

Building for the cow



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Future Farming

Building for the cow

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CHAPTER 2

Building for the cow

A comfortable barn for the cows provides the basis for high milk production per cow and for high labor productivity. Superior handling facilities are a critical element of a cow friendly barn.

And comfort for the workers is also important. Because in the end it is the management and therefore the efforts of the workers that determines whether the cows are healthy, productive and happy.

Health = productivity

Comfort ensures that cows are less likely to get sick, and that they recover easier if they do. An uncomfortable cow gives less milk, is more susceptible to illness, has more difficulty getting pregnant and does not survive as long in the herd. And she creates additional work and reduces your enjoyment of work every day. As a livestock farmer and as a business man you do not want to be responsible for sickness and discomfort of animals. Secondly, problems cost time and money. The economic benefit of a barn where cows stay healthy and where workers work efficiently increases as herd size and average production per cow increases. Bigger farms need fewer personnel if the cows are healthy. One sick cow takes about the same amount of labor and attention as forty healthy cows.

Well-being = housing + management

Culling cows in a timely manner is an important consideration in good animal care, along with prevention of illness, timely and effective treatment of sick cows, and euthanasia when the situation calls for it.



The pack barn with a base of straw, sand or compost offers the most comfort for the cow, provided the bedding is dry and the air quality and ventilation is excellent. Hence good management is absolutely essential in this barn as well.



From most perspectives, pasture is an ideal housing situation for the cow, as long as she can find shade on hot days, and can lie dry on rainy days. Good management is also needed in the pasture to ensure healthy feed, good access to water, and prevention of disease and parasitism.



Management question

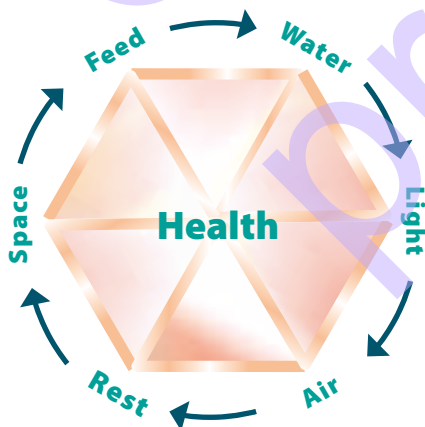
A cow that feels secure will make many trips to feed, water and a resting place. This activity keeps her healthier. How can you ensure that the cow feels secure?



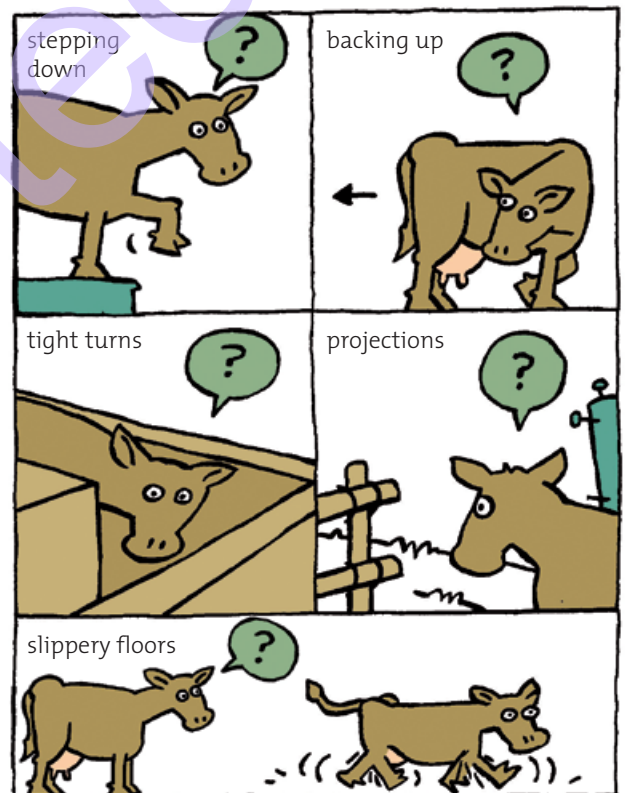
Security results when the cow is healthy, walks without slipping, and has ample space. Security is greater when there is no likelihood of aggressive encounters, injuries, and unexpected events. Feeding management and the way you handle cows also play a role. A cow always feels more secure when she is healthy and doesn't face frightening or dangerous encounters.

From the cow's perspective

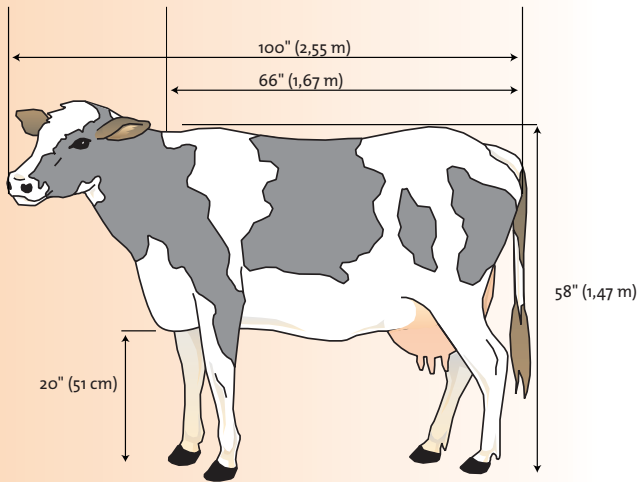
If you ensure the points of the Cow Signals diamond are looked after, you will have a barn where healthy cows stay healthy and sick cows get better.



What cows dislike:



Standing cow: measurements side view



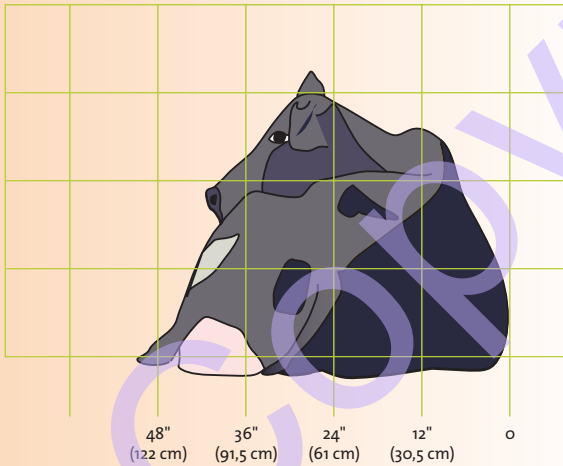
The cow: breeds and breeding



To house and care for cows well, the cows in a group should be as similar in characteristics as possible. That means they should have the same height and length and the same feed requirements. If you design the barn for the smallest cows, the large cows will have big problems. Breeding and selecting smaller cows is a good solution for barns where the measurements are too small for the modern Holstein Friesian cow.

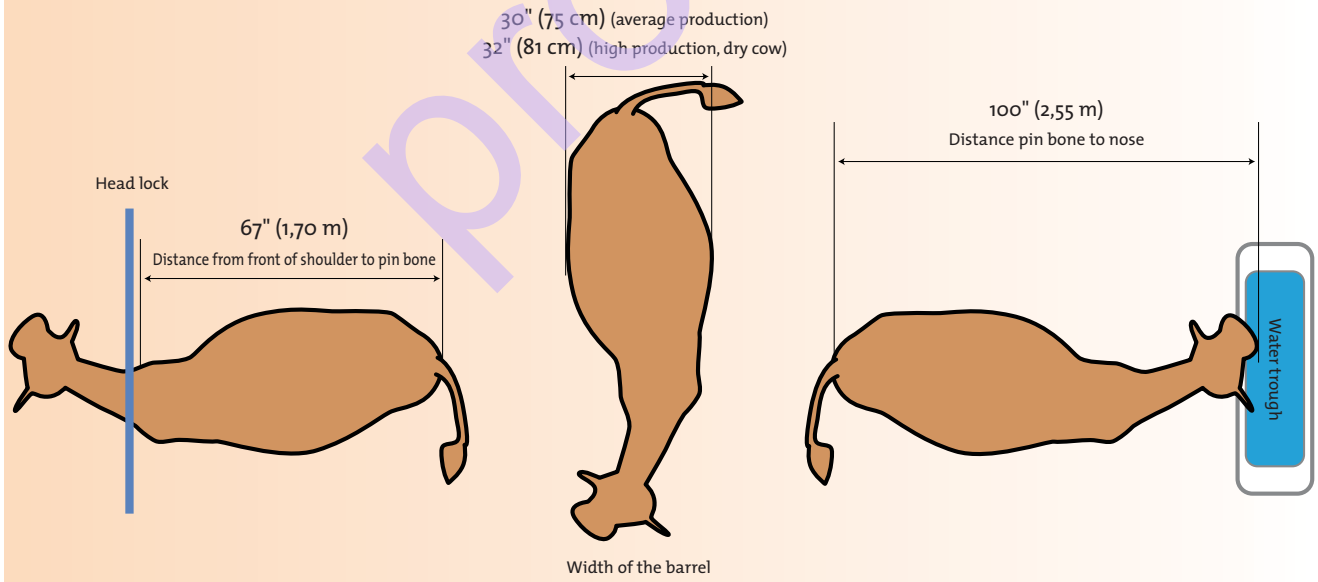
The facility needs to suit the cows and not the other way round. However, certain breeds fit better in certain barns and management systems. This is also probably true for crossbreds.

Lying cow: measurements rear view



These average sizes are for Holstein Friesian cows with a withers height of 58" (1,47 m). There are definite differences between farms. The differences correlate with heifer raising practices, breeding, and production level.

Standing cow: measurements top view



The Cow Signals Diamond

The basic needs of the cow can be summarized with seven key words, which form the corners of the Cow Signals Diamond. These seven basic needs are feed, water, light, air, rest, space, and health. Health is the result of the other six points, and it is also a basic need itself because freedom from infections, injuries and metabolic problems also form a separate and specific concern for the cow.



Every cow can eat palatable feed of the right composition at least 21 hours per day.

Every cow can access and drink palatable water free of contaminants at least 21 hours per day.



The cow can walk to the water trough, the feed manger, and freestalls without fear. She can socialize and exhibit signs of heat without problems.

Space



The cow experiences a light regime with at least 6 hours of darkness. When walking in the barn she encounters no transitions from deep shadow to bright light.

Light



The cow has a dry comfortable place to lie down. This means that housed cows not going to pasture should rest at least 13 hours per day. The cows should not be disturbed or chased by other cows, people or dogs. Fetching and handling are done in a calm and gentle manner with no aggression or risk of pain or injury.

Rest



The cow always breathes fresh clean air. The air in the barn smells the same as outside. In hot weather, air speed and air temperature both help the cow keep her body cool.

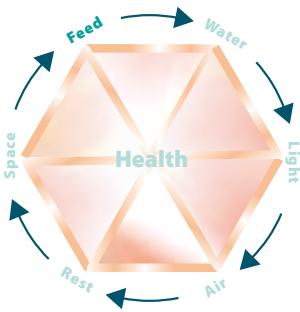
Air

Health

Feed

Water

Feed



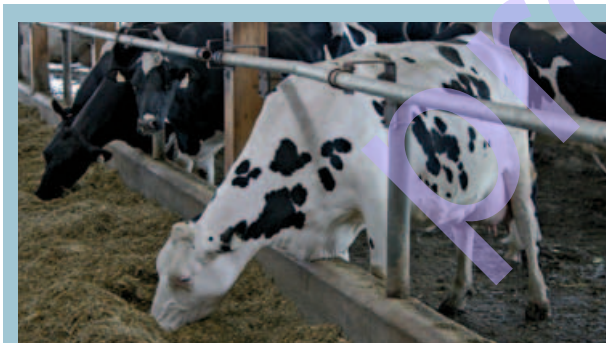
Every cow should have free access to sufficient palatable feed of the right composition for a minimum of 21 hours per day. This means there has to be feed in the manger, and that the cow can get to it without hindrance or disruption. Good feeding management requires that the feed is properly balanced and that feeds are presented to the rumen in an ideal order or mixture. This is most easily achieved when the cow receives all her feed in the same place. When different feeds are fed in different places there are greater risks. All cows in a group should be able to eat at the same time. Every animal should voluntarily consume 10 to 12 meals per day. In these situations the rumen stays nearly full of feed (well buffered) and the meals will be small (limiting acid formation). The cow will eat the greatest amount of feed under these circumstances. All of this minimizes the risk of acidosis and metabolic problems, and maximizes health and production.

Self locks or single head rail

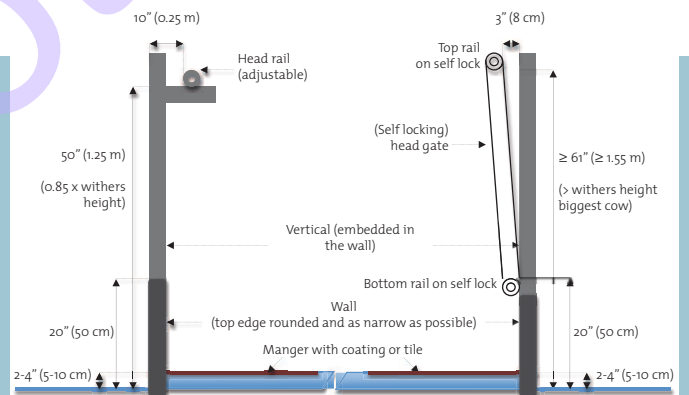
Cows prefer to eat at a single head rail manger, but headlocks have no disadvantages for the cow. If they are used to them, feed intake is comparable. Headlocks work best if there are enough of them so that all the cows can access the manger at the same time. Make sure that heifers, dry cows, fresh cows and separated cows don't suddenly have to switch from a single rail to a headlock. The result will be lower feed intake for a few days. The barrel of an average Holstein cow in the second half of pregnancy is about 32" (80 cm) wide. A self locking head gate with 28" (70 cm) per opening will usually fill completely with lactating cows, but dry cows and heifers in late pregnancy need more room than this.

Space requirements at different life stages

Stage	Head rail height	Min. manger space	Height of wall/bottom rail
Young calf	32" < (0,8 m)		
Older calf	32-39" (0,8-1,0 m)		
Young heifer	39-47" (1,0-1,2 m)		
Older heifer	47-55" (1,2-1,4 m)	18" (45 cm)	
Mature cow	55-59" (1,4-1,5 m)		
- ave. production		28" (70 cm)	20" (50 cm)
- high production		30" (75 cm)	20" (50 cm)
Dry cow			
- ave. production		30" (75 cm)	20" (50 cm)
- high production		32" (80 cm)	20" (50 cm)



The wall keeps the cow back and the head rail prevents the cow from jumping over the wall. Hence the head rail never touch the cow in the normal eating position. A high enough wall, well mixed feed and timely feed push up discourages cows from putting their feet in the manger.

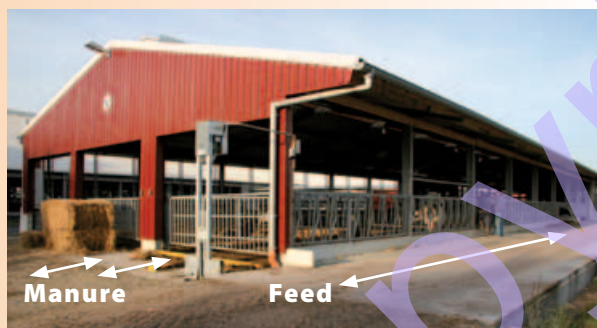


Measurements for a single head rail and self locking head gate for mature cows (withers height 58" (1.47 m)). Make the head rail position adjustable if you can. Make the wall the right height and as narrow as possible and round off the edges.

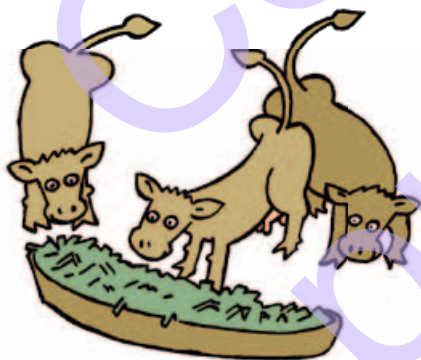
Make all feed handling easy to do



The feed should always be in reach of the cow. Leftovers should be removed and the manger should be completely clean. Finish the manger without seams and make it acid resistant and design it so leftovers can be easily cleaned out with machinery.



Pathways for feed and manure should ideally not cross each other. In this way manure handling is easy and contamination of feed with manure or urine is avoided.



Normal behavior

The herd synchronizes its behavior so that animals usually graze, rest, chew their cud, suckle and move about at the same time. They also drink at the same time to some degree. With full pasture access milking cows will graze eight to twelve hours per day. They chew their cud five to six hours. Maximum intake from grazing is 1 kg dry mat-

Management question

Two or three rows?

Not every cow can eat at the same time in a traditional three row barn area. The dominant cows eat first and use the freestalls closest to the manger as you can see in the picture.



The low ranking and weak cows go to the manger when the dominant cows are gone. They use the freestalls that are far away from the manger and have to walk the farthest. This is stressful for them and means that they have to eat during the midnight hours. Depending on the total layout and the feeding management, these weak and low ranking cows will likely eat too few meals resulting in more metabolic problems. In two row barn areas all cows can eat at the same time. These barns are more restful and are usually better ventilated. The low ranking cows have an easier life here. One person can look after more cows. So build a two row barn.

ter per hour. On a good mixed ration in the barn, the numbers are reversed: five to six hours eating, and eight to ten hours cud chewing. Shorter eating times and less cud chewing both result in a greater risk of rumen upsets.

The herd exhibits the greatest feeding activity and highest intake in the morning. In the afternoon they will graze a little, and in the evening there is another period of high feed intake. At night there are several hours of non-activity.

The notion that a cow in the wild can balance its ration properly is an old wives' tale. She will eat what tastes best, and that is the youngest and lushest growth. She will also consume some older grass, herbs and leaves from trees and bushes.

“Saving 10 minutes of labor every day will save you one and a half weeks of labor each year. With healthy cows and smart work routines you can save even more”

The cows and the workers should be the priorities in barn design. Comfortable cows stay healthy and productive. The same is true for people, when they are able to work in a pleasant and uplifting environment. Barn design is a process in which several perspectives **must** be taken into consideration as the project takes shape. These perspectives include the



needs of the cow, labor efficiency and keeping capital costs in check. It is also **important** to **ensure** the barn design is flexible so it can cope with expansion projects in the future.

A good barn provides the platform for a successful dairy, and no dairy farmer builds often enough to have sufficient experience in designing and building a good facility on their own. You should **seek** the advice of others from a variety of fields of expertise and

experience, because such advice is essential.

The basic design **must** be right, as it is virtually impossible to change at a later stage and it is a determining factor in the **health** and **productivity** of the cows in the barn. But the details must be correct as well. If a gate does not swing the right way, or two people are needed to catch and restrain a cow after all, then you have missed an opportunity to save labor. **Building for the cow** presents you with knowledge, insight and guidelines to help you develop an excellent barn design. Ideas are presented in clear language, with many pictures, sketches and practical tips.

“A barn plan that does not get ripped up at least twice is probably not a good design.”



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