Cattle production in Malaysia: Current trends and challenges

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MALAYSIA
Malaysian cattle industry

• Current scenarios
  Demands overtake the supply
• National Policies
  – Agriculture Policy (1998-2010)
• Still unable cope up with the demand of the increasing population
• Highly dependent on the import of livestock products
• Consequently increases the trade imbalance of food products
Poultry versus beef

- Malaysian consumption of beef - meat from cattle and buffalo

- 86% Chicken
- 12% Beef
- 2% Mutton
Why Malaysian consume more poultry compared to beef

- poultry is the cheapest form of meat available
- homogeneous to all races in Malaysia
- also reflective of consumer health concerns.
Local beef industry

• Despite low consumption as compared to poultry, local production of beef is still low as compared to local beef production

• In the Ninth Malaysian Plan (2006-2010), the Malaysian government targets to increase the production of beef and mutton in order to reduce the import dependency.
Table 1: Annual domestic production, consumption, consumption per capita and self-sufficiency level of Malaysian beef (cattle and buffalo) from 2005 to 2015

<table>
<thead>
<tr>
<th>Year</th>
<th>Local Production (metric tonne)</th>
<th>Total Consumption (metric tonne)</th>
<th>Consumption per capita (kg)</th>
<th>Self-sufficiency (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>29,396</td>
<td>138,980</td>
<td>5.32</td>
<td>21.15</td>
</tr>
<tr>
<td>2006</td>
<td>31,885</td>
<td>146,373</td>
<td>5.49</td>
<td>21.78</td>
</tr>
<tr>
<td>2007</td>
<td>34,976</td>
<td>144,732</td>
<td>5.33</td>
<td>24.17</td>
</tr>
<tr>
<td>2008</td>
<td>38,250</td>
<td>135,529</td>
<td>4.89</td>
<td>28.22</td>
</tr>
<tr>
<td>2009</td>
<td>42,178</td>
<td>149,256</td>
<td>5.35</td>
<td>28.26</td>
</tr>
<tr>
<td>2010</td>
<td>46,510</td>
<td>154,402</td>
<td>5.45</td>
<td>30.12</td>
</tr>
<tr>
<td>2011</td>
<td>48,835</td>
<td>167,388</td>
<td>5.76</td>
<td>29.17</td>
</tr>
<tr>
<td>2012</td>
<td>51,277</td>
<td>181,479</td>
<td>6.15</td>
<td>28.26</td>
</tr>
<tr>
<td>2013</td>
<td>51,715</td>
<td>201,533</td>
<td>6.74</td>
<td>25.66</td>
</tr>
<tr>
<td>2014P</td>
<td>52,857</td>
<td>209,108</td>
<td>6.91</td>
<td>25.28</td>
</tr>
<tr>
<td>2015E</td>
<td>50,493</td>
<td>214,866</td>
<td>7.05</td>
<td>23.50</td>
</tr>
</tbody>
</table>

P—provisional value; E—estimated value.

Sources: Livestock Statistics 2014/2015, Department of Veterinary Services, Malaysia
Local Production and total consumption of beef in Malaysia from 2005 to 2015

Local Production (metric tonne)
- 2005: 29,396
- 2010: 46,510
- 2015: 50,493

Total Consumption (metric tonne)
- 2005: 138,980
- 2010: 154,402
- 2015: 214,866

Years
- 2005
- 2010
- 2015
Malaysian consumers demand toward beef

- lower-income consumers
  - purchase more of lower value local/imported buffalo meat
  - tend to buy more for higher-value hybrid/imported beef/local beef meat as their income increases or during festive seasons.
- higher-income consumers
  - consume more of higher-value beef
  - tend to buy lower-value beef as substitute when their income reduces or price change
- Consumers with larger household size
  - tend to buy lower quality beef products in order to have larger quantity of beef for consumption. (Tey et al, 2008)
Malaysian consumers demand toward beef

• Fat is not an important feature in quality characteristics of beef in Malaysia
• However, Malaysian consumers are willing to pay for leaner beef with lower fat
• Higher-value beef is becoming a normal good to Malaysian consumers as per capita income approaches an affluent level (Tey et al, 2008)
Malaysian beef import

- In order to fulfil the increasing demand for beef, Malaysian has to import beef with different price and quality
- 86% of imported beef are Indian buffalo beef
- The remaining % came from Australia, New Zealand, Uruguay, Argentina and Brazil (Ariff et al., 2015)
- Malaysia will continue to import beef more than 215,00 MT a year with total imports amounted to at least RM 3.09 billion (USD 720 million) (USDA, 2016).
Current challenges

Important inputs for cattle industry

1. breeding stock
2. ruminant feed

Both are not readily available
- in sufficient quantity
- at reasonable cost
Current challenges

- Domestic production of beef increased at about 9.3% p.a. from 2005 to 2015
- Domestic output was from slaughtering local cattle and buffalo and imported feeder and slaughter cattle.
- Only 30% of total population of cattle and buffalo are breeding cows.
Beef production system

1. Intensive – feedlot, breedlot (commercial scale farm and small holders)
2. Semi-intensive - small holders
3. Extensive – integration of cattle with oil palm plantation (commercial scale farm and small holders)
Local beef production

Issues on breeding stock

• Low supply of quality breeding stock
• Low breeding performance of imported pure breed cows
• Low growth performance of local pure breed cows
• New policy implemented by oil palm producers – disbanded herds
Research on breeder cattle

- Since 70’s, MARDI has evaluated several breeder cattle, mostly crossbred cows including
  - local yellow cattle i.e. Kedah-Kelantan (KK),
  - Brahman,
  - Charolais,
  - Hereford,
  - Brahman-KK,
  - Charolais-KK
  - Hereford-KK
- Research scope – genetic improvement, feeding, production system
- Based on adaptability to Malaysian climate and production cost, Kedah-Kelantan (KK) dan Brakmas were identified to be further developed.
Kedah-Kelantan (KK)

- *Bos indicus* (Tropical breed)
- Origin: Local (Malaysia) - northern states
- Birth weight: ~ 15 kg; mature weight: 200-300 kg
- Purebred: Small in size and slow growing rate
- Achieve mature weight within 3-4 years
- > 70% KK in Malaysia are crossbred

**Table 7: Means and percent advantage of crossbreds over KK cattle for growth traits**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Hereford-KK</th>
<th>Friesian-KK</th>
<th>Brahman-KK</th>
<th>KK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Birth wt (kg)</td>
<td>20.1 (31.0%)</td>
<td>19.9 (29.7%)</td>
<td>20.2 (31.7%)</td>
<td>15.4</td>
</tr>
<tr>
<td>6-mo wt (kg)</td>
<td>97.9 (28.9%)</td>
<td>92.9 (22.3%)</td>
<td>89.9 (17.1%)</td>
<td>76.8</td>
</tr>
<tr>
<td>12-mo wt (kg)</td>
<td>154.3 (58.5%)</td>
<td>145.2 (48.5%)</td>
<td>120.3 (23.3%)</td>
<td>97.6</td>
</tr>
<tr>
<td>24-mo wt (kg)</td>
<td>261.1 (35.9%)</td>
<td>249.6 (30.0%)</td>
<td>215.6 (12.2%)</td>
<td>192.2</td>
</tr>
<tr>
<td>Pre-weaning daily gain (kg)</td>
<td>432.2 (28.2%)</td>
<td>405.7 (20.4%)</td>
<td>382.1 (13.4%)</td>
<td>337.0</td>
</tr>
<tr>
<td>Post-weaning daily gain (kg)</td>
<td>313.1 (60.9%)</td>
<td>222.2 (85.2%)</td>
<td>174.1 (45.1%)</td>
<td>120.0</td>
</tr>
</tbody>
</table>

Source: Dahlan *et al.* (1985)
KK cows with crossbred calves grazing on improved pasture

(Ariff et al 2015)
Kedah-Kelantan cattle are left to graze on native grasses and vegetation in coconut groves close to human settlements. (Ariff et al 2015)
Cattle rearing under young oil palms with the use of electric fence (Ariff et al 2015)
Kedah-Kelantan (KK)

- MARDI is able to maintain purebred KK at our research station (MARDI Stesen Kemaman)
- Currently - undergoing genetic selection for better growth rate and feed conversion ratio

Current Feature
- High fertility
- High adaptability toward tropical environment and diseases
- high calving percentage: 91%.
- Dressing percentage 56%
- Meat quality : Comparable to most KK crossbreds
  (W-B shear force value, tenderness score, flavour score, juiciness, overall score, ultimate muscle ph dan cooking loss)
KK (Female)
KK (Female)
KK (Bull)
Brakmas

• Brakmas, a composite breed developed by MARDI
• Crossing of Brahman and KK breeds
• Officially released as a breed by MARDI in 1999.
• Suitable for integration production system under oil palm plantation
• Features
  • >60% calving rate under oil palm plantation
  • 5% mortality rate
  • Birth weigh -20 kg; weaning weight - 95 kg
  • Average daily gain - 0.4 kg/day (integration); 0.75-1.0 kg/day (feedlot)
  • Mature weight – Bull: 450-500 kg; cow: 300-350 kg
  • Resilient and can adapt to heat stress
  • High durability against parasites and less vulnerable to disease
Brakmas
Brakmas
## Current status

<table>
<thead>
<tr>
<th>Breed</th>
<th>Before improvement</th>
<th>Current performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Kedah-Kelantan KK</td>
<td>180kg</td>
<td>400kg</td>
</tr>
<tr>
<td>2. Brakmas</td>
<td>197kg</td>
<td>500kg</td>
</tr>
<tr>
<td>3. Brahman</td>
<td>300kg</td>
<td>500kg</td>
</tr>
<tr>
<td>4. Charoke</td>
<td>270kg</td>
<td>350 kg</td>
</tr>
</tbody>
</table>

Current activity: Selection for higher FCR (for KK only)
Current challenges

Important inputs for cattle industry

1. breeding stock
2. ruminant feed

Both are not readily available
  – in sufficient quantity
  – at reasonable cost
Local beef production

Issues on ruminant feed

• High feed cost
• Low quality
• Irregular supply of high quality feed
• Inadequate suitable grazing area for maintaining large population of breeding cows
Factors contributed to limited utilization of available feed resources

- lack of practical techniques to convert local feedstuffs to quality feeds
- low efficiency of collecting and harvesting of raw materials
- high cost of drying of raw materials
- inefficient storage and handling of forage based feeds
- lack of established quality assurance protocols for prepared feeds
Available feed resources

• Agro-industrial by-products and crop residues
• Oil palm industry
  – Palm kernel cake (PKC)
  – Oil palm fronds (OPF)
  – Palm oil mill effluent (POME)
  – Spent bleaching earth (SBE)
  – Palm press fiber (PPF)
• Rice industries
  – rice straw
  – rice bran
  – rice husk.
Table 1: Chemical composition (% dry matter) and nutritive values of oil palm fronds and other oil-palm by-products

<table>
<thead>
<tr>
<th>By-products</th>
<th>CP</th>
<th>CF</th>
<th>NDF</th>
<th>ADF</th>
<th>EE</th>
<th>Ash</th>
<th>ME (MJ/kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Palm kernel cake</td>
<td>17.2</td>
<td>17.1</td>
<td>74.3</td>
<td>52.9</td>
<td>1.5</td>
<td>4.3</td>
<td>11.13</td>
</tr>
<tr>
<td>Palm oil mill effluent</td>
<td>12.5</td>
<td>20.1</td>
<td>63.0</td>
<td>51.8</td>
<td>11.7</td>
<td>19.5</td>
<td>8.37</td>
</tr>
<tr>
<td>Palm press fibre</td>
<td>5.4</td>
<td>41.2</td>
<td>84.5</td>
<td>69.3</td>
<td>3.5</td>
<td>5.3</td>
<td>4.21</td>
</tr>
<tr>
<td>Oil-palm fronds</td>
<td>4.7</td>
<td>38.5</td>
<td>78.7</td>
<td>55.6</td>
<td>2.1</td>
<td>3.2</td>
<td>5.65</td>
</tr>
<tr>
<td>Oil-palm trunks</td>
<td>2.8</td>
<td>37.6</td>
<td>79.8</td>
<td>52.4</td>
<td>1.1</td>
<td>2.8</td>
<td>5.95</td>
</tr>
<tr>
<td>Empty fruit bunches</td>
<td>3.7</td>
<td>48.8</td>
<td>81.8</td>
<td>61.6</td>
<td>3.2</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Strategy to produce practical and cost-effective feeds

- Maximize the use of agro-industrial by products
- Maximize the use of forages and legumes
- Reduce cost of drying
- Focus on fresh/wet feeding (e.g. silage)
Agro-industrial by-products
Palm kernel cake (PKC)

- Feeding – meal or pellet
- Maximize level of inclusion in complete feed
- Cost controlled by global market
- Total production > 2MT per year
- 90% exported to Europe (long term contract)
- Current usage: 110,000MT/year (5.5% of total production)
- Local requirement (2015) – 770,000MT/year
- Intervention
  - Limit exportation (< 80% total production)
  - Farmers cooperation – bulk purchase for stoking & sell to members at reasonable price
Agro-industrial by-products
Palm kernel cake (PKC)

• Feeding – meal or pellet
• Maximize level of inclusion in complete feed
• Require
• Cost controlled by global market
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  – Limit exportation (< 80% total production)
  – Farmers cooperation – bulk purchase for stoking & sell to members at reasonable price
Agro-industrial by-products

Oil palm fronds (OPF)

- Wet feeding
- Can be processed into silage
  - Drum system
  - Bunker system
  - Container system
- Can also be processed into pellet or cube
- Either 100% OPF or as a component in complete feed
OPF silage making using Otosil
Other agro-industrial by-products for fresh/wet feeding

- Rice straw (northern states- Kedah, Penang, Kelantan)
- Pineapple waste (peel and leaves) (Southern state- Johor)
- Sago waste (Sarawak)
- Tapioca (peel and leaves)
- Sweet potato (peel and leaves)
Forage /fodder

For fresh, wet feeding or processed into pellet or cube (100% or complete feed)

- Napier & Guinea grasses
- Corn fodder/plant
- Kenaf
- Gliricidia
- Mulberry
Practical and cost effective feed for cattle

Kedah-Kelantan and KK crossbred - Integration
Brakmas (Brahman-KK) - Integration
Charoke (Ch- Feedlot (intensive) & semi-intensive
Yellow- cattle - Integration
Feed for growing cattle (feedlot)

- OPF silage (25%)
- PKC (50%)
- POME (10%)
- Tapioca waste (10%)
- Premix (5%)

Expected ADG : > 0.90 kg/day
BRAKMAS

Feed for growing cattle (feedlot)
• OPF silage (25%)
• PKC (60%)
• POME (10%)
• Premix (5%)
Expected ADG : 1.0 kg/day

Feed for feeder cattle (feedlot)
• OPF silage (30%)
• PKC (63%)
• Molasses (3%)
• Premix (4%)
Expected ADG : > 1.0 kg/day
CHAROKE

Feed for growing cattle

**Feedlot**
- OPF silage (20%)
- PKC (52%)
- POME (10%)
- Rice bran (15%)
- Urea (3%)

Expected ADG : > 1.0 kg/day

**Semi intensive**
- Grazing (60%)
- Concentrate (40%)
  - PKC (63%)
  - POME (20%)
  - Premix (5%)

Expected ADG : > 1.0 kg/day
Malaysia’s efforts on the reduction of GHGs emission from beef production

- Far behind from other countries in term of R&D and mitigation
- However, scenario of GHG emission and reduction has been reported (Hosseini et al. 2013)

<table>
<thead>
<tr>
<th>Livestock</th>
<th>Enteric fermentation</th>
<th>Emission management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cattle-diary</td>
<td>68.0</td>
<td>31.00</td>
</tr>
<tr>
<td>Others</td>
<td>47.0</td>
<td>1.00</td>
</tr>
<tr>
<td>Buffalo</td>
<td>55.0</td>
<td>2.00</td>
</tr>
<tr>
<td>Sheep</td>
<td>5.00</td>
<td>0.20</td>
</tr>
<tr>
<td>Goats</td>
<td>5.00</td>
<td>.022</td>
</tr>
<tr>
<td>Pigs</td>
<td>1.00</td>
<td>7.00</td>
</tr>
<tr>
<td>Horses</td>
<td>180</td>
<td>2.19</td>
</tr>
<tr>
<td>Poultry</td>
<td>0.02</td>
<td>0.02</td>
</tr>
</tbody>
</table>
Malaysian’s efforts on the reduction of GHGs emission from beef production

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- However, scenario of GHG emission and reduction has been reported (Hosseini et al. 2013)

<table>
<thead>
<tr>
<th>Livestock</th>
<th>Total CH₄ emission (Gg) (1980)</th>
<th>Total CH₄ emission (Gg) (2008)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cattle</td>
<td>45.61</td>
<td>65.24</td>
</tr>
<tr>
<td>Buffalo</td>
<td>18.55</td>
<td>8.52</td>
</tr>
<tr>
<td>Sheep</td>
<td>0.63</td>
<td>0.32</td>
</tr>
<tr>
<td>Goats</td>
<td>1.79</td>
<td>1.49</td>
</tr>
<tr>
<td>Horses</td>
<td>0.10</td>
<td>0.14</td>
</tr>
<tr>
<td>Pigs</td>
<td>14.70</td>
<td>14.93</td>
</tr>
<tr>
<td>Poultry</td>
<td>2.18</td>
<td>8.17</td>
</tr>
</tbody>
</table>
Malaysian’s efforts on the reduction of GHGs emission from beef production

Mitigation options particularly for cattle production were suggested (Yusuf et al. 2012)

Nutritional

• modification of the dietary feed
• alteration of the fermentation process of the rumen
• selection of grasses with high concentration of water-soluble carbohydrates,
• forage legume with secondary metabolites like tannins
• High digestibility of pasture for grazing

Fig. 1: Methane emissions from cattle
Related activities in MARDI

• Varietal evaluation of grain corn, napier and legumes
• Improvement of silage quality via microbial and processing technology
• Establishment of facility (Sf6) for methane measurement for cattle consuming feed containing feed substitute (corn/legume silage, SBM) and feed supplement (lipid/concentrate feed)
• Selection of KK purebred for better FCR on low quality feed

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