The role of camels in food security in the arid zones: meat and milk production potential

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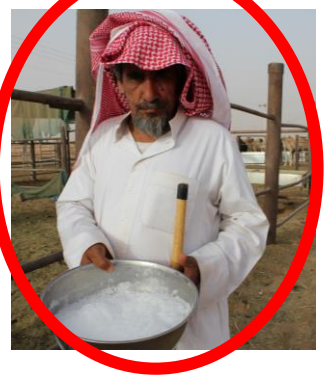
ISOCARD



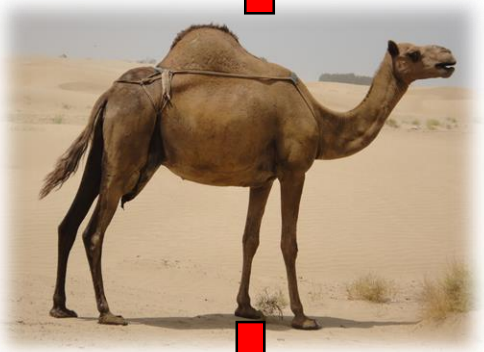


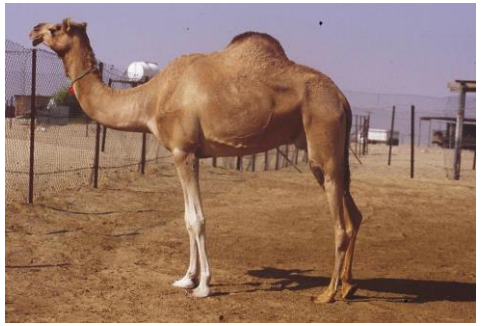
The camel, a multipupose animal

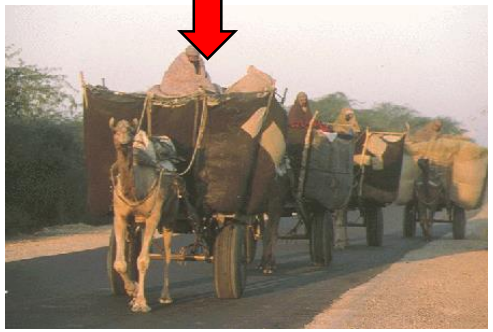







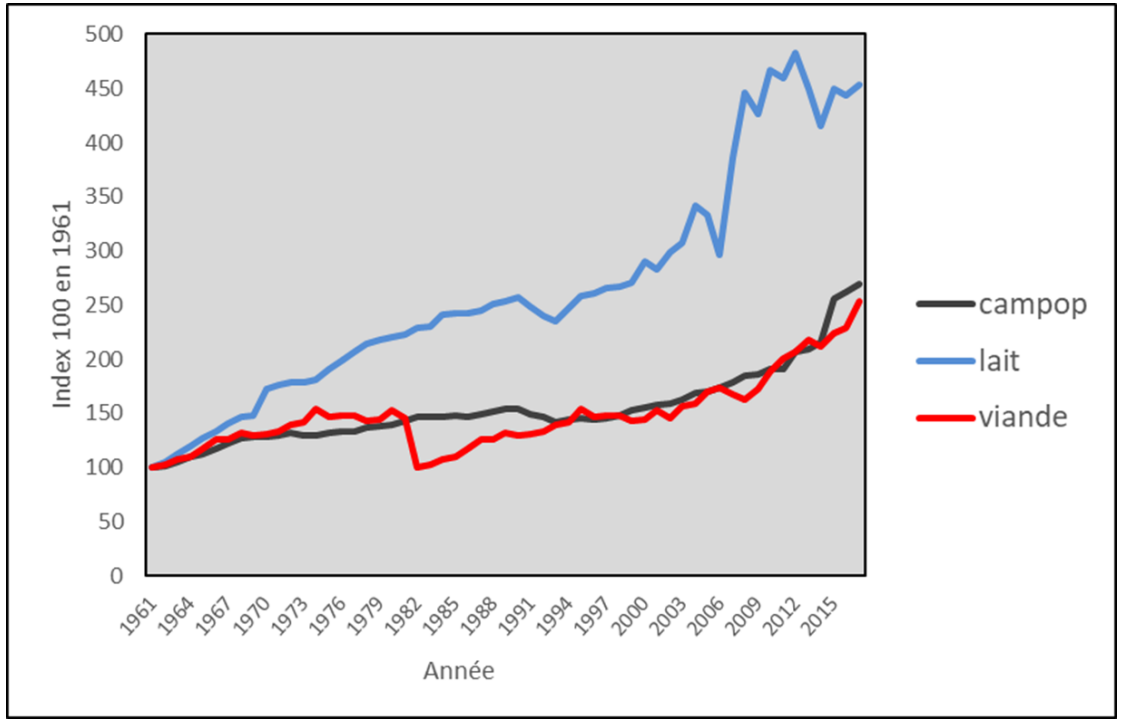





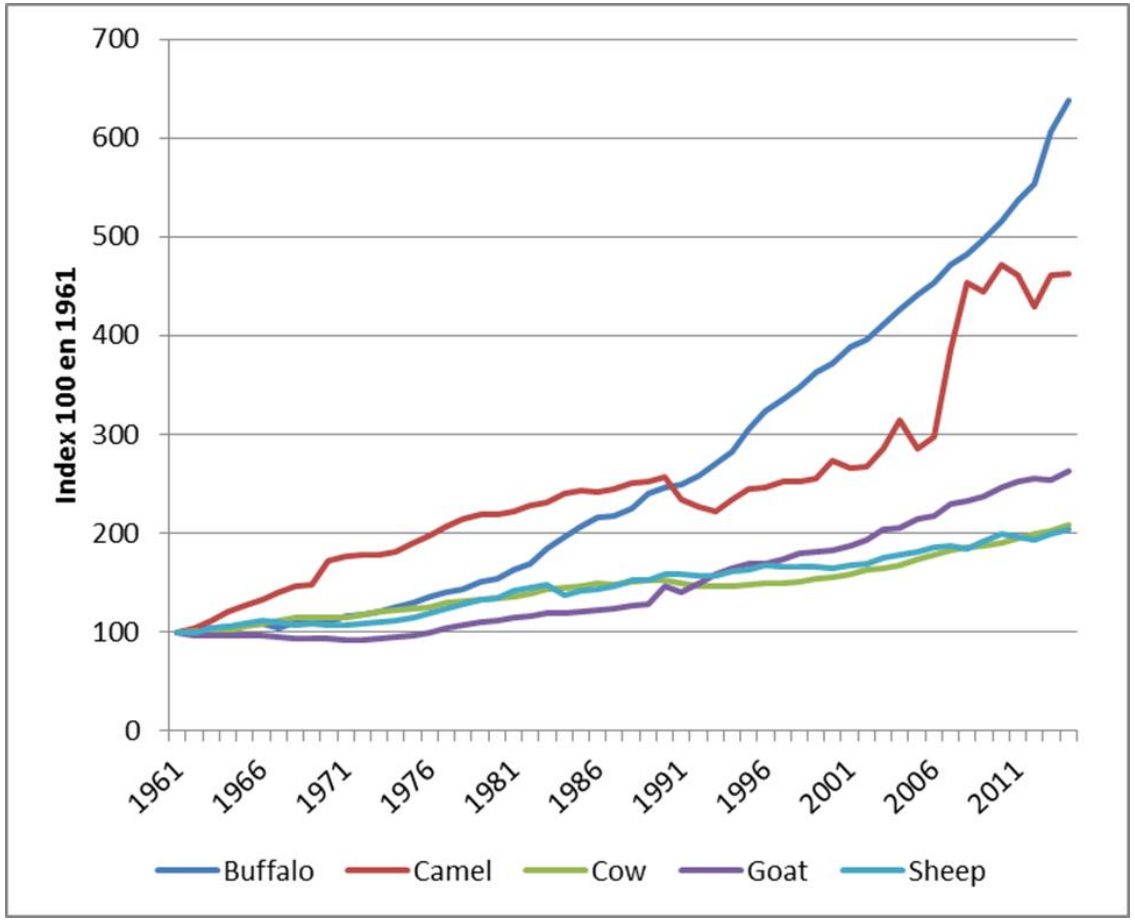


The contribution of camel to provide milk

- Camel milk production was 0.37% of the milk produced in the world by dairy animals for human consumption (0.18% in 1961 –FAOSTAT, 2019).
- 2.8 million tons in 2017 (under-estimated =5.7 millions tons?) for 35 millions heads (23% lactating females)



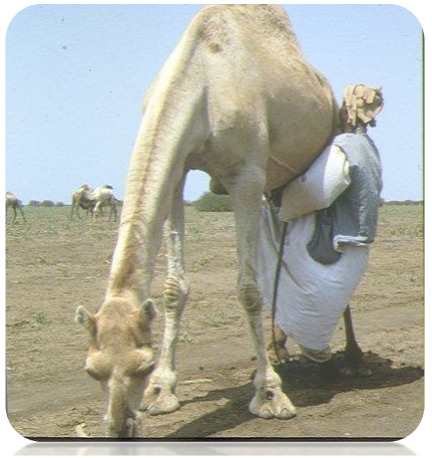
The relative growth of camel milk production for the last 55 years



Species	*Growth 61-17*	*Annual growth*
Buffalo	573,9	10,2
Camel	**353,3**	**6,3**
Cow	115,4	2,1
Goat	167,7	3,0
Sheep	103,9	1,9

Milk potential

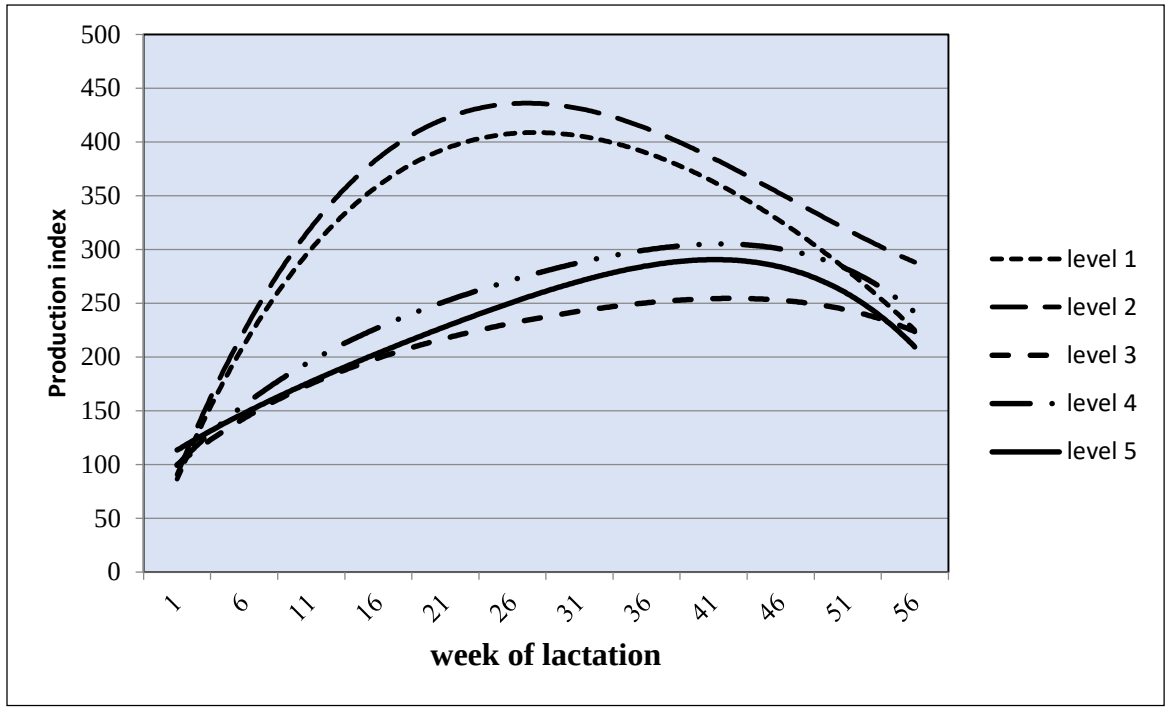
- Milk production: from 650 to 6000 litres/lactation
- Lactation length: 8-18 months
- Feeding, seasonal and parity effects

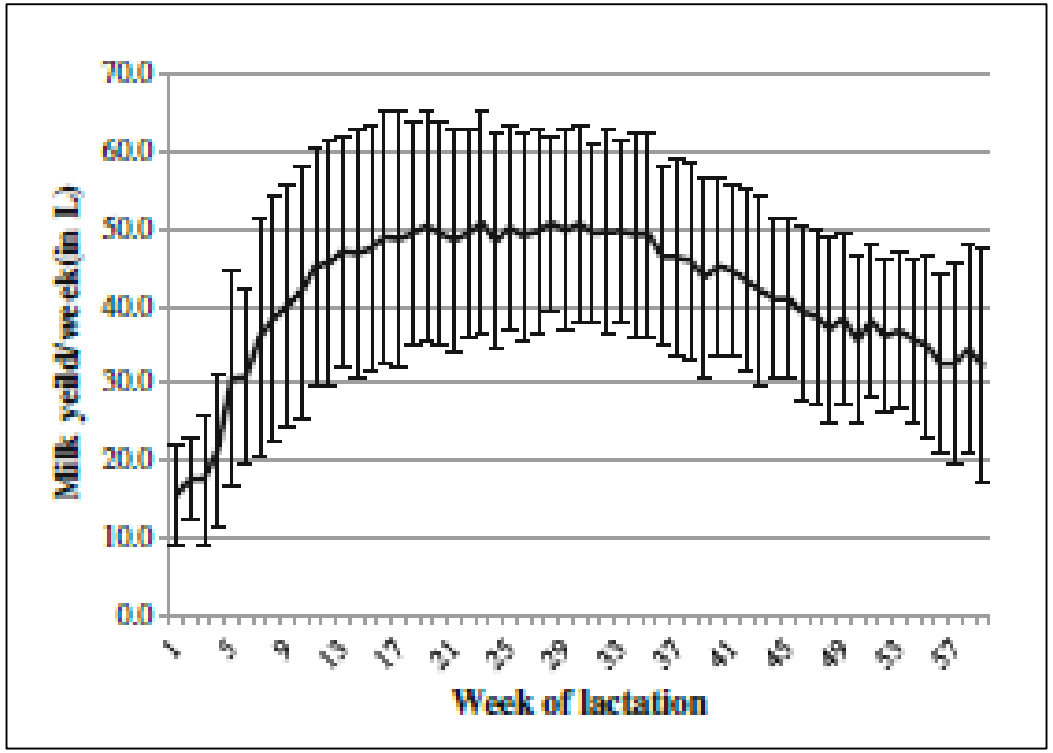


High-producing dromedaries (> 3000 L/lactation)		Medium-producing dromedaries (1500-3000L)		Low-producing camels (<1500 L/lactation)	
Marecha	Pakistan	Hoor	Somalia	Bactrian camel	Central Asia
Al-Majaheem	Saudi Arabia	Al-Homor	Saudi Arabia	Maghrebi	North Africa
Sirtawi	Libya	Anafi	Sudan	Manga	Chad, Niger
Arvana	Turkmenistan	Dankali	Ethiopia	Bishari	Sudan
Bikaneri	India	Azbin	Niger	Al-Shameya	Syria, Iraq
Barrela	Pakistan	Birabish	Mauritania	Anafi	Sudan
Shallageea	Sudan	Waddah	Saudi Arabia		
		Fakhreya	Libya		
		Eyddimo	Somalia		

Burger P., Ciani E., faye B., 2019. Old World camels in a modern world – a balancing act between conservation and genetic improvement. Animal genetics (accepted)

Lactation curve

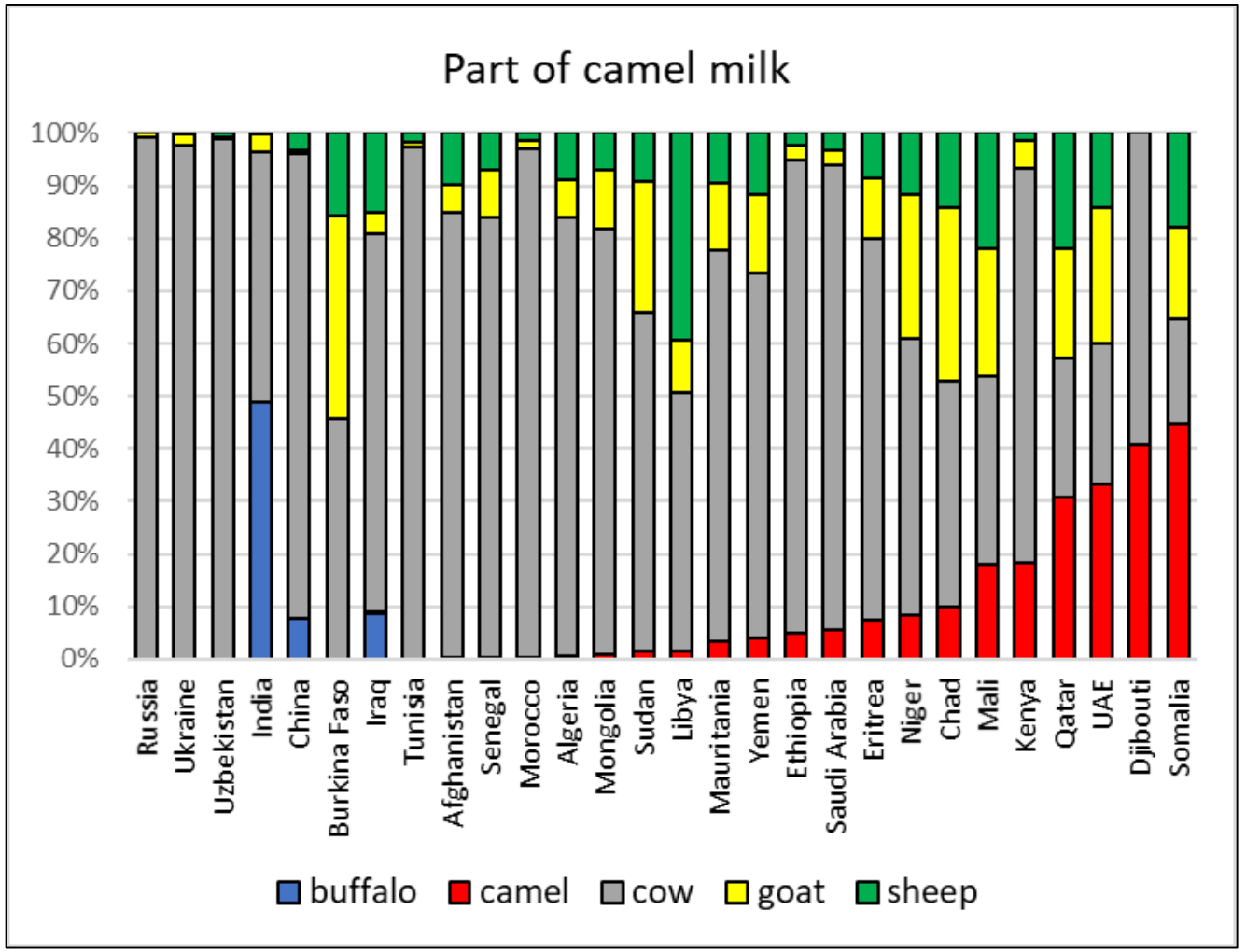




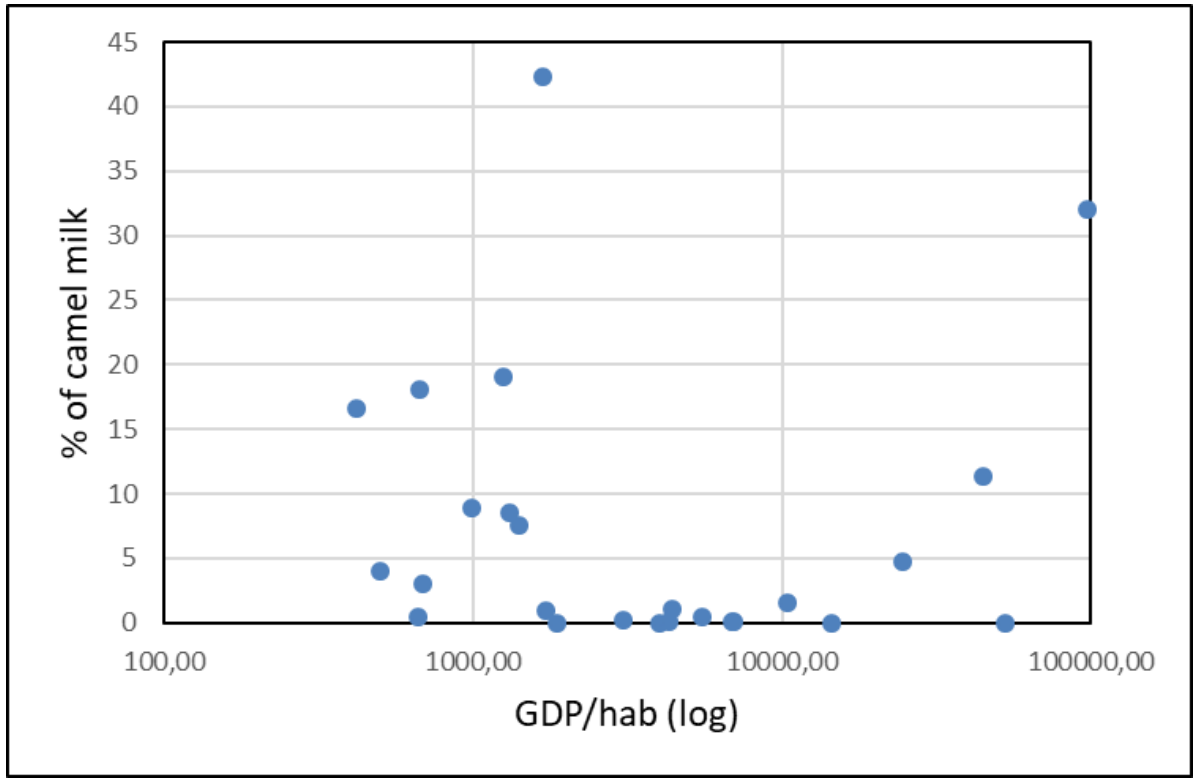
- A plateau rather a peak of lactation (between 3-5 months post-partum)
- Higher persistence rate compared to cow
- Shortening lactation length in case of gestation (Nagy et al., 2019)

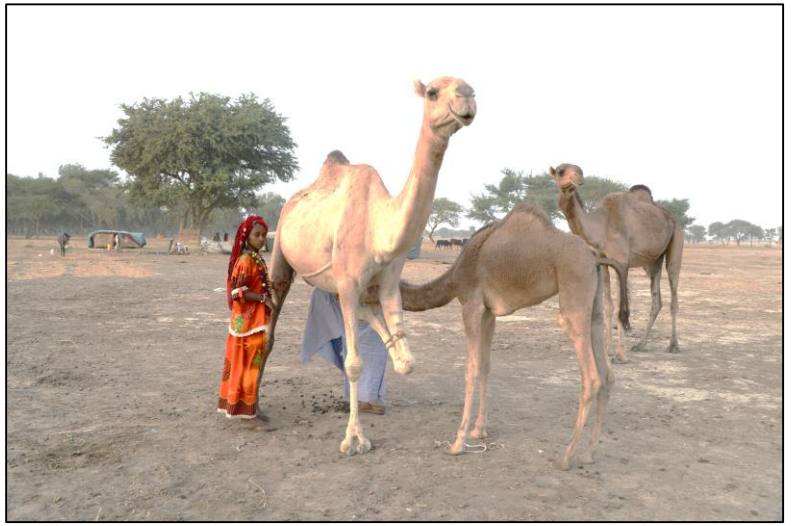
Camel milk in arid countries

From 0.0001% (Russia) to
45% (Somalia)



There is no clear evidence between camel milk production and GDP growth





The use of camel to provide milk is not only for economic reasons, but also for cultural reasons.

Camel milk is not a substitute of cow milk

A mean for people living in desert to have access to milk in places where dairy cow farming is problematic.

Camel milk is linked to social habits and is a part of the cultural identity of nomad people.

Specificity of the composition of camel milk explaining its dietetic virtues (fatty acid, vitamin and mineral composition) and its health effect (lack of β-lactoglobulin, presence of whey acidic protein, high concentration of non-protein nitrogen, richness in iron and vitamin C, high bioactivity of camel lactoferrin.

Specificity in technological process for making dairy products and traditional use by the consumers (fermented milk)

Food security in remotes places

Camel milk, the “white gold of the desert”

Camel milk production closely linked to the desert ecosystems from Mauritania to Mongolia (Without camel, who will produce milk in desert?)

In Saudi Arabia, more than 70% of the camel milk is self-consumed (Faye et al., 2014)

In pastoralist households, camel milk can make up to 70% of the dietary calories (Homewood, 2008).

Dairy camel farming systems (1)

- **Camel farming systems based on the mobility of the herds (nomadic or transhumant) under extensive management.**
  - Living in remote places, producers far away from consumption basins
  - Camel milk mainly self-consumed or processed into fermented milk for example in Central Asia.
  - Camel milk traditionally not sold (“gift from God”) or distributed to the poor families.

Dairy camel farming systems (2)

- **Camel farming system based on intensive management in high scale modernized unit**
  - Mainly in Gulf countries,
  - Modern “management”: milking machine, biotechnology of reproduction, improved diet and even industrial milk processing unit
  - Hybridization between dromedary and Bactrian camel in Central Asia

Between these two extrêmes….

Development of PeriUrban camel systems :

- Periurban dairy camel farms having commercial target with an important turnover of the camel stock (“Kleenex PU system”).
- Periurban dairy camel farms having commercial target with spatial differentiation of the camel herd.
- Transitory periurban farms (opportunist, commercial, adaptative mobility)

Example of the transitory settlement around N'Djamena (Chad)

- 100.000 camel heads
- 22000 liters camel milk delivered/day
- 3200 tons of camel meat on the local market

Strength and weakness of camel milk production for food security

Camel milk presents four main advantages:

(i) it is produced in remotes areas with very well adapted animal to specific ecosystem;

(ii) it is produced mainly in low input farming systems;

(iii) it contributes both to poverty alleviation and to local, national and sometimes international market integration,

(iv) as multi-purpose animal, camel can contribute to the diversification of incomes.

The added-value of camel milk

ECOLOGICAL ADDED-VALUE

- Valorization of low-quality forages characteristic of desert environment contributing to provide milk to human living in low-potential ecosystems.
- Complementarity in the use of the different strates in arid ecosystems by the cohabitation of different species (camel, small ruminants, cattle, donkey).
- Higher variety of grazed plants in arid ecosystems compared to other species
- Rearing of camel in low input farming systems managed by local communities.

SMALLHOLDERS' ECONOMY ADDED-VALUE

- High part of self-consumption: contribution to food security of households
- Contribution to regular cash for poor families.
- Contribution to the diversification of farming activities and incomes
- Potential added-value of its processed products on market (fermented milk),

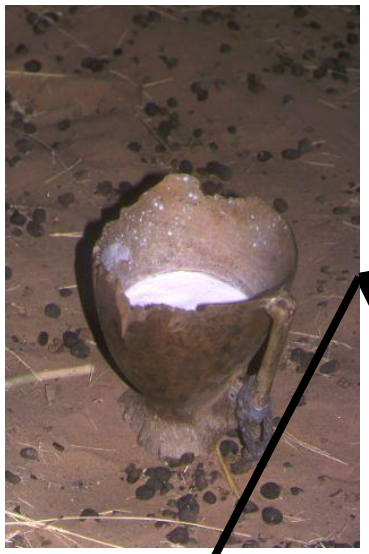
GENDER ISSUE ADDED-VALUE

- Potential role of women in milk marketing

MARKET ADDED-VALUE

- Low impact of direct competition with milk production coming from exporting countries like the cow milk powder from European Union or United States to the southern countries
- Possibility to reach the international market for export cosmetic products based on camel milk

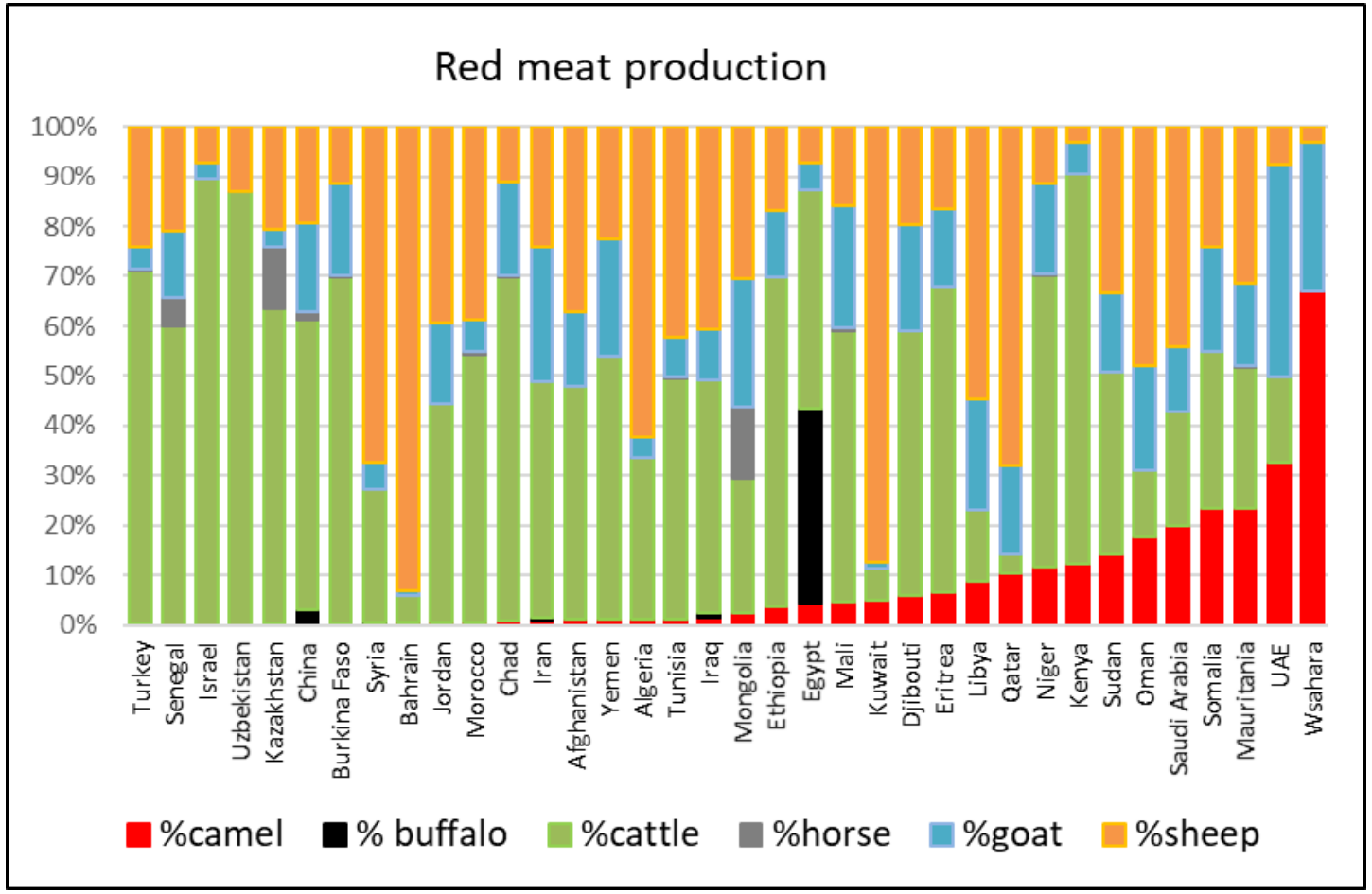
Diversification of camel milk products



The contribution of camel to produce meat

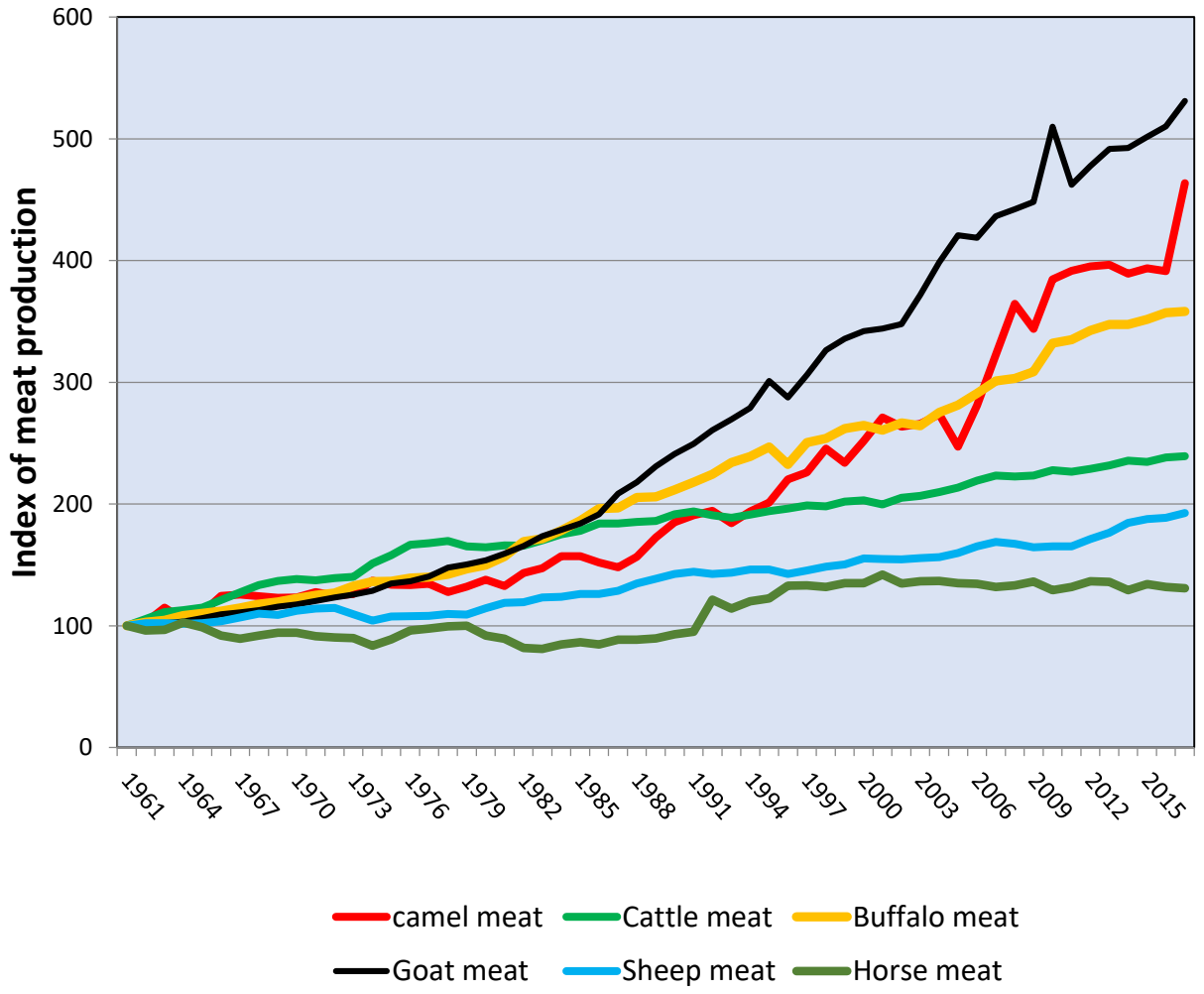
- 312,000 tons in 2017
- 0.72 % of the red meat consumed in the world (vs 0.38% in 1961)
- From 0.01% (Senegal) to more than 60 % (Western Sahara/Morocco)
- Mean slaughtering rate of 8,2%
- Important regional market

Camel meat production in arid countries



From 0.01% (Senegal and turkey) to more than 60 % (Western Sahara/Morocco)

The relative growth of camel meat production for the last 55 years

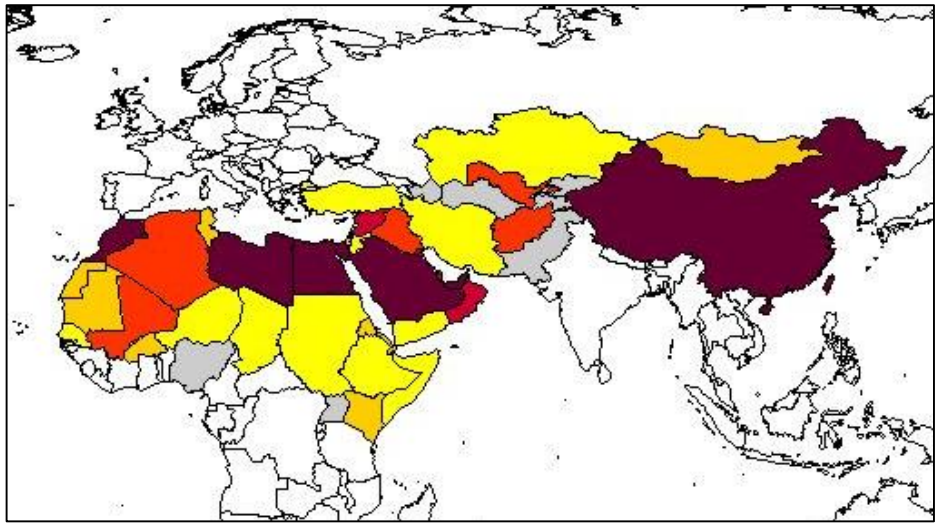


	1961	2017
Camel	100,0	463,5
Cattle	100,0	239,3
Buffalo	100,0	358,4
Goat	100,0	531,2
Sheep	100,0	192,7
Horse	100,0	130,9

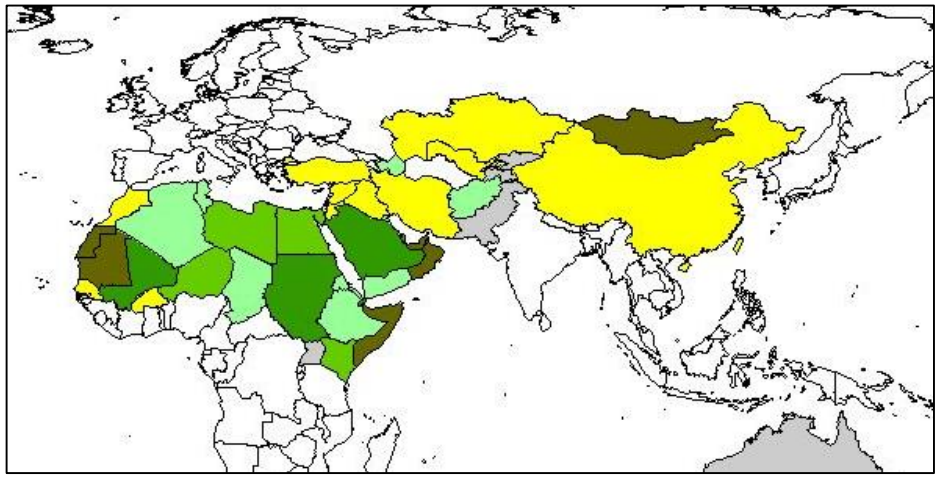
The slaughtering rate

High variability between countries:

- SL < 10% (14 countries mainly in Sahelian zone (Chad, Niger, Mauritania) and in the Horn of Africa (Djibouti, Eritrea, Somalia)= **exporting countries** or **countries with low camel population** (Turkey, Senegal);
- SL between 10 and 20% (12 pays in Africa (Mali, Sudan, Algeria, Morocco, Ethiopia), Middle-East (Qatar, Iran, Iraq) et Central Asia (Kazakhstan, Mongolia and Russia)= **exporting countries with high camel meat consumption**, or with **destocking population**;
- SL between 20 and 50% (9 countries from Middle-East (Koweït, Emirates, Bahreïn, Oman, Jordan), Morocco and Libyea, **all importing countries** ; China and l'Uzbekistan are rather destocking countries (stability of the camel population);
- Two countries, Egypt (82,4%) and Saudi Arabia (96,4%) have SL not compatible with camel survival = **Importing countries for camel meat consumption**



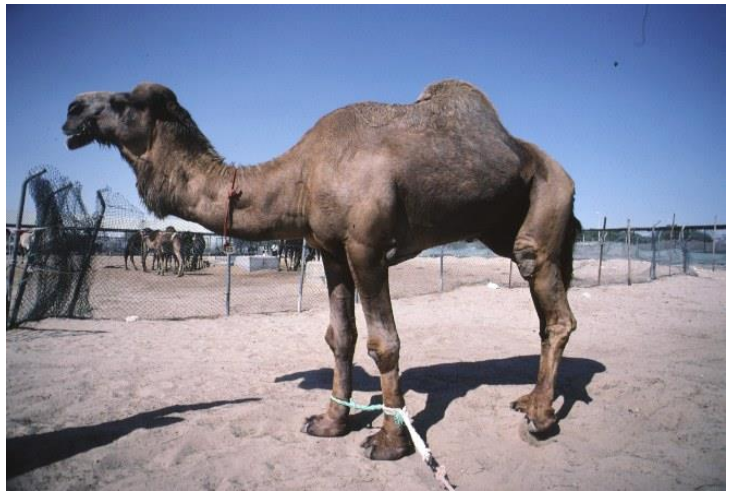
Slaughtering rate

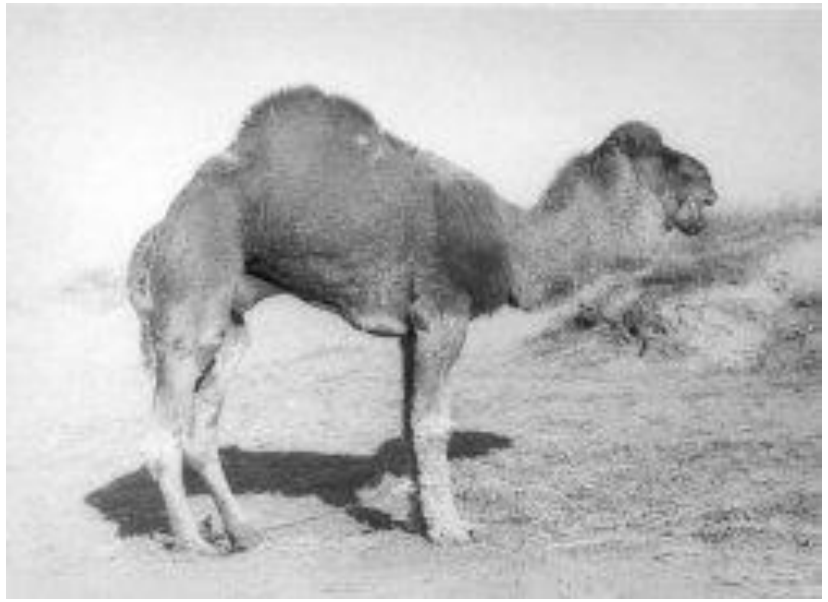


Camel meat consumption

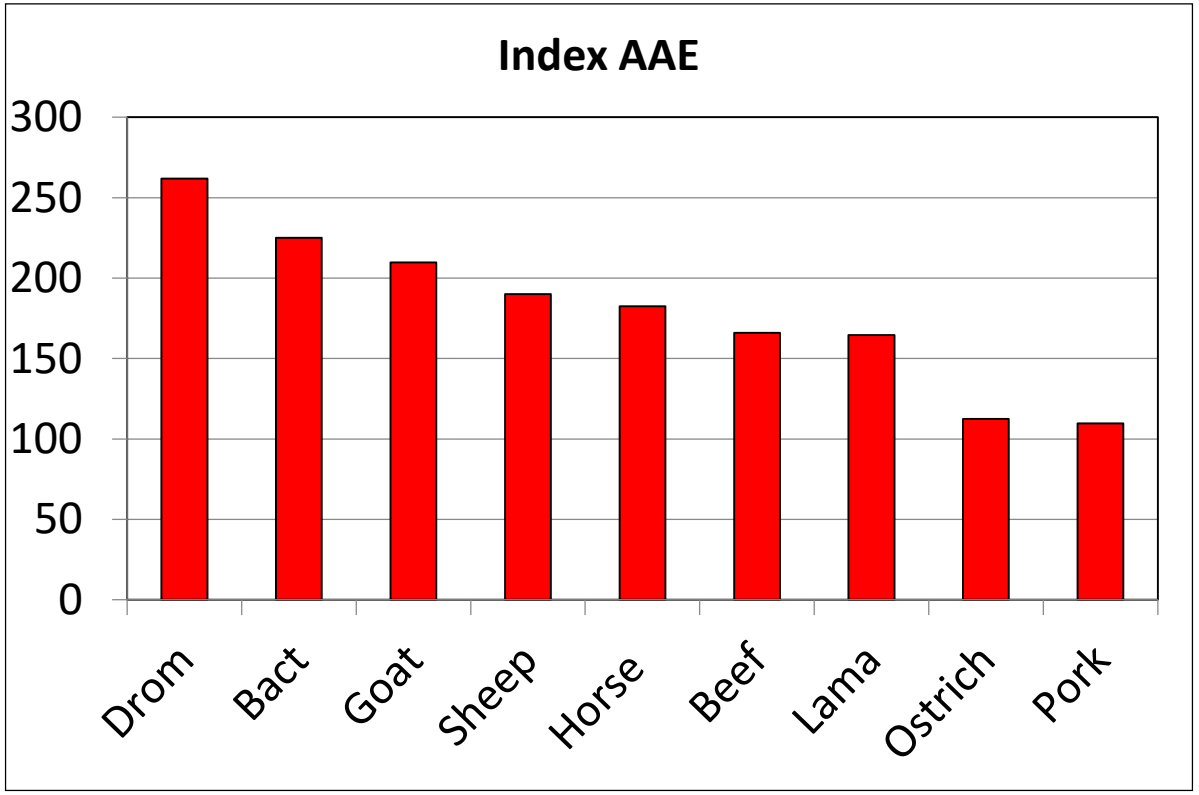
Meat potential

- Adult weight at 7 years old
- Adult weight between 350 abd 700 kg (mean: 430-480 kg)
- Males jusqu'à 800-900kg (Somalie)
- Record of 1300 kg (Turkmenistan)
- Dressing percentage (50-58%)





Dietetic quality of camel meat



Species	Cholesterol (mg/100g)
Camel	50-61
Cow	59-73
Goat	63-71
Sheep	53-78
Swine	60-80
Chicken	57-76
Kangourou	62
Oistrich	62

Modernization of camel meat sector: from pastoral fattening to feed-lots

Modernization of camel meat sector: from informal slaughtering to specialized abattoirs

Modernization of camel meat sector: specialized butchery to supermarket

Camel meat processing

Conservation/

Smoked/

Drying/

Confit/

Barquette/

Vacuum drying/

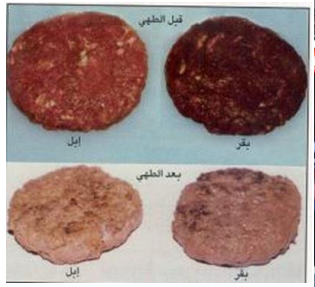
Hash/

Biltong

Cooked sausage /

Pate/

Processing/



Camel-burger

Sausage/

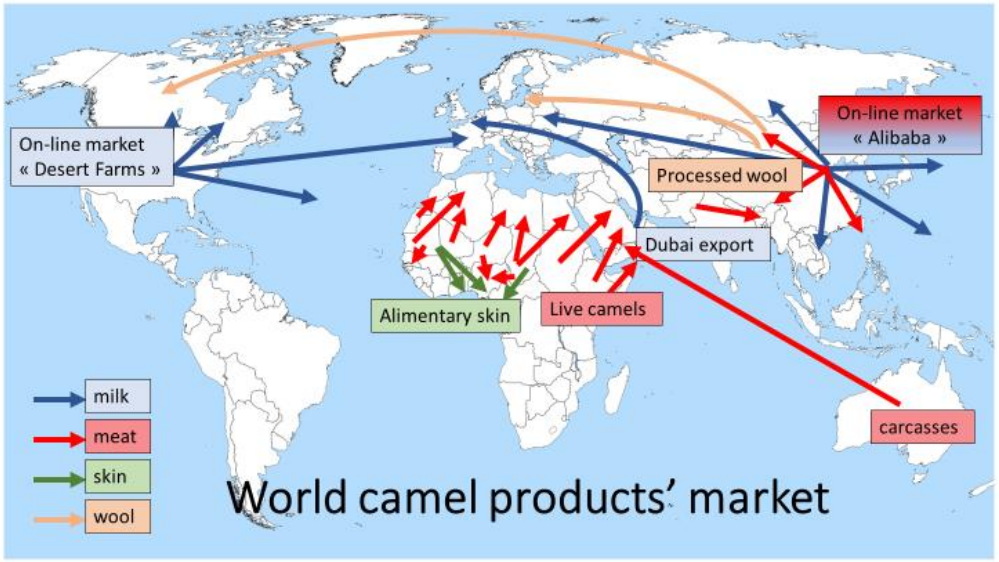
Luncheon

Corned-camel

Ham/

Mortadelle

Strength and weakness of camel meat production for food security



Camel meat presents four main advantages:

(i) as for milk, it is produced in remotes areas with very well adapted animal to specific ecosystem;

(ii) it is produced mainly in pastoral areas without expensive inputs;

(iii) it contributes to regional and international market integration,

(iv) the growth is low, and the slaughtering age varied from 1 to 5-6 years according to countries

CONCLUSION

Participation to food diversity of the humanity thanks to physicochemical composition as well as organoleptic characteristics and technological properties of camel milk and meat

Pivotal role in the food security of the populations living in arid areas thanks to production in marginal and low productive areas, especially because other agricultural productions are difficult.

Interest of camel products for local communities, not limited to their contribution in the diet but also to their cultural, economic and ecological aspect

Contribution to the territorial development by promoting dairy and meat products with high added-value being strong commercial argument regarding their dietetic virtues

Contribution to the poverty alleviation and to the environment preservation by maintaining rural population in arid areas.

Organization of the community of camelid scientists through ISOCARD (implemented in 2006)

International Society of Camelid Research and Development
ISOCARD

2006 –Al-Ain (UAE)
2009 –Djderba (Tunisia)
2012 – Mascate (Oman)
2015- Almaty (Kazakhstan)
2018 - laâyoune (Morocco/WSahara)

Thanks for attention