

## CRITICAL CONTROL POINTS OF ANIMAL HANDLING AND STUNNING TO IMPROVE MEAT QUALITY AND WELFARE

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**Background:**

Both research and practical experience has shown that improving handling and stunning procedures reduces bruises, PSE, blood-splash, and improve animal welfare. Grandin (1981, 1993) found that cattle handled roughly had twice as many bruises as cattle handled quietly. Cattle that became excited during handling had more borderline dark cutters and tougher meat. (Voisinet et al., 1997). Data collected in three different plants indicated that reduction of electric goad usage in the stunning race and careful handling of pigs resulted in 10 to 12% more pork which attained the quality standard for export from the U.S. to Japan. Warriss et al., (1994) reported that squealing in pigs was correlated with meat quality problems. In cattle vocalization (moos and bellows) are correlated with higher cortisol levels (Dunn, 1990). The author has observed that double electric stuns or sliding the electrode on the animal during the stun can increase petechial hemorrhages (blood splash) in pork.

There is a tendency for animal handling to become rough unless it is constantly monitored. Plants which have high standards of sanitation continually monitor microbiological counts. In most plants there is no similar monitoring system for handling and stunning. There is a need to determine the critical control points for maintaining high standards of handling and stunning. Measurement at these critical control points on a regular basis would assist in maintaining high meat quality and welfare standards.

**Objectives:**

The objective was to develop a practical scoring system for monitoring handling and stunning practices. This scoring system could be easily used by plant personnel, government inspectors or customers to assess the quality of handling and stunning practices.

**Method:**

Thirty-three beef and pork slaughter plants in the U.S. and Canada were visited. Data was collected at the following critical control points on 50 to 200 animals.

1A. Stunning Efficacy: Percentage of cattle rendered insensible with one shot from a captive bolt.

or

1B. Percentage of pigs with correct electrode placement.

2. Insensibility: Percentage of animals showing signs of sensibility on the bleed rail.

3. Vocalization: Percentage of animals that vocalize, (moo, bellow or squeal) during handling in the stunning race and restrainers. Each animal was scored as either a vocalizer or a non-vocalizer. Vocalization in the lairage were not tabulated.

4. Electric goads: Percentage animals poked with an electric prod (goad).

5. Slips and Falls: Percentage of animals that slip or fall during handling.

**Results and Discussion:**

Captive bolt stunning of cattle varied greatly from 100% of the cattle stunned correctly on the first attempt to only 50%. For 11 beef plants visited in 1996 the average first shot efficacy score was 90.5%. For 8 beef plants visited in 1998 the average was 89%. Four plants out of 19 (21%) had a perfect score of 100%. Poor stunner maintenance and poor ergonomics of bulky pneumatic captive bolts were the major causes of missed stuns.

For 10 pork plants visited in 1996 the correct placement of the electrodes to insure current passage through the brain varied from 100% to 90%. For three plants scored in 1998 the percentages were 100%, 100% and 99%. One plant was monitoring electrical stunning with a computerized stunner. It recorded double stuns and electrode slippage that can cause blood-splash. The management reported that the operator's performance declined after two hours due to fatigue.

Most plants allowed very few sensible animals to be hung on the bleed rail. Out of 33 plants only two allowed 4% to 6% of the cattle or pigs to reach the bleeding station showing obvious signs of sensibility. The rest of the plants had either 0% showing signs of sensibility or one animal showing questionable signs.

Vocalization was the single most useful measure for assessing handling. In cattle, individual animals could be easily scored as either a vocalizer or a non-vocalizer (Grandin 1998a). When a handling problem was corrected the percentage of cattle vocalizing was greatly reduced. Installation of a light at the entrance of a restrainer facilitated cattle movement and reduced the need to electrically goad the animals. The percentage of cattle vocalizing was reduced from 8% to 0%. Retraining employees in two plants to reduce the usage of electric goads resulted in the percentage of cattle vocalizing to be reduced from 22% to 7% (Grandin 1998b). The use of electric goads on these cattle was reduced from a mean of 83% to 17%. It was still possible to keep up with the line when goad use was reduced. In 6 out of 19 (32%) of the beef plants 3% or less of these cattle vocalized during handling in the stunning race. This is an indicator of good handling. Simple improvements in facilities to remove distractions that cause balking can assist in reducing the use of electric goads Grandin (1996). In most pork plants it was not possible to count individual pig squeals. Vocalization scoring of pigs could be conducted with a sound meter. In the three best plants which had very calm handling, individual squeals could be counted. These three plants specialized in producing high quality pork for both the export and U.S. domestic market. They had chainspeeds of 850 to 940 per hour going into the chiller. At 1000 pigs per hour quiet handling is impossible because the line speed exceeds the natural slow walk of the pig. Electric goads are used to speed the pigs up. Many plants in the U.S. are dividing lines that handle 1000 pigs per hour into two lines that run at 600 or less per hour. Careful observations of both pigs and cattle indicated that animals vocalize in a direct response to aversive events such as being shocked with an electric goad, slipping or falling, poor stunning or pinched by a restraint device. Cattle have a natural behavior to walk in single file. Therefore, they can be moved very quietly through curved single file races. Pigs, however, resist lining up in single file races. This is a difference in the behavior between pigs and cattle.

Comparisons of electric goad scores between plants was difficult because the power of the goads varied greatly from plant to plant. Electric goads with strong shocks caused both pigs or cattle to vocalize. In plants where slipping or falling occurred vocalization increased. Slipping in the cattle stun box was a problem in several plants. Vocalization scoring is more important than scoring electric goad use. Vocalization should only be scored during actual handling or stunning. Animals standing undisturbed in the lairage will often vocalize to each other. Vocalization scoring should not be used in sheep.

#### Conclusions:

Objective scoring of critical control points will assist plant management, customers and government inspectors in assessing the quality of handling and stunning. The scoring system described in this paper is currently being used by McDonald's Corporation, the American Meat Institute, the US Department of Agriculture and progressive management in meat plants.

#### Pertinent Literature:

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