

## **Camel (*Camelus dromedarius*) Meat Utilization in Kano-Nigeria (II): Post-Slaughter Handling and Marketing Wholesale Meat Cuts**

B.F. Muhammad and I.N. Akpan

Department of Animal Science, Bayero University, P.M.B 3011, Kano, Nigeria

**Abstract:** Using 10 camels, the post-slaughter activities and wholesale meat cut marketing at Kano municipal abattoir were studied. The major post-slaughter activities at the abattoir were flaying, evisceration and cutting, in that order. Camels were set in crouching position and flaying starts at position slightly over the hump. The wholesale meat cuts (as obtained at the abattoir) were neck-cut (mean weight = 15.93±1.00 kg), back-cut (mean weight = 32.43±4.85 kg), left (37.43±2.71 kg) and right (37.53±1.14 kg) forequarter, hindlegs (left = 27.00±0.65kg; right = 28.66±0.61kg), viscera (heart, 1.80±0.20kg; liver, 8.53±1.82kg; lungs, 3.45±0.11kg; full large and small intestines 30.50±2.17; caecum, 15.03±1.65kg ) and hide (mean wet weight = 43±3.67kg). The mean live weight of camels used in the study was 388.97±52.51 kg and costs ₦ 40, 000:00 to ₦ 60, 000:00 ₦ aira. The 2 forequarters together weighed 75kg and were sold at ₦ 16, 000:00 to ₦ 18, 500:00. The average hindquarters weighed 55.6 kg and cost ₦ 13, 500:00 to ₦ 16, 500:00. The ₦ eck and back cuts fetched ₦ 8, 000:00 to ₦ 12, 500:00 and ₦ 5, 600 to ₦ 7, 000, respectively. A profit margin of ₦ 8, 400:00 to ₦ 12, 900 was realized from the wholesale of camel meat at the abattoir.

**Key words:** Camel, meat, slaughter, pre-slaughter handling, wholesale cuts, abattoir

### INTRODUCTION

The world economy has been characterized during the last decade by rapid growth in production, consumption and trade, reflecting large productivity gain and a structural shift in diets towards more livestock products (von Massow, 1989). These trends hold more for the developing countries. The Sub-Saharan Africa, with a population of about 500 million people, which is expected to reach 1, 300 million by the year 2025, has even greater demand for food, especially that of animal origin (FAO, 2005).

The low daily per caput intake of animal protein by Nigerians was reported (Adegbola, 1991; Otuma, 1998). The situation could be turned-around by increasing the availability of affordable protein sources. Although, camel is considered a less conventional source of meat compared to other domestic animals (Kurtu, 2004), its large body mass and good dressing percentage compared to cattle, gave it an advantage as a better meat producer (Mukasa-Mugerwa, 1981).

The world estimate of camel population in 1993 was 18.5 million (FAO, 1995), 89% of which are single-humped camels in the tropical and sub-tropical regions (Payne and Wilson, 1999). According to the FAO report of 1978-79, Africa has 6.6 million camels and 80% are dromedaries.

The Nigerian camel population was reported to be slightly over 18, 000 heads which are found mostly in the northern parts. In that part of the country, there are reports on large trade in camels for slaughter (Alaku and Mohammed, 1991) and camel meat has been used for increased supply by the meat industry (Phillips *et al.*, 2001). Earlier investigations by the same authors studied the slaughter figures and pre-slaughter handling, while the current study assessed the post-slaughter camel meat handling and wholesale cut marketing at Kano municipal abattoir.

### MATERIALS AND METHODS

**Study area:** The study was conducted at the Kano Municipal abattoir, Kano State. Kano State lies between longitudes 9°30' and 12°30' North and latitudes 9°30' and 8°42' East, in the sudan savannah zone of Nigeria. The State is characterized by a wet season (May-October) and a dry season (November-April). The annual rainfall and temperature ranged between 787 and 960 mm and 21°C and 46°C, respectively (KNARDA, 2001). The people of Kano State are mainly traders, farmers and civil servants.

**Data collection and analysis:** A total of 10 camels were slaughtered (2 per week) in 5 weeks to determine the post-slaughter handling at the abattoir. The images of the

activities were captured using a digital camera (Model A302, Samsung Techwin Co., Ltd). The post-slaughter handling were flaying, evisceration and cutting. The various wholesale cuts were marketed at the abattoir and sold based on bargain as obtained in the abattoir. The profit margin was calculated based on buying and selling costs. The camels dressing percentage was determined (Wilson, 1978) as:

$$\text{Dressing percentage} = \frac{\text{Carcass weight}}{\text{Liveweight}} \times 100$$

The weight of various meat cuts were measured using Salter suspended scale (50 × 200 kg, Model 235, England Inc). The standard deviation (SD) of the means was calculated.

## RESULTS AND DISCUSSION

The results of post-slaughter activities of camel at the abattoir are shown in Fig. 1-4. The camels are set in a crouching position prior to flaying (Fig. 1). This is not the case for cattle, sheep and goat, which are usually laid on their back for flaying, usually on the kill floor. Desmond (1988) reported that animals to be flayed are hung head-down. In case of camel at the abattoir flaying begins from the posterior to anterior parts of the body (Fig. 2). The veins at the posterior cervical vertebrae are cut to relax the neck and to ease flaying. The flesh immediately beneath the skin appear whitish. However, the flesh of camel is reddish and darker than beef. Mukasa-Mugerwa (1981) reported that the meat of young camel is similar in colour to that of aged cattle.

The evisceration (Fig. 3) process starts by cutting through the right side of the camel, from the point of lumbar to the lower abdomen as against making a vertical cut from the thorax to the navel as reported (Desmond, 1988). The camel meat was cut into wholesale parts by dismemberment using local axe as shown in Fig. 4.

**Camel meat wholesale-cuts:** The various wholesale-cuts were sold bone-in at the abattoir. The neck-cut Wuya (Fig. 5) which consists of the cervical vertebra was splitted and spread using an axe. The cranium was detached from the neck and the spongy bones were left in the splitted flesh. The back-cut Gadon baya (Fig. 6) comprised the lumbar and sacral vertebra with the associated muscles and traditionally the heart, oesophagus and the wind-pipe are added to balance for the price of the part. The forequarters (right and left), thoracic vertebra and ribs G aba hagu and dama are shown (Fig. 7 and 8). The right and left forequarters constitute an



Fig. 1: Crouched camel prior to flaying



Fig. 2: Camel flaying



Fig. 3: Camel evisceration

important meat component that determine the overall profit realised by the butcher. The right and left hindquarters Cinai includes femur and tibia bones and are shown in Fig. 9. The hindquarters is considered the meaty part of the camel and were usually sold intact compared to the neck and other cuts.

The viscera Kayan ciki includes large and small intestine, caecum, lungs, spleen, liver, uterus and its contents (Fig. 10). The viscera was separated from the



Fig. 4: Cutting and dismemberment



Fig. 7: Camel right forequarter Gaba dama



Fig. 5: Camel neck-cut Wuya



Fig. 8: Left forequarter Gaba hagu



Fig. 6: Camel back-cut gadon baya



Fig. 9: Camel hindquarter Cinai

carcass and sold without the heart. In situation where the camel is slaughtered during pregnancy as is often the case, the liveweights are not be a good indicator of dressing percentage. The fetuses salvaged were sold along with the viscera similar to the reports of Abiola (1995). Figure 11 shows the hide and feet refer to as kirgi in the study area. The hide and feet were sold together either to agents of companies involved in tanning or

restaurateurs. The restaurateurs process the hide to a delicacy referred to as Ganda comm only consumed in the study area. The entire carcass dressing and marketing activities were carried out in the open, on the kill floor.

**Wholesale meat cut marketing:** The camel liveweight, carcass weight and prices of wholesale-cuts are shown (Table 1). The mean liveweight of camels slaughtered for

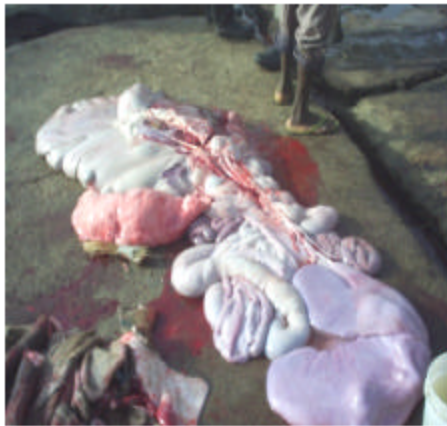


Fig. 10: Camel visceral Kayan ciki



Fig. 11: Hide and hooves kirgi

Table 1: Camel live weight, carcass weight and revenue from wholesale meat cuts

Item	Weight (kg) Mean±SD	Wholesale Price (Range, ₦)
Live Camel	388.97±52.51	40,000-60,000
Wholesale cuts		
Forequarter+ribs		
Left Side	37.43±2.71	
Right Side	37.53±1.14	16,000-18,500
Hindquarter		
Left Side	27.00±0.65	
Right Side	28.66±0.61	13,500-16,500
Neck	15.93±1.00	8,000-12,500
Back (+ hump)	32.43±4.85	5,600-7,000
Minor cuts	15.43±1.56	
Carcass weight	194.41±49.51	2,500-3,800
Dressing percentage	49.9	
Viscera		
Heart	1.80±0.20	4,600-6,400
Liver	8.53±1.82	
Lungs	3.45±0.11	
Intestine (full)+splen	30.50±2.17	
Caecum	15.03±1.65	
Cranium (+brain)	3.76±0.15	300-500
Hide (wet) and feet	43.00±3.67	2,400-3,200
Total		52,900-68,400
Profit margin		8,400-12,900

₦160 = 1 USD (at December, 2007). SD = Standard deviation

the study were  $388.97 \pm 52.51$  kg and cost between ₦ 40,000:00 and ₦ 60,000:00. The current live weight value is less than the 447 kg earlier reported (Wilson, 1978) and more recently 593 kg (Kurtu, 2004) for matured camel brought for slaughter. Camels for slaughter at the study area were mostly in poor body condition score.

The mean total carcass weight obtained was 194.41 kg, which was less than the 300 and 210 kg reported by Wilson (1988) and Kurtu (2004), respectively. A dressing percentage of 49.9% was obtained and correspond to the 49% reported by Wilson (1988). Mukasa-Mugerwa (1981) for a 590 kg liveweight camel reported a dressing percentage of 57%. The dressing percentage may not always correspond with liveweight, since female camels could be slaughtered while carrying fetuses that will finally influence the liveweight.

The mean carcasses forequarters weighed 75 kg ( $37.43 \pm 2.71$  and  $37.53 \pm 1.14$ , for left and right, respectively), lower than the range of 79-183.5 kg reported by Wilson (1978). The selling price for the forequarter ranged from ₦ 16,000:00 to ₦ 18,500:00 which depends on meat size and haggling ability of the butcher. The average weight of hindquarter was 55.6 kg, which is also, slightly out of range of 59.5-124.5 kg reported by Wilson (1988). The price of the hindquarters was less than the forequarters, though not proportional to weight difference and ranged from ₦ 13,500:00 to ₦ 16,500:00. The neck and back-cuts weighed 15.9 kg (selling cost ₦ 8,000:00-N 12,500:00) and 32.4 kg (selling cost ₦ 5,600 - ₦ 7,000), respectively. The neck, back and the minor cuts were unconventional meat cuts obtained in the abattoir and do not necessarily follow the meat cut standard recorded by Campbell *et al.* (2003) who reported major meat cuts as round, sirloin, loin and chunk.

The viscera was sold separately without the heart. That part that may not be considered meat elsewhere was consumed as a delicacy especially in the sub-saharan Africa (Abiola, 1995). The mean weight of heart, liver and lungs of camels slaughtered was  $1.8 \pm 0.2$  kg  $8.53 \pm 1.82$  kg and  $3.45 \pm 0.11$  kg respectively. These values were within the range reported by Wilson (1978). The hide (wet) and feet weighed 43.00 kg slightly lower than the reported value of 49.4 kg by Wilson (1988). The weight of the hide determines its price and ranged from ₦ 2,400:00 to ₦ 3,200, which is low, compared to its multiple uses. A profit margin of ₦ 8,400:00 to ₦ 12,900 was realized from the sales of the meat at the abattoir. However, the prices of the various meat cuts are not standardized and are influenced markedly by bargaining ability and the prevailing market situations of demand and supply.

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