

## THE ANCIENT COW CONTRACT - ERGONOMICS, HEALTH AND WELFARE ISSUES IN DAIRY CATTLE HOUSING

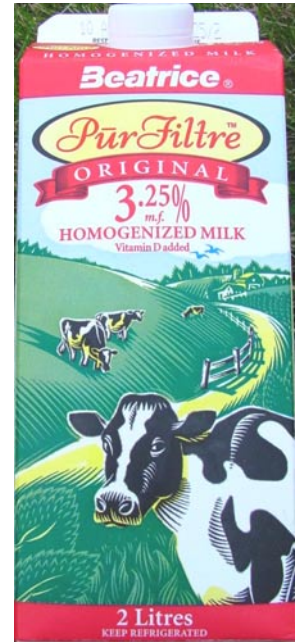
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Milk processors use images to market milk. Some images show cows in lush green pastures, blue water in streams, and clear blue skies – pastoral images that portray the wholesomeness of the environment where cows produce milk - healthy cows, healthy environment, and a healthy food.

Although dairy cattle confined to freestall or tiestall barns may be the norm and the rural scene the exception, scenes of cows inside dairy barns are not the images chosen to market milk. However, when looking for opportunities to enhance market access and international trade, human health and safety, animal health and welfare, residue avoidance, or to decrease antimicrobial resistance, our attention turns to the barn and its husbandry systems.

Rather than chase bugs with drugs, dairy producers are adopting housing and management practices to reduce environmental risk factors and improve cattle health. In this presentation, with the use of 24-hour time-lapse video recordings and colour photographs, I will illustrate several husbandry issues related to dairy cattle health and performance and relate these to the ancient cow contract, safety, fear, and behaviour.



### The Ancient Cow Contract

Dairy farming includes a contract with the cattle - a barter of housing, feeding, safety and comfort in exchange for milk and meat. Dairy cattle cannot audit our performance or write a report about how well we are living up to our end of the deal. Nonetheless, cows show signs of their pleasure or displeasure with their situation: fear, unusual behaviour, injuries, lameness, impaired reproductive performance, metabolic diseases, infectious diseases, or poor milk production.

Savvy cattle care professionals live up to their end of the bargain, auditing their contributions, and sweetening the deal for cattle in their care. Some, however, are unaware that their actions or inaction, their design or construction of a facility, their choice of a husbandry system, or their management within a system, infringes upon the contract. And occasionally, they are simply unaware that they have broken the contract.

As animal care professionals, our time spent on dairy farms provides an opportunity for observation and assessment - an audit of how well we are doing with our end of the *cow contract*. For some working on a dairy farm full-time, cow behaviour may be so common as to appear normal and bias their audit. The astute know this and often ask "How do the cows look to you?" or similar audit-type questions of visitors to their farms. We are learning that common behaviour is not normal behaviour and that common housing may not be best for the cows.

When asked, we must realize that our cameo appearances provide only snapshots in time, an estimate of events or actions that may be occurring during a greater time period. This estimate is often weak because of the short observation times. A more accurate assessment of events is possible with a stillwatch: a close and silent inspection of dairy farm activities.

Close study for 24-hours, or more, provides a better estimation of events influencing cow behaviour, health, comfort or performance - the opportunity for improved diagnosis, and the provision of superior advice. Using time-lapse video recordings, we can conduct an audit of the cow contract with relative ease. Video gives us the opportunity to observe cow behaviour and interpret how barn designs, construction, husbandry systems and practices affect our cows. Video also allows us to critically assess current practices and dogma, increase awareness and knowledge, reject compromises, and enable change.

### Safety

The housing and feeding parts of the contract are usually at the forefront of dairy herd management. Nonetheless, our contract includes responsibility for *safety* - freedom from danger, risk or injury. A careful inspection of our cows for injuries to hocks, stifles and knees, or bumps or bruises over the top line or rib cage will reveal how well we are living up to this part of our contract. Their reluctance to use stalls, to move quickly in or out of the parlor, or their actions at feed bunks or waterers may also alert us to issues of safety.

### Fear or Apprehension

Cows in unsafe facilities exhibit fear - feelings of alarm or disquiet caused by the expectation of danger, pain, or disaster.

The signs of fear or apprehension include abnormal or unexpected behaviours, such as:

1. increased defecation and urination,
2. standing with front feet in the stalls and rear feet in the alleys,
3. increased standing and less lying,
4. increased lying time and less frequent standing and re-positioning,
5. refusal to use stalls and lying in alleys or partially in stalls,
6. the *hesitation waltz* - apprehensive behaviour before lying in stalls,
7. unusual actions when rising or trying to rest in stalls,
8. lapping at water,

9. reaching over walls to drink rather than stand in passageways where waterers are located,
10. unusual and unexpected approaches to eating or drinking,
11. unusual walking actions, or
12. reluctance to cross gutters or enter some areas of a barn.

The intention behaviour, or *hesitation waltz*, can last for several minutes before a cow lies in an uncomfortable stall. This is an extremely long time when compared to the few seconds taken by cows on pasture. Intention time is one of several surrogate measures of stall comfort.

### Learned Behaviour from Sources of Pain

Apprehension may be learned behaviour because of experiencing pain while using the facility. The pain can originate from several sources:

1. needles or injections given in the milk parlor or at lockups at the feed manger,
2. neck rails that are too low or too high or too close to the back of a stall,
3. poorly positioned or designed stall partitions,
4. hard stall surfaces,
5. wide slots in slatted floors,
6. flooring surface - too rough or too smooth,
7. obstacles - alley scrapers, return pulleys in high traffic walkways,
8. automatic gates,
9. electric crowd gates,
10. body contact with parts of the milking parlor,
11. feed bunk barriers, or
12. electric cow trainers.

On some farms, cows that receive treatments or injections while in the parlor show their apprehension about entering by urination or defecation. Injuries sustained in milk parlors make cows apprehensive about entering and thus slow the milking time. Electric cow trainers alter behaviour and keep cows clean. However, we also know that they are a risk factor for silent heat, clinical mastitis, ketosis and culling relative to cows in herds not using cow-trainers. With some stall designs, cows prefer to stand rather than experience the pain associated with lying or rising. When we change the stalls, the cows use them.

### Apprehension from Intrusion on the Comfort Zone

Cows may show apprehension from dominance behaviour or intrusion on their comfort zone of cows. This apprehension can also originate from several sources:

1. lack of an escape route - position of water troughs in narrow alleys, lockups at bunks,
2. depth perception - deep gutters in tie stall barns, dark alleys and entrances, or
3. frightening objects - the same apron or clothes used while milking and while administering painful treatments.

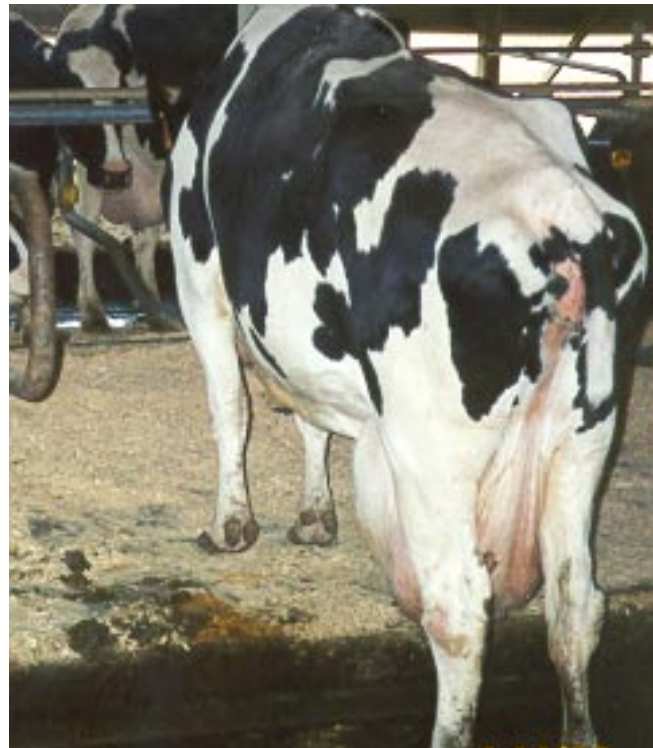
Cows adopt avoidance behaviour rather than risk injury. They move away from drinking or eating when approached by a dominant cow. In some freestall barns, cows step into the end stall and drink over a concrete partition rather than stand facing the water trough. Often, cows just drink from the ends of water troughs placed in 8-foot walkways, leading some producers to conclude that they should have saved money and only bought the ends. For a comparison, look at what store designers do to prevent “refusals to buy” by shoppers. They give us ample “butt space” so we are undisturbed by store traffic. Some dairy producers know this. Their barns have 12-15-foot walkways where the water troughs are located and they place them on the outside of the traffic curve.

### Apprehension from Design or Construction

Apprehension may arise from the design of equipment or facilities that is beyond the ability of the cow to cope comfortably. Examples include:

1. watering devices that are too difficult to operate, too high, with poor flow or access,
2. noise from air operated gates,
3. lack of lighting,
4. slippery floor surfaces, or
5. stall features that contribute to entrapment.

In some barns, we see cows lying partially in the stall and partially in the alley, rising like horses, backing into stalls, choosing the alley to lie, or pawing bedding out of stalls. In tie-stall barns, we see frustrated cows lapping at water or chewing on water bowls because the stabling and bowl position prevent them from getting their head in to drink comfortably. These cows are showing their displeasure with unwanted behaviour. Sometimes, in barns with slippery floors, they protest silently, by not mounting when in estrus.



## Design or Construction Features Leading to Disease

Design or construction features of the facility or characteristics of the husbandry system can lead to diseases in cattle that are not associated with fear. Some are traumatic injuries, sore feet, mastitis, or metabolic diseases.

Sore feet (laminitis, sole ulcers, strawberry foot rot, or heel horn erosion) often have predisposing causes related to housing or environment, such as:

1. shifting of weight to hind feet - steps or sanitary curbs at feed bunks or water troughs, steps into parlors, solid or vertical feeding barriers at mangers, mangers built with bottoms level with the walk alley or stall platform,
2. wet conditions - manure systems that leave wet floors, wet stalls, or ventilation systems with inadequate air flow or air exchange, and
3. hazards - wide slots, slippery floors, or obstacles.

The abnormal behaviour of cows with sore feet may be difficult to interpret. Some sore-footed cows actually spend more time standing when one might expect them to rest to relieve their pain.

Hard lying surfaces on stall platforms and stall characteristics that impede the ability to rise, predispose to abrasions leading to swellings or ulcerations on legs. Also, cows may spend considerably more time lying on hard surfaces without rising to change positions because they find the hard surface painful when they are rising. This behaviour poses another challenge when we are interpreting stall use and lying time.

When considering floor plans or building layouts, we must think about our ability to manage feeding strategies for dry cows and fresh cows. Compromises in the floor plan often lead to metabolic diseases because we cannot group cows separately and implement feeding programs to prevent the diseases. Over time, the initial investment in a housing system for optimal feeding strategies could be less expensive than the veterinary, culling or labour costs associated with the metabolic diseases.

Two of our goals are clean stalls and clean cows. To achieve these goals, we position the neck rail and the brisket board to locate the cow towards the back curb. When the neck rail is too low and too far to the rear of the stall, cows will stand sideways to get more room, and when they lie, they are sideways in the stall. We find that cows defecate on the corners in these stalls. By narrowing the stalls, we make the cows lie straight



so they will defecate off the stall platform. However, now the cows cannot keep their tails on the platform, their tails become dirty, and so do the cows. Rather than amputate tails or build narrower stalls, we should be raising and repositioning the neck rails and change the position and style of brisket board.

### Resting Positions

Dairy cows assume four common resting positions - wide, narrow, short or long. On occasion, they will stretch out on their sides for a short time. In many of our barns, our cows can only assume the short or narrow positions because of hazards associated with brisket boards, supporting pipes, narrow stalls, or manger curbs.

For mature Canadian Holsteins, 46-inch wide stalls, 68-inch long platforms, and 8-inch high brisket boards in freestall barns do not allow them to rest in their normal positions. Similarly, in tiestall barns, short platforms, narrow stalls, and high manger curbs are restrictive.

### Stabling Choices

This past year, several Ontario dairy producers chose significantly different stabling for their new freestall barns – stabling that allows their cows to assume the common resting positions. Now, others are modifying their existing stalls to gain the benefits of the design.

In these freestall barns, they installed the neck rail at 48-50 inches above the mattress and 66 inches on the horizontal from the rear curb. In addition, they used a low plastic *polypillow* rather than a brisket board and placed it 70 inches from the rear curb. They placed the partitions on 48-inch centres. The partitions and their supporting posts are designed with no obstructions in front of the cow. The changes allow the cows to stand straight in the stall, to lie straight, and to have their tails rest on the platform while lying. They chose stalls that favor cow comfort and as a trade off, they may spend more time in stall maintenance.



For our newest tiestall barns, the owners installed the single tie rail 48 inches above the mattress and 8 inches forward of the manger curb. One owner has 12 stalls for his biggest cows with the tie rail 50 inches above the mattress and 10 inches forward of the manger curb. Stall widths and platform lengths vary from 48 inches wide and 68 inches long for first lactation heifers to 60 inches wide and 74 inches long for the largest cows, and 54 and 72 for most cows. The steel loops are open enough to allow 22 to 24 inches space for the cows' heads above the water bowls for easy access to water.



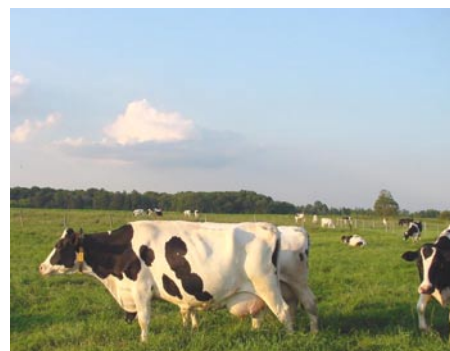
#### Expectations from Safe Dairy Facilities

Cow comfort is difficult to measure in business terms. Indeed, it's often difficult to measure in scientific experiments by researchers. Dairy producers, sensitive to injuries and disease, and observant of cow behaviour, do not wait for research results - they lead the way with innovations. They are unwilling to accept compromises in cow safety that appear as sore feet, injuries, lower reproductive performance, greater culling, reduced feed intakes, lower milk production, increased health care costs, or increased labour for management.

#### Self-regulated, Self-audited, Moral Obligation

In some countries, dairy producers must be responsive to consumer priorities for ergonomics, health and welfare in dairy cattle housing. In addition to meeting stringent standards for milk quality, producers must meet standards for cattle husbandry and pass an audit to qualify for a milk contract. Both marketing and market access are the reasons for the requirements.

In Ontario, our *cow contract* is self-regulated and self-audited: a moral obligation to deliver care, comfort and food in exchange for milk, meat and other products. Living up to our end of the deal requires consideration of both biosecurity and safety issues in dairy herd management. Biosecurity strategies minimize the risk of infectious diseases. Safety strategies minimize the risk of fear, apprehension and abnormal behaviour that lead to traumatic injuries, loss of comfort or welfare, and loss of cow performance.



Rather than accept compromises in facilities or husbandry systems, and chase bugs with drugs, let's follow our industry leaders. Let's speed the adoption of housing and management practices to reduce environmental risk factors for disease, and improve cattle health. By doing so, we enhance the image of milk and contribute to market access, animal health and welfare, human health and safety, and residue avoidance.

### Reading List

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