



Labour Efficiency Project

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1 SUMMARY

1.1 The aim of the project was the validation and further field testing of the DairyCo labour productivity management tool on commercial dairy farms and to allow benchmarking between farms.

1.2 There were 48 farms involved in the study covering three dairying systems across England, Wales and Scotland. The three systems were Grazing (Spring calving), TMR (higher yielding with diet feeders) and Other (more traditional with a combination of grazing and winter feeding).

1.3 The average herd size was 222 cows with a range from 65 to 633 cows.

1.4 The average parlour size was 20 clusters and 32 stalls with the Grazing system farms having the largest parlours and the Other system farms having the smallest.

1.5 The Key Performance Indicators (KPIs) were an average of 69 cows per man, 474,000 litres per man and a labour cost of 6.9 p/litre. The Grazing system farms had the highest cows per man (94) and the Other system the lowest (51). The milk sales per man and the labour cost per litre were similar for the Grazing and TMR system farms.

1.6 There were three recording periods of Summer 2009 (July and August), Winter 2009/10 (December to March) and Spring 2010 (April and May).

1.7 The task analysis and work recording was based on the methodology developed in previous DairyCo studies. The analysis of labour use was based on minutes per cow per day.

1.8 The analysis of the data indicates that a distinction should be made between cow specific tasks and non specific tasks.

1.9 The analysis shows a wide variation between the systems in both the total time and cow specific time. The average time for the three seasons across all three systems was 7.3 minutes per cow per day. The Grazing time was the lowest at 4.6 minutes and the Other system the highest at 9.6 minutes.

1.10 The analysis of the task times shows an average milking time for the Other system of 2.2 minutes per cow per day, which was double the Grazing system average of 1.1 minutes.

1.11 With the Grazing system farms there was a fairly strong relationship between increasing herd size and a reduction in labour input. This was less strong with the TMR and Other system herds.

1.12 The ten case study farms provide a wide range of systems, location, herd size and labour input.

1.13 The project does provide excellent data which is suitable for benchmarking. The project provides an Excel model for this purpose.

1.14 The project provides a number of opportunities for knowledge transfer.

2 AIMS OF THE STUDY

The aim of the project was the validation and further field testing of the DairyCo labour productivity management tool on commercial dairy farms and to allow benchmarking between farms.

3 SELECTION OF FARMS

From an initial group of 94 farms, 48 farms were selected which best met the criteria for the project (Appendix 1).

Region	Farms
South West	14
South East	3
Midlands	11
North	10
Wales	7
Scotland	4
Total	49

Whilst there were 49 farms involved in the project, one of the farms in Scotland provided only limited data, which then left 48 farms with 3 in Scotland.

The key aspect of the selection criteria was to include farms from 3 principle farming systems which was successfully achieved within the constraint of the geographic requirement.

System	Farms	Cows	<150	151 - 300	>300
TMR	18	234	5	10	3
Grazing	16	269	2	9	5
Other	14	137	8	6	0
Average	48	222	15	25	8

The average herd size was 222 cows with a range from 65 to 633 cows. There was a good spread of herd size with the TMR and grazing system, but with the 'Other' system there were no herds in the over 300 cow category.

The average herd size was highest in the Grazing system at 269 cows and lowest in the Other system at 137 cows, with the TMR system at 234 cows.

4 FARM DETAILS

All 48 farms were visited during July and August 2009 to collect details about the farm system (Appendix 2) and the annual labour use on the farm (Appendix 3). The system information which was expected to have the largest impact on labour use is summarised in the table below:

	Clusters	Stalls	ACRs	Backing gate	Diet feeder	Diets fed
Average	20	32	71%	60%	65%	1.5
TMR	20	26	89%	67%	94%	2.6
Grazing	24	48	44%	81%	13%	0.1
Other	13	20	71%	29%	79%	1.5

There was a large variation in the size of milking parlour with the average having 20 clusters and 32 stalls. The Grazing system farms had the largest parlours with an average of 24 clusters and 48 stalls (i.e. virtually all 'swingover' type parlours, with the TMR system an average of 20 clusters and 26 stalls and the Other system with much smaller parlours (13 clusters and 20 stalls). The majority of TMR farms (89%) had ACRs, whereas with the Grazing system there were 44% with ACRs. A backing gate was most common with the Grazing systems with 81% having a backing gate compared with just 29% for the Other system farms. Not surprisingly, 94% of TMR farms had a diet feeder, whereas just 13% of Grazing system farms had a diet feeder. In terms of diets fed, for the TMR system farms there were an average of 2.6 diets fed, compared to 1.5 for the Other system farms and just 0.1 for the Grazing system farms.

5 LABOUR KEY PERFORMANCE INDICATORS (KPIs)

The KPIs have been referred to as the 'light touch efficiency measures' whereas KPIs would seem a simpler and more easily recognised term to use. The KPIs for all the farms on the study are shown at Appendix 4 and are summarised below:

System	Cows/man/yr	Litres/man/yr	Labour p/litre	Cows
Average	69	473923	6.9	222
TMR	59	508588	6.0	234
Grazing	94	514242	5.5	269
Other	51	351898	9.2	137

Cows and litres per man are both terms which are easily understood and relatively easy to calculate based on the annual labour use (Appendix 3).

The table shows that the average was 69 cows/man/year with a wide range between the systems from 51 for the Other system to 94 for the Grazing system.

There was a also a wide range within the systems:

System	Cows/man/yr	Range
TMR	59	40 to 108
Grazing	94	41 to 131
Other	51	29 to 94

The average litres/man/year was 473,923, with both the TMR and Grazing systems achieving a similar output of around 510,000 litres, but the Other system only achieving 351,898 litres. There was also a wide range within the systems:

System	Litres/man/yr	Range '000 litres
TMR	508588	303 to 1022
Grazing	514242	164 to 785
Other	351898	160 to 574

The labour cost per litre tends to be less used as a KPI, but it does provide a useful to link to financial measures and to the price of milk. The cost per litre was calculated from the annual labour hours, which was multiplied by £10 per hour and then divided by the annual litres. The average labour cost was 6.9 p/litre, with the TMR and Grazing systems achieving a similar cost of around 6.0 and 5.5 p/litre respectively, with the Other system much higher at 9.2 p/litre. There was also a wide range within the systems:

System	Labour p/litre	Range
TMR	6.0	3.7 to 10.8
Grazing	5.5	2.9 to 17.0
Other	9.2	3.7 to 15.3

One issue that has to be recognised is that the amount of time worked in a year does vary considerably, especially comparing employed labour and family labour. The typical annual labour hours for an employee might be around 2500 hours, whereas for a family member this might be around 3000 hours. The labour hours used in the above table are based on labour units, but have not been standardised to the same labour hours. It would seem desirable to standardise labour units to say 2500 hours per annum (which also equates to £25,000 per annum labour cost at £10 per hour), which could then mean that a family member working 3000 hours per year, would be equivalent to 1.2 labour units.

The other issue to recognise is the variation in the effectiveness of people working on the farm. By the nature of the family farm there are often older family members still working on the farm, possibly for social reasons, but with a reduced work output. It is difficult to account for such differences, but account would need to be made when interpreting the results.

The project does provide an excellent database of KPIs which would allow any dairy farm to compare their own KPI with a corresponding system average. There would be a need to update the labour cost per litre over time.

6 LABOUR TASK RECORDING

The majority of the project was concerned with recording labour task times over the year to identify any differences in the seasonal labour requirement for the different systems. The actual recording pack used in the project is included at Appendix 5 which is waterproof paper and bound in to a 'Labour Metrics' recording pack which provides instructions, definitions and 3 days of recording forms. One labour pack is needed for each person working over the 3 day period. The recommended days for recording were Tuesday, Wednesday and Thursday to avoid the effect of the weekend. By using the same recording days does provide a consistent approach to work recording. The farmers found the recording packs easy to use. There may still be inconsistencies in recording due to 'lumpy' work associated with TB testing and mucking out yards. The task recording is split in to 7 broad task areas and 21 more detailed activities which does mean that these inconsistencies can be identified without impacting on the value of the work recording. The records were usually posted back for processing, with the data added to a central database.

There were 3 recording periods:

- Summer 2009
- Winter 2009/10
- Spring 2010

The target recording time was achieved at the first recording with all the labour records returned by the end of August 2009. All of the recording packs were returned, with only one farm recording incomplete data.

The 2nd recording packs were sent out in late November with the report back cover letter shown at Appendix 6. The target recording dates for the Winter were 1st to 3rd of December with recording packs received back up to early March (despite numerous requests for the data). The total number of farms returning data was 42 farms (88%).

The target recording dates for the Spring were 21st to 23rd April, although due to the very cold winter the recording packs sent out to the farms in the North was 2 weeks later. The recording packs were received back up to August, but with most of the recording carried out in April and May 2010. The total number of farms returning data was 37 farms (77%).

7 LABOUR TASK ANALYSIS

The task analysis for each recording is shown at Appendices 9, 10 and 11 for the Summer, Winter and Spring respectively.

The basis of the task analysis agreed with DairyCo was minutes per cow per day. Previous studies had related the task time to the litres of output. However, it was felt that this confused the issue as the task related to time and the number of cows. Although the milking activity will relate to milking frequency. One of the study farms milk three times a day and the length of the milking time was identified as an issue for the farm. Another of the case study farms installed an automatic milking system over the period of the project.

The task analysis and work recording was based on the methodology developed in previous DairyCo studies. However, our research has shown that a distinction should be made between cow specific tasks and non specific.

Cow specific	Non specific
Milking	Office management
Feeding	Maintenance
Mucking out	Slurry spreading
Herd health	Fertiliser spreading
Calves & heifers	Other
Dry cows	

The work recording did show quite large differences between farms in the non specific tasks, which could be due to differences in the use of contractors (e.g. slurry spreading) and differences in timing in relation to maintenance, office management and other. Whereas the cow specific tasks mainly have to be carried every day (with the exception of mucking out). However, it is felt that all tasks should still be included in the work recording as there is a danger that time could be wrongly allocated where the opportunity was not provided to record all time under an appropriate heading.

The analysis of the cow specific and total time recorded are shown below for each of the three recording periods:

	Cow task total Minutes/cow/day	Total Minutes/cow/day	Cow tasks % of total tasks
Summer			
Average	5.0	7.6	66%
TMR	5.7	8.1	70%
Grazing	2.8	4.8	58%
Other	6.7	10.1	66%

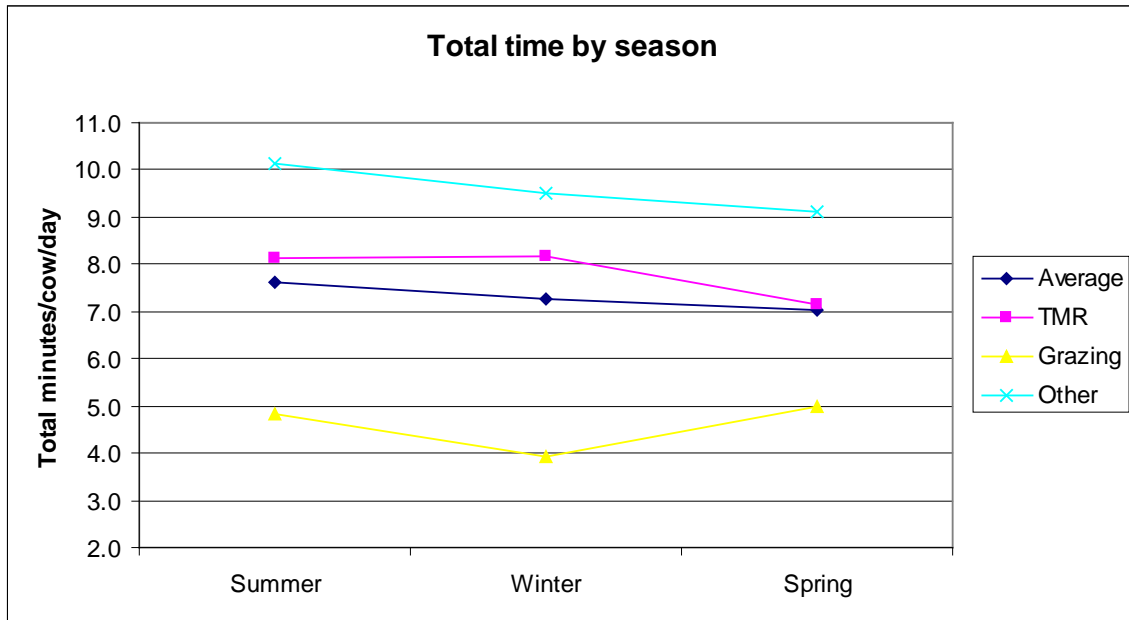
	Cow task total Minutes/cow/day	Total Minutes/cow/day	Cow tasks % of total tasks
Winter			
Average	5.7	7.3	79%
TMR	6.5	8.2	80%
Grazing	2.7	3.9	70%
Other	7.7	9.5	81%

	Cow task total Minutes/cow/day	Total Minutes/cow/day	Cow tasks % of total tasks
Spring			
Average	4.8	7.0	68%
TMR	5.1	7.1	71%
Grazing	3.2	5.0	63%
Other	6.4	9.1	70%

	Cow task total Minutes/cow/day	Total Minutes/cow/day	Cow tasks % of total tasks
Average of 3 seasons			
Average	5.2	7.3	71%
TMR	5.8	7.8	74%
Grazing	2.9	4.6	63%
Other	6.9	9.6	72%

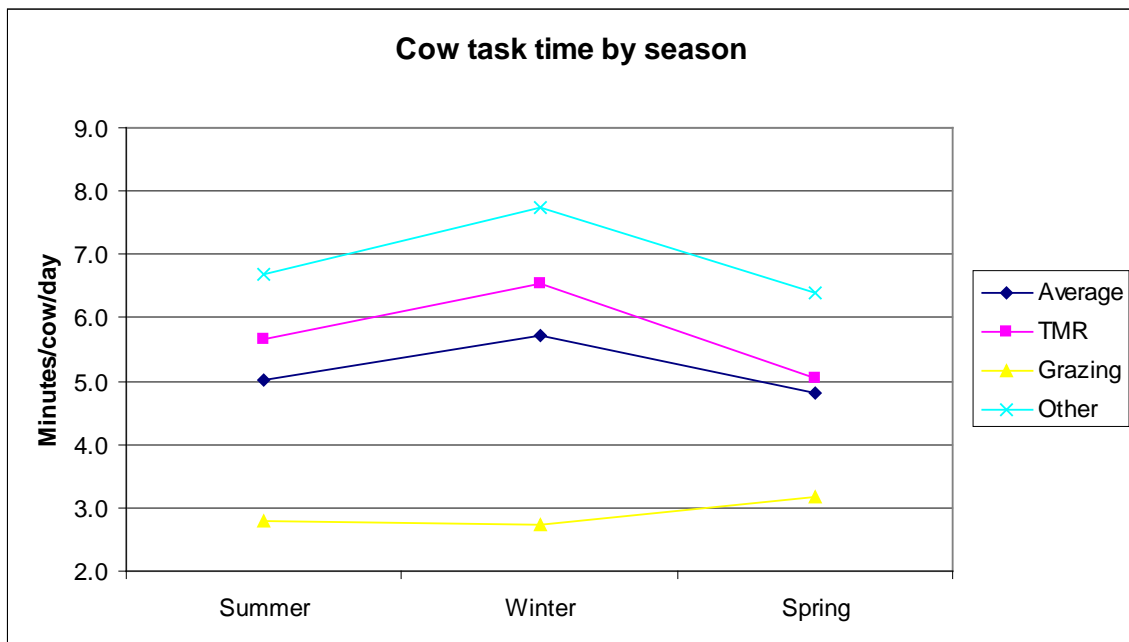
There was a wide variation between the systems in both the total time and the cow specific time, with the average total time for the three seasons of 7.3 minutes/cow/day, with 71% of the time related to cow specific tasks. The Grazing system time was the lowest at 4.6 minutes/cow/day with 63% related to cow specific tasks. The highest total time was for the Other system at 9.6 minutes/cow/day with 72% related to cow specific tasks.

There was some seasonal pattern to time input as shown in the graph below:



The total average time was lower moving from the Summer to Winter to Spring, with the Grazing system total time distinctly lower in the Winter when the cows were generally dry and the milking time was much lower.

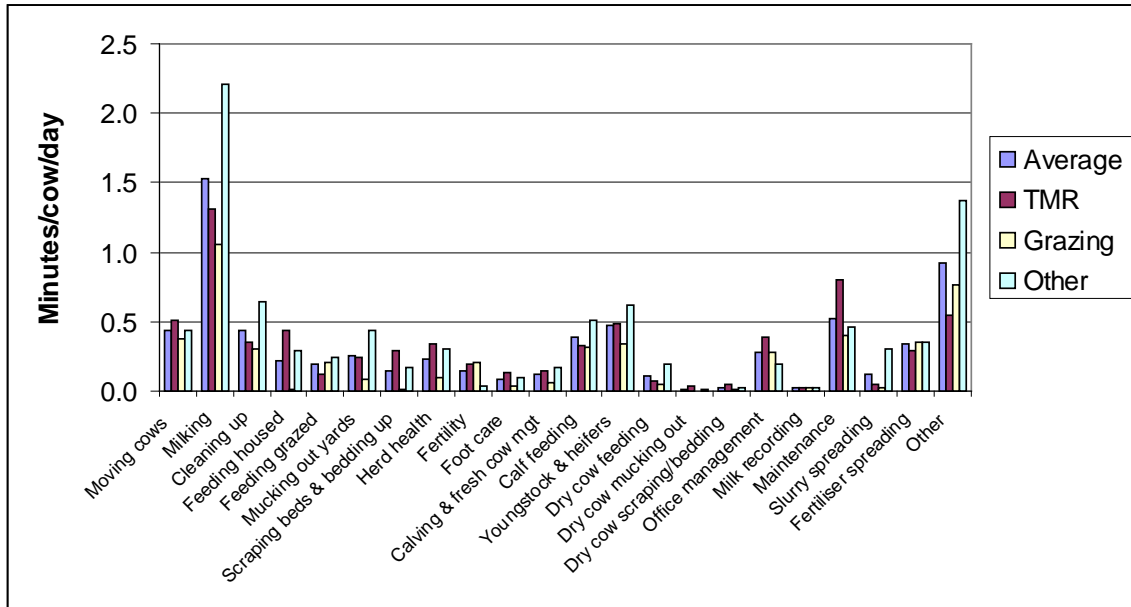
The graph below is for the cow specific tasks:



The graph shows a distinctly higher winter labour input for both the TMR and the Other systems, whereas the highest labour input for the Grazing input is during the Spring.

This is the pattern you would expect to see and demonstrates the need to display cow specific and non specific times separately.

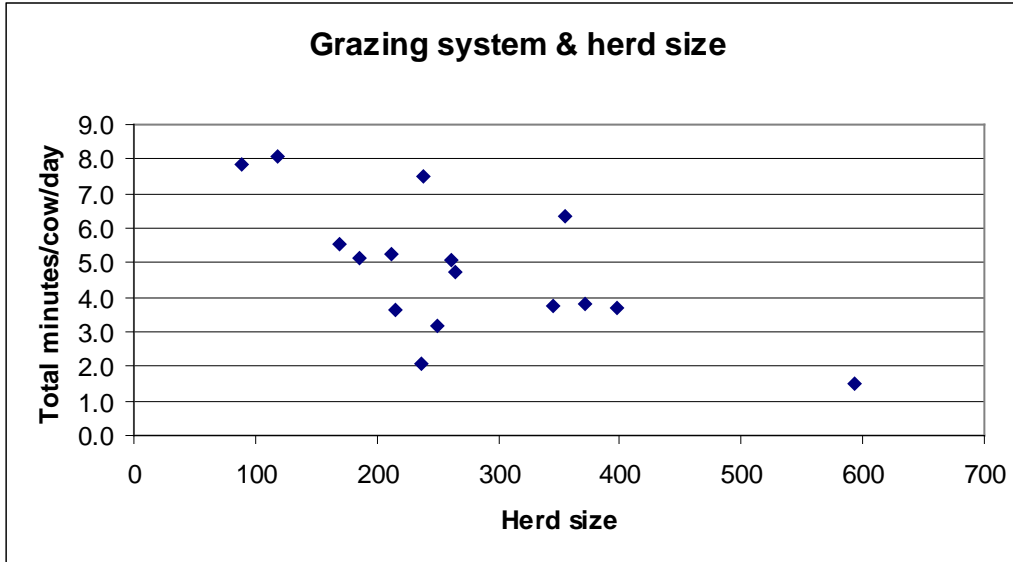
The analysis of task times is shown below as an average of the three seasons:



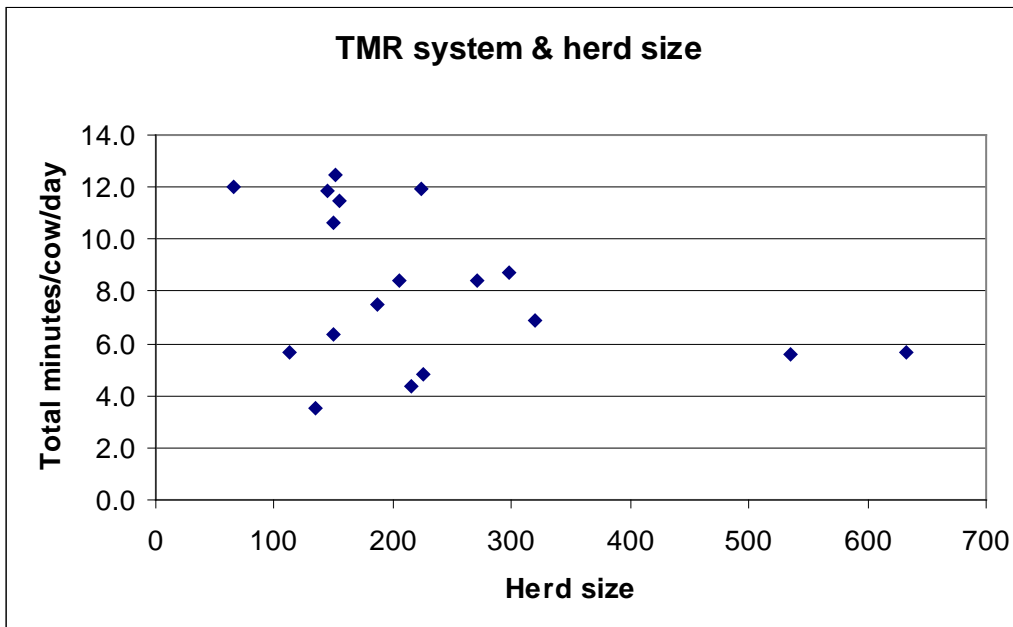
The most noticeable feature is the much higher milking time for the Other system at 2.2 minutes/cow/day which was double the Grazing system at 1.1 minutes/cow/day. The smaller herd size and parlour for the Other system is bound to be an issue for these units in terms of milking efficiency. The Other system tended to have the highest labour input for most tasks other than for feeding housed cows, office management and maintenance which was highest with the TMR system. The Grazing system had the lowest labour input for most tasks.

8 HERD SIZE AND LABOUR INPUT

The graphs below look at the relationship between herd size and labour input for each of the three systems. The analysis below is for the total time, with the pattern for cow specific time quite similar.

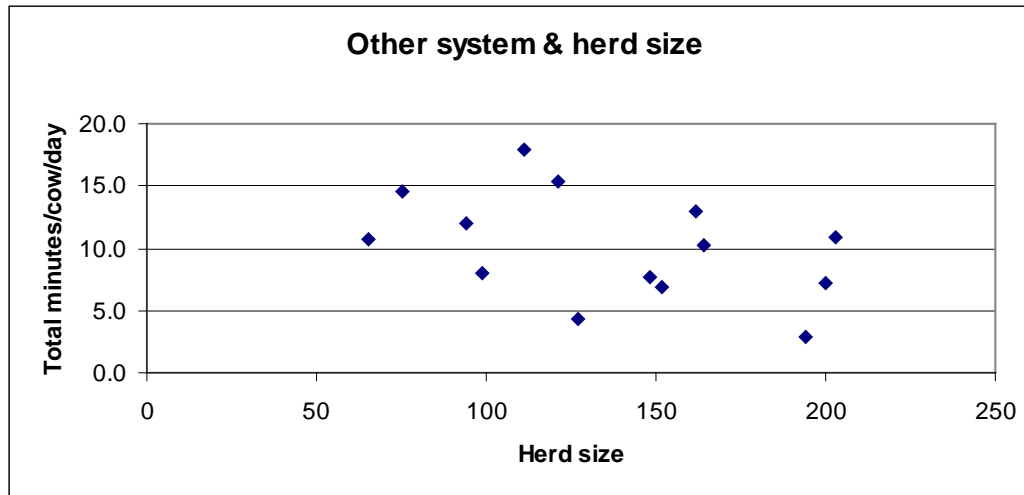


For the Grazing system there was a fairly strong relationship, with the largest herd size of 593 cows having the lowest total labour input of 1.5 minutes/cow/day and the smallest two herds of 89 and 118 cows having the highest labour input of 8 minutes/cow/day.



For the TMR system there was not such a strong relationship between herd size and the total time input which appears to 'bottom out' at around 5 minutes/cow/day. The smallest

herd of 65 cows did have the highest labour input of 12 minutes/cow/day, but there were also herds of up to 224 cows with a total time input of 12 minutes.



There was a less strong relationship with the Other system, although there was a tendency for the largest herds to have the lowest labour input. Also, there was not the same range in herd sizes as compared with the TMR and Grazing systems.

9 RELATIONSHIP BETWEEN WORK RECORDING & KPIS

The work recording was carried out over three seasons during the year and were effectively a spot record of labour input. The project identified a need to differentiate between cow specific tasks which require labour input every day and non specific tasks which are less frequent. The table below compares the KPI annual labour input with the cow task time and the total time.

	Annual	Cow task time	Total time	Average
System	Cows/man/yr	Cows/man/yr	Cows/man/yr	Cows/man/yr
Average	69	82	54	68
TMR	59	72	51	62
Grazing	94	147	85	116
Other	51	62	41	51

Using the cow task time provides an over estimate of the annual labour requirement, whereas the total time provides an under estimate. Using the average of the two gave a value which was similar to the KPI figure for the TMR and Other system but was an over estimate for the Grazing system. However, using the cow task time would provide a reasonable basis to calculate the staff time and the cost of any changes to labour input as reflected in the task analysis.

10 CASE STUDY FARMS

Ten case study farms have been developed, which cover a range of systems, geographic locations, herd size and labour input.

Farmer	Region	County	System	Herd size	Total minutes/cow/day
Brewer	South West	Cornwall	Grazing	593	1.5
Fewings	South West	Somerset	TMR	145	11.9
Halliday	Scotland	Dumfries	Other	200	7.2
Sanderson	North	Cumbria	Other	164	10.2
Ingram	Midlands	Shropshire	Other	194	2.8
Morgan	Wales	Denbighshire	Grazing	345	3.8
Oakes	Midlands	West Midlands	TMR	151	12.0
Skinner	South East	East Sussex	Other	94	12.0
King	South West	Dorset	TMR	224	11.9
Appleton	South East	East Sussex	TMR	297	8.7

The case studies are included at Appendices 12 to 21. Due to the nature of the study many of the issues identified in the labour analysis are long term issues which are not easily resolved and they tend to have a long time scale for implementation and assuming that the farmer is willing to implement changes.

11 LABOUR BENCHMARKING

This study does provide excellent data which is suitable for benchmarking. All of the 48 farms on the study have been provided with bench mark reports for each of the 3 recording periods, which includes both the KPIs and the task analysis. The Excel model is in a format which does allow benchmarking for any farm using the same methodology as used in the project. The following approach is recommended:

1. Contact the farmer to see how many people work on the farm.
2. Prepare for the farm visit
 - a. Labour packs for each person
 - b. Labour metrics form
 - c. Annual labour analysis form
 - d. Systems information
3. Visit the farm to explain the process, collect the annual KPI data and systems information.
4. Farmer to carry out the labour recording on Tuesday, Wednesday and Thursday. Post back the information.
5. Enter the data in to the Excel model and produce the benchmarking report.

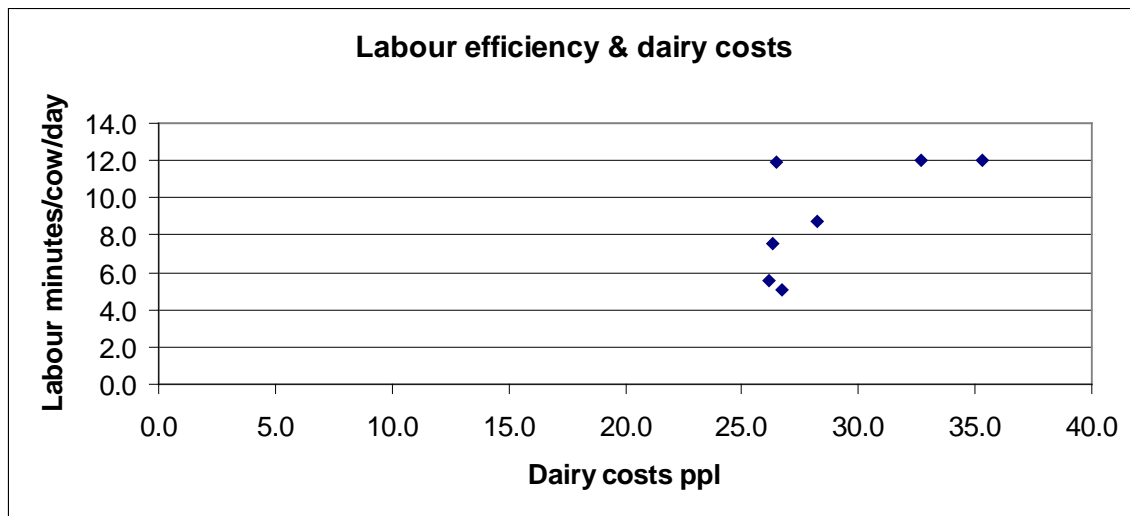
As the labour project has collected data over three seasons it does mean that the benchmarking can be carried out at any time. However, for the Grazing system it would probably be better to avoid the late lactation and dry period as there tends to be more variability between farms around this time.

The benchmarking report for the study compared the farm data with the average of all farms and with the system average. Feed back from the study would suggest that a

comparison with the system average and with the Top 25% would provide a better benchmark report.

12 DAIRY COSTS & LABOUR EFFICIENCY

The intention was to compare the labour efficiency with the total milk production costs based on information from Milk Bench. We identified 11 farms on the labour project which also have data on Milk Bench. Due to data protection DairyCo has requested that each of the 11 farmers need to provide their written authority, which has only been received from 3 farmers. As an alternative, we have our accounts database with data from 7 of the study farms which provides the analysis below:



The analysis shows a fairly close relationship with increasing total cost of milk production associated with an increasing labour cost. Clearly it would be useful to have accounts analysis of more farms on the study, but this was beyond the scope of the project.

13 KNOWLEDGE TRANSFER

The project provides a number of opportunities for knowledge transfer.

- Promotion of the study results and the benefits of the approach to improving labour productivity.
- Promotion of the case study farms as examples of best practice and/or how the approach has been used to improve labour efficiency.
- Farmer groups in relation to the KPIs. It is possible to carry out the KPI analysis at a group meeting, to collect the results and to compare with the group average and the benchmark results.
- Individual farmer benchmarking.