Introduction

• Age is an important factor in quality grading, exportation, and overall carcass value

• Different methods of determination of age are available including dentition, skeletal maturity, and verified age programs

Current methods of age determination vary in their accuracy due to animals’ variation

Without a national identification system, knowing the exact age of an animal at time of harvest is highly unlikely

Objective

• To more precisely determine dentition and skeletal maturity correlation to chronological age

• To determine correlation between percentage thoracic ossification and subjective skeletal maturity scores

Introduction

The use of visual image analysis is used when quality and yield grading beef carcasses

However skeletal maturity scores are still subjectively measured

Carcass Data Collection

• Cattle were evaluated in two different facilities in the Texas panhandle.

• Animals ranging from 15 mo to 108 mo of age and a variety of genders were evaluated

• Chronological age and dentition scores were collected on the harvest floor while skeletal maturity scores and vertebral column images were retrieved 28 hours later in the grading cooler
Carcass Data Collection

- Dentition scores were recorded as the number of permanent incisors present.
- Carcasses were tracked through the facility to maintain their initial identity for evaluation in the chill cooler.
- Trained personnel, following USDA grading standards, evaluated skeletal maturity scores of the thoracic vertebra of all carcasses.

Image Analysis

- Images were uploaded and analyzed using the commercially available software program APS Assess.
- Each image was evaluated for the overall area of the cartilaginous tip of the spinous process as well as the area of ossification in that tip.
- Once both measurements were made, the ossification area was divided by the total area with the results being multiplied by 100 to give percent ossification.

Statistical Analysis

- Data were analyzed using the MIXED procedure in SAS. Means were generated using the LSMEANS option and separated, when significant (P<0.05), using the PDIF option.
- Both dentition score and ossification were evaluated against chronological age. Frequency of dentition by age in months was generated using the FREQ procedure in SAS.
- Each variable was evaluated against each other using the CORR procedure in SAS.

Aged <21 mo

<table>
<thead>
<tr>
<th>Variable</th>
<th>15</th>
<th>16</th>
<th>17</th>
<th>18</th>
<th>19</th>
<th>20</th>
</tr>
</thead>
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<tr>
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<td>28</td>
<td>107</td>
<td>118</td>
<td>58</td>
<td>37</td>
</tr>
</tbody>
</table>
| TOSS
| Objective | 141.79 | 140.36 | 141.35 | 144.27 | 142.98 | 155.60 |
| Percent    | 0.17 | 0.32 | 0.22 | 0.37 | 0.89 | 1.08 |
| DENT       | 0.64 | 0.64 | 0.64 | 0.64 | 0.64 | 0.64 |

Aged >21 mo

<table>
<thead>
<tr>
<th>Variable</th>
<th>21-30</th>
<th>31-40</th>
<th>41-50</th>
<th>51-60</th>
<th>61-76</th>
<th>77</th>
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<tbody>
<tr>
<td>n</td>
<td>22</td>
<td>45</td>
<td>40</td>
<td>24</td>
<td>22</td>
<td>24</td>
</tr>
</tbody>
</table>
| TOSS
| Objective | 328.48 | 345.45 | 472.89 | 533.64 | 532.86 | 579.17 |
| Percent    | 36.61 | 25.04 | 39.72 | 46.95 | 72.63 | 71.47 |
| DENT       | 3.43 | 5.86 | 7.15 | 7.82 | 7.90 | 8.08 |

Notes:
1. Ossification = skeletal maturity A = 100; B = 200; C = 300; D = 400; E = 500.
2. Dentition = number of permanent incisors (0 = 0; 1 = 1-2; 2 = etc.).
Conclusion

- Age was highly correlated to DENT and TTP, but weakly associated to TOSS
- Subsequently, all variables were then correlated to DENT
- Results showed no difference in dentition scores of cattle ≤20 mo, but dentition score increased as cattle age increased from 21 to 51 mo
- No differences were observed in dentition scores between the 51 to 60 mo, 61 to 76 mo, and the ≥77 mo group

- Results for cattle less than 21 mo of age agree with previous research which found that permanent incisors begin to erupt at the age of 22.5 mo.
- Data indicated that as animals age TTP increases as well as TOSS, with animals in the 15 mo category exhibiting the lowest values and cattle ≥77 mo exhibiting the highest values
- Once animals passed 20 mo of age and before they reached 51 mo of age it appears that increases in thoracic ossification occur from posterior to anterior.
- Results indicate that both DENT and TTP may be viable factors in determining animal age

References


