

COWS, PEOPLE, FACILITIES

An efficient and productive milk harvesting system is all about getting the cows, people and facilities to work together. Each element of the system has an effect on the other elements. If one element is poorly handled or deficient in some way, the whole system suffers.

The outcome of the interaction between cows, people and farm facilities should be the efficient and profitable production of quality milk. An understanding of the important features of each element is the first step in making successful changes to the milk harvesting system. Benefits include:

- Better choices – an understanding of the basic principles helps sort out priorities.
- Improvements in cow behaviour – effective stockhandling can improve cow-flow and milk yield, and reduce injuries.
- Greater job satisfaction – good stockhandling skills and a pleasant working environment helps reduce stress for all those milking.
- Reduced costs – keeping milking staff and designing facilities correctly the first time has a positive impact on the bottom line.

This chapter contains ideas to consider on the following key areas:

- **Cow basics** p26
Vision, hearing, smell, flight zones, social behaviours, cow comfort, learning, fear in cows, effects of fear.
- **Stockhandling** p32
Positive and negative handling, positive cow/people relations, changing attitudes and behaviour, behaviours that provoke fear, reducing fear of people.
- **Facilities** p36
Cow area design principles, improving cow-flow, OH&S, risk assessment, control measures, personal protective equipment, worker comfort.

This chapter contains information on the nature of cows and their behaviour, the importance of stockhandling and the general principles of good design.

Cow basics

Cows, like people, are constantly recognising and responding to stimuli from their surroundings. Understanding how cows interpret and react to stimuli provides insights into good handling practices. This information is valuable when designing facilities to suit their needs.

Cows gain information about their surroundings using their senses. They are social animals and feel physically comfortable when certain basic needs are met.

Vision

Cattle have evolved with wide-angle (almost 360°) panoramic vision. Their vision has dominance over hearing.

- When moving animals forward, stockhandlers should position themselves about 45-60° from directly behind the animal, on the edge of its visual field.
- As grazing animals, cows see depth reasonably well, but they may need to stop to lower their heads to judge the depth of steps or gutters. This may explain why they balk at shadows on the ground or gutters.
- Cattle have a strong tendency to move from dimly lit areas to more brightly lit areas, but will not approach very bright light.
- Shadows and sparkling reflections will cause baulking. Races, particularly elevated races, should not directly face the sun.

Hearing

Cattle are very sensitive to high-frequency sounds and have a wider range of hearing than humans.

- Cows are sensitive to 23 Hz and can hear up to 35,000 Hz – humans can hear a range of 64 Hz to 23,000 Hz.
- Cattle may have difficulty locating sound and will use their sight to assist.

Research has shown that loud noise disturbs cows, but people yelling or whistling is more stressful than the sound of clanging gates.

Smell

Cows are sensitive to certain smells.

- Cattle will avoid places containing urine from stressed animals.
- Handling difficulties can create future stockhandling challenges, as subsequent cattle will be reluctant to enter the same location.

Flight zones

The distance at which the animal shows avoidance to humans is called the flight zone.

- Entering the flight zone from behind causes the animal to move forward.
- Entering from the front causes the cow to back away.
- An animal's flight distance will vary depending on how calm it is. Commonly, the flight distance of cows in commercial dairy herds ranges from 3 m to 5 m.
- States of arousal, caused by novelty, speed of approach or prolonged eye contact by the handler, can increase the flight distance.

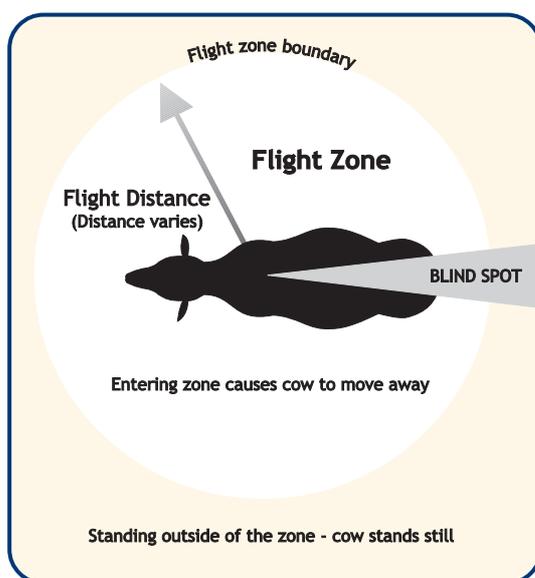


Figure 2.1: Typical flight zone of cattle.

Source: Based on Temple Grandin www.grandin.com/behaviour/principles/flight.zone.htm.

Social behaviours

As herd animals, cows exhibit and respond to social behaviour. Several aspects of cows' social behaviour affect their interpretation and reaction to stimuli.

- Herding, in which social spacing and orientation are maintained, is a characteristic of cow behaviour.
- Dominance (pecking order) is important to cows and each herd will have its own social structure, based on levels of dominance within the herd.
- Crowding breaks down this social structure – cows will attempt to re-establish their social space once the crowding constraint is removed.
- Negative or aggressive interactions are common as herd members re-establish their social space.

Being herd animals, cows like to be with others.

- Isolation from the herd will increase fear in the individual.
- If one animal needs to be isolated from the group, it may be preferable to move it within a small group to a location where the animal can easily be drafted from the rest.



Cows demonstrate 'following' behaviour – they follow their herd mates in activities such as walking, running, feeding and lying down. This motivation to follow others and to maintain visual contact with herd mates can be utilised when moving cattle.

Cow comfort

Understanding how to maintain cow comfort should result in improved cow behaviour.

Like all mammals, cows are most comfortable when their body does not have to work hard to regulate their core body temperature.

- Cows find it difficult to cope with hot, humid climates because their rumen digestion naturally creates heat.
- Cows require protection from excessively hot or cold environments.

Cows are highly motivated by good-quality feed.

- Providing feed in troughs during milking, while potentially providing an incentive or reward to enter the dairy, may result in fighting between neighbouring cows.
- Stall gates or individual feed bins will reduce negative interactions.

Cows tend to stand more quietly if the front of their body is slightly higher than the rear. This may be because the contents of the rumen are not thrust forward to press upon the cow's diaphragm, so breathing is easier. A slight upward slope (towards the dairy) will encourage cows to face that way.

Learning

Cows have good short-term and long-term memories, and will readily learn a variety of tasks. This characteristic is one reason why cattle respond well to consistent handling routines.

- Strong physical or emotional states (good food, fear, pain) are likely to result in strong memories.
- Cattle are also quick to learn to associate people or locations with rewarding or negative experiences.
- While an unfamiliar feature of the dairy may initially provoke moderate fear, heifers or new cows learn to become familiar with the feature over time.
- If things are constantly changing, a cow is not able to learn to become familiar with moderately fearful features. This heightens the cow's sensitivity to fearful experiences and can make the cow overly fearful of people, or a particular location or physical structure.

Fear in cows

Fear is a response to a real or perceived threat and serves to protect an animal from danger. Cows are prone to become fearful for a number of different reasons.

Cows are prey animals and, like all prey animals, they are sensitive to possible dangers in their environment.

- Cows can interpret some relatively common situations as threats – examples include a fear of heights, sudden movements, sudden noises, threatening or aggressive actions, prolonged eye contact, and large or towering objects.
- These evolutionary threats can be minimised through good dairy design and thoughtful stockhandling.

Cows are generally afraid of sudden changes to facilities or routines.

- It is important to keep features such as lighting, floor surfaces or levels, and fence or wall types as consistent as possible.
- If animals do become fearful in new situations, try to allow them some time to familiarise themselves with the environment before introducing further changes or other stressful procedures.

Fear is a powerful emotional state and bad past experiences can impact on how cows react to certain situations.

- Cows can learn to fear humans if handled badly. They can also associate this bad handling with the place where it occurred.
- Use the cows' natural behavioural characteristics to help with handling and other interactions, and to minimise learned fear responses.



Cows are afraid of sudden noises and changes in their routine or normal environment. Past experiences can also teach them to be fearful.

Effects of fear

The effects of fear can have a significant impact on the efficiency and productivity of the milk harvesting system. The effects of fear can include:

- handling becomes harder, more time consuming and more dangerous;
- milk yield declines;
- fear upsets milk let-down;
- cows become more prone to injuries; and
- welfare is compromised.

Fear & stockhandling

Animals are generally wary of entering an unfamiliar, inconsistent or unpredictable location. If they are fearful of both the environment and the handler, handling becomes more difficult, requiring more effort and time.

- Fearful cows are the most difficult to handle, especially in a new or unpredictable situation.
- The time taken to move cows in and out of the dairy is likely to be increased by rising levels of fear.



High levels of fear of humans or their environment makes cows more difficult to handle.

Fear & milk yield

Fear creates stress. Stress causes hormonal changes that affect the metabolism of cows. Theory suggests that cows under stress have decreased milk yield and this has been demonstrated under experimental conditions.

A series of studies in the Australian dairy industry by the Animal Welfare Centre has shown that high levels of fear of humans are associated with lower milk yield. In one of these studies, fear of humans accounted for about 20% of the variation in milk yield between farms, demonstrating that fear of humans may be a major factor limiting the productivity of commercial cows. Handling studies have also shown that milk yield is depressed in situations where cows are fearful of humans as a consequence of previous handling.

Fear & let-down

Cows have a 'fight or flight' response to fear. This is due to the release of the adrenaline hormone into the blood stream.

- Adrenaline primes the body for action – to fight or run – by increasing the heart rate and blood flow to the muscles.
- Adrenaline blocks the action of the 'let-down' hormone, oxytocin. This effect can last up to 30 minutes from a single release of adrenaline.
- Slow milking and incomplete milking out are features of interrupted milk let-down.



Quick Note 1.1 – Cow behaviour and let-down.

Fear & injury

There is also an increased risk of injuries and illness in fearful cows showing marked avoidance to humans.

- Stress may lead to immunosuppression and increase risks to the animal's health.
- Handling studies indicate increased lameness in fearful heifers.
- Scared cows are unpredictable and can cause injury to stockhandlers.

Fear compromises welfare

Animal welfare is an important issue for dairy farmers.

- Community expectations and attitudes increasingly require best practice in this area.
- Stress responses in fearful animals is ethically unacceptable.
- International markets are taking an interest in cow welfare as a trade issue.

Improved cow-flow and milk yield coupled with trade and market considerations, are measurable benefits flowing from 'cow friendly' dairy design and stockhandling practices.



Fearful animals are more prone to injury. Stress-free cows are likely to have better let-down and should produce more milk.



Quick Note 1.2 – Cow handling.

Stockhandling

Good stockhandlers manage cows in a quiet, positive manner to maintain excellent cow-flow and low levels of fear. This results in good let-down and increased milk yields.

Positive & negative handling

It is important to be aware of the huge impact that the behaviour of those handling stock has on cow behaviour. A stockhandler's behaviour can be categorised as either positive or negative.

- Positive behaviours include interactions, such as stroking, rubbing, resting a hand on the cow's back or flank, slow and deliberate movement, and talking.
- Negative behaviours include hits, slaps, tail twists, quick or sudden movements, and shouting.

The effects of these handling behaviours on the fear levels of cows have been studied in the Australian dairy industry. In these studies, the behaviour of farmers towards cows was recorded as either negative or positive, based on the descriptions explained above.

- Farmers that used lots of negative interactions had more fearful cows, i.e. their cows had learned to fear them.
- Less obvious negative behaviours, such as moderate slaps and pushes, also caused high levels of fear of people.
- The fear response was reduced when farmers increased the use of positive behaviours and used negative behaviours only when necessary.
- These findings are important as they indicate that cows are sensitive to even moderately negative behaviour from people. Similar findings have been found in other handling studies, both in Australia and overseas.



Interactions such as moderate slaps and pushes may appear harmless to the handler, but research has shown that frequent use of these routine behaviours will result in cows becoming highly fearful of people.

Positive cow/people relations

The relationship between the handler and the dairy cow is an important one. When the relationship is poor and fear is elicited in the cow, the animal may suffer from stress, be more prone to accidents and will ultimately produce less milk.

The human-animal interactions in the dairy industry can be summarised in the model presented in Figure 2.2.

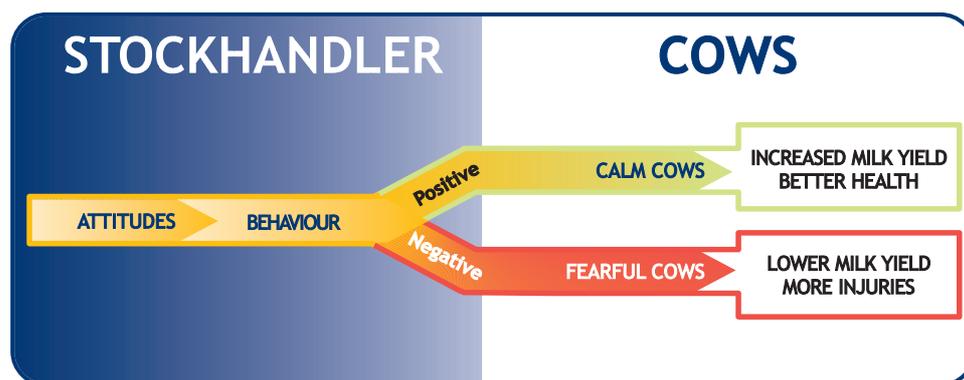


Figure 2.2: The effect of a stockhandler's attitudes and behaviour on cows.

Source: National Milk Harvesting Centre.



Changing attitudes will change the stockhandler's behaviour. In turn, this will reduce the cows' fear and thus improves the behaviour, productivity and welfare of cows.



Quick Note 1.2 – Cow handling.

Changing attitudes & behaviour

One of the keys to improving the handling, productivity and welfare of cows is an understanding of human behaviour. Strategies must be adopted to ensure people consistently behave in a manner that minimises fear responses in cows.

Australian studies show that there is a strong association between the attitude and the behaviour of the stockperson.

- In general, those with a good attitude towards handling cows exhibited better behaviour towards cows.
- For example, the belief that considerable verbal and physical force was required to move cows and that cows did not require petting (e.g. talking and stroking) correlated with a high use of negative behaviour by the stockperson when handling cows.

It is important to remember that both the cow and the stockhandler are affected by one another.

- The behaviour of the cow affects their ease of handling and influences stockhandler attitudes to handling.
- If the stockhandler's attitude and behaviour are poor, the consequent difficulties in handling cows will reinforce this negative attitude and, in turn, influence the subsequent behaviour of the stockhandler.

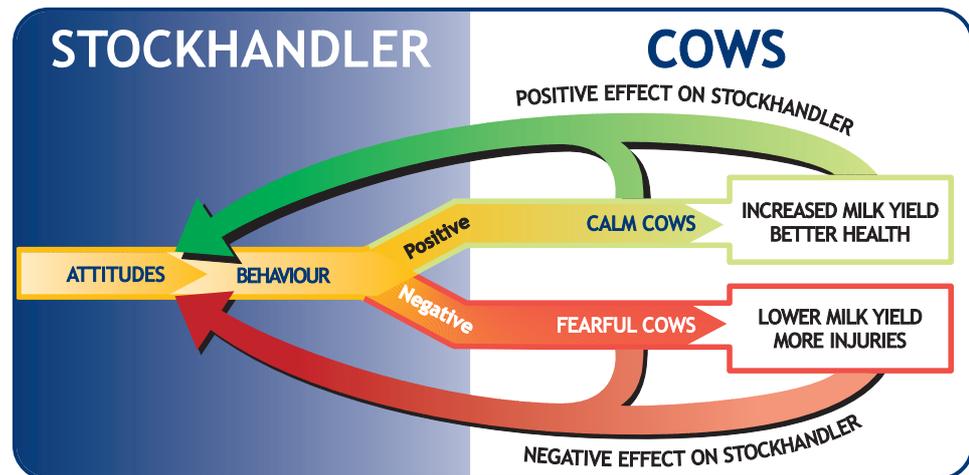


Figure 2.3: Positive attitudes and behaviour towards cows produces positive results for cows and those handling them.

Source: National Milk Harvesting Centre.

Stockhandling habits, as with all habits, can be particularly difficult to change.

- Practical tips and constant reinforcement are necessary to establish new stockhandling habits.
- Developing strategies to deal with stressful situations is critical.
- Stockhandling behaviour is likely to revert to the original habits when under pressure.

A training program called CowCare has recently been developed and trialed in the Australian dairy industry. An experiment involving 94 farms was conducted to examine the effects of this program on changing the attitudes and behaviours of dairy farmers. A 5% increase in milk yield occurred following participation in the training program. Similar treatment effects were observed on both milk protein and milk fat. Also, 83% of farmers reported improvements in their behaviour towards cows and 77% reported improvement in the behaviour of their cows.



Training can systematically target the attitudes and behaviour of the stockperson towards cows.

Behaviours that provoke fear

As was shown in previous sections, there are a number of factors that provoke fear in cows. The behaviour of the handlers should seek to minimise these fear responses.

- Stimuli such as hits, slaps and tail twists obviously provoke fear, probably induced by pain. These stimuli also provoke fear even when they are not forceful.
- Sudden or unusual movements will cause a fearful response. Avoid shouting or behaving in a threatening manner.
- Entering into the flight zone will provoke fear, especially if the cow cannot move away.
- The degree of fear a cow experiences is intensified in an unfamiliar environment or circumstance.



Frequent low-grade negative behaviours cause high levels of fear in cows, but many handlers consider these 'minor' interactions.

Reducing fear of people

Adopting strategies to behave positively towards cows is the key to reducing fear of humans in cows. This can be achieved by developing good handling practices and routines. Some examples include:

- Keep the milking routine calm and consistent.
- Allow time for the cow to learn a change in routine or milking environment.
- Use positive interactions such as a stroke, rub or gentle contact with the hand resting on the animal's back or flank.
- Scratch the cow or give a feed as a reward after a bad experience.
- Use slow and deliberate movement and talking.
- Reduce excessive noise, such as banging gates and shouting.
- Avoid staring at a cow directly for long periods.
- Move cows by working at the edge of their flight zone.
- Avoid painful procedures in the dairy where possible.
- Move cattle as a group, rather than individually.
- Use rewards to mask or minimise unpleasant experiences, such as restraint or vaccination.
- Rewards could include scratching on the head and neck (places where cattle often groom themselves or each other), providing brushes to allow them to rub against or a palatable feed such as barley.

Studies have shown that sheep can be trained with food rewards to move through a handling system. It is likely that cows would have similar abilities.

Facilities

The design of the dairy should take into consideration the comfort of the cows and the milkers.

Cow area – design principles

Well-designed milk harvesting facilities take into account principles of cow anatomy and behaviour. When designing cow areas, the following basic principles should be kept in mind:

- Milking facilities that are designed around the needs of the cows and their handlers provide a safer and more pleasant place for milking to occur.
- Well-designed facilities can make a big difference to the ease of handling cattle, by complimenting the natural 'following' behaviour of cows.
- Cow-flow is enhanced by clear entrances and exits which allow cows to see and follow others.
- Good design can partially compensate for poor stockhandling practices, by removing the need for handlers to interact with cows frequently or on an individual basis. This may not suit all styles of management, but is a big advantage in large enterprises with multiple employees.

Studies show that although cows do not like unfamiliar or new situations, they learn and adapt to them. This process can be helped by initially allowing the animals to move through the new environment at their own pace, to minimise any fearful experiences along their route.



Chapter 9 – Design considerations.

Improving cow-flow

Using the knowledge of how a cow perceives the environment, the following list of suggestions can be used to improve cow-flow:

- Provide wide, clear, well-lit pathways for cow movement.
- Cattle will be attracted by the sight of others moving ahead and visual contact with these animals needs to be maintained and not obstructed.
- Curved races (with an inner radius of 3.5-4 m) are most useful in situations in which animals are required to wait in a queue rather than run freely through the race.
- Races with clear, unobstructed views toward the exit or where the animals are meant to move will promote movement.
- The sight of stationary cattle adjacent to a race will slow movement, so screen race walls adjacent to other animals.
- Keep surfaces as consistent as possible. Changes in race construction material or floor type (e.g. slats to concrete) will inhibit cow-flow.

- Paint walls one colour to avoid contrasts.
- Ramps with covered sides will not allow animals to judge the elevation and so improve cow-flow.
- Provide an incentive to move through the dairy, such as food at the other end.

Cow-flow is also enhanced by reducing the number of fear-provoking features. Try to avoid the following:

- Sudden changes in lighting, floor surfaces/textures, floor levels, and fence or wall types.
- Changes at critical points in the route, such as at gates, pen exits, corners, and entrances to the race or laneways.
- Moving and flapping objects along the route.
- Noisy, dusty or uncomfortable environments.
- Solid (or painful) projections or obstructions should be removed from the cows' path.
- Places where painful procedures have occurred.



Quick Note 3.1 – Cow-flow

Occupational health & safety

From the workers' point of view, the design of the working environment can do much to make milking a more pleasant experience. Safety should also be a key concern. Consider the following:

- Milking is a repetitive task. Operator fatigue, a sapping of concentration from the repetition, heavy automated machinery and close proximity to unpredictable animals are a dangerous mix.
- To minimise the risks, each hazard in the milk harvesting system needs to be identified and then classified in terms of priority for action.

Risk assessment

A risk assessment system is commonly used to classify the hazard in terms of its likelihood of happening and the consequence of it occurring. This information is then used to prioritise control measures.

Table 2.1: Hazard priority table.

Likelihood of occurring	Consequences		
	Death or disability	Several days off work	First aid
Very likely	1	2	3
Likely	1	3	4
Unlikely	2	4	5
Very unlikely	3	4	6

Priorities: 1 = extremely important to do something to reduce this hazard as soon as possible. 6 = this hazard may not need immediate attention.

Source: Based on Dept Natural Resources and Environment, Gippsland Region and Holmesglen Institute of TAFE (2001) – OH&S Road Show notes.

Control measures

Control measures vary along a 'hierarchy of control'. Each hazard should be dealt with as far up the hierarchy as is practicable in the circumstance.

Table 2.2: Hierarchy of control.

Highest	Elimination	Completely removing the hazard, fixing faulty equipment, etc
	Substitution	Using different machinery, safer materials or chemicals, etc
	Engineering/isolation	Redesigning or changing equipment, using guards, enclosing machinery, etc
	Administration	Changing work practices to avoid the hazard, training staff, etc
Lowest	Personal Protective Equipment (PPE)	Using PPE in milk harvesting should not be relied on, but should be used as an interim measure while better methods are being put in place

Source: Based on Dept Natural Resources and Environment, Gippsland Region and Holmesglen Institute of TAFE (2001) – OH&S Road Show notes.



The safety of milkers should be of paramount importance. Various State laws are in place to protect worker safety and the appropriate authority in each State should be consulted for further advice.

Personal protective equipment

Basic personal protective equipment is required for many milk harvesting tasks. Common protective equipment includes:

- head protection – sun hat or safety helmet for motorbike;
- skin protection – protection from the sun, elements and chemicals;
- foot protection – steel-capped boots with soft, non-slip soles for concrete wear;
- hearing protection – in the pump room;
- eye protection – around chemicals; and
- body protection – water proofs and coveralls.



A policy relating to personal protective gear for all workers on the farm is good practice.

Worker comfort

Making workers comfortable with their environment will make the task of milking that much easier. It should also make it easier to find and maintain staff who can help with the task.

- Equipment and controls should be within easy reach of the operators' working positions.
- The heights of equipment and the working area should be ergonomically correct.
- Comfort facilities (toilets, wash-up area, showers) should be considered in larger installations.
- Features such as a tea room, wash room, access to a phone, toilets, showers and change rooms greatly enhance the comfort of the staff and should be thought about if planning a new facility.



Psychological stress should be of concern to all farm managers. This is a recognised OH&S risk and is caused by a number of situations – using high-value equipment, working alone, coping with unplanned events, a fast pace of work or poor working environments. Many of these situations are present in dairies. Good design of the facilities and routines can help to minimise this risk.



Rounding up ...

Understanding the characteristics of the cows, people and facilities, and the interactions between them, can be used to achieve a more efficient and pleasant milking environment.

Reducing fear and stress in cows is worth pursuing – easier handling, better production, better cow health and fewer injuries.

Improving cow welfare has big benefits for farms, as well as meeting community expectations.



Further information ...

Farmers who would like to know more about CowCare are advised to contact the Animal Welfare Centre, Victorian Institute of Animal Science, Werribee, Victoria. See **Further Assistance** for contact details.

For more on animal behaviour, see the Temple Grandin website www.grandin.com/behaviour/principles/flight.zone.htm