

Asia Dairy Network Website News Number 8

from John Moran, your ADN Coordinator

Welcome to the eighth edition (Jan 2015) of the ADN News. This newsletter discusses the very important topic of types of housing for milking cows, namely tie stalls or free stalls.

Tie stalls v free stalls for milking cows

Types of cow stalls

One of the most controversial aspects when confining cows to a shed is the type of stalls they are provided with. Tie stalls are the most common in Asia, purely for the convenience of the farmer whereas free stalls are the most common with shedded cows in more developed dairy industries, because cow comfort is given a higher priority. Although they are usually associated with very large farms, free stall sheds can be designed for herds of any size.

Tie stalls

With tie stall systems, each cow is restrained in a separate stall. Feed is delivered in a trough in front of the cows. Milking usually takes place individually in the stall, by hand or machine, the latter using either a bucket or a pipeline system. Manure is collected in a gutter behind the stock. With cows tied up all year round, they can suffer from feet problems and become stiff. Hence they should be provided with an easy to clean, soft surface on which to lie down, such as rubber mats or straw. Heat detection demands more attention in tie stalls while a high incidence of trampled teats can become another problem.

As far as the cow is concerned, tie stalls are:

- extremely uncomfortable and often with a hard surface
- painful with risk of inflammation of knees and hocks
- frustrating because lying down with the head constrained is more difficult and the animal cannot lie down with a stretched foreleg or with its head tucked into its front legs
- boring because it restricts any opportunity for social contact or interaction and foraging
- restricts the ability for each cow to self-groom itself, particularly if the tether rope or chain is too short
- reduce lying and resting time which can lead to increased lameness
- can lead to abnormal behaviour such as swinging from side to side and shifting/moving back and forth. Many cows often stand in a dull state if not eating or otherwise stimulated.
- can lead to more frequent occurrences of stereotypical activities, such as bar biting or tongue rolling, which disappear when animals are transferred to loose housing.
- removes the ability for stock to find the best location in the shed for reducing climatic stresses.
- Reduces the quality of the microclimate (higher relative humidity and air ammonia concentration and lower air movement) which can lead to reduced cow comfort and performance.
- All too commonly associated with poor hygiene hence the cow is forced to lie in its own manure, thus creating additional problems with animal health and milking hygiene, such as mastitis.
- Adversely affects reproductive performance, partly because cows cannot move freely and assist in identifying other cows on heat.
- Can lead to higher teat injuries due to physical damage
- Tie stall dimensions can influence cow behaviour, cleanliness and well-being

If farmers persist with tie stalls, they need to pay closer attention to stall dimensions in that:

- shorter stalls are associated with more cows with dirty hind limbs and rotated hind claws

Asia Dairy Network Website News Number 8

from John Moran, your ADN Coordinator

- low tie rails can lead to more cows with neck lesions and broken tails, the latter resulting either from the tail being stepped on or forceful manipulation by the farmer
- short tie ropes or chains can lead to more swollen hocks dirty hind limbs with cows struggling to stand and lie down easily.

In summary, tie stalls are not appropriate for the well-being of milking cows and these conditions can negatively affect milk yields and cow longevity. Tie stalls have been the traditional method of maintaining dairy cows in some European countries for many decades. This has created so much public concern that certain countries, such as Norway, have recently legislated against their future use in preference to loose housing.

Loose housing

With loose housing, cows are not tied up and can walk around freely. Such systems usually have a loafing area and a lying area, with the feeding area separated from the lying area. As the cows are forced to walk frequently, the manure is spread over a large floor area so has to be collected by scraping the dung by hand (or sometimes mechanically) into a manure pit. With adequate water supplies, rapid flushing of large amounts of water can clean alleys, directing effluent into a pond. Milking is usually carried out in a specific milking parlour or area in the shed. The feed trough is separated from the loafing alley by either a feeding rack or wire rope.

Loose housing can be of two types, either with a common lying area with open lounging or with cubicles or free stalls. In open lounging systems, cows can lie down anywhere although they are usually allocated a particular place to rest. The floor can be earthen or cement, generally with bedding material, the base being well drained. In dry climates, earthen floors without bedding can be used so long as the dry manure is frequently removed. The loafing area behind the feed troughs should be cement and at least 3 m wide. Each cow should be allocated at least 9 m² resting area.

Open lounges create their own problems of regularly removing and cleaning the bedding and ensuring all cows will use it in preference to lying on dirty cement walkways, and hence increasing potential mastitis problems.

“Compost barns” are becoming popular in which the fresh manure is removed at least daily and the dried manure is regularly turned over to create a type of compost bedding which remains relatively free of pathogens.

Free stalls

A free stall shed is essentially a feedpad with the addition of specific bedding areas for the stock to lie down. It is generally a covered shed and may include a loafing area for cattle to also be loose housed where they can stand, ruminate or idle. In these sheds each cow is provided with a stall which she may enter and leave at will.

When well designed and managed, free stalls provide the ideal system for intensively managing dairy cows off pasture as each animal is provided with a specific place to rest, their management (feeding, cleaning and relaxing) is potentially optimised and the system can operate efficiently with minimal labour. However they are relatively expensive to construct and can become very unprofitable if stock suffer from poor welfare, animal health and milk quality due to poor feeding and herd management.

Asia Dairy Network Website News Number 8

from John Moran, your ADN Coordinator

Stalls must allow enough room for the largest cow to freely enter the stall, lie down, rest comfortably and easily get to her feet to exit the stall. To do this, stalls should take into account the cow's normal desire to rest facing uphill slightly, change resting positions or stretch while lying down. In addition, cows need to lunge forward to lift their hind quarters first when rising.

Free stalls are then individual cow bedding cubicles where partitions orientate stock for comfort and sanitation, providing each cow with a dry and comfortable place to lie down and rest and ruminate. Free stall sheds should have one stall for each lactating cow. Some farmers provide additional stalls to allow for herd growth and to provide areas for subordinate animals to move away from more aggressive herd mates.

Stalls can be arranged in a single row or in more than one row with a central feeding alley or with feeding alleys along the sidewalls. They can be arranged with cows facing one another (head-to-head) or the other way around (tail-to-tail). With the tail-to-tail arrangement, a central cow alley, 2.2 m wide between the cubicles is needed. If the stalls are head-to-head, two cow alleys behind each row are necessary. Usually one of these alleys is combined with the feed alley. Free stalls are usually laid out in modules with crossovers providing access to the feeding alley. These can provide multiple routes between cubicles and feeding area and so minimise the adverse effects that dominant stock can have on eating behaviour of submissive stock.

Stall dimensions should be based on the largest 25% of the herd to allow for increase in cow size through improved feeding and genetics over time. They should also provide for adequate lying down as well as necessary forward and sideways lunging to stand.

Stalls that are too long or wide allow the animal to move forward, in which case faeces and urine can be deposited within the stall and not in the alley way. To further prevent cows from soiling the cubicles, shoulder and neck rails are needed to force cows backwards when they stand up.

The stall curb separates the stall area from manure in the walk way. It should be high enough to prevent manure from entering the stalls, but low enough to allow cows to enter and exit the stalls easily. Recommended maximum curb heights are 20 cm or, if a mattress or mat is used, 30 cm.

The condition of the bedding is most important to encourage cow use of the stalls. The free stall base and bedding should provide a comfortable conforming surface to cushion the cow as she drops to a resting position or while resting. When cows are forced to lie on hard surfaces, they do not lie down for long, are more unsettled and may develop knee and hock lesions and swelling. All base types need loose bedding material on top for further cushioning, moisture absorption and to reduce friction. If the stall base provides good cushioning, less bedding is needed on top. To be comfortable, the base and bedding layers should cushion the contact areas for hock, knees, hips, brisket and shoulders. It is best to provide cushioning using a thick layer (15 to 20 cm) of bedding on a firm base or by an intermediate layer, cushioning mat or mattress and 3 to 5 cm of bedding. Rubber mats are common and can vary in thickness for <10 mm to >25 mm. The thicker the rubber mat, the greater its degree of flexibility (and presumably comfort) for the cow when she lies down. Mattresses are made by containing a resilient fill material such as crumb rubber, foam or liquid with a woven polyethylene or felt-type geotextile textile material.

Hard rubber mats provide little cushioning, particularly if very thin and may be slippery. Soft rubber mats provide the same of the features as mattresses. Attachments methods, surface texture and compaction of the

Asia Dairy Network Website News Number 8

from John Moran, your ADN Coordinator

mat or mattress material are all issues to consider when selecting and installing mats or mattresses. Bedding is required on top of mattresses and mats to help to maintain clean dry conditions.

In addition to preventing injury and providing comfort for cows, free stall bases should only require minimum maintenance. Materials used for bases vary from stone-free earth fill, available on site, to sand, to concrete. Earth fill requires the most maintenance as cows getting up and down will disturb and hollow out the surface. It is essential to select a material which does not contain stones or other solid particles that can be kicked into walkways, potentially causing injury or discomfort to cows' hooves. Sand is the most favoured bedding as it reduces pressure on the joints, distributes weight over the area and provides unparalleled traction.

Manure and wet bedding should be removed and replaced with dry bedding material each day. Cleaning should be frequent enough to keep the back of the stall clean because this is where the cow's udder and teats are in contact with the bedding when she lies down. Organic bedding should be added every 1-3 days, especially on mattresses and rubber mats, as it is hard to keep bedding on these surfaces.

Dirty cow alleys will result in dirty beds and udders, weakened hoof horn and potential mastitis. Cow and feed alleys should be kept clean by manual scraping, automatic scrapers or flood washing. Although cows can still be in their stalls, it is better to time flood washing during milking when they are away from the shed.

Care should be taken to ensure the stall construction or installation does not interfere with either the natural movements of the rising and reclining cows or the ventilation of the shed. Consider the effects of the stall structure on air flow at cow level. For example, using smaller dimensional steel rather than larger wooden planks when constructing the stalls can result in more open area for better ventilation.

The free stall environment should be made safe for the stock through ensuring they cannot put their heads through gates and fences or get stuck under stall divisions and barriers. There should be no projections, such as broken boards or rails or rough, sharp edges on the concrete. Rails should be strong enough not to break when cows lean on them. Walking surfaces can be grooved to minimise slips and falls and so encourage normal oestrus activity.

The free stall facility should be designed to ensure smooth and quiet cow flow. There should be no sudden changes from light to dark, reflections or drains across the cow alleys. Cows will move more smoothly along curved races, up a slight incline and where they have "sure" footing. Gates could be muffled by attaching rubber strips to prevent excessive noise. Yards must be designed for easy drafting of targeted cows. Stock should only be moved around using "flappers" (leather strips attached to a cane, sometimes known as cattle talkers) rather than using wooden or metal pickets or pipes. Excessive twisting of an animal's tail is unacceptable and electric prods should only be used in emergencies.

Proper selection of stall dimensions, partition, design, stall base type and bedding material are essential in encouraging their daily use but regular management and maintenance are necessary to assure clean, comfortable cows. Check stalls at least three times daily (at milking and feeding), remove manure and wet material and rearrange bedding if necessary, to provide a uniform surface. Adding large amounts of bedding material less frequently can lead to increased bedding waste after filling which can reduce cow comfort and lead to undesirable cow positioning prior to the next bedding application.

Asia Dairy Network Website News Number 8

from John Moran, your ADN Coordinator

As organic bedding can more readily support bacterial contamination than can inorganic material, they should be replaced more frequently, with soiled organic material removed from the rear third of the stall every day. The first step a cow makes into the stall is near the place the udder and teats will come in contact with as she settles down into a resting position. The regular cleaning of walkways can reduce manure tacked into the stall surface. Depending on the frequency of milking and on the movement of the cows, cleaning the walkways up to three times a day can be appropriate.

Monitoring free stall use

The cow is the final inspector of free stalls and if cows are not successfully and regularly using them, or they are dirty and show signs of injury, action is required. There are a variety of ways to monitor the cows' use of free stalls and free stall sheds, such as:

- Do cows appear comfortable when standing or lying? If not, stall dimensions and bedding may need attention.
- Do cows have to push, bang and/or bump against stall components to lie down, get up or change positions?
- Do cows lie backwards in the stalls or in the alleys?
- Do cows stand half in or half out of the stalls? This can occur when the stalls are too short, the neck rail is too far back or when the stalls are otherwise uncomfortable.
- Do cows stand in the stalls in an angular fashion? This indicates the stalls are too wide.
- Are all stalls used equally? If not, there would be a reason why some are not chosen by the cows.
- When cows normally rest (between 10 PM and 4 AM) are more than 20 to 30% of the herd standing in the stalls? If so, stall comfort may be questionable.
- Are cow's udders, tails or hindquarters dirty? This could indicate dirty bedding but may also be due to low fibre diets and very loose manure.
- Are there patches of rubbed off hair or visible injuries to hocks and knees? These are signs that cows rub excessively on stall partitions or neck rails when rising or lying down.
- *Cow comfort and stall standing indices*; this is the % of cows in contact with a stall that are actually lying down or standing up
- *Stall use index*; this is number of cows within a pen that are lying down expressed as % of those not actively feeding
- The softness of the stall bedding can be assessed by the
 - *Wet knee test*, which involves kneeling in the stall for 10 seconds and if the knee is wet, the stall bedding is not dry enough.
 - *Drop knee test*, which involves crouching and then dropping to your knees in the stall. This will quickly tell you how truly comfortable the stalls are.

=