Understanding Cow Behavior

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Understanding cow behavior, and behavioral responses to stress of any origin, is important when attempting to interpret the effects of stray voltage on a dairy farm. Some behaviors can become detrimental to health and production even if the cause of the behavior change does not directly result in damage. The essential message to understand is that the behaviors commonly considered as indications of stray voltage are general behavior responses. These changes should not be considered specific to stray voltage. This is particularly relevant in cases where stray voltage is resolved, but abnormal behaviors do not decrease.

Abnormal or undesired animal behaviors usually have their origins in the very basic psychological makeup of an animal. The performance of the animal behaviors commonly associated with the occurrence of stray voltage are generalized behavioral expressions that are likely to come from a variety of electrical and non-electrical stresses. Behaviors such as lapping at the water cup, weight shifting, tail switching, nose pressing, kicking, self destructive heifer syndrome, and a general unthriftiness or apathy in the herd may be perceived as being caused by stray voltage. Certainly some of these behaviors are increased by stray voltage, but their origin can also be from non-electrical stresses.

Instinctual Drives or Behavioral Needs

Basic behavioral needs which are instinctual drives are such things as eating, drinking, sleeping, resting, sexual activity, exercise, play, exploration, escape activity, grooming, and social interaction. It is essential to consider observed cow behavior as directed towards fulfillment of these activities. Conditions that prohibit performance of basic behavioral needs produce an intensification of the need to perform the frustrated drive.

Examples:

* Limited feed availability will tend to increase the mouthing of objects like water bowls, tongue playing, and teeth grinding activity.
* Being continually stanchioned may intensify the escape or defense response (kicking or tail switching) to mildly threatening or annoying events.
* Calves that suck on any alternative object when nursing is unavailable.
* Cattle that are not let out for prolonged periods of time will be far more animated when let out for the first time, than if let out daily.

Many times behaviors are viewed strictly as a response to a physical or physiological stimulus, but in reality psychological events as powerful as physiological or physical events. For example, cows are naturally social grazers, and consequently eating is more than just food consumption. This increases the psychological implications of having continual access to feed in relative proximity to the rest of the herd.

It is most important to understand that psychological influences of being shocked may be more important than the actual shock. Psychological events are extremely potent in eliciting stress.

> "Psychological stimuli evoke not just a few, individual hormonal responses, but generally elicit a broad scope of multiple concurrent responses, while physical stimuli are usually thought of as eliciting a specific response that attempts to reestablish homeostasis for a particular entity (e.g., blood pressure or body temperature)." [3, p. 294]

Psychological effects are usually stronger, and more persistent than other negative influences.

Frustration or Displaced Activity

Good examples of frustrated activities are vocalizing, aggressiveness (e.g., kicking), shifting of weight back and forth, and increased tongue activity.

> "When an animal is frustrated, or prevented from performing a basic behavioral need, it may perform some other behavior as a substitute for the blocked behavior." [3, p. 297]

Animals frustrated by watching others eat for even 25 minutes may tend to increase things like biting of water cups, kicking, and stall prancing.

Learned Helplessness [3]

An animal experiencing chronic, unavoidable, psychological stress may develop learned helplessness.

Learned helplessness is a developed generalized apathy. It is expressed as an overall decrease in responsiveness toward all stimuli and a lack of interest in the surroundings. Learned helplessness can be very difficult to overcome. In some barns, where long term stresses have occurred, cows may appear to be calm and easy to work with. In reality the herd may be resigned to the difficulties, and are showing a general lack of interest and vitality. In one study an increase in leg ulcers was seen to be related primarily to a failure to make the normal frequent changes in posture while lying.

Vacuum Activities (e.g., lapping at water)

Highly repetitive coping behaviors help animals deal with psychological stresses. A common behavior is that of lapping of the water cup. Tongue playing is a repetitive coping behavior, that can be highly therapeutic. In one study, veal calves that had to deal with both stall stresses (low comfort), and nutritional insults demonstrated this relationship.

> "(Nine of 27 calves) that developed tongue-playing behaviors had no stomach (abomasal) ulcers, whereas the other calves that did not develop tongue playing behavior all had ulcers." [9, p. 257]

Repetitive coping behaviors can become too extreme, and result in self mutilation, but in general, if these behaviors are prevented from being performed, stress and its undesired health effect will increase.

Control Over Environment and Predictability of Stimuli [3, 8]

The ability of an animal to be able to avoid or modify a stress has been shown to decrease the occurrence of ulcers, and repression of experimentally induced tumor growth.

> "Control, or even perceived control, over a stressor can greatly influence the occurrence of stress related disorders." [3, p. 296]

When animals are on pasture and only in the barn for milking during the summer, most health problems improve. Having an increased period of time with control over more of the basic behavior needs, plays a significant role in this phenomenon. Stanchions and to a lesser extent tie-stalls, by their nature and construction, limit a cow's control over her environment. A cow's natural lying position is with her head along her side. A stanchion can reduce a cow's sense of control, which increases stress and the susceptibility to stress related health problems.

The effects of stresses are reduced if the stress event is predictable, or is preceded by some warning. Studies have indicated that animals developed less stomach ulcers when stress events were predictable. Frequent changes in milking or feeding routines, cow grouping and stall location can add to the level of stress.

Discomfort: Nose Pressing and Teeth Grinding [1, 5, 6, 7, 10]

Nose pressing and other trance like events, are seen by some as a sign of stray voltage. As with other behaviors, there are a number of non-electrical causes, in addition to stray voltage, for an increase in the length and frequency of nose pressing. Several studies in Europe have looked at nose pressing, or leaning. They have found it to increase with stall discomfort. This would be any factor that increases standing time or causes a painful situation such as with severe foot rot, severe mastitis, and abdominal pain. Dr. Wolfgang Klee (Germany) has indicated that nose pressing can be seen as a cow's effort to achieve an endorphin release. Hans Hopster (Netherlands) identified nose pressing with small or poorly constructed stalls, lameness, or any event that decrease lying time. He sees it as a kind of "tension relief." Lene Munksgaard (Denmark) made the following comments to me about nose pressing:

> "We have some old data showing that 1 out of 10 tethered cows kept in a barn with common management procedures (i.e., milking and feeding twice a day, no exercise, staff in the barn for 8 hours a day) performed leaning [nose pressing], whereas 13 out of 22 tethered cows kept in another barn (same fixtures and tie systems) with more intensive management procedures (milking and feeding 4 times a day, half of the cows exercised in a yard 45 min. a day, staff in the barn for 12 hour a day) showed leaning [nose pressing]. In the latter barn, cows who showed the highest amount of leaning [nose pressing] had a shorter lying time than the cows without showing leaning [nose pressing]. Furthermore, we have looked at leaning [nose pressing] in cows subjected to daily deprivation of lying down (0900 to 1600 and again from 2200 to 0500) compared to control cows. The results showed that deprivation of lying down increased both the frequency and duration of leaning [nose pressing]. Furthermore, I have occasionally seen cows with severe mastitis performing leaning [nose pressing] for a very long time. Although we do not have so much evidence, it is my impression that leaning is performed when cows are in pain or some kind of discomfort." [7]

Teeth grinding is also seen in similar situations of pain or discomfort from a variety of sources.

Tail Switching [4]

Tail switching that occurs at a time of the year other than during the fly season has commonly been suspected as an indication of stray voltage. In addition, tail switching is a behavior that increases with the preparation to go in, or out, of a barn or the frustration with going in, or out, of a barn, or stall. Food related frustration such as empty mangers, crowded bunks, or irregular feeding schedules can also increase tail activity. Another way to view this behavior is to consider the tail a sensory tool the cow uses to quickly examine the area behind her, where visibility is limited.

Of frequent concern are the factors associated with whole herd reflexive tail switching. Routine video taping during the REPS, Stray Voltage Analysis Team investigations have detected that tail switching can be a whole herd reflex, usually as a response to vocalization by a particular cow in the barn. This type of tail switching is seen as a response to certain kinds of vocalizations of a cow or calf in the barn, but also can occur outside of barns. This behavior appears to be a group protective herd activity. Commonly it can be seen in situations that cannot be electrical in origin. The bellowing produced by a cow during the forcing of labor, lost calves, or cows that are kept separate from the herd have been seen as causing this whole herd reflex tail switching.

Absence of Normal Behavior [3]

Self maintenance or comfort behaviors are often absent in an animal under excessive stress. "Failure to perform self-maintenance behaviors is often an early clinical sign of stress." [3, p.300] Recently fresh heifers can be a good example of this, due to the increased stress of calving and joining the adult milking herd. Failure to perform self maintenance or comfort behaviors is a significant factor in the fresh heifer self destructive syndrome that is commonly seen.

Non-conformance to group activity patterns is a very sensitive indicator of poor emotional state. The lack of non-conforming behaviors should be considered as much of a problem as expressing abnormal behaviors.

> "Play or exploratory behavior is a very sensitive indicator of internal state. Animals play only when drives more directly related to survival, such as hunger, are satiated and only when they feel secure in their environment. Non-conformance to group activity patterns also is a very sensitive indicator of internal state. This would include deviation from grazing, eating, resting, or rumination patterns and feed consumption rates." [3, p.300]

Determining the Behavioral Effects of the Stray Voltage

Stray voltage has the effect of producing behavioral changes in cows. A farmer works intimately with the animals on the farm, and is usually very aware of abnormal or undesired behaviors in the animals. Frequently the observation of these behaviors is not possible to visiting investigative or professional service persons because of the increased distraction of their presence. (The use of an unattended video camera on a properly positioned tripod will increase the chances of confirming such behaviors during an investigation.) Farmers may be reluctant to discuss animal behaviors as perceived evidence of a problem, because of the difficulty of convincing others of the occurrence, and the uncertainty of the significance or legitimacy of abnormal behaviors. While a farmer may not fully understand or may misinterpret the significance of behaviors, it is very important not to ignore his or her reported observations.

What a farmer notices about the cows are, with rare exception, accurate observations, and should be considered as important clues to the forces that are at work in the herd.

Because the origins of animal behaviors are not specific to electrical stress, it is not possible to determine if stray voltage is a factor on a farm without electrical testing. Stray voltage is an electrical issue, and needs to be investigated and resolved electrically.

Resolving behavior related concerns requires a team approach. A team will provide a farmer with the best chance at resolving the often multiple causes of abnormal or undesirable behaviors on his farm. A team investigating a potential stray voltage problem should actively involve veterinarians, nutritionists, and other professional farm service personnel in evaluating the non-electrical factors at the same time that electrical factors are investigated. Thoroughly evaluating cow comfort issues (stall size, construction, and use, amount of bedding used, ventilation, lighting, etc.), feed delivery issues (especially if feed and water are available for 20-24 hours a day), and daily exercise and socialization opportunities will help in determining the many potential sources for physical, and more importantly, psychological stress in the herd.

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HHS NEWS

U.S. Department of Health and Human Services
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The Food and Drug Administration today proposed to prohibit using tissues from ruminants -- animals such as cows, sheep and goats -- in the manufacture of ruminant feeds. Mink tissue would also be prohibited from such feeds.

The proposed regulation is the latest in a series of preventive measures -- including a voluntary industry moratorium -- that FDA, other federal agencies and industry have already taken to protect animals from transmissible degenerative neurological diseases, and to minimize any potential risk that such diseases could be transmitted from animals to humans.

These animal diseases are known as transmissible spongiform encephalopathies (TSEs). Bovine spongiform encephalopathy (BSE) is among the more commonly known of these diseases. TSEs are characterized by a long incubation period, a relatively short clinical course of neurological signs, and 100 percent mortality. Because of concerns that BSE could in the future be identified scientifically as the cause of a new TSE in humans, FDA and USDA officials said the protection of public health depends on the development of a strategy of control possible routes of TSE expansion in food animals.

FDA'S proposed regelation would prohibit the use of nearly all potential sources of ruminant and mink protein in feed intended for ruminants. The only exceptions would be bovine blood, ruminant-derived milk and gelatin, since FDA has no information suggesting that milk proteins, gelatin or bovine blood proteins are potentially infective for TSEs.

"This is a precautionary measure -- there have been no reported cases of BSE in this county," said Donna E. Shalala, Secretary of Health and Human Services. "It will add another level of safeguards to protect the U.S. against the potential risk from these diseases."

"If for some reason a case of BSE were to occur in the U.S. -- and ever been found here -- the steps we are taking today would confine to the individual animal and greatly decrease the potential risk to humans," and FDA Commissioner David A. Kessler, M.D. " In essence, this proposal would build a protective barrier against the spread of BSE.

In addition to prohibiting tissues with the potential to spread TSEs, the proposed rule also requires process and control systems to ensure that ruminant feed does not contain the prohibited tissues.

The first case of BSE was reported in the United Kingdom in 1986. Epidemiological evidence gathered in the U.K. Suggests an association between the outbreak of BSe there and the feeding to cattle of protein derived form sheep infected with scrapie, another TSE.

Recently, scientists have postulated an association between BSE and a variant form of Creutzfeldt Jakob Disease (v-CJD) reported in the U.K. Creutzfeldt-Jakob Disease is a degenerative neurological disorder that affects humans.

The British government on March 20 announced a possible link between BSE and 10 cases of v-CJD. Nine days later, U.S. national livestock organizations and professional health groups announced a voluntary moratorium on the use of ruminant protein in feeds of ruminants. At the same time, FDA committed to expediting regulations addressing issues related to feeding ruminant protein, and on May 14 the FDA published an Advance Notice of Proposed Rulemaking to solicit scientific and economic information and other public comments.

Today's proposed regulation is the product of FDA's evaluation of this information to date. FDA will continue to evaluate additional data and comments related to this proposal.