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DAIRY CATTLE BEHAVIOR AND WELFARE¹

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INTRODUCTION

Modern dairying follows European traditions where most breeds and husbandry practices were developed. New Zealand sets the world standard for economical milk production with milking parlors and unhoused cows on lush pastures. Recently, dairying has been pushed beyond these cool, temperate climates into the Sunbelt and desert. This was accomplished with the advent of ample feedstuffs combined with strategic placement of shade, sprinklers, misters and fans (Armstrong et al., 1984, 1985; Schultz et al., 1985). Extensive dairying can now be found in such unexpected places as Israel, Saudi Arabia, Arizona and New Mexico. The state of New Mexico now has or near the highest milk production per cow in the United States (Buckner, 1991).

HISTORY

Dairy farm management studies including housing and cattle care were instigated in 1895 (Hodgson, 1986). Early research from Indiana showed an economic advantage to winter housing of dairy cows instead of leaving them outside (Plumb, 1893). Dairy cows cannot endure as much exposure as steers. In turn, according to Fraser (1905), this concept gave rise to the all too common practice of keeping dairy cows shut up in tightly closed stables, cramped on a platform, and crowded among other cows with their heads held fast in rigid stanchions for nearly 24 hours a day for six or eight months each year, usually with no system of ventilation and with very little light, yet the majority of cows in Illinois were kept in this manner. The plan of allowing dairy cows to run loose in a shed looked so reasonable and those dairymen who had tried it reported so favorably concerning the results obtained, that loose housing was put into operation at the University of Illinois over 90 years ago in 1903. Over a two year period they found the cows to be much cleaner than when stanchioned and the separate milking area was more sanitary and easier to produce clean milk. By this method cows were supplied an abundance of fresh air and they were more vigorous and healthy with better appetites.

Facilities for dairy cattle now range from fenced pastures, corrals, and exercise yards with shelters to insulated and ventilated barns with special equipment to restrain, isolate, and treat the animals. Generally, corrals and sunshades are used in warm semi-arid regions; pastures and shelters are common in warm humid areas; naturally ventilated barns with free stalls are used widely in cool humid climatic regions, and insulated and ventilated barns with tie stalls are common in colder climates (Albright et al., 1988).

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AUTOMATION

New housing and herd management developments have important effects on the well-being of dairy cattle and the cattle enterprise is well suited for the application of electronics and automation (Albright, 1987). Automation, considered by some to be detrimental to the husbandry and welfare of animals in intensive units, needs to be re-considered. The time saved, together with reduced work and drudgery, could free people for more human-animal interactions allowing better care. Automation can increase the time given to the training of handlers for observational or "eyes on" rather than manipulative "hands on" skills. Automation should take the pressure off existing workers which, in term, should reduce accidents and injury. If stress on the worker is reduced, animals in large intensive units may be treated more humanely (Kilgour, 1985).

Over time, capital investments for cow comfort and sanitary requirements have increased markedly. Labor-saving practices have been developed to reduce the drudgery of dairy farming. Many of the top producing cows continue to be housed and milked in labor intensive stall barns. For these stall barns there now are battery operated silage carts, portable straw choppers, automatic detaching milking machines with low milk lines, and mechanized manure handling.

Whenever possible, many dairy farmers let cows out of their barns in the middle of the day. It is interesting that during sunny or mild winter weather, 100 years ago like today, dairy farmers turned their cows out into an open yard (Plumb, 1893). On pleasant days, cows are more likely to groom themselves and each other, stretch and exercise their limbs, "sun" themselves, show estrus behavior and overall health and well-being.

Economic pressures have forced many dairy farmers into programs of close confinement and intensification. Some animals are kept on concrete throughout their productive lives. These trends were accepted at first by producers and scientists without adequate data on the long term effects of such confinement, but concern has since been expressed over the effects of the environment upon comfort, well-being, behavior, reproduction, udder health and feet and leg structure. As a safeguard, most cows are moved from concrete to dirt lots or pasture, at least during the dry period. Also, rate of detection and duration of estrus are higher for cows on dirt lots than on concrete (Britt et al., 1986).

BEHAVIOR AND MANAGEMENT

The dairy cow has been called "the foster mother of the human race" (Rankin, 1925). A relationship develops between the milker and the cow which is a vital part of the milk extraction process. As machine milking took over from hand milking this relationship was considered by many to have diminished. After her calf is removed, the cow is milked with a minimum of manual stimulation in highly automated surroundings.

Caretakers in high-producing herds are aware of the importance of such changes. For as long as cows have been milked there has been the art of cow care that results in more milk from healthier, contented cows. It has been recognized that the dairy cow's productivity can be adversely

affected by discomfort or maltreatment. Alert handlers have the perception and ability to read "body language" in animals. For example, healthy calves and cows will exhibit a good stretch after they get up, then relax to a normal posture. Increased standing of cattle is often taken now as a sign of discomfort or discontent in studies of cow and calf confinement (Albright, 1987).

Clues to a cow's mood and condition can be obtained by observing the animal's tail. When the tail is hanging straight down, the cow is relaxed, grazing or walking, but when the tail is tucked between the cow's legs, it means the animal is cold, sick, or frightened. During mating, threat or investigation, the tail hangs away from the body. When galloping, the tail is held straight out, and a kink can be observed in the tail when the animal is in a bucking, playful mood (Manthey et al., 1992).

According to Kiley-Worthington (1976) when studying the cause and function of tail movements it is necessary to consider the whole posture of the animal as well as the contexts that give rise to it. In cattle (and horses) the immediate association one makes with lateral tail movements is with cutaneous irritation. In these species there are morphological changes of the tail which point to its use as a fly switch.

Also, cattle under duress show signs by bellowing, butting or kicking. Behavioral indications of adjustment to the environment are always useful signs of whether the environment needs to be improved. In some cases, the way animals behave is the only clue that stress is present, (Stephens, 1980, Albright, 1983).

SOCIAL ENVIRONMENT

Dairy cattle are social animals that function within a herd structure and follow a leader to and from pasture, milking parlor and so forth. Cows exhibit wide differences in temperament, and their behavior is determined by inheritance, prior experience and training. Cows are normally quiet and thrive on gentle treatment by handlers. Handling procedures are more stressful for isolated animals, therefore attempts should be made to keep several cows together during medical treatment, artificial insemination, or moving one group to another (Whittlestone, et al., 1970; Arave et al., 1974).

Many dairymen allow their cows to develop their own individual personalities as long as it does not require special care and treatment. Mass handling of cows dictates that individual cows fit into the system rather than the system conforming to the habits of the cow. The slow milker, the kicker, the boss cow, the timid cow, the explorer and the finicky eater usually are removed from larger herds, regardless of pedigree.

Although concern is expressed from time to time about temperament and behavioral problems, most attempts at reinforcing correct behavior and disciplining improper behavior have been successful. One dairy study showed that behavior as a reason for disposal was less than 1 percent of cases. Other categories include: udder problems and mastitis-23 percent; low yield-4 percent; reproductive disorders and diseases-36 percent; digestive problems-11 percent; metabolic

problems-7 percent; anatomical problems (feet, legs and skeleton)-11 percent. The cows culled for behavior represent the truly wild ones which would not conform to training and management, (Albright and Beecher, 1981).

As creatures of habit, gentle dairy animals may be excited into rebellion by the use of unnecessarily severe methods of handling and restraint. Attempts to force an animal to do something it does not want to do often end in failure and can cause the animal to become confused, disoriented, frightened or upset. Handling livestock requires that they be outsmarted rather than outfought and that they be outwaited rather than hurried (Lemenager and Moeller, 1981).

Considerable self-stimulation and "inwardness" occur in cattle due to the rumination process. During rumination, cows appear relaxed with their heads down and their eyelids lowered. Resting cows prefer to lie on their chests, facing slightly up hill. Also, through cud-chewing as well as mutual and self-grooming, aggression is reduced and there is little or no boredom (Albright, 1986).

Management developments which have improved the comfort and well-being of dairy cattle include raising calves in individual pens or hutches (Baker, 1981), providing exercise prior to calving (Lamb et al., 1979), grooving or roughening polished, slick concrete flooring (Albright, 1983), making use of pasture or earthen exercise lots and removing slats (Albright, 1983), and eliminating stray voltage (Appleman, 1991). Individual stalls (free stalls) have proved better than loose housing. Dairy cattle thrive best when they are kept cool, free from flies and pests and provided with a dry bed to lie down (Albright, 1986).

COW AND CALF HANDLING

Milk production is a by product of the reproductive process. Therefore, an essential part of the onset of lactation is the birth of a calf. Unfortunately, newborn calves are sometimes cast aside. They require special handling and care from the time they are born. The most important point to remember is to feed the newborn calf colostrum soon after birth and within the first six hours. A calf should be given 8 to 10% of its body weight in fresh colostrum by bottle, bucket or tube feeder. Colostrum is nutrient rich and provides the calf with vital immunoglobulins. Good nutrition along with proper handling starts a calf on its way toward a healthy life. If young calves are to be marketed, follow these three procedures:

1. Provide individual care and colostrum for two to three days following birth.
2. Calves should always have a dry haircoat, have a dry naval cord, and walk freely before being transported. A day-old calf can stand, but it is unsteady and wobbly and is not ready for market. In England and Canada, the sale of calves under a week old is forbidden. Calves should not be brought to a livestock market until they are strong enough to stand and walk without assistance. To reach adequate strength and vigor, calves need to be a minimum of five days old (Grandin, 1990).

3. Handle calves in transit carefully, protecting them from the sun and heat stress in the summer, and from the cold and wind chill in winter.

Observing behavior characteristics and carefully following these recommendations will assure healthier and contented dairy cattle:

1. Always keep hooves trimmed to prevent lameness. A cow with properly trimmed hooves and healthy feet and legs will stand quietly and occasionally shift her weight. Cows with feet and leg problems are more restless or crampy and do not settle, appearing to walk in place.
2. Breed first-calf heifers to bulls with a reputation for easy calving.
3. Use caution with calf pullers to prevent internal injuries.
4. If internal injury happens during calving, lift the cow into a standing position for rehabilitation. An apparatus with a wide belt and hoist can be used for gently lifting a cow to her feet.
5. To prevent downed cattle from milk fever and other metabolic disorders, obtain the services of a competent veterinarian or dairy specialist .
6. To prevent mastitis, keep the udder dry and dip teats before and after milking.
7. When loading dairy animals for shipping, allow plenty of handling space. Cattle need ample room to turn, then leaders will move into the chute, with other animals following.
8. Stair steps are recommended for loading ramps. Each step should have a 3 1/2 inch rise and a minimum 12 inch wide tread.
9. Loading ramps for young stock and animals that are not completely tame should have solid sides.
10. Never attempt to transport cows which become emaciated or too weak to stand. If rehabilitation doesn't occur within a reasonable time, the animal should be humanely euthanized on the farm (Livestock Conservation Institute, 1992).
11. When transporting young dairy animals or producing cows, always handle them gently. Allow them to quietly investigate their new environment and ease into it without outside distractions. Cattle should be moved at a slow walk.
12. Try to ship dairy animals under favorable weather conditions. Avoid extremely hot or extremely cold temperatures that create undue stress and may cause sickness.

Dairy producers and the dairy industry have much to gain when cows and young stock are properly handled and cared for (Manthey et al., 1992).

The Canadian guide (Agriculture Canada, 1990) contains a complete transportation section including definitions, general information, vehicles, containers, space requirements, protecting cattle, food, water and rest for cattle in transit, unfit cattle, pregnant cattle, precautions in cold or hot, humid weather and transportation stress. There is also a section on assembly yards, sales yards, and processing facilities that includes facilities, unfit cattle, holding and handling, education of personnel, slaughter and emergency procedures (Agriculture Canada, 1990).

Transport Developments

Heartrate (HR) transmitters were implanted in lactating Holstein cows prior to travel (Ahn et al., 1992). Cows were transported 250 miles in about six hours over various road surface conditions in a 8.2m long livestock trailer. The two way journeys started in the morning and ended late afternoon. Cows stayed overnight and were brought back late afternoon. This two day journey was repeated one week later. Feed and water were provided during the interim between travel; cows receiving their normal ration for that period. Cows were milked by portable machine according to their regular schedule and confined to a fenced corral of approximately 1 acre. HR taken as travel commenced averaged 89.7 bpm and differed significantly ($P < .01$) from all hourly readings. Average HR for hours 2,3,4,5,6 averaged 77.0, 74.8, 71.3, 74.4 and 72.9 respectively (which are all similar to a resting HR of 76.5). HR's differed significantly ($P < .01$) by road surface averaging 83.3 bpm on a dirt road, 81.2 on paved rural three and four lane road, 76.1 on paved two lane desert road and 73.6 on the freeway. HR's observed gave evidence of habituation on the day of travel and also from week one to week two.

HUMAN-ANIMAL INTERACTIONS THE BEHAVIOR OF THE COWMAN

Studies by Seabrook (1972, 1977) on homogeneous herds as defined by similar feeding policy, feeding levels, breed and genetic potential, grazing management and climate demonstrate the effect of the cowman's behavior and personality. The highest performance cowmen, in terms of milk yield for a given level of input, have the following traits: considerate; patient; independent; persevering; grumpy; difficult to get on with; forceful; confident; suspicious of change; not easygoing; unadaptable; not neat; not modest; not a worrier; not talkative; uncooperative; unsociable.

In summary, they are confident introverts. Some of these traits may seem to be socially undesirable, but it is the cow's and not another human's reaction which is critical. The men with these traits were more stable and had an air of confidence, enabling them to develop a relationship with their cows which positively influenced the animal's performance.

Building on this work, Reid's study (1977) of high achievement herds both in North America and England yielded some important results. Reid concluded that the high production cowman was able to minimize output of adrenaline by the cow and obtains a higher percentage of the milk yield which her genetic capacity permits than others would obtain from the same cow under similar conditions. The high production herdsman achieves this by constant attention to the behavior patterns or performance of each individual cow in the herd. Other interests of Reid's "confident introverts" included vegetable growing, but the most startling fact was that they also grew either roses, gladiolus, or chrysanthemums, species that have different varieties requiring specific treatment and respond to feeding at specific times of the year. The best herdsman were attuned to the individuality of their cows as well, and had a close identification with the herd. In many cases it was difficult to define whether the herd was regarded as an extension of the family or the reverse.

THE BEHAVIOR OF THE COW

Albright (1978) and Seabrook (1980) have shown that animal behavior differs among dairy herds. One factor which varies both within and between groups of cows is flight distance (basically, how close one can approach an individual animal without it moving away). In some dairy herds, this distance may be almost zero, while in others it may be as high as 6 meters (20 ft). For individual animals in these herds there will be ranges of values, but they may be lower for one herd than the lowest for another herd. Why do these differences exist, and how do they arise? Some variation could be attributed to conditioned learning, e.g., the "memory" of being struck by a handler, but there is little evidence to account for all of the differences.

Observations of identical one-person units show behavior differences in terms of how long it takes cows to enter the parlor. In some herds the cows are keen to enter, in others they are reluctant to do so. Studies showed parlors and their identically sized and shaped collecting yards to be in excellent condition. It is the relationship between the cowmen and the cows which seems to explain the difference in entry time. It is fallacious to talk about the behavior of dairy cows in isolation; the actual pattern is a reflection of the relationship between human and cow. This connection was realized in the 1940's by Rex Paterson, the pioneer of large scale dairy farming in England, when he publicly stated that the biggest effect on herd yield and cow behavior on his one-person dairy units was exerted by the cowman.

Establishing the Relationship

In higher performance herds, where cowman and cow enjoy a good relationship, the animals have a short flight distance, tend to move quickly into the milking parlor and are comfortable in the cowman's presence. The cowmen establish and maintain the relationship by frequently touching and communicating with the animals, treating them with special care at critical points such as calving and first milking after calving, and assuming the roles of both boss animal and caring mother substitute. This close relationship enables the cowman to spot changes in the cows' behavior quickly and thus to prevent situations from developing which could adversely affect performance. In addition, the atmosphere created by this kind of psychological environment seems to be more conducive to rest, which means that the cows may be able to reserve more energy for milk production.

The Implications for Animal Welfare

The animals in the herd where there is a good relationship between cowman and cow produce more milk, as they release less adrenaline to block milk letdown. The cows are less jumpy, more settled and steady in an environment created by a confident cowman. The pertinent point, from an animal welfare point of view, is that these are not necessarily the best equipped herds technically, e.g., in parlor design. In other words, cows can be under stress in a well-designed system if they cannot develop a good relationship with their cowman. Similarly, they may be in a poor system technically, but may be content and under little stress if they have confidence in and a good relationship with the person who tends to them.

Efficient dairy management and animal welfare would be both served by selecting cowmen who have the correct traits and then further training them to develop a relationship with their animals and so ensure that they animals are able to live in an environment where stress is reduced to a minimum. Design of a system from a welfare perspective is only part of the solution. The most important factor in determining stress is the behavior and attitude of the cowman (Seabrook, 1980).

HUSBANDRY PROCEDURES

Certain dairy cattle behavior (e.g. aggression and kicking) put at risk the health and well-being of herdsmates as well as the humans handling the cattle. Several devices and procedures can reduce or modify these behaviors. Certain identification procedures, clipping milk cows, training them to milk, and milking them must be done properly to minimize negative effects on cattle health (Moeller, 1981; Albright et al., 1988; Agriculture Canada, 1990).

Castration may be performed on bull calves except those being raised as veal calves. The same is true early in life for dehorning (Lemenager and Moeller, 1981). Many dairy calves are born with more than the usual four teats. These supernumerary (extra) teats can grow and develop much like a normal teat. They detract from the general appearance of the animal, have the potential to disrupt the milking process later and to become infected. For these reasons it is a good practice to remove these extra teats as early as possible in the calf's life. If it is done immediately after birth at the same time the naval is treated, the calf is easy to handle and one person can accomplish the task (Moeller, 1981). Because the calf is very young, the cut bleeds only slightly. Older calves and heifers close to calving should have extra teats removed under local anesthetic by a qualified person (Albright et al., 1988). Removal can be performed in the first three months of life with sharp scissors or scalpel.

SUMMARY

Observation of cattle has been going on for centuries (Albright, 1987) and helps to increase knowledge and improves husbandry techniques. A more logical approach to the study of cow behavior and training is now advocated linking it with the commercial situations. Time saved through automation should be invested in observing animals. A knowledge of normal behavior patterns provides an understanding about cattle and results in improved management and handling that will achieve and maintain higher yields. Dairy cattle must fit in well with their herdsmates as well as their handlers. Proper mental attitude of handlers must blend in with skillful management and humane care in today's highly competitive, technological, urban based society.

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ADDENDUM

RECENT MILESTONES IN DAIRY ANIMAL WELFARE

Milestones in dairy animal welfare were prepared through 1986 (Albright, 1987). For this talk, recent milestones in dairy animal welfare were compiled as follows:

1987-Dairy cattle management developments have improved the comfort and well-being of dairy cattle. 1

1988-Published Guide for the Care and Use of Agricultural Animals in Agricultural Research and Teaching². Separate chapters on dairy cattle and veal.

-Recommended Code of Practice for the Care and Handling of Special Fed Veal Calves (Coordinated by the Canadian Federation of Humane Societies).³

-The Massachusetts Debate on Initiative Petition 3: Should Farm Animal Husbandry Standards Be Set By the State?⁴

1989-Joint Hearing of the Veal Calf Protection Act H.R. 84 Before the Subcommittee on Livestock, Dairy and Poultry of the Committee on Agriculture, House of Representatives 101st Congress First Session, June 6. Rep. Charles Bennett (D-FL) introduced the bill and the Committee was convened by Charles W. Stenholm (D-TX). A summary of the hearing appears as a Special Commentary in the Journal of the American Veterinary Medical Association.⁵

1990-Recommended Code of Practice for the Care and Handling of Dairy Cattle (Coordinated by the Canadian Federation of Humane Societies).⁶

1991-Farm Sanctuary produced "The Down Side of Livestock Marketing" (Downer animal video by Becky Standstedt from the South St. Paul, Stockyards, Minnesota).⁷

-Hoard's Dairyman reported non-ambulatory cattle accounted for 0.1 percent of the cattle received at the United Stockyards (South St. Paul, Sioux City, Omaha, St. Joseph, Indianapolis and Milwaukee), but these stockyards will no longer accept non-ambulatory cattle.

1992-Understanding Dairy Cattle Behavior to Improve Handling and production (Videotape).⁸

-Proper Handling Techniques for Non-Ambulatory Animals (Pamphlet).⁹ The video and pamphlet produced by the Livestock Conservation Institute.

-Welfare parameters in Veal Calf Production Facilities-Prepared for the California Legislative by Carolyn L. Stull and Duncan A. McMartin. Veterinary Medicine Cooperative Extension, University of California-Davis.¹⁰

1993-Illinois (Senate Bill 177) enacted "downer" animal legislation. Industry supported the Illinois bill because it focused on "one animal/one move" and included carcass disposal options not offered in any other state. This means non-ambulatory animals go directly to slaughter or rendering and do not pass through markets or stockyards.

-Farm Sanctuary initiates California (Senate Bill 692) Downed Animal Protection Act (for cattle, swine, sheep and goats).

-Lancaster Pennsylvania Stockyards found guilty of cruelty to animals for its treatment of a cow too crippled to walk (charge brought forth by Farm Sanctuary).

1994-California Downed Animal Protection Act signed by Governor Pete Wilson (Section 599F added to penal code). Industry did not oppose the contents of the California bill. Industry did oppose the bill being an amendment to the criminal code rather than the food and agriculture code.

- AVA Guide for the Care and Production of Veal Calves 4th Edition.11
- Caring for Dairy Animals-Reference Guide and On-Farm Evaluation Guides.12
- Recombinant bovine somatotropin (rBST) approved by FDA February 4th and placed on open market.13
- On June 21st Rep. Bernard Sanders (I-VT) introduced the Bovine Growth Hormone Milk Act (H.R. 4618).14
- On Sept. 28th Livestock Subcommittee Public Hearing on the Downed Animal Protection Act H.R. 559 (72 co-sponsors in the House) to amend the Packers and Stockyards Act.15. (There was also a hearing in 1992).

1995-Revision of the Guide for the Care and Use of Agricultural Animals in Agricultural Research and Teaching (also known as the "Ag Guide") is underway.16 Dairy cattle chapter additions include special needs areas, group sizes, stray voltage, tail docking, handling and transportation-including calf care and loading and shipping, non-ambulatory or downed animals, euthanasia and bulls.

-It is suggested that foot lameness is probably the greatest insult to the welfare of the modern dairy cow. Lameness can be kept under control by foot baths and foot trimming.17 In situations having the potential for outbreak of infections, antiseptic footbaths are recommend.18 Hairy warts, in particular, have emerged as a particularly troublesome and difficult to treat problem. Topical spray application of individual cows is recommended.19

-USDA abolishes face branding in cattle and standing spay operations without anesthesia in heifers.

-Tail docking of adult dairy cows controversy remains unresolved.

-Lowest dairy calf prices in history (\$1-\$5/head). Many producers lost money on their calves after fees at auction yards were deducted. Reasons? Veal and feedlots not in need of present supply. NAFTA agreement brought surplus Mexican and Canadian cattle into U.S.A.

1996-Low calf prices of 1995 continue. Calf welfare is at risk whenever prices get too low.

-"Mad Cow" Disease-Bovine Spongiform Encephalopathy (BSE) in UK

Since the British Ministry of Health's statement on March 20 indicating the possibility of a link between Bovine Spongiform Encephalopathy (BSE) in cattle and Creutzfeldt-Jakob Disease (CJD) in humans, the issue has made headlines around the world. However, the Ministry also pointed out that there was no direct evidence of a link. In addition, the Ministry noted that steps were taken in 1989 to ensure that meat and milk are safe and they remain safe today.

Based upon 10 years of monitoring and surveillance data in the United States, we can confirm that there is no BSE in the U.S. and there are a number of long-standing, aggressive programs to prevent BSE from ever entering the U.S. Consumers should be reassured about the safety of U.S. beef.20

The USDA Animal and Plant Health Inspection Service (APHIS) imposed a ban in 1989 on the importation of live ruminants (cattle, sheep, etc.) or products from countries where BSE has been found. In addition, the USDA Food Safety Inspection Service said that no beef has been imported from the UK since 1985.

In addition, since 1986 the U.S. has maintained a sophisticated and aggressive BSE surveillance program involving 250 APHIS veterinarians who conduct field investigations of suspicious symptoms. In addition, more than 60 veterinary diagnostic laboratories around the country work on BSE surveillance in cooperation with the National Veterinary Services Laboratories in Ames, IA.

What is BSE?

BSE is a progressive degenerative disease that affects the central nervous system of cattle. It is classified as a transmissible spongiform encephalopathy (TSE). Affected animals may display changes in temperament, such as nervousness or aggression; abnormal gait and posture; incoordination and difficulty in rising; decreased milk production; or loss of body weight despite continued appetite. Affected cattle always die, since there is no known treatment. When autopsies are performed, the brains of infected animals exhibit a sponge-like appearance, hence the name.

The cause of the disease is not completely understood. It appears to have an incubation period of between two and eight years, but there is no test to detect the presence of the disease in live cattle and no evidence that it spreads between unrelated cattle or from cattle to other species by contact. Evidence suggests that maternal transmission is rare if it occurs at all.

All known TSEs are caused by similar uncharacterized agents that produce spongiform changes in the brain. Specific types include: scrapie, which affects sheep and goats; transmissible mink encephalopathy; feline spongiform encephalopathy; chronic wasting disease of mule deer and elk; and three rare diseases in humans: kuru, Creutzfeldt-Jakob disease and Gerstmann-Strausler syndrome.²¹

Where is BSE to be found?

In 1992 and 1993, new cases in Great Britain approached 10,000 monthly. More recently, between September 1 and December 1, 1995, Great Britain reported 3,151 newly confirmed cases of BSE with 272 more herds affected. As of December 1, 1995, the total number of confirmed cases equaled 155,621; total number of affected herds stood at 32,991; 54.1 percent of the dairy herds have been affected.

Great Britain certainly is the worst but not the only country to be affected by BSE. The countries and total cases are Guernsey, 524; Northern Ireland, 1,642; Jersey, 109; Isle of Man 375; Republic of Ireland, 102; Switzerland, 180; Portugal, 31; and France, 12.

Countries which have had imported BSE cases only include Germany (4 cases), Canada (1), Denmark (10) Falkland Islands (1), Italy (2) and Oman (2).

The point? Hoard's Dairyman is thankful BSE has not set foot on U.S. shores. All dairy and beef operators should feel likewise. Too, we appreciate the surveillance by the National Veterinary Services Laboratories.²²

Footnotes

1 These recent husbandry practices include the raising of calves in individual pens or hutches; providing exercise for cows prior to calving; type and location of resources, e.g., smooth material at floor level, feeding cows at floor level, lock-in stanchions; plentiful water; changing the flooring, e.g., grooving of concrete, use of dirt exercise lots and getting rid of slats; new designs in freestalls; shade and cooling (misting) during hot weather; adequate bedding to allow for cow comfort and insulate the udder against extremes in cold while keeping cows dry, clean, out of mud and sun, cool, and free from flies and pests; feeding at night to influence daytime calving, and elimination of stray voltage.

2 Guide Development Committee consisted of Stanley E. Curtis, Chair and Editor; Jack L. Albright, Dairy Cattle and Veal; James V. Craig, Poultry; Harold W. Gonyou, Sheep and Goats; Katherine A. Houpt, Horses; John J. McGlone, Swine; W. Ray Stricklin, Beef Cattle plus 22 members of the Consortium and Representatives from the scientific, veterinary, farming, regulatory, animal care community and the public (see inside cover). Each species covered had an animal behaviorist as Chair, with animal scientists, veterinarians, agricultural engineers and industry.

3 After five revisions this informative guide was published. It contains suggestions for producers, research needed, definitions, Section I-housing, Section II-feed and water, Section III-delivery and postnatal care of veal calves, Section IV-grooming, Section V-attendants, Section VI-supervision and protection of calves, Section VII-transportation, Section VIII-processors; Appendix Tables-A) emergency tables (transportation) B) space requirements during transportation c) wind chill factors and D) participants.

4 The results of the defeated referendum seem to be three-fold. First, the farmers of Massachusetts received a great deal of publicity and people are now more aware that there are farmers in Massachusetts and that some of them are struggling to survive. Second, people are thinking about where their food comes from and how it is raised. Third, it seems that animal rights activists suffered a reversal in terms of public perception.

5 In terms of conflict resolution the four issues which were debated and remain unresolved were 1) Should calves be raised individually or in groups, and if they are raised individually, should housing in small enclosures be stopped? 2) Is the raising of marginally anemic (low-normal hemoglobin/PVC) calves inhumane? 3) Do residues of antibiotics, sulfonamides, and other chemical feed additives in veal need better control? 4) Should the federal government regulate the veal industry, mandate an industry-based method of regulation, or leave the industry to its own devices? Representative Charles W. Stenholm, Chairman of the Subcommittee on Livestock, Dairy and Poultry of the House Agriculture Committee, stated that agriculture "must recognize how public perceptions shape political reality, whether those perceptions are correct or

not. What we are facing is a constant struggle between perception and fact". Two approaches to deal with the issues, which are not mutually exclusive, are public education (i.e. countering charges) and reexamination of husbandry practices by the producers, effecting changes where needed.

6This complete dairy cattle guide follows a similar format as the previous Canadian veal guide with special emphasis on pastures, delivery of calves; care of calves and young cattle; and dairy herd management.

7An inside pictorial look at what goes on at stockyards with emphasis on "downer cows" is graphically portrayed. Also featured was Farm Sanctuary which produced the "Down Side of Livestock Marketing", an 18-minute color video that includes footage of many of the worst abuse the monitors have seen. The videotape is available on VHS for \$18.50 (P.O. Box 150, Watkins Glen, NY 14891). Also featured is activist Becky Standtedt who did the taping at the South St. Paul Stockyard.

8A 24 min videotape was produced on handling techniques for dairy cattle from birth to mature milking cows. During five days of videotaping, nine hours of tape were shot in color at Hoard's Dairyman Farm, Fort Atkinson, WI, Arizona Dairy Company in Phoenix and Purdue University Dairy Research Center. Behavioral principles include 1) Body language and resting behavior, 2) Vision, 3) Reaction to sound, 4) Flight zone and point of balance, 5) Tameness, and 6) Herding behavior. Procedures for proper handling of calves and young stock with recommendations for calves to be marketed were covered. Comparative facility design leading to cow comfort, cleanliness, efficiency and smooth handling at the three distinctive locations were detailed. Featured were proper housing, feeding, and routine, consistent, gentle care and handling, proper treatment, keeping cows clean and comfortable to ensure animal well-being as well as enhancing the dairy industry. (Videotape was produced in 1992 and available for \$29.95 in VHS format for the Livestock Conservation Institute, 1910 Lyda Drive, Bowling Green, KY 42104).

9In 1991 the Farm Animal Welfare Coalition asked the Livestock Conservation Institute to organize a task force to respond to the downer animal issue. The pamphlet developed and emphasized "3 P's": Prevention, Preparation and Prompt action are the keys to the proper handling of non-ambulatory animals. The task force covered euthanasia, the role of the owner or manager in preventing downer animals, non-slip flooring, loading ramps, recommended methods for moving non-ambulatory animals and other educational materials.

10Due to pending legislation and public concerns in California, a multidisciplinary approach was designed to investigate the welfare of special-fed veal calves in commercial veal facilities. Concerns included housing conditions, dietary regimens, management practices, and behavioral aspects imposed on special-fed calves. Four categories of parameters including environment and housing, nutrition, health and stress, and behavior provided a broad base of evaluating veal systems. Observations and samples were collected on 550 Holstein bull calves located in 10 commercial veal facilities. Each facility was visited to collect data during week 0 (week of arrival of calves), 2,4,8,12 and 16. Nine facilities used individual stalls 48 to 55 cm (19 to 21 in) in width with tethers attached to the front of the stalls. One facility housed 30 calves in group pens after obtaining calves at 8 wk of age. Ammonia, carbon monoxide and hydrogen sulfide gas did not exceed the permissible limit for humans in any facility. All facilities exceeded the 2-foot-candle recommendation for lighting. The average daily gain of calves was .85 kg (1.87 lb) during week 0 to 8 and 1.18 kg (2.6 lb) during week 8 to 16. Dietary iron levels decreased from 209 ppm at wk 9 to 32 ppm at week 16. At 16 wk, 25% of calves were marginally anemic and 10% clinically anemic. Overall mortality was 4.2%. Stress indices such as plasma cortisol

concentrations of neutrophil to lymphocyte ratios declined as calves approached market weight. In either pens or stalls, calves spent approximately 25 and 75% of time in standing and lying positions, respectively. However, group-penned calves while recumbent extended one or more legs 13% of time; calves in stalls extended one or more legs 2% of time. The major factor adversely affecting the welfare of the veal calf was an inadequate immune system of its arrival to the facility. Quantification of immunoglobulin G levels indicated that 22% of all calves received adequate transfer of colostral immunoglobulins and 78% had not absorbed sufficient quantities from colostrum and, therefore, were more susceptible to infectious pathogens. The low mortality rate, rapid growth rate, and absence of stress indicators demonstrated the ability of the producer and suitability of commercial facilities to effectively manage and care for these immunological deficient calves. By comprehensively describing current management practices and identifying multidisciplinary factors that influenced the health and welfare of special-fed veal calves in commercial facilities, the integrated approach provided objective data in response to pending legislation and societal concerns.

11 The revisions in 1981, 1987, 1990 and 1994 of the American Veal Association (AVA) Guide for the Care and Production of Veal Calves are the result of a continuous process as new information regarding husbandry and technologies become available. The individuals who contemplate beginning in the veal industry and experienced veal farmers will find information in this guide to aid in a successful veal production program. However, veal farmers must also rely upon other direct sources of information such as nutritionists, ventilation and facility design experts, animal scientists, animal care specialists, and veterinarians. Printed updates are available directly from these specialists as well as from AVA under the auspices of the Veal Total Quality Management Education Program (VTQMEP); Veal farmers should continually avail themselves of these and other sources.

12 On the inside cover of the 10-part Caring for Dairy Animals Reference Guide and the Caring for the Dairy Animals On-Farm Reference Guide, Congressman Harold L. Volkman (D-MO) Chr. Subcommittee on Livestock and Steve Gunderson (R-WI) Ranking Minority Member Subcommittee on Livestock submitted the following 1994 letter:

"Dear Dairy Producer:

Food Safety, animal health, and proper animal care have become important public policy issues in recent years and we recognize most of you are already practicing the recommendations contained in this Reference Guide for the Care of Dairy Animals. We are proud of the dairy industry's record on these issues and commend the thousands of dairy producers who practice proper animal husbandry on a daily basis.

Regrettably, the inhumane actions of a few individuals and slaughtering plants, particularly regarding non-ambulatory "downer" dairy cows, have raised questions in the media about the quality of animal care in the industry as a whole. This has led some groups to call for additional Federal regulation of the industry.

While no one in Congress condones the inhumane treatment of animals, we believe that this matter is better addressed by the industry through voluntary guidelines rather than through government regulation. We are, therefore, pleased that the Dairy Care Task Force has developed this Reference Guide for the Care of Dairy Animals for distribution throughout the dairy industry.

Accordingly, we hope that you will take time to review the guide and pass it along to your friends and neighbors in the industry. Working together, we can voluntarily adopt common sense and practical animal care guidelines that will make government regulation of the industry unnecessary. Thank you for your consideration and cooperation in this regard."

13Dr. Gary Hartnell of Monsanto Company, St. Louis, MO reviewed the technical aspects of the development and commercialization of recombinant bovine somatotropin (bST) with emphasis on the effects of bST on milk production and composition, feed intake, body condition, health, and reproduction. Results from an unprecedented number of studies (over 1500 studies with more than 30,000 dairy cows) conducted worldwide demonstrate that bST is safe to humans and animals. Administration of bST results in significant increases in milk yield with similar composition regardless of dairy breed tested, geographical location studied, milking frequency used, and feeding system employed. Cows administered bST are physiologically and metabolically like cows producing milk at similar levels. Therefore, the feeding and management of the cow administered bST is like that of untreated cows with similar milk production.

14Milk Hudak, Binghamton, NY area coordinator, Pure Food Campaign, reported on the introduced Bovine Growth Hormone Act (H.R. 4618) which has three primary titles:

Title I: Requires mandatory labelling of milk and milk products produced by rBGH-injected cows.

Title II: Provides that the increase in costs to the government which are attributable to the use of rBGH will only be assessed against the price received for milk produced by cows injected with rBGH. Hence the average taxpayer will be spared the expense of the government having to buy surplus milk that results from the use of rBGH. Estimated savings are \$500 million over the next five years.

Title III: Mandates development of a test to detect rBGH in milk, and therefore assure compliance with labeling laws. The test will be available to public health and agricultural agencies. (Although Monsanto, manufacturer of rBGH, has argued that no test for rBGH is possible, European scientists have reported (Journal of Immunoassay, March 1994) using such a test in their lab and appear to have laid the groundwork for a commercial test.)

As of July 25th only six New York federal representatives had co-sponsored this legislation. Representatives will support this legislation only if they hear from their constituents! If you are in favor of H.R. 4618, begin by phoning or writing your representative, urging him/her to co-sponsor this legislation. (Note that legislators are obligated to respond only to written correspondence).

15Written statements were made by the Hon. Gary L. Ackerman, member of Congress from New York; Mr. Calvin W. Watkins, Acting Administrator, Packers and Stockyards Administration, U.S. Department of Agriculture, Washington, D.C.; Mr. Eric Sakach, Investigator, West Coast Regional office, The Humane Society of the United States, Sacramento, California; Mr. Eugene Underwood, Jr., Senior Vice President and General Counsel, The American Society for the Prevention of Cruelty to Animals, New York, New York; Dr. Lowell Wilson, Professor of Animal Science, Pennsylvania State University, University Park, Pennsylvania, on behalf of the Farm Animal Welfare Coalition; and Mr. Ken Jordan, Owner/operator, Jordan Cattle Auction, San Saba, Texas, on behalf of the Livestock Marketing Association.

16Members of the Guide Development Committee are Joy Mench (Univ. Calif.-Davis), Chair; Jack Albright (Purdue) Chair, Dairy & Veal Subcommittee; Margaret Benson (Mich. State) Chair, Sheep & Goat Subcommittee; Jim Craig (Kansas State) Chair, Poultry Subcommittee; Katherine Houpt (Cornell) Chair, Horse Subcommittee; John McGlone (Texas Tech) Chair, Swine Subcommittee; Neal Merchen (Univ. Illinois) Chair, Beef Subcommittee; William Klvasnicka (Univ. Nevada) Chair, Veterinary Subcommittee; Les Christianson (Univ. Illinois)

Chair, Ag Engineering Subcommittee; Adele Douglass (American Humane Association) Community Representative; and Stan Curtis (Penn State) FASFAS Liaison to the Steering and Development Committee.

17Webster, J. 1993. *Understanding the Dairy Cow*. 2nd ed. Blackwell Scientific Publ. Oxford, UK.

18Blood, E.C., D.M. Radostits and J.A. Henderson. 1983. *Veterinary Medicine*. 6th ed. Balliere Tindall, London, UK

19Many veterinary papers could be cited here. For field research under commercial conditions see Shearer, J.K., J.B. Elliott, R.G. Geisy and R.E. Injoque. 1995a. Effect of Oxytetracycline topical spray treatment on prevalence of digital dermatitis in 4 herds. *J. Dairy Sci. (Suppl. 1)* 78:257 (Abstr.) and Shearer, J.K., J.B. Elliott and R.E. Injoque. 1995b. Control of digital dermatitis in dairy herds using a topical spray application of Oxytetracycline. *J. Dairy Sci. (Suppl. 1)* 78:170 (Abstr.).

20The National Cattlemen's Beef Association is working with scientists and appropriate government agencies to consider additional steps to ensure we are not at risk from BSE in the United States. A March 26, 1996 Advisory Memo covered Q & A regarding BSE to provide more information about the disease and steps taken to verify it does not exist in the U.S., and to prevent its introduction.

If you have questions, please contact: Gary Weber, Ph.D. at (202)347-0228 or Marietta Buyck (312)467-5520 or Rick McCarty at (303)694-0305.

21Ken Olson, American Farm Bureau Federation, dairy policy specialist wrote the article "Mad Cow concerns high, U.S. control measures in place". *Farm Bureau News* Vol. 75(14):2. April 8, 1996 issue.

22Editorial Page. Be thankful you've never heard of BSE. Vol. 141(2):58. January 25, 1996 issue.