	707	557	944	887	Total	300	707	557	944	887

* Figures in parentheses give average values (£).

Table 22. Proportion of homereared replacements, rates of turnover and herd size increase, by herd size groups 61 herds, 1968/69

	Under 20 cows	20 and under 40	40 and under 60	60 and under 100	100 cows and over
	%	%	%	%	%
Homereared as a per cent of incoming cows and heifers	71·4	68·6	64·7	85·5	64·8
Outgoing cows as a per cent of opening valuation	15·9	23·2	24·2	18·8	16·6
Per cent increase in cow numbers, closing valuation over opening valuation	0·4	0·9	3·0	11·8	6·2

Table 22. shows that homereared replacements far outnumber purchased incomers in all groups but particularly in the smallest and in the 60 to 100 groups. It would be expected that larger herds would have most time and space for rearing replacements but it might be thought that smaller herds would concentrate on as large a milking herd as possible with rearing kept to a minimum. Instead over 70% of the incomers into the smallest herds were homereared.

Between 16% and 24% of cows in the opening valuation were replaced during the year. This represents a milking life of four to six years with the best results being shown by the smallest herds. Although not quite as good as in the 1965/66 sample, it shows an improvement on the three to four years that were general about ten years ago. The smaller herds did not increase greatly in size during the year, by less than 1% in fact, but the two largest groups increased considerably, mostly by the introduction of homereared heifers. Since the term "barrener" is somewhat vague, farmers were asked the reason for disposing of cows under that heading. The chief reasons were

infertility (28% of barreners), low yield (27%) and mastitis (11%).

Miscellaneous costs

Although, individually, some of these costs may not appear very great, in all they form a larger share of total costs than does labour, amounting to between £23 and £24 per cow or 6½d and 8¾d per gallon.

These costs are set out in Table 23. under various headings, most of which are self explanatory. By far the largest item is "share of general expenses" representing all the overheads incurred by the milking herd. It consists of two parts. First, a charge of 15% of the direct labour of the milking herd and second, a charge of £5 per £100 of gross output.

Table 23. Analysis of miscellaneous costs per cow by herd size, 61 herds, 1968/69

	Under 20 cows	20 and under 40	40 and under 60	60 and under 100	100 cows and over
	£	£	£	£	£
Rental value of milking herd buildings	2·8	3·1	3·7	4·4	5·4
Dairy equipment repairs and depreciation	1·3	1·4	2·7	1·6	1·7
Miscellaneous horse and tractor hours	1·1	0·8	0·2	0·2	-
Share of general farm expenses	11·5	10·8	10·0	10·2	9·3
Service fees	1·4	1·4	1·4	1·3	1·2
Veterinary charges and medicines	1·2	1·7	1·5	2·1	2·4
Consumable dairy stores	1·3	1·7	2·5	2·0	3·2
General dairy charges	2·1	2·5	2·3	2·6	3·3
Total	22·7	23·4	24·3	24·4	26·5

The second largest item is that rental of milking herd buildings. For post-1950 buildings a charge was made of 12% of their original cost, net of any grant, to cover depreciation, interest, repairs and maintenance. For pre-1950 buildings there was a charge of £1 per standing and per 100 square feet of other floor space. In addition any capital improvements carried out after 1950 were charged at 12% as above. The chief feature of this item is the increasing amount spent on dairy buildings with increasing herd size.

Calving patterns

Detailed records were kept during 1968/69 of all calvings to see whether any definite patterns would emerge either of calving dates or of calf disposals. Table 24. shows that the majority of calvings were in

Table 24. Monthly distribution of calvings 61 herds 1968/69

Month	Cows	Heifers	Total
	%	%	%
April	6·3	5·9	6·3
May	4·7	4·2	4·6
June	4·1	2·4	3·8
July	5·3	6·1	5·5
August	9·9	13·0	10·6
September	12·1	11·4	12·0
October	12·0	16·0	12·6
November	9·7	11·9	10·1
December	8·5	12·1	9·1
January	8·7	6·8	8·3
February	9·1	2·9	8·0
March	9·6	7·3	9·1
Year	100·0	100·0	100·0

the early autumn with a smaller peak in March, while May and June were the

quietest months. This would suggest that most herds were still inclined towards an emphasis on winter milk. However an extension of the calving period into December with a further batch calving in March resulted in a fairly even spread of milk production throughout the year, the two larger size groups being the only ones to produce more than 50% winter milk. Even so this was only 52·3% for the largest size group. When cows and heifers are considered separately the most striking feature is the concentration of heifers calving in October. Recalling that one of the larger size groups had the greatest percentage of homereared replacements (Table 21), this would fit in with the tendency for more emphasis on winter milk in the larger herds.

Calf disposals

The disposal of calves is summarised in Table 25. and the monthly

Table 25. Summary of calf disposals 1968/69

	Male		Female		Total	
	Number and value					
Sold	905	(£11·9)	357	(£10·4)	1262	(£11·5)
Retained	397	(£12·7)	841	(£11·7)	1238	(£12·0)
Deaths	148		93		241	
Total	1450		1291		2741	
	Per cent					
Sold	62·4		27·7		46·0	
Retained	27·4		65·1		45·2	
Deaths	10·2		7·2		8·8	
Total	100·0		100·0		100·0	

Table 26.

Monthly disposals of calves
61 Herds 1968/69

Month	SALES						RETENTIONS				DEATHS				Total	%
	MALE			FEMALE			MALE		FEMALE		MALE		FEMALE			
	No.	%	Av. value (£)	No.	%	Av. value (£)	No.	%	No.	%	No.	%	No.	%		
April	64	7·0	12·2	34	9·5	10·8	26	6·5	34	4·0	7	4·7	4	4·3	169	6·2
May	54	6·0	10·5	24	6·7	10·7	12	3·0	24	2·9	5	3·4	8	8·6	127	4·6
June	33	3·6	16·0	14	3·9	9·9	19	4·8	25	3·0	7	4·7	4	4·3	102	3·7
July	46	5·1	11·8	26	7·3	13·2	26	6·5	43	5·1	7	4·7	1	1·1	149	5·4
August	87	9·6	11·9	52	14·6	9·2	38	9·6	87	10·3	18	12·2	9	9·7	291	10·6
September	116	12·8	10·2	44	12·3	9·8	26	6·5	116	13·8	19	12·9	10	10·8	331	12·1
October	95	10·5	12·7	25	7·0	11·0	65	16·4	129	15·3	16	10·8	20	21·5	350	12·8
November	91	10·1	12·1	28	7·8	10·6	41	10·3	92	11·0	16	10·8	7	7·5	275	10·0
December	82	9·1	11·7	18	5·0	9·2	45	11·4	87	10·3	7	4·7	7	7·5	246	9·0
January	73	8·1	12·0	20	5·6	12·0	40	10·1	72	8·6	15	10·1	9	9·7	229	8·4
February	80	8·8	12·8	35	9·9	8·9	25	6·3	58	6·9	12	8·1	9	9·7	219	8·0
March	84	9·3	11·8	37	10·4	11·3	34	8·6	74	8·8	19	12·9	5	5·3	253	9·2
Year	905	100·0	11·9	357	100·0	10·4	397	100·0	841	100·0	148	100·0	93	100·0	2,741	100·0

distribution of disposals is given in Table 26. Of the male calves nearly two-thirds (62·4%) were sold and just over one-quarter (27·4%) retained, the balance of 10·2% being deaths. With the female calves the position was reversed with just over one quarter (27·7%) sold and almost two-thirds (65·1%) retained with 7·2% deaths. Bull calves sold made on average £1. 10. 0d. per head more than heifers, £11·9 compared with £10·4. Calves retained were valued by the farmers, males averaging £12·7 per head and females £11·7 a difference of £1. 0. 0d. per head. The heifer calves retained were valued at £1. 6. 0d. per head more than the price realised for heifers sold while the retained bull calves were valued at only 16/- per head more than the sale price realised for those sold. A differential between sale price and retained values would be expected as there would be a tendency for the better quality calves to be retained. However the difference in actual average realised prices for bull and heifer calves sold of £1. 10. 0d. per head is less than the market report prices would suggest.

Turning to the monthly disposals of calves, summarised in Table 26, as might be expected the largest percentage of heifer retentions was in September, October and November for if these were to calve down at $2\frac{1}{4}$ years the pattern would be maintained. As regards the retention of bull calves it is more difficult to account for the monthly variations except to assume that if it is the policy on a farm to keep all male calves then the peak month will be that of peak calving.

There appears to be no definite pattern of prices for calves sold according to the time of year. Average returns for bull calves remained around £12 throughout the year and heifer calves averaged around £10, with the majority, of both sexes, being sold at the time of peak calving. Variations in particular months were probably due to unusual demands at certain markets or to such factors as an unusual number of either beef crosses or of Channel Island calves.

A P P E N D I C E S

I. Individual results on a gross margin basis, 61 herds.

II. Supplementary tables:-

(1) Average cost of hay and of grass silage.

(2) Average cost of grazing and of kale.

(3) Cows milked per worker and per labour hour by herd size, 59 herds.

(4) Cows milked per worker and per labour hour by milking place, 59 herds.

(5) Gross output, variable costs and gross margins per cow by herd size, 61 herds.

III. Accounting methods and definitions.

APPENDIX I.

Individual results for 61 herds on Gross Margin basis, 1968/69

Code No.	Size of herd	Breed	Yield per cow	Forage acres per cow	Concs. and corn per gall.	Gross output per cow				Variable costs per cow				Gross margin	
						Milk	Calves	Less herd depn.	Total	Concentrates	Bulk feed & grazing	Misc.	Total	Per cow	Per forage acre
	cows		galls		lb.	£	£	£	£	£	£	£	£	£	£
Under 20 cows															
612	15.4	Mx.	1143	2.2	2.8	181.0	9.4	4.0	186.4	49.8	6.6	9.7	66.1	120.3	54.4
583	18.4	Fr.	866	1.7	2.1	143.2	11.8	1.0	154.0	24.3	6.3	7.8	38.4	115.6	66.5
605	18.4	Fr.	854	1.3	1.6	138.0	18.9	4.3	152.6	22.3	11.3	6.9	40.5	112.1	85.2
600	6.8	Ayr.	931	1.2	1.9	146.5	4.0	4.1	146.4	24.6	8.1	8.8	41.5	104.9	85.9
565	14.6	Fr.	969	2.1	2.7	155.2	15.9	4.0	167.1	47.9	12.0	11.1	71.0	96.1	45.1
584	17.4	Fr.	850	2.8	2.7	136.9	16.0	7.4	145.5	36.4	12.0	6.6	55.0	90.5	32.4
576	18.0	Fr.	657	2.2	1.7	107.8	11.0	5.6	113.2	14.9	8.5	6.2	29.6	83.6	37.4
613	18.0	Gu.	645	1.3	3.6	128.3	6.0	-	134.3	32.5	12.0	7.3	51.8	82.5	61.6
598	11.8	Mx.	727	1.0	3.2	113.9	19.4	1.0	132.3	37.7	6.5	10.3	54.5	77.8	79.1
579	18.9	Fr.	646	1.9	1.3	104.9	12.4	11.4	105.9	14.1	10.5	7.6	32.2	73.7	38.9
608	18.7	Gu.	541	1.9	0.6	104.8	4.0	13.0	95.8	4.5	12.9	5.3	22.7	73.1	39.5
627	18.6	Mx.	606	1.5	2.5	98.7	15.3	2.5	111.5	24.7	8.8	8.0	41.5	70.0	46.0
570	19.5	Gu.	609	1.5	2.6	112.1	7.1	5.8	113.4	25.4	11.1	8.6	45.1	68.3	44.4
585	14.2	Mx.	617	1.5	3.0	112.7	6.3	4.9	114.1	29.4	17.0	8.1	54.5	59.6	41.0
604	14.2	Fr.	796	1.7	4.3	123.9	10.4	2.8	131.5	51.8	13.6	8.1	73.5	58.0	34.6
591	6.9	Sht.	618	2.0	2.2	93.3	10.9	9.3	94.9	16.8	14.9	7.7	39.4	55.5	27.4
572	10.8	Gu.	495	1.5	1.3	94.9	6.9	6.4	95.4	11.0	28.5	10.4	49.9	45.5	31.0
Aver.*	15.3	-	739	1.7	2.4	123.3	10.9	5.2	129.0	27.5	11.8	8.1	47.4	81.6	50.0
20-40 cows															
582	29.8	Fr.	975	1.4	2.0	158.1	9.8	6.6	161.3	26.7	11.7	8.5	46.9	114.4	81.9
626	23.5	Fr.	1068	1.3	2.3	176.0	12.3	5.8	182.5	44.7	8.6	16.4	69.7	112.8	85.5
592	33.9	Fr.	983	1.3	3.3	163.0	11.8	4.5	170.3	47.9	4.1	7.9	59.9	110.4	87.7
607	35.9	Mx.	815	1.4	1.8	132.1	16.8	2.7	146.2	23.8	10.4	10.3	44.5	101.7	70.2
610	27.7	Mx.	935	2.0	2.6	149.9	9.2	9.1	150.0	37.1	6.4	8.9	52.4	97.6	48.2
573	20.3	Mx.	942	1.8	3.4	154.1	12.6	6.1	160.6	47.6	8.2	9.3	65.1	95.5	54.3
568	24.1	Mx.	800	2.1	1.9	134.4	11.1	6.3	139.2	24.7	14.9	9.4	49.0	90.2	42.1
603	21.2	Fr.	853	1.8	3.1	131.9	24.6	8.5	148.0	39.0	9.4	10.9	59.3	88.7	50.0
569	29.9	Gu.	727	1.3	3.4	141.9	7.1	5.2	143.8	37.4	12.8	9.5	59.7	84.1	63.8
597	28.7	Mx.	736	1.8	2.8	115.6	9.4	3.9	121.1	27.4	2.8	7.5	37.7	83.4	46.8
596	26.5	Mx.	727	1.5	3.8	118.2	10.8	3.2	125.8	32.5	5.4	7.1	45.0	80.8	53.8
590	33.8	Fr.	829	1.7	1.9	130.1	12.3	9.0	133.4	24.7	20.2	9.1	54.0	79.4	47.3
618	32.9	Fr.	904	1.6	4.2	144.9	14.4	5.2	154.1	57.8	5.8	12.5	76.1	78.0	49.9

581	39•0	Fr.	806	1•3	2•4	125•0	12•1	13•1	124•0	30•3	8•0	9•1	47•4	76•5	57•4
567	22•2	Mx.	737	1•3	2•5	122•3	9•8	3•6	128•5	28•8	14•5	10•0	53•3	75•2	58•0
580	22•0	Fr.	611	1•5	2•1	98•4	14•1	6•6	105•9	20•5	2•3	10•8	33•6	72•3	48•8
594	28•5	Fr.	743	1•8	3•9	118•6	12•5	8•8	122•3	40•3	7•1	6•4	53•8	68•5	38•0
616	30•5	Mx.	721	2•5	3•9	112•7	12•7	3•3	122•1	43•7	6•2	7•4	57•3	64•8	26•4
599	27•5	Mx.	658	1•3	2•3	105•5	6•0	7•5	104•0	23•2	11•3	7•8	42•3	61•7	45•8
593	35•1	Mx.	629	2•4	1•8	96•7	7•8	11•9	92•6	17•6	8•5	6•8	32•9	59•7	25•1
Aver.*	28•6	-	810	1•7	2•8	131•5	11•9	6•6	136•8	33•8	8•9	9•3	52•0	84•8	54•1
40–60 cows															
574	48•3	Fr.	826	2•5	2•1	131•2	11•7	13•3	129•6	23•5	10•0	8•5	42•0	87•6	35•0
595	47•0	Fr.	794	2•3	2•4	126•8	16•7	6•4	137•1	28•3	9•9	11•6	49•8	87•3	38•1
589	44•6	Mx.	867	1•1	2•1	140•2	7•4	10•4	137•2	24•5	15•2	11•4	51•1	86•1	77•9
621	49•8	Fr.	888	1•5	2•5	145•9	8•1	7•7	146•3	32•1	10•8	17•9	60•8	85•5	56•8
564	45•6	Fr.	977	1•8	3•5	156•6	15•2	16•9	154•9	47•5	10•7	13•4	71•6	83•3	45•7
611	50•0	Fr.	715	1•4	3•0	115•1	10•4	0•9	124•6	30•5	9•1	8•7	48•3	76•3	55•0
622	59•6	Fr.	747	2•7	3•7	120•1	12•2	4•9	127•4	35•8	14•8	8•3	58•9	68•5	2[illegible]•6
577	40•8	Fr.	676	2•2	2•2	109•0	12•6	8•1	113•5	23•1	13•7	8•9	45•7	67•8	3[illegible]•4
615	49•5	Fr.	658	1•1	4•6	106•2	12•2	4•4	114•0	42•6	6•8	6•9	56•3	57•7	5[illegible]•8
Aver.*	48•3	-	794	1•8	2•9	127•9	11•8	8•1	131•6	32•0	11•1	10•7	53•8	77•8	46•5
60–100 cows															
623	72•2	Fr.	1075	1•8	3•3	179•1	11•8	9•1	181•8	50•0	12•4	9•4	71•8	110•0	60•6
614	83•8	Fr.	1074	1•8	2•5	171•9	12•7	4•8	179•8	44•8	16•2	9•6	70•6	109•2	62•3
609	99•1	Fr.	994	1•3	2•9	164•1	14•2	4•4	173•9	44•3	13•0	8•6	65•9	108•0	81•6
578	73•0	Fr.	866	1•4	2•1	141•9	18•9	8•9	151•9	28•2	8•5	10•0	46•7	105•2	74•8
619	65•0	Mx.	851	1•8	3•4	135•7	9•0	4•8	139•9	43•7	8•7	7•3	59•7	80•2	43•6
588	85•8	Fr.	824	2•2	3•0	132•8	11•1	6•5	137•4	38•6	8•7	10•0	57•3	80•1	36•3
566	65•6	Fr.	792	1•1	2•6	124•3	11•7	9•7	126•3	25•4	14•7	10•9	51•0	75•3	67•2
625	71•7	Ayr.	744	2•0	3•0	125•2	4•0	1•7	127•5	35•3	9•1	11•6	56•0	71•5	36•1
543	72•8	Fr.	830	1•2	4•4	133•3	9•8	4•1	139•0	51•7	12•9	10•2	74•8	64•2	55•2
602	75•9	Mx.	814	2•0	3•8	130•4	5•6	9•5	126•5	45•8	10•7	9•6	66•1	60•4	30•4
Aver.*	76•5	-	886	1•7	3•1	143•9	10•9	6•4	148•4	40•8	11•5	9•7	62•0	86•4	54•8
Over 100 cows															
523	105•0	Fr.	828	1•3	3•2	135•2	11•9	5•6	141•5	39•8	11•1	8•5	59•4	82•1	62•1
628	265•0	Fr.	886	1•8	3•5	146•1	8•6	9•8	144•9	42•6	15•3	12•7	70•6	74•3	42•1
620	124•5	Jer.	571	1•1	2•1	113•9	1•3	5•9	109•3	19•1	12•1	11•2	42•4	66•9	63•4
587	122•1	Fr.	521	2•3	2•9	81•6	7•5	8•0	81•1	17•0	18•0	8•5	43•5	37•6	16•1
624	141•1	Fr.	665	1•1	6•4	108•6	11•2	6•1	113•7	61•8	7•5	16•0	85•3	28•4	25•1
Aver.*	151•5	-	694	1•5	3•6	117•1	8•1	7•1	118•1	36•1	12•8	11•3	60•2	57•9	41•3
All Herds*	45•8	-	791	1•7	2•8	129•6	11•1	6•4	134•3	33•1	10•8	9•4	53•3	81•0	50•9

* Simple averages.

APPENDIX II

Table 1. Average cost of hay and of grass silage

Crop	Hay	Grass silage
Acres	185 8¾	98 4½
	£ s per acre	£ s per acre
Manual labour	1 19	2 6
Tractor cost	1 3	1 13
Contract services	16	1 11
Purchased fertilisers	2 19	4 14
Lime	2	2
F.Y.M. (cost of carting and spreading)	8	8
Rent	3 16	4 6
Miscellaneous expenses	10	7
Overheads:-		
Depreciation of machinery & implements	13	1 0
Share of hedging and drainage	8	8
Share of general overheads	6	7
Share of costs of establishing leys	11	1 7
Total	13 11	18 9
Share of costs to grazing	2 15	3 12
Total net cost	10 16	14 17
Yield per acre (tons)	2·0	7·0
Net cost per ton	£5 8s.	£2 3s.

Table 2. Average cost of grazing and of kale

Crop	Grazing	Kale (grazed)
Acres	361$0\frac{1}{4}$	212
	£ s	£ s
	per acre	
Manual labour	7	2 0
Tractor cost	5	1 8
Contract services	1	14
Seeds	-	1 1
Purchased fertilisers	3 6	6 2
Lime	2	3
F.Y.M. (cost of carting and spreading)	4	13
Rent	3 18	2 17
Miscellaneous expenses	2	16
Overheads:-		
Depreciation of machinery & implements	3	17
Share of hedging and drainage	8	6
Share of general overheads	1	6
Share of costs of establishing leys	8	-
Total	9 5	17 3
Yield per acre (tons)	-	10·6
Cost per ton	-	£1 12s.

Table 3. Cows milked* per worker and per labour hour by herd size, 59ø herds, March, 1969+.

Herd size	Number of cows milked per	
	Worker	Labour hour
Under 20 cows	9·0	8·8
20 and under 40	17·1	13·3
40 and under 60	32·9	16·9
60 and under 100	44·8	20·5
100 cows and over	52·0	19·3

* The term milked covers weighing and feeding concentrates, milking cows and cleaning milking equipment.
ø Two multiple herds excluded.
\+ Normal daily routine in the month of March, 1969.

Table 4. Cows milked per worker and per labour hour by milking place, 59 herds, March, 1969*.

Milking place	Number of cows milked per		Per cent of sample
	Worker	Labour hour	
Parlour - Herringbone	55·0	20·8	5·1
Abreast	42·4	18·8	25·4
All parlours	44·7	19·3	30·5
Bail (fixed)	35·4	20·2	5·1
Milking shed - relay	15·3	11·9	32·2
Cowshed	12·8	11·4	32·2

* See footnotes to Table 3. above.

Table 5. Gross output, variable costs and gross margin per cow by herd size groups 61 herds, 1968/69

	Under 20 cows	20 and under 40	40 and under 60	60 and under 100	100 cows and over
	£	£	£	£	£
Gross output					
Milk	123·5	131·2	127·7	145·0	122·0
Add calves	11·2	11·7	11·8	11·0	8·1
Less herd depreciation	5·2	6·7	7·9	6·3	7·6
Total	129·5	136·2	131·6	149·7	122·5
Variable costs					
Concentrates	27·3	33·6	32·2	41·1	37·8
Bulk feed and grazing	11·4	8·9	11·2	11·5	13·2
Miscellaneous	8·0	9·2	10·6	9·7	11·8
Total	46·7	51·7	54·0	62·3	62·8
Gross margin	82·8	84·5	77·6	87·4	59·7

APPENDIX III

Accounting methods and definitions

(a) General

Foods

Purchased foods were entered at delivered cost to the farmer. Homegrown bulk foods and grazing were charged at cost of production on each farm but homegrown cereals were charged at average market prices. No allowance was made for residual manurial values.

Direct labour

This refers to labour spent directly on milk production, including, for example, milking and feeding cows, cleaning utensils and sheds, carting foods from stores, moving electric fences and taking churns to collection points. Paid labour was charged at the actual rate paid by the farmer with adjustments for holidays, sick leave, insurance, etc. Unpaid family labour (including any manual work performed by the farmer and his wife) was charged at the rate for corresponding hired labour.

Miscellaneous expenses

Items under this heading include rental of dairy buildings, share of general overheads, dairy equipment depreciation, milking machine depreciation and running costs, consumable stores, recording fees, veterinary and medicines and service fees. Bull costs have been excluded from the costings, all cows having been assumed to be artificially inseminated and the appropriate services charged at current rates.

Herd replacement

This was based on changes between opening and closing herd valuations, sales and purchases of cows and values of homereared heifers transferred

in. Cows were valued on the basis of current market values. Purchased cows were entered at cost and homereared heifers at estimated market value, disregarding any special pedigree value.

Returns for milk

In addition to the value of milk sold wholesale, all milk fed to livestock, sold retail or used for farm manufacture was valued at the appropriate monthly and quality price. Milk sold or given as a perquisite to workers and milk used in the farmhouse was valued at rates recognised in the Wages Orders.

Credit for calves

This was the net value of calves sold within a few days of birth plus the estimated market value, within a few days of birth, of calves kept either for rearing or for sale at a later date.

Margin

Margin in this report is management and investment income, i.e. returns less costs, where the labour charge includes all manual labour (paid or unpaid) including that of farmer and wife.

Family income

This is margin (or management and investment income) plus the value of all unpaid family labour.

Yield per cow

This figure represents the annual production of each herd (including wholesale, retail, perquisites, milk used in the farmhouse and fed to livestock) divided by the average number of cows in the herd.

Percentage winter milk

This is calculated by expressing the output in the six months October to March as a percentage of the annual output.

Forage acres

These are farm acres devoted to providing fodder crops such as hay, silage, kale, cabbage, mangolds and grazing but not homegrown cereals. The acreage used by the milking herd was calculated on the basis of the yield of crop and quantities fed to the different classes of stock. For hay and grass silage adjustments were made for aftermath grazing. Acres of grazing for the milking herd were calculated by allocating the grazing available for all classes of grazing stock on a livestock unit (cow equivalent) basis.

(b) Crop costs

Labour

The rate per hour for each class of worker (men, youths, women) was calculated by dividing gross weekly wages by the hours worked and raising the resulting figure to cover overtime, holidays, insurance, etc. Typical figures were:-

Men	7s. 2d. per hour
Women	5s. 0d. " "
Youths	4s. 0d. " "

Wheeled tractors were charged at:-

30-38 h.p.	4s. 6d. per hour
45-48 h.p.	5s. 2d. " "
55-58 h.p.	5s.11d. " "
65-68 h.p.	6s.10d. " "
100 h.p.	7s. 4d. " "

Fertilisers and manures

Artificial fertilisers and lime were charged at cost delivered to

the farm, less subsidies. No value was placed on farmyard manure but a charge was made for carting and spreading.

Rent

Assessed rents for farmhouse, cottages and buildings were deducted from the total rent or rental value of each farm and the remainder divided by the total acreage of crops and grass to obtain a figure for rent per acre.

Miscellaneous

These expenses consisted mainly of sprays, baler cord and coverings for silage.

Depreciation of implements and machinery

A charge of 60% of tractor costs was made.

Hedging and drainage

A charge of 8s. 0d. per acre was made to cover these field upkeep costs.

General overheads

A charge of 15% of direct manual labour cost was made to cover general farm expenses.

(c) Method used for allocating costs between fixed and variable categories for gross margin calculation

Feed

All purchased feed was regarded as a variable cost. Homegrown feeds and grazing costs were allocated on each individual farm using the following assumptions:-

Variable costs	Fixed costs
Contract work	Manual labour
Seeds	Horse labour
Fertilisers	Rent
Lime	Overheads
Miscellaneous	
Ley establishment	

Tractor cost was allocated in the proportions of 58% variable to 42% fixed costs.

Labour

Direct labour was regarded as a fixed cost.

Miscellaneous

Rental value of buildings and share of general farm overheads were regarded as fixed costs. Miscellaneous horse and tractor hours were allocated as outlined above. All other items of cost under the heading of miscellaneous have been regarded as variable costs.