The relationship between reaction to sudden, intermittent movements and sounds and temperament


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ABSTRACT: Casual observations indicated that some cattle are more sensitive to sudden movement or intermittent sound than other cattle. Six commercial livestock auctions in two states and a total of 1,636 cattle were observed to assess the relationship between breed, gender, and temperament score on the response to sudden, intermittent visual and sound stimuli, such as the ringman swinging his arm for a bid and the sound of him briefly yelling a bid. A 4-point temperament score was used to score each animal while it was in the ring. The scores used were 1) walks and (or) stands still, with slow, smooth body movements; 2) continuously walks or trots, and vigilant; 3) gait is faster than a trot (runs even a couple of steps), with fast, abrupt, jerky movements, and very vigilant; and 4) hits the ring fence, walls, partitions, or people with its head. Animals were observed for flinches, startle responses, or orientation toward sudden, intermittent sounds, motions, and tactile stimulation, such as being touched with a cane or plastic paddle. The cattle observed were mostly Bos taurus beef breeds and Holstein dairy cattle. Holsteins were more sound-sensitive (P = .02) and touch-sensitive (P < .01) than beef cattle. Sensitivity to sudden, intermittent stimuli (e.g., sound, motion, and touch) increased as temperament score (excitability) increased. Cattle with a temperament score of 1 were the least sensitive to sudden, intermittent movement and sound and those with a temperament score of 4 were the most sensitive (P < .01). This same relationship was sometimes observed for touch but was not statistically significant. Motion-sensitive cattle were more likely than nonsensitive cattle to score a temperament rating of 3 or 4 (P < .01). Steers and heifers were more motion-sensitive than the older bulls and cows (P = .03). Beef cattle urinated (P < .01, n = 1,581) and defecated (P < .01, n = 1,582) more often in the ring than did dairy cattle. Cattle that became agitated during handling in an auction ring were the individuals that were most likely to be startled by sudden,
intermittent sounds and movements. Reactivity to sudden, intermittent stimuli may be an indicator of an excitable temperament.

Key Words: Cattle, Responses, Sounds, Temperament

Introduction

There is an increasing interest in management options for improving animal welfare. There has been extensive research conducted to assess stress associated with handling and husbandry procedures (Mitchell et al., 1988; Lay et al., 1992; Zavy et al., 1992; Rushen et al., 1998). There is a significant relationship in cattle between temperament and productivity. Cattle that became agitated during restraint in a squeeze chute had lower weight gains and tougher meat (Voisinet et al. 1997a,b). Burrow and Dillon (1997) found that cattle that exited more slowly from a squeeze chute had greater weight gains than those that exited the squeeze chute quickly. Drugociu et al. (1977) reported that dairy cows with calm temperaments had increased milk production. Stressful treatment during growth can have adverse effects on meat quality in lambs (Bramblett et al., 1963). Producers are becoming increasingly interested in assessing temperament because excitable animals have reduced weight gain (R. D. Green, unpublished data). Temperament is definitely heritable (Shrode and Hammack, 1971; Hearnshaw and Morris 1984; Fordyce et al. 1988).

Casual observations at auctions indicated that cattle in the auction ring are most likely to flinch and startle in response to sudden, intermittent stimuli such as a ringman waving his arm or yelling for a bid and children running near the ring. The purpose of the study was to determine whether the reaction of cattle to sudden, intermittent motions, sounds, and touch in an auction ring is related to their overall temperament. This could be useful to producers for temperament-testing cattle.

Materials and Methods

Animals

Two observers collected data in six different commercial auctions during the summer of 1998. Five auctions were located in Colorado and the sixth was in Texas. All five auction houses in Colorado were east of the Rocky Mountains. Two were located in the north, one in central Colorado, and the last two in southern Colorado. The Texas auction house was 161 km from Fort Worth. A total of 1,636 beef cattle were observed. They were 74.4% British and European breeds (Bos taurus) and 21.4% Holsteins (Bos taurus). Ninety-three Bos indicus cattle consisted of Brahman, Watusi, and crosses with Bos taurus breeds. Most of the European and British breeds were Angus, Hereford, Charolais, Simmental, and their crosses. Breeds were categorized
based on the auctioneer's announcement of cattle breeds. Cattle with longer ears, loose dewlap, and a dorsal hump were classified as Brahman crosses. Single cattle (n = 1,543, 94.3%) and cow/calf pairs (n = 93, 5.7%) weighing 182 kg or greater were recorded. Only 3.2% of the total sample were Brahman or Brahman cross. Interviews with ranchers indicated that they were not selling their heat-tolerant cattle (Brahman or Brahman crosses) due to drought conditions. Data were collected only on the cow when a cow-calf pair was sold. Cattle weighing less than 182 kg were considered juveniles and were not part of the study. Data were collected while each animal was in the auction ring, while the gates were closed and the auctioneer was soliciting bids. Animals that initially entered the ring alone or with a calf were scored. Cattle that were taken out of the ring and later brought back through were not scored.

Observers

Observers were always centered in the first to third rows of seats nearest the auction ring or 3 m from the center, toward the gate from which the cattle entered the sale ring. Seating near the entrance gate was ideal for the collection of data because the majority of the cattle remained in this area of the ring during bidding. Inter- and intra-rater reliability tests conducted at two of the auctions used in the study, with two separate observers, demonstrated reliability between the two experienced observers (P> .05). However, the reliability does decrease if the observer is unfamiliar with cattle behavior, cattle flight zones, or has not previously practiced scoring cattle behavior in an auction ring.

Prior to the collection of data, the observers practiced the recording of data at three different auctions (140 cattle). These data were used to refine methodology and were not included in the study. During the study, the first 10 animals observed at each new auction were used for practice and were not included in the analysis of data.

Scoring Temperament

The first observer collected data on animal weight, breed, color, and gender (bull, steer, cow, or heifer). A second observer collected behavioral data. Both observers sat in the spectator area of the auction barn, and both had full view of the animals and the auction ring. Reactivity to external stimuli (e.g., noise, being touched) was not used to determine temperament score. Activity level of each animal was the primary scoring criterion, followed next by the head and neck position of the animal. All scoring was done while the amplified auctioneer chanted. Each animal was in the auction ring for a period of approximately 15 to 30 s.

Temperament Rating: Activity Level in the Auction Ring.

The following scoring system was used to rate cattle behavior in the auction ring:

1 = Walks and(or) stands still. Slow smooth body movements. Head and neck in a
lowered, relaxed position. The head and neck may be thrust forward.

2 = Continuously walks or trots. Vigilant. Head and neck is slightly raised above back, slightly lowered below back, or level with back.

3 = Gait is faster than a trot (runs even a couple of steps). Fast, abrupt, jerky movements. Very vigilant.

4 = Hits the ring fence, walls, partitions, or people with its head. Contact with the ring fence, walls, partitions, or people due to licking, smelling, or bumping into or brushing up against with its body were not considered as a rating of 4. A 4 was given if the animal attempted to go under, through, or jump or climb over a barrier, regardless of activity level (i.e., standing, walking, or running).

Behavior Rating: Aggression or Escape.

Animals that were rated as either a 3 or a 4 were further rated for aggressive behavior (A), or escape behavior (B):

(A) Aggression behavior = Pawing the ground while the head is lowered, lunging forward at a person or object with the head slightly lowered, lowering and shaking head at a person or object, or charging a person or object. Aggressive behavior head position: Head and neck were held high above back held close to the ground, or slightly raised above back.

(B) Escape behavior = Head and neck were stretched forward and either slightly raised above back, slightly lowered, or level with back.

For example, a cow that was walking continuously around the ring with its head held slightly raised above its back would rate a 2. However, if the cow then attempted to climb out of the auction ring, the rating of 2 would be void and she would be recorded as an "escape" 4.

Scoring Animal Response to Sudden, Intermittent Environmental Stimuli

Animals that flinched and (or) oriented immediately toward a sudden sound, motion, combination of sound and motion, or touch were scored as sensitive to those particular stimuli. A flinch was scored if the animal gave a startle response or its skin quivered immediately after the stimulus. The auction houses would not allow the use of a controlled movement or sound stimulus to test each animal's startle reaction. One hundred forty cattle were observed in three different practice auctions to determine the naturally occurring intermittent movements, sounds, and touches that were most likely to cause cattle to flinch, jump, quiver, or orient.
Stimuli Scoring

The following naturally occurring intermittent movements, sounds, and touch stimuli were used. Movements: 1) ringman swinging an arm to take a bid; 2) audience deliberately waving at an animal; or 3) young children running within 2 m of the ring. Sounds: 1) ringman briefly yelling a one-syllable bid without the aid of a microphone; 2) air hoses used to move cattle outside of the auction ring but audible in the spectator seating; 3) children yelling; or 4) a "rattle-paddle" shaken or hit on a wall or fence. Touch stimuli: 1) hit with a paddle, cane, or whip by the ringman; or 2) poked with a cane by the audience.

Movements related to startle response and not flight zone were recorded. To avoid being confounded by an animal reacting to a movement made directly in front of its face, motions that were close to the animal's face were not scored. All other occurrences of the above movements, touches, and sounds were scored. The observer must have been able to discern between an animal reacting to a movement that applies pressure to the flight zone and causes the animal to move away, and a movement that does not affect the flight zone and causes a startle response. Response of an animal to a stimulus was not used in determining the animal's temperament. For example, if the ringman touched a cow with a cane, and the cow jumped and flicked her ears, a temperament rating based on this response was not given.

Animals exposed to the above movements, sounds, and touches were scored. Animals were either scored as "yes," sensitive, or "no," not sensitive. Reactions of an animal to sudden environmental stimuli used to score an individual as "yes," included flinching, jumping, whole body quivers, and ear and (or) head orientation toward the stimulus. Only one of the criteria was needed in order for an animal to be scored as sensitive to sudden environmental stimuli. Reactions to motion, tactile stimulation, and combinations of auditory and visual (motion) stimulation were scored as discrete binomial variables.

Scoring of an animal's reactivity to sudden sounds, motion, or being touched was recorded for those animals for which the stimulus occurred while the animal was in the ring and the auctioneer was chanting. The first sound, motion, and touch detected by the observer were used for scoring sensitivity. Inter-observer reliability tests demonstrated that neither all behaviors nor reactions to all behaviors could be reliably observed and recorded, due to the speed of the auction. It was found that inter-observer reliability was very high (92%) if each observer recorded the first behavior that he or she observed, rather than attempting to record the first behavior that occurred.

If a sudden stimulus occurred while the auctioneer was silent, the response was not scored. This was done for consistency for the type of background noises all animals would receive, and to control variance. In addition, during the practice recording of cattle behavior in the auction ring, it was observed that the constant chant of the auctioneer appeared to separate out those cattle that had become accustomed to a low volume of noise and stress but that were actually reactive under extreme conditions. Reactivity to external stimuli was not used to determine temperament.
Animals that urinated and/or defecated in the auction ring were recorded as either "yes," they did, or "no," they did not.

**Statistical Analysis**

Data analyses were conducted with the use of chi-square (SAS, 1991). The effect of breed and gender were controlled for by chi-square and the logistic regression genmod procedure (SAS, 1995). The GLM procedure (SAS, 1985) controlled for auction, breed, and gender. Results and conclusions were identical from both analytical methods. Intra- and inter-observer reliability were verified using a paired t-test (SAS, 1991).

**Results**

The breakdown of gender within Holsteins was 4.4%, 8.5%, 6.8%, 80.3% for steers, bulls, heifers, and cows, respectively. Genders of the beef-type cattle were 7.2%, 21.4%, 15.8%, and 55.6% for steers, bulls, heifers, and cows, respectively.

**Sound Sensitivity**

There were differences in responses to sudden, intermittent sounds among the temperament score groups (Table 1) (chi-square 51.31, P < .01, n = 928; GLM P < .01, F = 18.03). Analysis by least significant differences found the same effect. Holstein cattle were significantly more sound-sensitive (P = .02, n = 918) than beef cattle. Of those individuals scored for sound sensitivity, 34.9% were Holstein and 27.4% were beef cattle. The percentage of bulls and steers that were aggressive in the sale ring and were sensitive to sound was 14.6% (P = .01, n = 64).

<table>
<thead>
<tr>
<th>Temperament score</th>
<th>Intermittent motion</th>
<th>Intermittent sound</th>
<th>Sound and motion</th>
<th>Touch</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>20.43% 38/186</td>
<td>13.07% 26/199</td>
<td>43.33% 13/30</td>
<td>29.41% 10/34</td>
</tr>
<tr>
<td>2</td>
<td>38.54% 227/589</td>
<td>29.58% 147/497</td>
<td>74.58% 88/118</td>
<td>47.62% 60/126</td>
</tr>
</tbody>
</table>
Motion Sensitivity

Motion-sensitive cattle were more likely to score a temperament rating of 3 or 4 than were non-sensitive cattle (chi-square = 85.27 P < .01, n = 1,082; GLM P < .01, F = 30.74) (Table 1). There was no significant difference between Holstein (38%) and beef cattle (44%) that were motion-sensitive (P = .13). The percentages of motion-sensitive cattle were 50.65% of the heifers, 38.26% of the cows, 43.27% of the bulls, and 46.91% of the steers (Table 2).

Sound and Motion Sensitivity

Sensitivity to sudden sound and motion, (e.g., a ringman swinging his arm upward as he called out a bid) increased as overall temperament score in the auction ring increased (chi-square = 15.42, P < .01, n = 190 GLM; P < .01, F = 5.48) (Table 1). There was no difference in reaction between Holstein and beef-type cattle for combinations of sound and motion sensitivity.

Table 2: Percentage and fraction of cattle that were sensitive to an environmental stimulus

<table>
<thead>
<tr>
<th>Animal</th>
<th>Intermittent motion</th>
<th>Intermittent sound</th>
<th>Sound and motion</th>
<th>Touch</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>61.02 % 180/295</td>
<td>42.34 % 94/222</td>
<td>82.5 % 33/40</td>
<td>52.17 % 24/46</td>
</tr>
<tr>
<td></td>
<td>66.67 % 8/12</td>
<td>70.0 % 7/10</td>
<td>100 % 2/2</td>
<td>33.3 % 1/3</td>
</tr>
<tr>
<td>Heifers</td>
<td>50.65 % 77/152</td>
<td>34.09 % 45/132</td>
<td>82.61 % 19/23</td>
<td>63.64 % 14/22</td>
</tr>
<tr>
<td>Cows</td>
<td>38.26 % 251/656</td>
<td>31.94 % 183/573</td>
<td>70.53 % 79/112</td>
<td>38.52 % 47/122</td>
</tr>
</tbody>
</table>

a All are significant at the P .05 level (GLM and chi-square; SAS, 1985) except for touch sensitivity. Fractions are actual numbers. The numerator is the number of animals sensitive. The denominator is the total number of animals with that particular ring score that were scored for sensitivity. Ring scores ranged from 1 for a calm animal to 4 for a highly agitated animal.
<table>
<thead>
<tr>
<th>Cattle Type</th>
<th>Heifers</th>
<th>Cows</th>
<th>Steers</th>
<th>Bulls</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Holstein cattle only</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heifers</td>
<td>31.58 % 6/19</td>
<td>58.82 % 10/17</td>
<td>100.00 % 2/2</td>
<td>80.00 % 4/5</td>
</tr>
<tr>
<td>Cows</td>
<td>35.15 % 84/239</td>
<td>33.33 % 71/213</td>
<td>82.35 % 14/17</td>
<td>57.90 % 11/19</td>
</tr>
<tr>
<td>Steers</td>
<td>50.00 % 7/14</td>
<td>55.56 % 5/9</td>
<td>0.00 % 0/2</td>
<td>66.67 % 2/3</td>
</tr>
<tr>
<td>Bulls</td>
<td>60.00 % 12/20</td>
<td>23.53 % 4/17</td>
<td>100.00 % 10/10</td>
<td>81.82 % 9/11</td>
</tr>
<tr>
<td><strong>Beef-type cattle only</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heifers</td>
<td>53.23 % 66/124</td>
<td>58.82 % 10/17</td>
<td>84.21 % 16/19</td>
<td>62.50 % 10/16</td>
</tr>
<tr>
<td>Cows</td>
<td>40 % 162/405</td>
<td>33.33 % 71/213</td>
<td>68.89 % 62/90</td>
<td>35.35 % 35/99</td>
</tr>
<tr>
<td>Steers</td>
<td>46.15 % 30/65</td>
<td>55.56 % 5/9</td>
<td>50.00 % 5/10</td>
<td>45.45 % 5/11</td>
</tr>
<tr>
<td>Bulls</td>
<td>41.53 % 76/183</td>
<td>23.53 % 4/17</td>
<td>67.57 % 25/37</td>
<td>50.00 % 22/44</td>
</tr>
</tbody>
</table>

All are significant at the P .05 level. Fractions are actual numbers. The numerator is the number of animals sensitive. The denominator is the total number of animals of that--that were scored for sensitivity to the stimulus.

**Touch Sensitivity**

Holsteins were significantly more touch-sensitive (P <.01, n = 208) than beef cattle (Table 2).
Heifers (63.6%) were the most touch-sensitive, followed by bulls (55.4%), steers (50.0%), and cows (38.5%) \((P = .05, n = 214)\) (Table 2).

**Combined Stimuli Effects**

Ninety-one percent of the motion-sensitive bulls and steers and 89% of the cows and heifers were sensitive to combinations of sound and motion \((P < .01, n = 42, \text{ and } P > .01, n = 72, \text{ respectively})\). Sixty-nine percent of the cows and heifers that were sound-sensitive were also sensitive to being touched \((P .01, n = 32)\).

**Gender Differences**

Differences between temperament score and ~were found. Bulls were the calmest in the auction ring, followed by cows. Steers and heifers were the most agitated in the ring \((P < .01, n = 1,614)\).

**Urination and Defecation**

Beef cattle urinated \((P < .01, n = 1,581)\) and defecated \((P < .01, n = 1,582)\) more often in the ring than dairy cattle \((95\% \text{ of beef cattle vs } 5\% \text{ of Holsteins and } 85\% \text{ of beef cattle vs } 15\% \text{ of Holsteins, respectively})\). Bulls and steers defecated in the ring more often than females \((P < .01, n = 1,635)\). Cattle with a temperament rating of 3 or 4 were less likely to defecate in the auction ring \((P < .01, n = 1,613)\). These highly excitable cattle probably defecated before reaching the auction ring.

**Auction Effect on Temperament**

The effect of auction on all measured behaviors except vocalization and motion sensitivity was significant \((P < .05)\). Motion sensitivity was not affected by auction (location). Temperament scores at some auctions were significantly higher \((P < .05)\) than at other auctions.

**Discussion**

Our results indicate that reactivity to intermittent sounds and sudden movements is significantly related to numerical ranking of cattle temperament during handling in a commercial auction ring. One of the advantages of observing cattle in commercial auction houses was that it made it possible to observe very large numbers of cattle. The disadvantage of commercial auctions was that it was not possible to control all the variables. Conducting observations in six different auction houses and visiting the auctions more than once (except for the Texas auction) helped prevent variables that were unique to one auction from confounding the results. Eight auction houses were visited but two were not used in our observations because rough handling and over use of electrical prods made a very high percentage of animals become extremely agitated with a
temperament score of 3 or 4. Differentiation of the temperament scores and observing the 
animal's reaction to intermittent stimuli would have been impossible. Correlation between 
methods used to move animals and temperament scores were not evaluated.

The sounds that were most effective for eliciting a response were often accompanied with 
sudden movement (e.g., the ringman shouting while swinging an arm into a raised position). 
Stimuli that were most effective for eliciting a startle response were intermittent, high-pitched 
sounds and sudden movements. In rats, sound pulses of 3,000 to 7,000 Hz elicited less of a 
startle response than sound pulses of 15,000 to 23,000 Hz (Blaszczyk and Tajchert, 1997).

The intermittent stimuli chosen in our observations were based on observations made at the 
three different auctions used for practice. The stimuli chosen were the ones that were most 
effective for eliciting a startle reaction. We noticed that high-pitched, intermittent sounds of the 
ringman yelling "hey" or a young child yelling had a greater effect on the cattle than the 
amplified auctioneer's chant, gates slamming, or phones ringing. Waynert et al. (1999) found 
that sounds made by people while handling cattle had a greater effect on heart rate and reactivity 
than equipment sounds such as gates banging. Pajor et al. (1999) reported that shouting at cows 
was very aversive. Our own observations indicated that the constant sound of the auctioneer's 
chant did not directly elicit a startle response compared to sudden, intermittent stimuli. 
However, the background noise of the chant may sensitize the animal to intermittent stimuli. 
Research with rats shows that a constant background noise enhances an acoustic startle response 
(Schanbacker et al., 1996). High-pitched sounds have a greater effect on an animal's heart rate 
than low-pitched sounds (Talling et al., 1996). High-pitched sounds with a rising pitch are used 
in dog training to signal an animal to do something. For example, a whistle signals an animal to 
come. A low-pitched sound is used to inhibit an activity (McConnell, 1990).

Talling et al. (1996) reported that piglets had increased heart rates when they were exposed to 
high-frequency and high-intensity (sound pressure) sounds, whereas piglets' movement was 
associated only with loudness. In another experiment (Talling et al., 1998), swine exposed to 
intermittent, sudden sounds were more reactive than when they were exposed to a constant 
sound. This study is of particular interest because it showed that intermittent sounds had a 
greater effect.

Cattle and horses have ears that are more sensitive than human ears. They are especially 
sensitive to high-frequency sounds (Heffner and Heffner, 1983; Grandin 1996; Smith, 1998). 
Therefore, noises that are a whisper to humans are quite audible to cattle. Trnka (1977) reported 
an inverse relationship between level of sound and abnormal behavior in dairy cattle. Noises in 
auction houses are diverse in frequency and source, so auction houses provide a good setting for 
observing cattle's reaction to intermittent sound.

The physiology of the eye and how that relates to instinctual behavior may explain the results 
found for reaction to a sudden motion. Prey species have visual adaptations for survival in the 
wild (Craig, 1981). In general, these adaptations are wide field of vision (especially while the
head is lowered) (Prince, 1970; Coulter and Schmidt, 1993) and bulbous eyes on the side of the head. They also have slit-shaped pupils, whereas most predatory animals have round pupils (Smith, 1998). Grazing animals have a smaller binocular field of vision than predatory animals and a reduced ability to see objects above them compared to humans (Prince, 1970; Lynch et al., 1992). Prey animals have relatively weak eye muscles, which inhibits the ability to quickly focus on nearby objects; this may explain the tendency of horses to shy from nearby, sudden movement (Prince, 1970; Coulter and Schmidt, 1993). While grazing, the visual system of a prey animal has an increased ability to detect movement, which helps protect the animal from predators. The latest research indicates that cattle, sheep, and goats are dichromats with cones that are most sensitive to yellowish-green (552 to 555 nm) and blue-purple (444 to 445 nm) light (Jacobs et al., 1998). Dichromatic vision may provide an animal with better vision for detecting motion than full color vision (Pick et al., 1994; Miller and Murphy, 1995). LeDoux (1996) states that sudden movements have the greatest activating effect in the amygdala. The amygdala is a region in the brain that controls fearfulness (LeDoux, 1996; Rogan and LeDoux, 1996).

It is possible that motion-sensitive cattle are simply ineffective at visual search (Humphreys, 1996) and have a greater desire to orient to an object (e.g., the exit) than their conspecifics that are not motion-sensitive. Like horses, cattle may have the tendency to shy from sudden motion because of the morphology of their eyes.

There was no difference in temperament between single animals alone in the ring and cows with calves at their sides. It was not within the scope of this study to investigate the behavior of larger groups of animals. Grouped cattle tend to be less behaviorally agitated during routine handling (Ewbank, 1968; Grandin, 1987).

The differences found between genders were also expected. Voisinet et al. (1997b) found that heifers were more excitable than steers. Fleming and Luebke (1981) demonstrated that virgin female rats were more excitable than mature male rats. Hard and Hansen (1985) found that female rats became less fearful after parturition and the onset of lactation. This may explain why cows had lower temperament scores than heifers.

Predictions of cattle temperament in unfamiliar environments are becoming increasingly important in today's cattle industry. Animals that are calm and placid on their ranch may become agitated and stressed when they are confronted with a novel situation such as the fair grounds, feedlots, auctions, and slaughterhouses (Grandin, 1997; Grandin and Deesing, 1998). This is especially a problem in cattle that have an excitable, nervous temperament. Visual stimuli can disrupt handling (Grandin, 1996, 1980). Both cattle and deer orient and face a moving person in a field (Grandin and Deesing, 1998; Hodgett et al., 1998). On detection of motion, prey species visually orient to the source of the movement and watch until they determine that the stimulus is or is not a danger. After such a determination, the animal either returns to its previous activity or takes appropriate evasive action (B. J. Smith, personal communication, 1999). This reaction to visual stimuli can adversely affect smooth animal handling. For example, cattle that are going down an alley may balk at seeing a hat blowing in the wind. After the cattle have determined
that the hat is not a danger, they will proceed calmly down the alley.

Temperament scores at some auctions were significantly higher ($P < .05$) than at other auctions. This may be due to differences in animal handling before the cattle entered the auction ring. No data regarding animal handling outside of the auction ring were collected. Electrical prods were used extensively and indiscriminately in the two auctions in which data were not collected. Use of electrical prods in this manner caused normally calm cattle to become agitated and aggressive and (or) to injure themselves during the auction. The relationship between overall behavior in the auction ring and reactivity to sudden, intermittent stimuli was significant in all six auction houses. The differences in animal handling between auctions may have had an effect on cattle temperament. Two auctions in Texas were excluded from the study because the extremely rough handling and excessive electrical prodding caused all animals that entered the auction ring to run (ring score of 3). All other auctions surveyed had a consistent percentage of animals in each ring score and therefore the effect of auction handling on temperament was thought to be minimal. No data on individual auction handling practices, other than brief notes, were collected.

A survey conducted by R. D. Green (unpublished data) found commercial cow/calf producers ranked disposition, after birth weight, as their second most important selection trait in bulls. Their top three reasons for desiring bulls with calm dispositions were 1) excitable bulls lose weight, 2) temperament is heritable, and 3) there is a high labor cost associated with wilder cattle. Producers know that calm handling of cattle (Stricklin and Kautz-Scanavy, 1984) and calm cattle (Burrow and Dillon, 1997; Voisinet et al., 1997a,b; Smith 1998) can increase productivity.

**Implications**

Cattle that become agitated during handling in an auction ring are more sensitive to sudden touches and sudden, intermittent movements and sounds, such as the ringman yelling and waving his arm, a plastic "rattle-paddle" slapping a fence, or children yelling or running. Reactivity to intermittent stimuli may be useful for predicting which cattle would be more likely to become agitated when exposed to a new place such as an auction, feedlot, or meat packing plant.

**Literature Cited**


cross feedlot cattle with excitable temperaments have tougher meat and a higher incidence of borderline dark cutters. Meat Sci. 46:367-377

