Production systems and dairy production of Sudan camel (*Camelus dromedarius*): a review

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Introduction:

- 2,505,813 square kilometer of territory.
- The grazing lands constitute 40.4%.
- Pastoralists own 90% of the livestock.
- Camel spread in a belt configuration between latitudes 12-16º N.
## Intro. Continue Population: (Arab world)

<table>
<thead>
<tr>
<th>Country</th>
<th>(1000 Head)</th>
<th>Country</th>
<th>(1000 Head)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jordan</td>
<td>8.00</td>
<td>Oman</td>
<td>122.07</td>
</tr>
<tr>
<td>Emirates</td>
<td>341.40</td>
<td>Palestine</td>
<td>0.58</td>
</tr>
<tr>
<td>Bahrain</td>
<td>2.00</td>
<td>Qatar</td>
<td>32.40</td>
</tr>
<tr>
<td>Tunisia</td>
<td>72.00</td>
<td>Kuwait</td>
<td>5.75</td>
</tr>
<tr>
<td>Algeria</td>
<td>291.36</td>
<td>Lebanon</td>
<td>0.44</td>
</tr>
<tr>
<td>Djibouti</td>
<td>68.82</td>
<td>Libya</td>
<td>170.00</td>
</tr>
<tr>
<td>Saudi Arabia</td>
<td>869.00</td>
<td>Egypt</td>
<td>157.00</td>
</tr>
<tr>
<td>Sudan</td>
<td>4238.00</td>
<td>Morocco</td>
<td>180.00</td>
</tr>
<tr>
<td>Syria</td>
<td>27.36</td>
<td>Mauritania</td>
<td>1600.00</td>
</tr>
<tr>
<td>Somalia</td>
<td>7130.00</td>
<td>Yemen</td>
<td>365.00</td>
</tr>
<tr>
<td>Iraq</td>
<td>51.00</td>
<td><strong>Total</strong></td>
<td>15732.18</td>
</tr>
</tbody>
</table>

*Arab Agricultural Statistics Year book 28 (2008)*
Introduction continue.

Livestock

1st among the Arab countries & 2nd in Africa with respect to animal population

- 43 M.h
- 50 M.h
- 40 M.h
- 4.4 M.h
The history:

- Historical trends is difficult because of lack of reliable data.
- The oldest evidence is a bronze figure of camel with a saddle found at Merwi and estimated to date between 25-15 B.C.
- Probably camels entered Sudan through the following routes:
  1. North West Africa route during the 4th to 6th century.
  2. Egyptian route.
Population % / Sud. state:

Total = 4,406,000
Production Systems:

- For the nomads who inhabit the desert and semi-desert regions in Sudan the camel plays important cultural, economic and social roles in the lives of these communities.
- In these marginal lands, stricken by recurrent droughts the camel is usually the sole survivor when all other types of livestock have succumbed.
- To those people camel herding is a way of life, an insurance against natural disaster and a highly valued cultural heritage.
- The camel herds are managed by husbandry system deeply rooted in the society based on superstition and practices that were founded down by father to son over the ages.
• In Sudan the production systems include

• 1- Traditional Nomadic System:
  In the geographical zone between 13°N to 16°N (Northern part of the camel belt). This is typically practiced by the Kababish tribe in Northern Kordofan State. The camel herders are continuously on the move in response to availability of grazing and water supplies.

• 2- Transhumant or Semi-Nomadic System:
  Found in Eastern and Southern regions of the camel belt and is practiced by semi-nomadic tribes. A degree of settlement is experienced during the rainy season where rain fed agriculture is practiced for stable food production and the crop residues provide feed supplement for camel populations.

• 3- Sedentary or Semi-sedentary System:
  Practiced in the eastern region of Sudan (East of River Nile and west of the Red Sea hills). It is also practiced in the agricultural areas in the central and southern parts of the camel belt.

• 4- Intensive system:
  An intensive system of production exists but it is limited to racing and dairy camels.
Camel milk:

- In many arid areas, camels play a central role as milk suppliers.
- The comparative advantage of the camel as a dairy animal over the other species in the same environment is difficult to quantify; however, it is widely recognized that in absolute terms, the camel produces more milk and for a longer period of time than any other milk animal held under the same condition (Farah, 1996).
- Camel’s milk is generally white, it has a sweet and sharp taste, but sometimes it can be salty.
- The test generally depends on the type of fodder and availability of drinking water.
Milk letdown:

• In camel, the presence of the calf is considered imperative for milk let down, and hand massaging is also used to enhance this response. Milk letdown in this species is easily noticeable after a short period of suckling (1.5 min) when the teats suddenly swell, becoming much larger than before.
Milking procedure:

• Camels in most pastoral societies are milked by men.
• Before milking, the calf is allowed to suckle until the milk starts to flow and the camel can be milked.
• Because of the height of the udder the milking is done standing.
• The milker stands on one leg and balances the milking bowl on his bent left leg.
• The left hand holds the bowl, while the camel is milked with the right hand.
• Some times both udder halves are milked at the same time by two herdsmen.
Teat tie up:

• some times one half of the udder is milked and the other one left for the calf. And to prevent calves from suckling at pasture during the day it is common among the nomad, to tie up one or more teat with special strings.
Milk yield:

• The actual amount of milk produced by camels are not very accurate for judging the milk yielding capability of camels.

• Mainly because:

  Camels exist in desert areas with difficult accessibility

  The calve are still suckling.

  Milking frequency varies among the different nomads groups

Generally: milk yield of Sudan camel can reach 20 kg/day in the early lactation and good conditions and declined to 2 kg/day in the late lactation and bad conditions (in best animal) otherwise it range 5 – 10 kg / day.
Milk production and lactation length of Sudan camel according to main camel regions.

<table>
<thead>
<tr>
<th>Regions</th>
<th>Milk production (liter)</th>
<th>Lactation length (month)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Beginning</td>
<td>Middle</td>
</tr>
<tr>
<td>Sinnar</td>
<td>7.38±2.19</td>
<td>4.63±1.37</td>
</tr>
<tr>
<td>Gedaref</td>
<td>7.10±2.57</td>
<td>4.70±2.96</td>
</tr>
<tr>
<td>Gezira</td>
<td>6.39±1.94</td>
<td>4.12±1.42</td>
</tr>
<tr>
<td>Kordofan</td>
<td>5.83±2.84</td>
<td>4.17±2.19</td>
</tr>
<tr>
<td>Overall</td>
<td>6.72±2.54</td>
<td>4.63±2.27</td>
</tr>
</tbody>
</table>
# Milk composition % of Sudan camels:

<table>
<thead>
<tr>
<th></th>
<th>Fat</th>
<th>Prot.</th>
<th>Lacto.</th>
<th>T .S</th>
<th>Ash</th>
<th>Mois.</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3.15</td>
<td>2.81</td>
<td>4.16</td>
<td>10.95</td>
<td>0.83</td>
<td>88.33</td>
<td>Al-Amin, (1992)</td>
</tr>
<tr>
<td>2</td>
<td>3.36</td>
<td>3.41</td>
<td>3.60</td>
<td>10.9</td>
<td>0.81</td>
<td>89.26</td>
<td>Bakheit (1999)</td>
</tr>
<tr>
<td>3</td>
<td>3.72</td>
<td>3.84</td>
<td>-</td>
<td>-</td>
<td>0.71</td>
<td>88.67</td>
<td>Salman (2002)</td>
</tr>
<tr>
<td>4</td>
<td>3.31</td>
<td>3.38</td>
<td>3.25</td>
<td>10.44</td>
<td>0.59</td>
<td>90.42</td>
<td>Eisa (2006)</td>
</tr>
</tbody>
</table>
Utilization:

• Most of the camel milk in the Sudan is drunk fresh, and some times sour (fermented) (Garis) or with tea (Sbanes).

• Others method of manufacturing of camel milk in to milk products like butter, ghee, cheese, ice cream, etc ……, not found except some limited research.