Technical note: Evaluation of the official identification system for pigs for sale in New South Wales


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Technical note: Evaluation of the official identification system for pigs for sale in New South Wales


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ABSTRACT: A study was undertaken at 2 saleyard (1 domestic, DS, and 1 export, ES) and 2 abattoir (1 domestic, DA, and 1 export, EA) locations in New South Wales, Australia, to assess the compliance (presence) and readability of body tattoos used to identify individual pigs presented for sale or slaughter. Each location was visited on 3 trading or slaughter days, and tattoo presence and readability of porkers (25 to 60 kg of BW), baconers (60 to 90 kg of BW), backfatters (>90 kg of BW but not for breeding), and breeders were recorded. A total of 4,655 pigs were inspected, including 158 DS, 1,599 ES, 1,257 DA, and 1,641 EA. Tattoo performance at the saleyards was influenced by producer (P < 0.05). Average brand presence at the DS (93.0%) did not differ (P = 0.28) from ES (74.2%). Tattoo compliance ranged from 88.3 to 100% of pigs across pig classes (P > 0.05) at DS. At the ES, tattoo compliance among baconers, backfatters, and breeding stock ranged from 82.4 to 88.3% and was greater (P < 0.05) than that of porkers (70.3%). Average readability was 85.4% at ES and 77.6% at DS (P > 0.05). Tattoo compliance differed (P < 0.05) between abattoirs (98.7% at DA and 92.6% at EA). Readability was greater (P < 0.05) at the EA (80.1%) than at the DA (72.0%). Final performance, as readable brands among animals sold or slaughtered, of the official tattoo system was similar between locations and ranged from 63 to 74%. Our results suggest that current compliance and readability of tattoos would compromise traceback to the farm of origin in the event of an emergency animal disease outbreak. Education activities on legislation requirements and tattoo procedure would likely increase compliance and performance of the system.

Key words: Australia, identification system, pig, tattoo, readability

INTRODUCTION

Animal and animal product traceability, including an efficient animal identification system, are key for disease control and eradication, maintaining international trade, and optimizing consumer confidence (McKean, 2001; Caja et al., 2002). Methodologies used to identify pigs include ear notching, tattoos, ear tags, and electronic systems (Holm et al., 1976; Stårk et al., 1998; Caja et al., 2005).
Livestock Traceability. The aim of this study was to measure the compliance and readability of body tattoos used to identify individual pigs at domestic and export saleyards and abattoirs as a means of assessing the performance of the tattoo as an effective traceability system.

MATERIALS AND METHODS

Site Location and Animals

Animal Care and Use Committee approval was not obtained for this study because the data were obtained from commercial sales or slaughter facilities and the animals were not subjected to any procedures other than those used routinely at these commercial facilities.

The study was undertaken at 4 sites in NSW: a domestic saleyard (DS), an export saleyard (ES), a domestic abattoir (DA) that slaughtered pigs only for the domestic market, and an export abattoir (EA) that slaughtered pigs for export and domestic markets. Each site was visited on 3 trading or slaughter days from December 2006 to February 2007. Porker (25 to 60 kg of BW), baconer (60 to 90 kg of BW), and backfatter (greater than 90 kg of BW but not for breeding) pigs along with breeding stock were included in the study. Weaner pigs (less than 25 kg of BW) were not inspected, because they are not required to be individually tattooed under NSW legislation. All pigs over 25 kg of BW presented for sale at the saleyards and for slaughter at DA were inspected. Only a proportion of pigs (approximately 65%) were inspected during a 6-h work shift at the EA due to the high number of animals slaughtered each day.

Inspection Methodology

Inspection of tattoos was performed by 1 of 2 researchers who had training in tattoo recognition. A brand was considered to be readable when all 6 digits could be identified. At the saleyards, presence of a tattoo on individual pigs was evaluated from outside and inside the pen, and if the brand was not readable, a damp cloth was used to clean the tattooed region. Reasons for an illegible brand were recorded and classified as follows: 1) excess ink, 2) digits missing in part or in full, 3) colored pig, and 4) faint ink. Brand presence, readability, and reasons for brand illegibility were recorded when the carcasses entered the chilling room at the DA and when weighed at the EA. Illegible brands were classified into 4 categories: 1) excess ink, 2) digits missing in part or in full, 3) faint ink, and 4) skin damage.

Tattoo readability was determined as the proportion of readable brands among the animals branded, and final performance of the system was calculated as the number of pigs with readable brands among pigs sold or slaughtered on that day.

The class of pig (classified by an estimate of BW), the brand position (shoulder, loin, ham, neck) on the body of the pig, and the producer brand number of each consignment was recorded at the saleyards and abattoirs. For analysis, the shoulder was the correct position for tattoo placement, as recommended by the New South Wales Department of Primary Industries (2005).

Statistical Analysis

Descriptive statistical analyses were performed in Excel. Further statistical analysis was performed using GenStat Release 9.1 (PC/Windows XP, 2006, VSN International Ltd., Hemel Hempstead, UK). To investigate the influence of domestic or export facility and pig class on brand presence, brand readability, and brand position, 6 GLM models were constructed that included saleyard or abattoir and pig class as fixed effects and producer as a random effect, because clustering within producer was expected. The illegible brand outcomes were converted from nominal to binary form, and 2 GLM models were constructed including saleyard or abattoir and pig class as fixed effects and producer as a random effect. Only statistically significant factors and interactions ($P < 0.05$) were included in each final model.

RESULTS AND DISCUSSION

This is the first study undertaken in Australia to assess tattoo compliance (presence) and readability for pig traceability. According to NSW legislation, pigs must be tattooed before they leave their property of origin on 1 or both shoulders (Stock Diseases Act 1923; Stock Diseases Regulations 2004). Owners without a registered tattoo brand must notify government inspectors, and a special temporary brand must be applied before sale or slaughter (Schembri et al., 2007). There are no published studies evaluating the body tattoo as an identification system or an official traceability system.

Branding Performance at Saleyards

A total of 158 and 1,599 pigs were inspected during the study period at DS and ES, respectively. The majority (45.9%) of pigs sold at the ES were porkers, whereas weaners constituted the major class (68.8%) of pigs sold at the DS. Thirteen vendors traded pigs at the DS and 122 vendors at the ES.

Tattoo performance results according to pig class at the DS and ES are shown in Table 1. An effect ($P < 0.05$) of producer was observed for all the saleyard outcome variables. The number of branded pigs at the DS (93.0%) did not differ ($P = 0.28$) from ES (74.2%). The relatively high proportion of unbranded pigs at the ES was unexpected, because we anticipated that the larger-scale producers, more likely to sell at export plants, would own and apply a registered brand more often than small-scale producers. Among the 13 producers selling pigs through DS, 3 producers (23.1%) sold a total
Table 1. Performance results of the tattoo methodology at 2 saleyards in New South Wales during 2006-2007 according to pig class and saleyard

<table>
<thead>
<tr>
<th>Item</th>
<th>Domestic saleyard</th>
<th>Export saleyard</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Porker (25 to 60 kg)</td>
<td>Baconer (60 to 90 kg)</td>
</tr>
<tr>
<td>Pigs sold</td>
<td>77 (88.3)</td>
<td>53 (100)</td>
</tr>
<tr>
<td>Branded, n (%)</td>
<td>68 (88.3)</td>
<td>53 (100)</td>
</tr>
<tr>
<td>Readable pen side, n</td>
<td>44</td>
<td>52</td>
</tr>
<tr>
<td>Readable after cleaning, n</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Readable brands, n (%)</td>
<td>46 (67.6)</td>
<td>52 (98.1)</td>
</tr>
<tr>
<td>Traceable animals, n (%)</td>
<td>46 (59.7)</td>
<td>52 (98.1)</td>
</tr>
<tr>
<td>Pigs sold</td>
<td>1,192</td>
<td>154</td>
</tr>
<tr>
<td>Branded, n (%)</td>
<td>838 (70.3)</td>
<td>136 (88.3)</td>
</tr>
<tr>
<td>Readable pen side, n</td>
<td>656</td>
<td>73</td>
</tr>
<tr>
<td>Readable after cleaning, n</td>
<td>91</td>
<td>15</td>
</tr>
<tr>
<td>Readable brands, n (%)</td>
<td>747 (89.1)</td>
<td>88 (64.7)</td>
</tr>
<tr>
<td>Traceable animals, n (%)</td>
<td>747 (62.7)</td>
<td>88 (55.8)</td>
</tr>
</tbody>
</table>

\[\text{a}\text{–c Within a row, values without a common superscript letter differ (}P < 0.05).\]

\[\text{1Traceable animals = animals branded and with a readable brand.}\]

of 11 pigs without any brand. At the ES, 24 producers (19.7%) sold a proportion of their consignments unbranded, (n = 418 pigs), and an additional 4 producers (3.3%) did not brand the whole consignment. The proportion of branded pigs at DS ranged from 88.3 to 100%, with no differences between pig classes (P > 0.05). In contrast, the proportion of branded pigs within each class varied (P < 0.05) at the ES, with fewer porkers branded than other pig classes. A total of 83.3 and 70.3% of pigs were branded at the correct position at the DS and the ES, respectively.

Among branded animals, 85.4% at ES and 77.6% at DS (P = 0.29) had readable brands. Readability results differed (P < 0.05) according to pig class at both saleyards (Table 1). Of the 10 producers branding pigs at the DS, 7 (58.3%) producers branded all sale pigs with a readable brand (n = 104), and, consequently, brand readability problems were limited to 3 producers. A similar trend was observed at the ES, where 70 (57.4%) producers branded all sale pigs with a readable brand (n = 895), 12 producers (9.8%) had illegible brands on all sale pigs, and 12 producers (9.8%) had illegible brands on a portion of pigs sold. These results suggest that branding performance is affected by application methodology.

Our results suggest that although most animals present at saleyards were branded, a large percentage of brands were not completely legible due most often to faint ink at both locations. At the DS, the proportion of illegible brands due to faint ink was 51.3%, missing digits was 46.2%, and colored pigs was 2.6%. At the ES, illegible brands resulted from faint ink (47.2% of illegible brands), excess ink that made it impossible to read the tattoo after cleaning (36.4%), and missing digits (16.4%).

The proportion of pigs branded and with readable brands was low (72.1% at DS and 63.4% at ES) and did not differ (P = 0.68) between locations, suggesting the traceback of pigs sold without brands or with illegible brands at the saleyards could be compromised.

### Branding Performance at Abattoirs

A total of 1,257 and 1,641 pigs were inspected at DA and EA, respectively, during the study period. The EA considered porkers and baconers the same pig class, which represented the majority of animals slaughtered (92.4%). At DA, the proportion of weaners, porkers, and baconers were very similar (30 to 35%). A total of 41 producers presented pigs for processing at the DA during the 3 study days, whereas pigs inspected at the EA came from 27 different vendors.

Tattoo performance results according to pig class at DA and EA are shown in Table 2. No effect of producer was observed on tattoo performance results at the abattoirs. The percentage of branded pigs differed (P < 0.01) between DA and EA (98.7 and 92.6%, respectively). Under the NSW Stock Diseases Act 1923, each pig should be branded and individual brands inspected before slaughter, with animals without identification recorded and identified with a special brand. As expected, branding percentages observed at the abattoirs were greater compared with results obtained at the saleyards.

Our results suggest that antemortem brand inspection at the abattoirs was not completely efficient, because some unbranded animals were found in the meat chain. No differences in the proportion of pigs with brands within each pig class were detected at either of the abattoirs (P > 0.05). Of the 41 and 27 producers sending pigs to the DA and EA, respectively, only 1 producer at each location did not brand the whole consignment.

Tattoos at EA were correctly applied at the shoulder area in 70.8% of baconers and 76.1% of backfatters. At
Table 2. Performance results of the tattoo methodology at 2 abattoirs in New South Wales during 2006-2007 according to pig class and abattoir

<table>
<thead>
<tr>
<th>Pig class</th>
<th>Domestic abattoir</th>
<th>Export abattoir</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pigs inspected</td>
<td>Branded, n (%)</td>
</tr>
<tr>
<td>Porker (25 to 60 kg)</td>
<td>656 (100)</td>
<td>554 (97.2)</td>
</tr>
<tr>
<td>Baconer (60 to 90 kg)</td>
<td>570</td>
<td>31 (100)</td>
</tr>
<tr>
<td>Backfatter (&gt;90 kg)</td>
<td>31 (100)</td>
<td>28 (90.3)</td>
</tr>
<tr>
<td>Total</td>
<td>1,257</td>
<td>1,241 (98.7)</td>
</tr>
</tbody>
</table>

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1. Traceable animals = animals branded and with a readable brand.

2. Within a row, values without a common superscript letter differ ($P < 0.05$).

3. Within a column and for the same variable between locations, values without a common superscript letter differ ($P < 0.05$).

Although branding percentages at the abattoirs were very high, a number of brands were illegible (Table 2). Average tattoo readability at the EA (80.1%) was greater ($P = 0.001$) than at the DA (72.0%). The proportion of producers with readable brands for the whole consignment at the EA (51.9%) was greater ($P = 0.002$) than at the DA (25.0%), which could suggest that the tattoo procedure of vendors selling at the EA is more efficient than the one used by domestic abattoir vendors. These observations confirm results obtained at the saleyard about the effect of the tattoo application process on the performance of the system. Missing digits and faint ink were the most important reasons for illegible brands at both abattoirs, but values obtained differed ($P < 0.01$) between locations. At the DA, missing digits (62.7%) was the main reason, followed by faint ink (33.9%) and damaged skin (3.5%). At the EA, the main reasons for illegible brands were faint ink (55.3%) and missing digits (43.7%; $P > 0.05$), with only 1.0% illegibility due to damaged skin.

The average number of traceable animals, taking into account the unbranded animals and the illegible brands, at the DA and EA was 71.0 and 74.2%, respectively. These percentages were similar to values presented previously with animals sold through saleyards and suggest that the tattoo procedure is not efficient. Implications of unbranded animals and illegible brands at the abattoir in the event of an exotic disease outbreak are similar to those for the saleyard.

It is likely that faulty tattoo equipment and tattoo application are the main factors influencing the legibility of the tattoos, but further research is required to confirm this. Extension and education activities to determine the best procedures for pig branding would improve branding efficiency and the traceability of pigs and pig products in Australia.

**LITERATURE CITED**


References

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