Game and Venison –

Meat for the Modern Consumer?

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Definition of terms

- Game meat: meat derived from African wild animal species
Definition of terms

- Venison: meat derived from deer
  - Wild
  - Farmed
Definition of terms

• Bushmeat: meat sold on the informal (illegal?) market
  • Primates
  • Rodents
  • Small ungulates
Definition of terms

Modern consumer: Typical first world consumer, higher income

• SLOPs

• Still Living Off Parents
INTRODUCTION
Consumer expectations

- **Meat products:**
  - Nutritional value
  - Wholesome
  - Fresh
  - Lean
  - Sensory: juiciness, flavour, tender
INTRODUCTION
Universal trends in consumer attitudes

- Health is a macro concept → balanced lifestyle
- USA:
  - 60% shoppers → diet could be healthier
  - Reasons healthier diet
    - 42% lose weight
    - 39% prevent health problems later in life
    - 30% follow Dr advice
    - 28% manage existing medical condition
  - Families with children
    - Buy organic → perceived healthier
Universal trends in consumer attitudes

- Convenience foods
- Safety and Quality issues
- Young consumers less red meat
- Women less red meat
  - Especially game/ostrich
- Animality perception → disgust response
- Production methods employed
- Ethics applicable to killing of animals
Universal trends in consumer attitudes

- **Growing health concerns** → demand for
  - Low kilojoule & cholesterol
  - Reducing n-6/n-3 PUFA

- **Concerned about the environment**
  - Organic products
  - Natural (low input) systems
Presentation outline

• Production methods
  • Wild
  • Free-range / low input systems
  • Intensive production
• Ethical harvesting
• Healthiness
  • Chemical composition : f/a
• Traceability
Production systems

• Potential meat production from African game species long known
  • Biltong
  • Export
  • Trophy hunters

• Biltong hunting (2004)
  • 200 000 hunters in RSA
    • Average hunter spends R4 130 on hunt & R11 622 on game (5 animals per hunter; 1 000 000 per season)
    • Total of R3 150 474 000 per annum
Game meat export from RSA

- **2005**
  - Deboned meat from 160,000 carcasses
    - Springbok (>80%)
    - Blesbok
    - Kudu
  - 8 export approved abattoirs
South African game meat production systems

- Predominately extensive
- Low input system/organic
  - Fenced
- Ecto-parasite control
- Winter/strategic feed

Single farmer feedlotting Eland
Deer production systems

Europe
- **UK** – 36 000
- Semi intensive
- Feed
- Red deer (*Cervus elaphus*)
- Fallow deer (*Dama dama*)

- Sweden, Norway and Finland – 700 000 Reindeer (*Rangifer tarandus*) (220 000 slaughtered annually)
- Free-ranging system
Deer production systems

- **North America**
  - Marginal lands → small, intensively managed farms
  - Elk / wapiti (*C. elaphus nelsoni*)
  - Fallow deer
  - Sika deer (*C. nippon*)
  - Axis deer (*Axis axis*)

- **Canada**
  - 162,000 farmed deer
  - 14,000 slaughtered (2004)
Deer production systems

- New Zealand
  - Animals pests → capturing of wild animals → farmed export industry - intensive
  - 1.7 million farmed deer
  - Imported East European genotypes → antlers & meat production
  - 2004 – 680,000 slaughtered
    - 90% products exported
Deer production systems

Farming systems range from extensive to intensive

- Strategic feeding
  - Over winter
  - Finishing off
- Deer velvetting & castration
- Herd health & vaccination programs
- AI & embryo transfers
- Hybridization
- Growth hormones? – rejected by deer industries worldwide
Ethical Harvesting / Cropping

• **Harvesting**: killing of animals for meat production purposes
• **Cropping**: removal of animals (may include killing) so as to maintain a balanced eco-system

• Most species mentioned wild – predisposed to flight or fight reaction
  • Design of facilities for handling, transport, lairage important

• Two strategies
  • Wilder African game species
  • More domesticated deer species
Harvesting of African game species

- Hunter
  - Fair Chase
- Game Processor
  - Different standards

- Five Freedoms of Webster?
  - Freedom from thirst, hunger and malnutrition
  - Freedom from discomfort (?)
  - Freedom from pain, injury and disease
  - Freedom to express normal behaviour
  - Freedom from fear and distress
What is acceptable to the game processor?

- Quality of the carcass
  - Condition
  - Size
  - Placement of the shot
    - Rifle caliber
    - Quality of the meat sold (?)
  - Cost efficient
What does the consumer want?

- Eating experience
- Meat quality – healthy
- Animal had a happy, free life
- Harvested in a scientific manner
- Value for money
These factors are all inter-related

- Condition of the animal
  - Fat
  - Chased – exhausted
- Post mortem glycolysis
How does it work?

- Game harvesting team
- Approved vehicle, methodology, etc
SA Standard …

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  - Approved vehicle, methodology, etc
SA Standard ...

- Game depots
  - Approved specifications
SA Standard …

- Game depots
  - Approved specifications
• **Game depots**
  • Health inspection
SA Standard …

- Game depots
  - Carcasses sealed in cold truck
SA Standard ...

- **Game depots**
  - Moved to processing plant
  - Normal legislation

![Image of meat processing plant](image.png)
Bushveld (information supplied by Dr T Bergh)

- How does it work?
  - Groups of ± 10 animals in small confinement (10x5 m)
  - .22 with silencer used from above
  - Shooting: 60-90 secs
  - Animals removed – hooked onto truck
  - Truck moves 30 m then animals exsanguinated
  - Process completed within 10 mins
- Animals moved off to field depot
Bushveld (information supplied by Dr T Bergh)

• Animals dressed and inspected
Bushveld (information supplied by Dr T Bergh)

- Animals loaded into cold truck
Slaughter of deer species

Mobile abattoirs

Harvested in the field

Transport to stationary abattoirs
Slaughter of deer species

- Licensed deer/reindeer slaughter premises
- Rules
  - Animal transport
  - Veterinary inspection of live animals & carcasses
  - Stunning methods
  - Slaughter hygiene
  - Carcass grading
  - Cooling conditions
Healthiness

- Dietary fat
  - 15-30% total calorie-intake
  - Saturated fat <10%
- Red meat associated with obesity
- However game meat perceived to have health benefits
  - Tourists
  - 300 local game meat consumers
    - Healthiness (25%)
    - Leanness (23%)
    - Taste (14%)
    - Health benefits – low fat (83%)
Mean total fat (%), fatty acid composition (%) and total cholesterol content (mg.100 g⁻¹) of the *M. longissimus dorsi* of the common duiker, kudu, blesbok, springbok, impala, red hartebeest, black wildebeest, blue wildebeest, warthog, buffalo and zebra.

<table>
<thead>
<tr>
<th>Fatty acid</th>
<th>Common duiker a</th>
<th>Kudu b</th>
<th>Blesbok c</th>
<th>Springbok d</th>
<th>Impala e</th>
<th>Red hartebeest c</th>
<th>Black wildebeest f</th>
<th>Mountain reedbuck f</th>
<th>Warthog g</th>
<th>Buffalo h</th>
<th>Zebra g</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Fat</td>
<td>2.12</td>
<td>1.58</td>
<td>0.76</td>
<td>1.07</td>
<td>-</td>
<td>4.69</td>
<td>0.97</td>
<td>2.94</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>SFA</td>
<td>22.24</td>
<td>35.93</td>
<td>42.33</td>
<td>40.35</td>
<td>38.11</td>
<td>56.18</td>
<td>40.97</td>
<td>38.55</td>
<td>35.8</td>
<td>38.78</td>
<td>34.12</td>
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<tr>
<td>MUFA</td>
<td>37.51</td>
<td>20.48</td>
<td>18.51</td>
<td>16.67</td>
<td>20.15</td>
<td>28.1</td>
<td>15.33</td>
<td>17.23</td>
<td>16.7</td>
<td>31.61</td>
<td>22.91</td>
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<tr>
<td>PUFA</td>
<td>40.26</td>
<td>43.59</td>
<td>40.96</td>
<td>31.59</td>
<td>41.74</td>
<td>32.41</td>
<td>44.27</td>
<td>42.99</td>
<td>47.6</td>
<td>29.32</td>
<td>42.96</td>
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<tr>
<td>PUFA:SFA</td>
<td><strong>1.81</strong></td>
<td><strong>1.23</strong></td>
<td><strong>0.97</strong></td>
<td><strong>0.79</strong></td>
<td><strong>1.10</strong></td>
<td><strong>0.58</strong></td>
<td><strong>1.01</strong></td>
<td><strong>1.15</strong></td>
<td><strong>1.33</strong></td>
<td><strong>0.76</strong></td>
<td><strong>1.26</strong></td>
</tr>
<tr>
<td>(n-6)/(n-3)</td>
<td>-</td>
<td>2.29</td>
<td>3.62</td>
<td>3.28</td>
<td>-</td>
<td>2.75</td>
<td>2.82</td>
<td>2.07</td>
<td>-</td>
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<tr>
<td>Cholesterol (mg.100 g-1 meat sample)</td>
<td>-</td>
<td>-</td>
<td>51.38</td>
<td>56.9</td>
<td>-</td>
<td>50.9</td>
<td>46.05</td>
<td>51.08</td>
<td>-</td>
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</tbody>
</table>

Adapted from:

- d Kroucamp (2004)
- e Hoffman *et al.* (2005b)
- f van Schalkwyk (2004)
- g Unpublished data chemically analyzed as described in Hoffman *et al.* (2005b)

**PUFA:SFA > 0.4**

**N-6:n-3 < 4.0**
Conclusion: game meat

• No research yet on effect of diet
• Low in lipids
  • Phospholipids
    • Long chain unsaturated
  • Conjugated linoleic acid (CLA) & isomers?
Deer

- Also has low lipid content
- Higher content (4.5%) when finished off in feedlots
- Effect of
  - Age
  - Gender (including castration)
  - Region
  - Production system
  - Respond manner similar to any domestic ruminant
    (fallow deer, red deer & reindeer)
Mean values for fatty acid composition (%) in *M. longissimus* from pasture and pellet-fed reindeer (*Rangifer tarandus tarandus* L) and red deer (*Cervus elaphus*).

<table>
<thead>
<tr>
<th>Fatty acid</th>
<th>Reindeer&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Red deer&lt;sup&gt;b&lt;/sup&gt;</th>
<th>Degree of significance&lt;sup&gt;#&lt;/sup&gt;</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Pasture (n = 9)</td>
<td>Pellets (n = 6)</td>
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<td></td>
<td></td>
<td>Degree of significance&lt;sup&gt;#&lt;/sup&gt;</td>
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<tr>
<td></td>
<td>Pasture (n = 7)</td>
<td>Pellets (n = 7)</td>
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<td></td>
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<td></td>
<td>Degree of significance&lt;sup&gt;#&lt;/sup&gt;</td>
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<td>Polar lipids</td>
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<tr>
<td>SFA</td>
<td>25.4</td>
<td>26.3</td>
<td>n.s.</td>
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<tr>
<td>MUFA</td>
<td>17.3</td>
<td>16.0</td>
<td>*</td>
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<tr>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>PUFA (n-6)</td>
<td>31.9</td>
<td>39.4</td>
<td>***</td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>PUFA (n-3)</td>
<td>14.2</td>
<td>7.5</td>
<td>***</td>
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<tr>
<td>(n-6)/(n-3)</td>
<td>2.2</td>
<td>5.3</td>
<td>***</td>
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<tr>
<td>Neutral lipids</td>
<td></td>
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<tr>
<td>SFA</td>
<td>53.0</td>
<td>54.6</td>
<td>n.s.</td>
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<tr>
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<td>39.2</td>
<td>*</td>
</tr>
<tr>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PUFA (n-6)</td>
<td>2.6</td>
<td>2.3</td>
<td>n.s.</td>
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<td>PUFA (n-3)</td>
<td>1.4</td>
<td>0.3</td>
<td>***</td>
</tr>
<tr>
<td>(n-6)/(n-3)</td>
<td>1.9</td>
<td>7.7</td>
<td>***</td>
</tr>
</tbody>
</table>

<sup>a</sup> Wiklund *et al.* (2001c)<br><sup>b</sup> Wiklund *et al.* (2003)<br><sup>#</sup> n.s. Not significant, * P < 0.05, ** P < 0.01, *** P < 0.001

PUFA:SFA > 0.4
N-6:n-3 < 4.0
Traceability

- Most of the South African game meat & venison exported into EU
  - Chapter III article 15 of EC directive 92/45/EEC imports into the community

“The conditions applicable to the placing on the market of wild game meat imported from the third countries shall be at least equivalent to those laid down for the production and placing on the market of wild game meat obtained in accordance with Chapter II, excluding those in Articles 6 and 8”.
Conclusion

• Game meat & venison meet criteria of demanding consumer
  • Low lipid content: phospholipids & cholesterol
  • Influenced by diet
• Could fill a niche market
• Care
  • “untainted by modern farming practices”
• Information required as pertaining to interaction between production systems, slaughter handling techniques and ultimate meat quality
• Can consumers distinguish between different game and/or deer species?