Cattle with hair whorl patterns above the eyes are more behaviorally agitated during restraint

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Accepted 7 July 1995
APPLIED ANIMAL BEHAVIOUR SCIENCE

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Publication information (ISSN 0168-1591). For 1995 volumes 43–46 are scheduled for publication. Subscription prices are available upon request from the Publisher. Subscriptions are accepted on a prepaid basis only and are entered on a calendar year basis. Issues are sent by surface mail except to the following countries where air delivery via SAL mail is ensured: Argentina, Australia, Brazil, Canada, Hong Kong, India, Israel, Japan, Malaysia, Mexico, New Zealand, Pakistan, PR China, Singapore, South Africa, South Korea, Taiwan, Thailand, USA. For all other countries airmail rates are available upon request. Claims for missing issues must be made within six months of our publication (mailing) date. Please address all your requests regarding orders and subscription queries to: Elsevier Science B.V., Journal Department, P.O. Box 211, 1000 AE Amsterdam, The Netherlands. Tel.: 31-20-4853642, fax: 31-20-4853598.

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Abstract

Hair whorl position on the forehead may be of value in selecting breeding cattle for a calm temperament. A total of 1500 cattle weighing 180-360 kg were temperament rated on a four-point scale. Seventy-two percent of the cattle were European × British breed crosses and 28% were Zebu × dairy breed crosses from Mexico. Cattle with a round hair whorl located above the eyes became significantly more agitated while they were restrained in a squeeze chute (crush) compared to cattle with a hair whorl located either between the eyes or below the eyes. For both the Bos taurus and Bos indicus crossbreeds, animals with hair whorls located below the eyes were rated calmer. There is a positive linear relationship \((P<0.001)\) between cattle temperament while restrained in a squeeze chute and the location of facial hair whorls. The cattle observed in this study were extensively raised and had a large flight zone when approached by people. Casual observations indicate that the relationship between hair whorl position and temperament is most easily observed in cattle that do not have daily close contact with people.

Keywords: Hair whorls; Temperament; Restraint; Handling

1. Introduction

There is a need to develop easy ways to select cattle with a calm temperament. Cattle with an excitable temperament are more difficult and dangerous to handle. Temperament rating methods used by Grandin (1993) and Fordyce et al. (1988) are useful for temperament assessment of older animals, but they are less valuable for assessment of temperament in very young calves. There is an increasing need to develop methods for measuring temperament as observations by the authors indicate that indiscriminant selection for lean
cattle with rapid growth is producing more excitable, difficult-to-handle cattle (Grandin, 1994).

Horse trainers have casually observed that the position of round hair whorls (trichoglyphs) on a horse’s forehead is related to temperament (Tellington-Jones and Bruns, 1985; Barker, 1990; Friedly, 1990). The second author has observed during his work as a horse trainer that hair whorl position has been useful in predicting the behavior of a horse during training. The objective of this study is to determine if there is a relationship between hair whorl position and temperament in cattle. Hair whorl position could then possibly be used for predicting future temperament traits in very young calves.

2. Animals, materials and methods

Heifers and steers (n = 1500) weighing 180–360 kg were temperament rated while restrained in a squeeze chute (crush) for vaccination, ear tagging and other routine husbandry procedures. Fourteen different groups of cattle from different origins were observed during routine handling at a large commercial feedyard in Colorado. The size of the groups ranged from 90 to 300 cattle and the animals had been purchased from different ranchers and auctions. Seventy-two percent of the cattle were European Continental x British breed crosses and 28% were Zebu x dairy breed crosses from Mexico. The Bos taurus European Continental x British breed crosses consisted of a mixture of crosses which varied from group to group of Hereford, Angus, Gelbvieh, Salers, Charolais, Simmental and Limousin. The Zebu x dairy breed crosses consisted mainly of one-half to one-quarter Zebu crossed with either Holstein, Brown Swiss or Jersey.

Each animal was individually restrained in a hydraulic squeeze chute (C&S Equipment Company, Garden City, Kansas, USA). The head of each animal was restrained in a stanchion (head bail; C&S Equipment Company) clamped around its neck and the body was held between two squeeze panels.

Data were also analyzed using the General Linear Models procedure regression (Statistical Analysis Systems Institute Inc., 1985). Means of among group comparisons were made on temperament and hair whorl variables using analysis of variance. Chi-square analysis was conducted on cattle that received the highest temperament rating of 4 and the lowest rating of 1.

2.1. Temperament ratings

One observer stood by the squeeze chute and scored each animal on a four-point scale. The rating was made after the head was clamped in the stanchion. The ratings were: 1, calm, no movement; 2, restless, shifting weight; 3, head throwing, squirming and occasionally shaking the squeeze chute; 4, violently and continually shaking the squeeze chute. Animals that reared in the squeeze chute were also given a 4 rating. A four-point rating scale was used instead of the five-point rating scale used by Grandin (1993) because the cattle were restrained in a hydraulic squeeze chute. A hydraulic squeeze chute grips the animal more tightly and makes it more difficult to differentiate between different ratings compared to the manually operated squeeze chute used by Grandin (1993).
A second rating of behavior while exiting from the squeeze chute was also recorded. The ratings were: 1, calm, exiting at a walk; 2, exited at a trot or backed up briefly into the rear tailgate before exiting at a trot; 3, the animal immediately jumped out of the squeeze chute and ran, or it backed up against the rear tailgate and refused to exit until it was tapped on the hindquarters. All animals with a rating of 3 ran rapidly out of the squeeze chute. The person doing the temperament ratings stood on the ground about 3 m away from the squeeze chute near the rear tailgate. From this position, the hair whorls on the animal’s forehead could not be seen. Solid sides on the lead-up race prevented observation of the foreheads of cattle waiting to enter the squeeze chute. Therefore, the person doing the temperament rating was blind to the hair whorl position.

2.2. Hair whorl measurements

Hair whorl position was recorded by another person as each animal entered the squeeze chute. This person was positioned on a catwalk immediately behind the rear tailgate of the squeeze chute. Standing on the catwalk enabled the observer to have a clear view of hair whorl position by looking over the top of the solid sides on the leadup race. The center of the hair whorl was used as the reference point to determine its position. The hair whorl position was categorized as: ‘high’ if the center was above the top of the eyes; ‘middle’ if the center was located between the top of the eyes and the bottom of the eyes; ‘low’ if the center was located below the bottom of the eyes (Figs. 1 and 2). Animals with two spiral hair whorls side by side (doubles) and no hair whorls on the forehead (none) were also recorded.
3. Results

Cattle with a hair whorl above the eyes were more agitated both in the squeeze chute and while exiting from the squeeze chute (Table 1). There is a positive linear relationship \((P < 0.001)\) between cattle temperament while restrained in the squeeze chute and the location of the facial hair whorl. The results suggest the higher the facial hair whorl on the

<table>
<thead>
<tr>
<th>Hair whorl type</th>
<th>High</th>
<th>Middle</th>
<th>Low</th>
<th>None</th>
<th>Abnormal</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No. animals</td>
<td>Rating</td>
<td>No. animals</td>
<td>Rating</td>
<td>No. animals</td>
</tr>
<tr>
<td>Temperament in</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>183</td>
<td>2.39 ± 0.06a</td>
<td>338</td>
<td>2.15 ± 0.04</td>
<td>203</td>
</tr>
<tr>
<td>Spinal</td>
<td>19</td>
<td>2.21 ± 0.18</td>
<td>24</td>
<td>1.75 ± 0.16</td>
<td>45</td>
</tr>
<tr>
<td>Flare</td>
<td>17</td>
<td>2.41 ± 0.19a</td>
<td>68</td>
<td>2.23 ± 0.09a</td>
<td>195</td>
</tr>
<tr>
<td>Double</td>
<td>12</td>
<td>2.33 ± 0.22a</td>
<td>9</td>
<td>1.88 ± 0.26</td>
<td>13</td>
</tr>
<tr>
<td>Temperament exiting</td>
<td>183</td>
<td>1.93 ± 0.05a</td>
<td>338</td>
<td>1.76 ± 0.04</td>
<td>203</td>
</tr>
<tr>
<td>Spinal</td>
<td>19</td>
<td>1.79 ± 0.17</td>
<td>24</td>
<td>1.58 ± 0.15</td>
<td>45</td>
</tr>
<tr>
<td>Flare</td>
<td>17</td>
<td>2.06 ± 0.18a</td>
<td>68</td>
<td>1.95 ± 0.09a</td>
<td>195</td>
</tr>
<tr>
<td>Double</td>
<td>12</td>
<td>2.08 ± 0.22a</td>
<td>9</td>
<td>1.66 ± 0.26</td>
<td>13</td>
</tr>
</tbody>
</table>

*Mean differ \((P < 0.01)\).
*Mean differ \((P < 0.05)\).
*Mean differ \((P < 0.10)\).

Definitions of hair whorl type: single, tight, round, symmetrical hair whorl located along the vertical midline of the face; spiral, tight, round, symmetrical hair whorl located off center either over or under the eyes; flare, spiral pattern that is no longer symmetrical, but still has a definite center; double, two tight, round, symmetrical hair whorls; none, no hair whorl pattern; abnormal, hair patterns without an easily distinguished center.
Table 2

Cattle with high hair whorls had greater agitation in the squeeze chute.

<table>
<thead>
<tr>
<th>Hair whorl type</th>
<th>Number of animals rated 1</th>
<th>Number of animals rated 4</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>All highs versus all lows</td>
<td>High 34</td>
<td>16%</td>
<td>Low 28</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Low 134</td>
<td>30%</td>
<td></td>
</tr>
<tr>
<td>British × European highs versus lows</td>
<td>High 26</td>
<td>19%</td>
<td>Low 14</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dairy × Zebu highs versus lows</td>
<td>High 8</td>
<td>10%</td>
<td>Low 14</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All highs versus all nones</td>
<td>High 34</td>
<td>16%</td>
<td>Low 28</td>
</tr>
<tr>
<td></td>
<td>Nones 106</td>
<td>31%</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>British × European highs versus nones</td>
<td>High 26</td>
<td>19%</td>
<td>Low 14</td>
</tr>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dairy × Zebu highs versus nones</td>
<td>High 8</td>
<td>10%</td>
<td>Low 14</td>
</tr>
</tbody>
</table>

For forehead, the more reactive the animal is to being restrained in a squeeze chute. Also, while exiting the squeeze chute, the cattle with higher hair whorls had a higher temperament rating ($P < 0.01$). When all the cattle were sorted into two categories of 1's (very calm) and 4's (very agitated), chi-square analysis indicated that hair whorl height had a significant ($P < 0.001$) effect on the percentage of animals that were rated either 1 or 4 (Table 2). The effect of hair whorl height on temperament ratings in the squeeze chute was similar for both the Bos taurus and Bos indicus cattle ($P < 0.001$; Table 2). Hair whorl height on temperament during exiting of the squeeze chute was also similar for both Bos taurus and Bos indicus × Bos taurus crosses ($P < 0.04$; Table 3). Regardless of cattle type, groups of animals with high hair whorls had a higher percentage of agitated animals as compared to groups of animals with low hair whorls. Tables 2 and 3 also show that cattle with a high hair whorl were more agitated than cattle without a hair whorl (nones) ($P < 0.01$). The distribution of hair whorl heights of the cattle observed was 14% high hair whorls, 30% middle hair whorls, 29% low hair whorls and 22% nones (Fig. 3).

4. Discussion

Hair whorl height is a useful indicator of excitability levels that is clearly measurable on cattle from many different origins. The European Continental × British crosses came from over 35 different ranches and the Zebu × dairy breed crosses came from over 90 different ranches. Therefore, it is unlikely that our findings are due to previous handling experiences. Temperament ratings are definitely affected by hair whorl height.

It may be useful in predicting the temperament of calves, but further research is needed. Some of the animals observed had abnormal hair whorl patterns on the forehead and face.
Table 3
Cattle with high whorls had greater agitation while exiting from squeeze chute.

<table>
<thead>
<tr>
<th>Hair whorl type</th>
<th>Number of animals rated 1</th>
<th>Number of animals rated 4</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>All highs versus all lows</td>
<td>High 68 32%</td>
<td>High 53 25%</td>
<td>$\chi^2 = 15.68, P &lt; 0.001$</td>
</tr>
<tr>
<td></td>
<td>Low 212 47%</td>
<td>Low 67 14%</td>
<td></td>
</tr>
<tr>
<td>British × European highs versus lows</td>
<td>High 45 33%</td>
<td>High 29 21%</td>
<td>$\chi^2 = 7.69, P &lt; 0.01$</td>
</tr>
<tr>
<td></td>
<td>Low 29 8%</td>
<td>Low 50 13%</td>
<td></td>
</tr>
<tr>
<td>Dairy × Zebu highs versus lows</td>
<td>High 23 29%</td>
<td>High 24 31%</td>
<td>$\chi^2 = 4.78, P &lt; 0.04$</td>
</tr>
<tr>
<td></td>
<td>Low 40 45%</td>
<td>Low 17 19%</td>
<td></td>
</tr>
<tr>
<td>All highs versus all nones</td>
<td>High 68 32%</td>
<td>High 53 25%</td>
<td>$\chi^2 = 7.59, P &lt; 0.01$</td>
</tr>
<tr>
<td></td>
<td>Nones 149 44%</td>
<td>Nones 60 18%</td>
<td></td>
</tr>
<tr>
<td>British × European highs versus nones</td>
<td>High 45 33%</td>
<td>High 29 21%</td>
<td>$\chi^2 = 14.54, P &lt; 0.001$</td>
</tr>
<tr>
<td></td>
<td>Nones 8 4%</td>
<td>Nones 29 15%</td>
<td></td>
</tr>
<tr>
<td>Dairy × Zebu highs versus nones</td>
<td>High 23 30%</td>
<td>High 24 31%</td>
<td>$\chi^2 = 3.10, P &lt; 0.06$</td>
</tr>
<tr>
<td></td>
<td>Nones 57 40%</td>
<td>Nones 31 22%</td>
<td></td>
</tr>
</tbody>
</table>

that did not form tight, round spirals. Animals with hair whorls (located below the eye) that flared instead of forming a tight, round spiral appeared to be more unpredictable in behavior. These animals seemed to be more erratic and likely to run into other cattle or fences. Casual observations indicate that the relationship between hair whorl position and temperament is most easily observed in cattle that are not accustomed to daily close contact with people. The cattle observed in this study had been raised under extensive range conditions prior to arrival at the feedlot. Possibly taming and daily association with people may partially mask underlying temperament traits because taming reduces or eliminates the animal’s flight zone.

![Fig. 3. Distribution of hair whorls in the surveyed cattle.](image)
The relationship between hair whorl height and temperament may possibly be explained by the fact that hair patterns in the fetus form at the same time as the brain forms (Smith and Gong, 1974). In humans, abnormal hair whorl patterns are found in children with developmental disorders such as Down’s syndrome and Prader–Willi syndrome (Smith and Gong, 1973, 1974). Alexander et al. (1992) found a higher prevalence of counter-clockwise hair whorls in schizophrenics. Ortiz de Zarate and Ortiz de Zarate (1991) found that 78.49% of left-handed people had a right-sided hair whorl. Research by Tanner et al. (1994) has also shown that hair whorl patterns are correlated with behavior in dairy cattle. Holstein cows with two round spiral whorls on their foreheads had less side preference in the milking parlor compared to other cows. These two studies show very clearly that hair whorl patterns are associated with behavioral traits. Further study of hair whorl patterns may find further relationships between hair whorl patterns and behavior in cattle and horses. This information would be useful to both cattle producers and horse trainers to make predictions about animal temperament and thereby alter their handling techniques.

Acknowledgements

We wish to thank Dan Kniffen and Donna Murphy for assistance with statistics and Dick Farr of Farr Feeders in Greeley, Colorado, for providing facilities and cattle for this study.

References

Friedly, J., 1990. Dang...there’s a trichoglyph on your horse. Rocky Mountain Quarter Horse, 28 (July): 26–27.

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The relationships between hair-wrinkle and temperament were explored by analyzing the number of animals with wrinkled hair. The data was compared between British and European high cows against non-highs, and between Zebu and non-Zebu cows. The analysis revealed that hair wrinkle type was significantly associated with temperament. Cows with higher hair wrinkle numbers were found to have a more temperamental behavior. This relationship was further supported by the higher incidence of double wrinkle types in both British and European high cows compared to non-highs. The results suggest that hair wrinkle patterns may be used as a proxy for temperament, potentially offering insights for breeding programs.