THE MILK HARVESTING SYSTEM

Every day, dairy farmers all around Australia undertake the routine tasks associated with milking and managing a farm. Often there is little time to consider issues of efficiency or think of practical tasks as part of a system.

Many people will be reading these guidelines to find out how to improve specific aspects of their milk harvesting. Developing a broader perspective of the milk harvesting system and its processes can improve the bottom line and make the job of milking easier, every day.

An efficient and productive milk harvesting system can have many benefits. These include:

- reasonable demands on labour;
- well-utilised investment in milk harvesting capital equipment;
- maximised farm profit; and
- a manageable milk harvesting system.

This chapter overviews the key principles of milk harvesting and performance measures:

Information in this chapter provides an overview of how the whole milk harvesting system fits together and the way performance measures can be used to compare and improve the system.

1

System overview

All systems have component parts and processes – the farm system for harvesting milk is similar to one that harvests any other commodity, e.g. grain. Usually the aim is to produce a quality product for the market as cheaply as possible, but other factors may need to be considered. In the case of dairy farming, the aims may include improving the productivity of labour and making the day to day operations easier, safer and more pleasant.

Analysing the elements and processes of a system is the first step in achieving these aims.

3 key elements

There are 3 key elements that make up any milk harvesting system – cows, people and facilities. No matter what the system, the cows, people and facilities all interact at milking time. The way the milk harvesting system functions is the result of the interaction of these elements at milking time.

All elements come together at milking time and each is dependent on the other.

Figure 1.1: The three key elements of the milk harvesting system.

Source: National Milk Harvesting Centre.

- The behaviour of cows is directly influenced by their interaction with the facilities and the milkers.
- The milker's work rate is dependent on the cow-flow and the equipment.
- The design of the facilities determines how the cows and milkers interact with the equipment.

  Each of the elements has specific characteristics that need to be taken into consideration when designing the whole milk harvesting system.
- Efficient dairies have facilities designed for the cows and the people who use them.
- Cow and operator comfort is equally important.
- If milkers take care to interact with cows in a positive manner, the cows respond by being less fearful of people and equipment at milking.
- These systems are usually stress-free work places, and are safer for both the milkers and the cows.

A change made to any element of the milk harvesting system will also have an impact on the other elements.

4 main processes

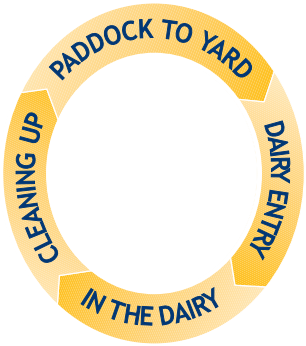

Figure 1.2: The four milk harvesting processes.
Source: National Milk Harvesting Centre.

The milk harvesting system has 4 main processes from start to finish. Each of these processes is different and requires different skills and infrastructure. These are explained in detail in the CowTime Guidelines section called **Improving Processes**.

Integrated & efficient systems

Figure 1.3: The milk harvesting system – elements and processes are integrated.
Source: National Milk Harvesting Centre.

It is important to note that the three elements of milk harvesting need to be considered within each of these processes when looking to make changes. It is natural to concentrate on the physical structures of the facilities, but sometimes the biggest improvements to a milk harvesting system can come about by concentrating on the cows and the people.

An efficient milk harvesting system has the cows, people and facilities working in balance within each of the four milk harvesting processes. Efficiency is all about optimising the use of the equipment and labour resources that are available – to get the best from the milk harvesting system.

A smoothly running milk harvesting system provides many benefits for the cows and people who are involved. These include:

- A more productive process, that is less costly to operate and maintain.
- A better working environment for the people.
- Calm cows through improvements in cow welfare.

The efficiency of the dairy operation can be evaluated and is particularly important to understand when designing a new dairy facility.

Performance measures can be used to assess milk harvesting performance. However, these must be interpreted in the light of the values of the owner of the system. For example, a farmer may wish to spend more time preparing cows for milking to protect milk quality, and so may be happier with a lower result for the cows/operator/hour performance measure.

An efficient milk harvesting system only occurs when the cows, people and facilities within each of the milking processes are working well together – and each of the processes are well integrated with one another.

Measuring performance, p18; Chapter 8 – Planning a new dairy.

Individual systems

Everyone's system has the same elements and processes, but each system is unique and individual to the farm. What suits one person will not suit another. What is important to one person will not necessarily be important to others.

Each milk harvesting system is influenced by the values of the people who designed or use it. For example:

- Some farmers hate milking – they may value lots of automation or employ labour when upgrading.
- Cows are very important to some farmers – their attention to cow comfort and health issues will not be compromised for speed.
- Some farmers like to keep costs to a minimum – they will be attracted to system choices that provide the most for the least dollars.
- Some farmers keenly analyse their marginal returns – they don't mind spending if they get a reasonable return on their investment.

These different values affect the individual milk harvesting targets that a farmer may set. These values will also affect the way a person goes about planning a new dairy and the way they prefer to measure the current performance of the milk harvesting system.

The CowTime team visited many farms during milking time as they collected data around the country. One of the most striking things they noticed was the variety of milking routines on the various farms. The farmers' different values were the key to many of the reasons they did things the way they did.

One thing is certain – there is no such thing as the 'right' routine or the 'best' set up. Making milking easier, safer, more pleasant or a more attractive occupation is about getting the best from the cows, people and facilities through good organisation, good skills, appropriate facilities and serviceable equipment.

Measuring milk harvesting performance

Measuring performance is all about numbers – finding out the number of cows or litres the system handles. These numbers can then be used to evaluate the performance of any aspect of the milk harvesting system. Measuring performance is the first step on the road to improving productivity.

It is possible to describe the performance of the milk harvesting system by looking carefully at the time when the cows are collected for milking, during milking time and during the cleaning time. It is also possible to describe the overall performance of the milk harvesting system by looking at the system over the total milk harvesting time.

Figure 1.4: Milk harvesting time.
Source: National Milk Harvesting Centre.

- Many factors need to be taken into account when interpreting performance measures.
- Farms are complex systems and have individual aspects that are often poorly described by performance measures.
- Care is required when using these measures – they are a 'tool' rather than a 'rule'.

While important, milk harvesting is only one component of the farm system and must be considered in light of the whole farm operation and other business or life stage goals.

Measuring performance

The various measures of performance are simply ways of looking at what is being achieved by the milk harvesting system.

It is not a matter of one measure being better than another. Each provides a different way of looking at the milk harvesting system. It is like looking at the same thing from two different positions. A person's understanding is richer and enhanced by having different perspectives.

Table 1.1: Performance measures used in milk harvesting.

Performance measure	Use this measure to answer questions like ...
Cows/operator/hour Cups on cups off	How many cows can 1 milker handle per hour? How many cows does each milker put through in an hour?
Litres/operator/hour Cups on cups off	How many litres does each milker put in the vat?
Kilometres/hour	How fast do the cows get to the dairy?
Minutes	How long does it take the milkers to clean the machines? How long is being spent cleaning the yards?
Clusters/operator	How many clusters can a single milker handle in a particular work environment?
Cows/cluster/hour	How many cows can each cluster milk in an hour?
Litres/operator/hour (Total Milk Harvesting Time)	How well is my milk harvesting system working overall? How many litres does each milker put into the vat per hour when all the time taken from getting the cows to the dairy through to the cleaning up is considered?

Source: National Milk Harvesting Centre.

These performance measures describe different aspects of the time spent in milk harvesting (see Figure 1.5).

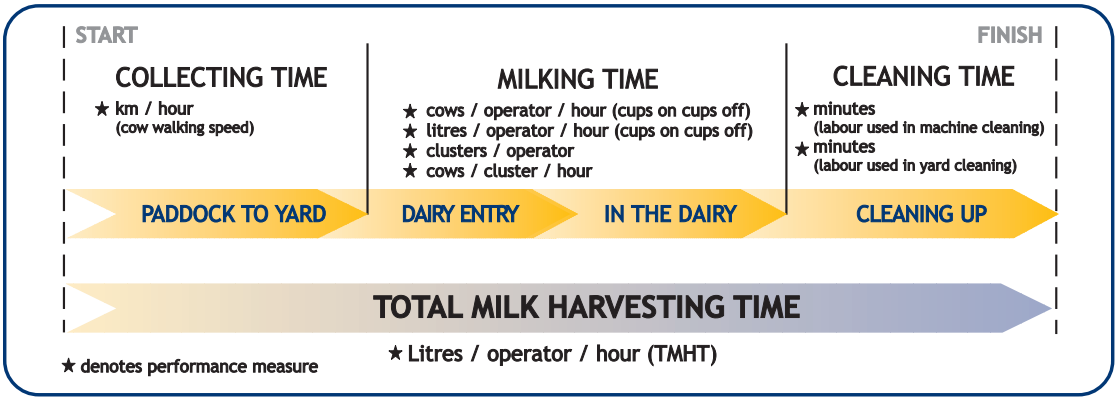

Figure 1.5: Performance measures of milk harvesting time.

Source: National Milk Harvesting Centre.

Chapter 8 – Planning a new dairy, Chapter 10 – Doing the sums.

Performance measures

CowTime is primarily concerned with measuring performance in terms of the physical outputs achieved by the system. Financial aspects are covered briefly in Chapter 10 and equipment utilisation issues are covered in Chapter 8. Chapter 7 contains industry performance graphs on each of the performance measures.

It is common for farmers to measure their performance in terms of cows per hour.

- This is the number of cows milked in an hour, based on the start of milking to the end of milking – 'cups on' to 'cups off'.
- This is usually expressed as cows per hour (cows/hour).

This simple measure has too many limitations to be useful.

- The number of clusters has a significant impact on the number of cows that can be milked in a dairy.
- Larger dairies (the ones with many clusters) will always come out on top when using this type of measure.

Cows per hour is not an effective measure of performance – bigger dairies will always 'look' more productive if this simplistic measure is used.

One solution to these limitations is to correct for the difference in dairy size by comparing the systems on the basis of what is produced by a single labour unit used at milking.

Cows/operator/hour (cups on cups off)

If trying to measure the performance of the system at milking time, it may be more appropriate to focus on the number of cows a milker can milk in an hour.

- This balances out the effect of dairy size.
- It enables a clear comparison between different dairies based on the labour units involved.
- This is a good measure of milking time labour productivity.

Cows/operator/hour factors in the labour used in putting the cows through the dairy.

Litres/operator/hour (cups on cups off)

The performance measure cows/operator/hour has one main limitation – it focuses on cows and not milk! There is a significant move to focus farm managers' attention onto the litres of milk that are harvested.

- An appropriate measure is based on litres of milk harvested by each milker per hour at milking time.
- This removes the size differences and focuses on the productivity of the labour used in the dairy.
- From a labour productivity point of view, it is better to milk fewer, higher producing cows than lots of low-producing cows.
- This is perhaps the best measure of milking time labour productivity.

Farmers are not paid for the number of cows milked per hour, but for the litres of good-quality milk that are loaded into the tanker.

Km/hour

This measurement of cow walking speed is used to examine the movement of cows along the laneway as they come to the dairy for milking.

- The collecting time taken to bring the cows from paddock to yard can impact significantly on the labour required for milking and so is important to consider.

Chapter 3 – Paddock to yard.

Minutes

This measurement is used to gauge the labour time spent on the machine cleaning and the yard cleaning processes of milk harvesting. The total labour time used on these tasks is often ignored as a productivity measure, but many farms spend a significant proportion of their milk harvesting time completing these tasks.

There are two performance measures in the cleaning time using minutes:

- minutes of labour time used in machine cleaning; and
- minutes of labour time used in yard cleaning.

When looking at minutes of labour time, it is important to consider the total time taken by all labour units to complete milk harvesting tasks, rather than the overall time allocated in the day.

Chapter 6 – Cleaning up.

Clusters/operator

This measurement is often used inappropriately to compare the efficiency of different systems in terms of how many clusters the milkers can handle at milking time.

- Although it is useful for individuals to evaluate their own work practices in their own dairy, it is not a good way to compare different systems.
- The efficiency of the dairy is determined by a complex set of factors, including the milker's work routine time and the unit time of the clusters.
- Expectations of performance based on this measurement need to be in the context of the whole dairy environment.

Chapter 8 – Planning a new dairy.

Cows/cluster/hour

This is a good measure to use to evaluate equipment performance, as it examines how many cows are milked by an individual cluster in each hour of milking time – the cluster throughput.

- This performance measure is determined by the cluster unit time and is greatly influenced by the cow's milk yield and the type of dairy.

Chapter 8 – Planning a new dairy.

Milk harvesting performance

When measuring the overall performance of the system, it is important to consider all the processes over the total milk harvesting time. The total milk harvesting time is from when the cows leave the paddock on their way to the dairy until after the clean up.

Litres/operator/hour (TMHT)

Perhaps the best way to measure milk harvesting performance in terms of labour productivity is by using the performance measure 'litres/operator/hour (Total Milk Harvesting Time)'.

- This performance measure includes the labour required for all milking processes – paddock to yard, dairy entry, in the dairy and the cleaning up.
- Different sized dairies and herds, with different labour requirements, can be compared on the same basis.

Labour is a key cost of milk harvesting and the total milk harvesting labour requirements need to be considered when comparing different milk harvesting systems.

Industry performance graphs, p132.

Targets in milk harvesting

Some people find it useful to compare measurements obtained from their own system with the results of others. Other people are keen to set their own targets to strive towards.

CowTime provides industry performance graphs in Chapter 7. Performance targets used by CowTime are presented in Table 1.2. These targets are based on performance that has been monitored on Australian farms.

Table 1.2: Milk harvesting performance targets.

Measuring performance in terms of ...	**Milk harvesting performance targets**
Cows/operator/hour (cups on cups off)	Herringbone 160+ cows Rotary 230+ cows
Litres/operator/hour (cups on cups off)	Herringbone 2000+ litres Rotary 2500+ litres
Km/hour	2-3 km/hour
Minutes of labour (machine cleaning)	Under 10 minutes
Minutes of labour (yard cleaning)	Under 10 minutes
Clusters/operator	General targets are not used Work through own figures to set farm-specific targets[1]
Cows/cluster/hour	General targets are not used Work through own figures to set farm-specific targets[2]
Litres/operator/hour (Total Milk Harvesting Time)	**Herringbone 1200+ litres Rotary 1500+ litres**

Source: National Milk Harvesting Centre.

[1] Sizing a herringbone, p189. [2] Unit time, p183.


Industry performance graphs, p132.

Performance measures need to be interpreted carefully. For example, Jersey cows will tend to have higher results than average in the 'cow' related performance measures, but lower results than average in the 'litres' related performance measures.

Rounding up ...

- All processes – paddock to yard, dairy entry, in the dairy and cleaning up – must be well-integrated for an efficient milk harvesting system.
- Efficiency is all about optimising the use of the labour and equipment resources that are available.
- Performance measures describe a system's outputs and are generally used for benchmarking or comparative purposes.
- There are many ways to measure performance with the litres/operator/hour (TMHT) being the most appropriate in terms of overall milk harvesting labour productivity.