WASTE MANAGEMENT: RED MEAT ABATTOIRS

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Red Meat Abattoir Association

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Waste management has become a serious challenge for the abattoir industry. Traditional methods of rendering (sterilisation plants, incineration and even denaturing) are out of fashion as a result of disease risk, environmental emissions or environmental contamination. NEM:WA further restricted the transport, handling and processing of abattoir by-products and waste. Alternative methods of handling waste materials are crucial to the success of abattoir industry.
1. Organic Waste Stream(s) in the Red Meat Abattoir Industry

- Blood
- Effluent & Sewerage
- Paunch and Dung
- Inedible usable material - hides, skins, hooves, horns (= by-products)
- Condemned Material

<table>
<thead>
<tr>
<th>Beef</th>
<th>% Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dressed Carcass</strong></td>
<td>55</td>
</tr>
<tr>
<td>Hide / Skin</td>
<td>7</td>
</tr>
<tr>
<td>Blood</td>
<td>4</td>
</tr>
<tr>
<td>Offal</td>
<td>9</td>
</tr>
<tr>
<td>Paunch contents</td>
<td>15</td>
</tr>
<tr>
<td>Other wastes*</td>
<td>10</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Province</th>
<th>HT (100+)</th>
<th>HT (21-99)</th>
<th>LT (10-20)</th>
<th>LT (&lt;10)</th>
</tr>
</thead>
<tbody>
<tr>
<td>GP</td>
<td>15</td>
<td>10</td>
<td>9</td>
<td>4</td>
</tr>
<tr>
<td>LP</td>
<td>0</td>
<td>7</td>
<td>4</td>
<td>17</td>
</tr>
<tr>
<td>NW</td>
<td>7</td>
<td>1</td>
<td>7</td>
<td>16</td>
</tr>
<tr>
<td>FS</td>
<td>9</td>
<td>13</td>
<td>20</td>
<td>41</td>
</tr>
<tr>
<td>KZN</td>
<td>10</td>
<td>7</td>
<td>8</td>
<td>26</td>
</tr>
<tr>
<td>EC</td>
<td>9</td>
<td>7</td>
<td>15</td>
<td>58</td>
</tr>
<tr>
<td>WC</td>
<td>12</td>
<td>6</td>
<td>16</td>
<td>24</td>
</tr>
<tr>
<td>MP</td>
<td>5</td>
<td>10</td>
<td>11</td>
<td>15</td>
</tr>
<tr>
<td>NC</td>
<td>10</td>
<td>4</td>
<td>12</td>
<td>34</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>77</strong></td>
<td><strong>65</strong></td>
<td><strong>102</strong></td>
<td><strong>235</strong></td>
</tr>
</tbody>
</table>

Total = 479
5 000 000 sheep
2 000 000 pig
2 000 000 beef = 9 million carcasses for 2013

4,841,475 sheep
2,461,235 pig
2,422,589 beef =
9,725,299 or approximately
8 million carcasses for 2014

<table>
<thead>
<tr>
<th>PROVINCE</th>
<th>Total Cattle</th>
<th>Total Sheep</th>
<th>Total Pigs</th>
</tr>
</thead>
<tbody>
<tr>
<td>EASTERN CAPE</td>
<td>164,905</td>
<td>516,286</td>
<td>145,495</td>
</tr>
<tr>
<td>FREESTATE</td>
<td>477,187</td>
<td>772,155</td>
<td>185,502</td>
</tr>
<tr>
<td>GAUTENG</td>
<td>322,772</td>
<td>612,913</td>
<td>1,063,911</td>
</tr>
<tr>
<td>KWAZULU NATAL</td>
<td>271,193</td>
<td>99,327</td>
<td>332,040</td>
</tr>
<tr>
<td>LIMPOPO</td>
<td>121,854</td>
<td>15,134</td>
<td>49,650</td>
</tr>
<tr>
<td>MPUMALANGA</td>
<td>533,756</td>
<td>90,359</td>
<td>138,633</td>
</tr>
<tr>
<td>NORTHERN CAPE</td>
<td>197,984</td>
<td>1,632,852</td>
<td>69,064</td>
</tr>
<tr>
<td>NORTH WEST</td>
<td>183,339</td>
<td>48,929</td>
<td>71,173</td>
</tr>
<tr>
<td>WESTERN CAPE</td>
<td>149,599</td>
<td>1,053,520</td>
<td>405,767</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>2,422,589</td>
<td>4,841,475</td>
<td>2,461,235</td>
</tr>
</tbody>
</table>
A Slaughter Unit is an estimation based on weight and may be equivalent to:

- 1 cow, bull or ox
- 2 calves
- 1 horse
- 6 sheep / goats
- 4 porkers
- 2 baconers
- 1 sausage pig
## WASTE AMOUNTS

### BOVINE

- Rumen / stomach content: 18 kg
- Manure (Lairages): 4 kg
- Condemned material/Trimmings: 9 kg
- Blood from bleeding area: 12 L
- Bloody water (rinse off): 2 L
- Waste Water (Inflow = 880 liter x 85%): 748 L

Waste per slaughter unit =

- Effluent & Waste Water: 818.0 liter
- Solid Waste: 31.0 kg
Disposal of CONDEMNED material

119. Any condemned material must be disposed of by –

(a) total incineration;

(b) denaturing and burial of condemned material at a secure site, approved by the provincial executive officer and local government, by –

(i) slashing and then spraying with, or immersion in, an obnoxious colorant approved for the purpose; and

(ii) burial and immediate covering to a depth of at least 60 cm and not less than 100 m from the abattoir, providing such material may not deleteriously affect the hygiene of the abattoir; or

(c) processing at a registered sterilizing plant.
3. Current Initiatives by Red Meat Abattoirs for Alternative Solutions

- Waste water
  - Sieves
  - Sedimentation dams
  - Oxidation & enzymes
  - Turbulation

- Blood
  - Coagulation
  - Drying
  - Denaturing

- Condemned
  - Incineration
  - Hydrolysis
  - Composting
  - Vermi-composting
  - Plasma converters

- Raw
  - Fertiliser

- Coagulated
  - Animal food

- Rendering
  - Waste site

- Sewage or recycled
  - Biofuel & Biogas

Chapter 1: Legislative Requirements
Chapter 2: Administrative Requirements
Chapter 3: Environmental Management Standards
1. Process And Sources Of Waste In Red Meat Abattoirs
2. Types Of Waste Generated In Red Meat Abattoirs
3. Utilisation Of Waste
4. Methods Employed For Dealing With Waste
5. Solid Waste
6. Wastewater
7. Impacts & Mitigation Measures
8. Performance Indicators

Chapter 4: Monitoring and Compliance
1. Monitoring Requirements
2. Record Keeping
3. Reporting
4. Departmental Inspections

Chapter 5: Miscellaneous
2. References, Tables, Figures, Abbreviations, Acronyms
### 3. Desktop Study – Innsbruck University

<table>
<thead>
<tr>
<th>Pathogen</th>
<th>Pasteurize (70°C)</th>
<th>Anaerobic digestion at 37°C</th>
<th>Anaerobic digestion at 55°C</th>
<th>Pre-pasteurize &amp; Anaerobic digestion at 37°C</th>
<th>Composting</th>
<th>Alkaline hydrolysis</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Escherichia coli</em></td>
<td>++</td>
<td>+</td>
<td>+</td>
<td>(+++)</td>
<td>+</td>
<td>(+)</td>
</tr>
<tr>
<td><em>Salmonella</em></td>
<td>++</td>
<td>+</td>
<td>++</td>
<td>(+++)</td>
<td>++</td>
<td>(+)</td>
</tr>
<tr>
<td><em>Clostridium</em></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>(-)</td>
<td>-</td>
<td>(+)</td>
</tr>
<tr>
<td><em>Brucella abortus</em></td>
<td>++</td>
<td>NI</td>
<td>(+++)</td>
<td>(+++)</td>
<td>NI</td>
<td>(+)</td>
</tr>
<tr>
<td><em>Bacillus antracis</em></td>
<td>_</td>
<td>-</td>
<td>-</td>
<td>(-)</td>
<td>-</td>
<td>(+)</td>
</tr>
<tr>
<td><em>Mycobacterium bovis</em></td>
<td>++</td>
<td>(+)</td>
<td>(+++)</td>
<td>(+++)</td>
<td>++</td>
<td>+</td>
</tr>
<tr>
<td><em>Erysipelothrix</em></td>
<td>++</td>
<td>+</td>
<td>++</td>
<td>(+++)</td>
<td>++</td>
<td>+</td>
</tr>
</tbody>
</table>

++ Total inactivation  
+ Inactivation  
- Survival  
NI No information  
(++) No information on process, but predicted inactivation of pathogen

No information found, but predicted survival of pathogen
No information found
Contradictory information

++ Total inactivation  
+ Inactivation  
- Survival  
NI No information  
(++) No information on process, but predicted inactivation of pathogen

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+ Inactivation  
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### 4. Gaps in Research (to guide future targeted R&D in support of industry)

- Risk of pathogens after treatment options e.g., Composting / Biogas / Alkaline hydrolysis
- Utilization of animal byproducts as organic compost
- Cost effective options for smaller plants
- Centralized communication / technology transfer on effective utilisation of organic waste
THANK YOU!