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Bringing Camels into Focus: A Photo-Essay on Dromedaries in the Nigeria-Niger Corridor

The one-humped camel (*Camelus dromedarius*) is a multipurpose domestic animal. It is well adapted to the harsh conditions of the arid and semi-arid zones and therefore thrives where other livestock species do not. The dromedary is versatile and its ability to survive and perform in the harsh, arid and semi-arid areas of the world has earned it a good reputation amongst pastoralists of tropical Africa and Asia (Waziri/Shehu/Kwari 1999). Camel keeping is a common activity in the Nigeria-Niger border areas. The dromedaries are found in the northern parts of Nigeria on latitudes 8°N and 14°N. According to Bourn et al. (1994), the camel population estimate in Nigeria stood at 90,000. Niger Republic, which is one of Nigeria's neighbors to the north, has a camel population of 420,000 (FAO 1990; as cited in Breulmann et al. 2007). Pastoral groups of Nigerien origin own most of the camels in Nigeria.

This border region is characterized by extensive, flat dry lands, in which transhumant livestock herders move several kilometers north and then south again each year, following the rains and the grazing. Sedentary farmers grow crops along a south-north gradient of diminishing rainfall and increasingly erratic distribution, and population density is increasing as a result of both natural increase and immigration from more densely settled areas in the south (Mortimore et al. 2008). The region has a uniting effect on both countries in terms of a common cultural heritage, seasonal livestock movements and commerce. Camels are commonly thought of as being confined to the northern borders of Nigeria, and this is still largely true of breeding herds (Blench 1999). Although individual farmers may breed camels on a small scale, relatively few breeding herds spend the entire year in Nigeria; most cross into the Niger Republic for three to four months at the height of the wet season (Blench 1999) between July and September in company of their traditional nomadic herders (Mohammed/Hoffmann 2006), so there is a tendency for Nigeria's camel population to fluctuate as a result of this transhumant activity.

The dromedary can provide a wide array of functions and products. It is probably best described by Bulliet (1975) who wrote that, "the camel can be milked, ridden, loaded with baggage, eaten, harnessed to a plough or wagon, traded for goods or wives, exhibited in a zoo or turned into sandals and camel hair coats" (as cited in Waziri et al. 1999:135). The camel feeds on plants or parts of plants not eaten by more conventional livestock. In addition to being complementary to other livestock in the use of feed resources, camels complement them in production. Milk is among the most important products of the camel, with long lactation periods and the ability to maintain milk production through long dry spells. The vitamin C content of camel milk is superior to that of cow's milk, which is very important from the nutritional viewpoint, especially in arid regions where fruit and vegetables are scarce. Moreover, the fat content is lower than cow's milk, making it easily digestible, and as it does not sour as quickly as cow's milk it is ideal in hot areas (Teka 1991). Meat is largely a by-product of a camel-rearing system, as males are used to advanced ages for transport, power and often for recreation in the form of racing. Other economic products include wool and hair, and investment and capital accumulation are aspects of camel productivity.

During a field survey carried out in Nigeria and Niger Republic between July and September 2010, different aspects of camel production were photographed.¹ This article highlights the significance of these pictures for camel research and development in Nigeria. Photographs can serve as a tool to draw the attention of scientists and researchers to issues relevant to camel research and development in developing countries. They are useful because they convey complex information, and in the case of a photo-essay the photographs are not separate from the research context (McClatchey/Gollin/Rakotonandrasana 2005). Today, photos are a necessary tool that can be used by everyone in most areas of science research (Mokkamul 2006). They can continue to produce better information long after the field-data collection process is over.

METHODOLOGY

Informed consent was obtained from the camel owners who participated in the field survey. Photographs were taken from Kano in northwestern Nigeria, Garin Alkali in northeastern Nigeria and Kursilla in the Maine Soroa Department (Diffa Region, southeastern Niger) and Gujjo in Goure Department (Zinder Region, Southeastern Niger). All photographs were taken using a Nikon Coolpix L18 digital camera with a 5.7–17.1 mm lens. Other than image resizing, the photographs have not been substantially modified. The photographs were broadly classified based on the following criteria for ease of discussion: camel phenotypes, camel reproduction and fetal wastage, and camel health. These are prioritized because, in addition to camel nutrition, they form the cornerstone of any camel-rearing system. Prioritizing these aspects in our research agenda will aid the development of a viable camel industry that could improve the livelihood of the pastoralists who rear dromedaries in the Nigeria-Niger corridor.

PICTORIAL REVIEW 1: CAMEL PHENOTYPES

According to Mukasa-Mugerwa (1981), the name of the dromedary breeds and types in Africa is often a reflection of their locality or country, the people who breed them or simply the animal's color, rather than any division into work, riding or milking breeds. He further opined that it is possible for the same camel types, with a common ancestry but occupying different geographical areas, to be labeled as two separate types or breeds. There is an absence of a well-defined breed classification for dromedaries in northern Nigeria. Identification is mainly by body color. Mohammed (2000) reported four major phenotypes in livestock markets of northwestern Nigeria based on body color. These comprise the sand-brown (see picture 91), gray-white (see picture 92), dark-brown (see picture 93), and pied phenotypes (see picture 94). In addition to these phenotypes, we also observed the white (see picture 95), brown-black (see picture 96) and black phenotypes (see picture 97). According to Mohammed (2000), the pied phenotype has been described by respondent Tuareg pastoralists as a beast with good mothering ability and highly palatable milk, although difficult to control when grazing because it is deaf. Epstein/Mason (1971) also reported that the pied dromedary was of great value to dromedary pastoralists in the Sahel (as cited in Mohammed 2000). A gap in knowledge exists as far as the identification, documentation, characterization, preservation and economic evaluation of these phenotypes is concerned. The bottom line is that we do not know whether these phenotypes are individual breeds or several types of the same breed. To answer this, a genetic characterization of these phenotypes is needed and should be a priority in future research.

PICTORIAL REVIEW 2: CAMEL REPRODUCTION AND FETAL WASTAGE

Breeding behavior of camels differs from sheep and cattle in two primary ways: males show strong seasonal activity (rut), while females are induced ovulators; that is, the act of mating stimulates ovulation (Lapidge/Eason/Humphrys 2008). Mature dromedary bulls during rut or

¹ The authors are grateful for the cooperation given to them by the key informants and the camel owners whose animals were used in this study. We are also grateful to Nura Ibrahim Mukhtar and Muhammad Baba Bello for the help with the field work.

musth are characterized by a dramatic increase in androgen levels in the blood with intense sexual desire and extremely aggressive behavior (El-Wishy 1988). They become unmanageable, blow out a palatal flap from the mouth, vocalize, and spread urine over their backs with the aid of their tails (Yagil/Etzion 1980). The *dulaa* is a palatal flap (see picture 98) that is extruded on the side of the mouth of the male camel during the mating season, and sometimes incorrectly assumed to be the tongue (Yagil 2006). The flap is formed under the influence of testosterone, so the more virile the male, the longer is its *dulaa*, which protrudes further in a ball-like structure. According to Kuhad et al. (1998), potential airway obstruction could be caused by the *dulaa* in male racing camels and this reduces maximum oxygen uptake and therefore lowers performance. Attempts have been made to alleviate the problem by surgical resection of the *dulaa* to provide better air-flow in the upper respiratory tract during strenuous exercise (Kuhad et al. 1998).

According to Agarwal/Khanna (1990), higher testosterone and active poll glands have been reported during the rut season (as cited in Al Eknah 2000). The poll glands (see picture 99) are situated on the back of the neck between the ears (Yagil 2006) and secrete a coffee-colored acid fluid, which flows down the back of the neck, marking the skin with a dark color. The males rub their necks on any solid object, thus marking their territory (Yagil 2006). It was earlier assumed that the poll glands secreted substances of a male character (Purohit/Singh 1958; cited in Tingari et al. 1984), which was substantiated by evidence that the secretions have similar concentrations of androgens as in the blood (Yagil/Etzion 1980). Tingari et al. (1984) suggested that the poll glands could be a source of pheromones, and histological examination confirms that the glands are of endocrinological origin (Tibary et al. 2005; as cited in Yagil 2006).

Picture 100 shows a pregnant camel, diagnosed by traditional method in which when pushed slightly on the flank, she urinates and curves her tail upwards toward the hump (tail “cocking”). According to Yagil (2006), a pregnant camel will show it by lifting and curving her tail when a male advances. The male then moves off looking for another receptive female. This is the method used by nomads to determine pregnancy. Other methods of pregnancy diagnosis include ultrasound (Schels/Mostafawi 1978, Skidmore 2000, Vyas et al. 2002, Vyas et al. 2004), chemical tests such as Cuboni and barium sulfate tests (Khanvilkar/Samant/Ambore 2009), vaginal cytology (Khanvilkar/Samant/Ambore 2009), and the detection of gonadotrophins (Khanvilkar/Samant/Ambore 2009) or immunoassays for progesterone (Agarwal et al. 1987, Homeida 1990).

Fetal wastage as a result of the slaughter of a pregnant camel is shown in picture 101. Ataja/Uko (1994) reported that 24.06% of female camels slaughtered for meat at Sokoto abattoir in 1992 were pregnant (as cited in Muhammad/Ashiru/Abdullahi 2007). Reproduction is the basis of any livestock economy. It is an important factor in determining the production efficiency of individual animals as well as the entire herd and livestock industry of a nation. The percentage of young animals is crucial for herd replacement while milk off-take for the neonate and human consumer is dependent on reproduction. If the menace of fetal wastage through slaughter of gravid animals is not checked, the rate of decline in the numerical strength of replacement stock will worsen and translate into a deficit in access to adequate animal products, especially with the impending increase in human population growth.

Slaughtering of pregnant animals for meat is contrary to the rules of slaughter, under which only unproductive, infertile, sterile, old or accidentally injured animals are allowed to be slaughtered (Khan/Khan 1989; cited in Ademola 2010). This practice ultimately reduces the quantity and quality of animal protein available for human consumption, which worsens an already bad situation in most developing countries (Ademola 2010).

PICTORIAL REVIEW 3: CAMEL HEALTH

The diseases of the African camel have not been extensively studied in the Nigeria-Niger corridor. In a study of ectoparasites of *Camelus dromedarius* in Sokoto, Nigeria, Lawal/Ameh/Ahmed (2007) reported that ticks were the most abundant parasites infesting camels. They observed that these ticks occurred in clusters mostly at the base of the tail. Other body sites where they were commonly seen include the interdigital spaces, perineal region, axilla (see picture 102) and abdomen. In addition to these, we were able to find ticks in the eye region and the nostrils (see picture 103) and on the udder and inguinal region (see pictures 104 and 105). Ticks on the udder can be regarded as risk factor for mastitis and udder lesion (Megersa 2010). We could not classify these ticks into genus and species but they seem to belong to the hard ticks group in different stages of development. The effect of tick infestation on camels has been highlighted by Moallin (2009), who mentioned that, "ticks on camels are found in inguinal, perineal and axillary regions. They are also found in the ears, nose and eyes. Ticks cause irritations and anemia. Heavy infestation with ticks can lead to injuries on bite sites and wounds. Pyoderma may occur as a consequence".

Lymphadenitis, an inflammation of the lymph nodes, was also observed during the survey (see pictures 106 and 107). According to Moallin (2009), the cervical lymph node is the most involved in camel lymphadenitis. He further mentioned that in this disease skin abscesses are observed on the head, shoulder, abdomen and legs and several bacterial species were isolated from these abscesses. Didier (1975) considered different corynebacteria as the main cause of lymphadenitis in camels (cited in McGrane/Higgins 1985).

During the survey, camel owners reported that the plants "Kalumbo" (*Leptadenia pyrotechnica*; see picture 108) and "Yadiya" (*Leptadenia lancifolia*; see picture 109) lead to abortion when consumed by pregnant camels and the latter also acts as an aphrodisiac in the male camel. These claims are anecdotal and their veracity needs to be established.² However, it is possible that these plants contain some phyto-oestrogens, which could interfere with the normal physiology of pregnancy in the camel leading to its termination. The phytoestrogens are associated with a number of problems, including development, infertility, reproductive disorders, abortion, premature maturity and even death caused by immune-system failure (Allawati/Kumar/Musa n.d.). These authors reported the possible role of fresh Alfalfa (*Medicago sativum*) in an outbreak of abortion in camels. They further stated that Alfalfa is widely used for feeding camels in the Gulf region and contains an oestradiol concentration of 37.76 pg/ml. Alfalfa also contains flavones, isoflavones, sterols and coumarin derivatives, and the isoflavones genistein and dadzein, appear to be responsible for oestrogen-like effects in animals and are collectively referred to as phytoestrogens (Allawati/Kumar/Musa n.d.). There is a need to document indigenous knowledge in the Nigeria-Niger corridor with respect to plants known to cause abortion in camels and to determine their oestrogen level.

Camel owners also mentioned some ethnoveterinary remedies for treating infertility in their herds. They described the scarification of the frenulum of the tongue, a fold of mucous membrane extending from the floor of the mouth to the midline of the underside of the tongue (see picture 110) and the excision or cutting off a protrusion from the vagina (see picture 111) as ways in which they address the problems of infertility in their herd. In both cases they allow the bull to mount after the surgical intervention. Camel owners in Sheikh District of Somaliland have reported protrusion in the vaginal area as one of the signs of brucellosis in female camels (Barre 2009). Camels with this disorder were also reported as being excited, exhibiting behavior similar to camel bulls and a tendency to mount other females in the presence of male camels. If Somaliland camel keepers have treated the vaginal protrusion in their female camels with some kind of traditional method, it was not mentioned in Barre's study (2009). There is therefore a

² For a further discussion of camel fodder in a historical Arabian context see the article by Daniel Varisco in this volume.

need to investigate the scientific basis behind the practice of surgical removal of the vaginal protrusion as a remedy for female camel infertility in the Nigeria-Niger corridor.

CONCLUSIONS

Camel keeping in the Nigeria-Niger corridor is an important activity that calls for urgent attention from researchers and policy-makers. Aspects such as camel phenotype characterization, camel reproduction and camel health should be given priority because, in addition to camel nutrition, they form the cornerstone of any camel-rearing system. Prioritizing these aspects in our research agenda will give rise to a viable camel industry that could improve the livelihood of the pastoralists who happen to be the traditional herders of the dromedary in the Nigeria-Niger corridor. Boosting camel-rearing in this context could provide the much needed animal protein to the inhabitants of this area, who are constantly threatened by the menace of desertification, and the camel, known for its resilience with regard to desert ecosystems, is probably the best candidate for this.

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