

Donkeys in Nigeria: history, distribution and productivity

by

Roger Blench¹, A de Jode² and E Gherzi³

¹ Overseas Development Institute, 111 Westminster Bridge Road, London SE1 7JD, UK

² Department for International Development, PO 1356, Kaduna, Nigeria

³ ImTal 73, Rückgebäude, München, Germany

Abstract

Although donkeys have been widespread in Nigeria for many years they have received little research or development attention. During the oil boom in the mid 1980s the number of donkeys fell sharply and they were largely replaced by motorised transport. Since national economic circumstances have deteriorated the demand for donkeys has increased markedly. In response to this situation and to the shortage of published work on traditional donkey management a survey was undertaken in 1990 which is reported.

Productivity data were assembled on 77 breeding females in northern Sokoto, in the northwest of Nigeria. Four types or breeds of donkey were identified owned by both pastoralists and settled farmers. Donkeys were found to be involved in a wide range of transport activities but were not used widely for plowing, in part due to the lack of suitable equipment. Although discouraged in many areas, donkey meat continues to be traded and consumed especially in the south.

Various reproductive parameters are described including age at first foaling and seasonality of foaling. The herd structure is described and compared with structures from other systems where donkeys are found. A mortality rate of 7% was identified in the population studied. Nine commonly encountered diseases of donkeys in northern Nigeria are described. They could not all be matched to internationally recognised diseases.

It is concluded that the oil boom severely damaged the base breeding population of donkeys in Nigeria which is only now recovering due to increased demand for power and continuing demand for meat. It is anticipated that the use of donkeys could grow further if suitable equipment, such as lightweight plows, were available.

Introduction

Although donkeys are an everyday sight throughout most of northern Nigeria, little is known of their use, distribution and productivity under traditional management. As compared to other domesticated species donkeys have received

little or no attention from development agencies despite the fact that they are essential to the subsistence strategies of many communities in semi-arid regions. Donkeys can provide power for a wide variety of rural and urban tasks and appear to stay healthy on varied and often poor-quality diets and with only modest management inputs. Fielding (1987) has reviewed the distribution and place of donkeys in rural Africa.

The primary function of donkeys in Nigeria has traditionally been as pack animals, but it is in this role that their use went into a temporary decline during the oil boom of the 1970s. For a long period an artificial exchange rate for the Naira meant that vehicles, fuel, and spares were unrealistically cheap. This encouraged the development both of a road infrastructure for trucks and pickups and the widespread use of low-capacity motorcycles in rural areas.

From the late 1970s this combination of motorcycles and cheaper, more regular, rural transportation provided effective competition for donkeys. Indeed, although the *jakin Kano*, the Kano donkey, is proverbial, by the mid-1980s it had all but disappeared. Donkeys were seen as a symbol of the old-fashioned and 'backward' rural ways and were thought to be permanently disappearing. As a result, initiatives to study donkeys or assist smallholders with their purchase, or to develop equipment for them, were poorly received.

However, economic circumstances changed rapidly. In 1986 under the strictures of structural adjustment, the Naira currency was effectively devalued, making everything with an imported component more expensive. The massive road and vehicle infrastructure established in the 1980s was able to carry this recession for a while, but transporters found it increasingly difficult to maintain vehicles. As a result, many vehicles went out of service over the years and the numbers in use declined gradually. Moreover, where vehicles

This paper is published in: Starkey P and Fielding D (eds), *Donkeys, people and development. A resource book of the Animal Traction Network for Eastern and Southern Africa (ATNESA)*. ACP-EU Technical Centre for Agricultural and Rural Cooperation (CTA), Wageningen, The Netherlands, 244p. ISBN 92-9081-219-2. This publication was supported by CTA and Neda, The Netherlands. For details of ATNESA and its resource publications see <http://www.atnesa.org>

were valuable it was more strategic to use them on tarmac roads where recurrent maintenance costs were lower. Rural markets have thus been increasingly left to their own devices.

One consequence of these developments has been that donkeys are beginning to become popular once again. Their low cost, capacity to work, hardiness and resistance to disease makes them attractive to rural households in the semi-arid zone. However, rebuilding donkey capacity takes time. Equipment, management skills and core breeding herds within the country have been lost and buying new stock from Niger involves payment in CFA Francs, a hard currency relative to the Naira. Nonetheless, that farmers have been motivated to do this since 1986 speaks strongly of the benefits derived from donkey ownership.

In view of this, a more detailed study of donkeys seemed appropriate and they were included in the National Livestock Resource Survey in 1989–1991. This paper presents the results of that survey, together with additional observations made during further field trips up to 1998.

Donkeys are much more scattered than ruminants and are usually not kept in herds. Many owners buy their animals from traders from Niger. As a result, donkeys are difficult to study because it is rare to encounter owners who have a comprehensive knowledge of the breeding history of individual animals. The productivity data in this paper are based on the analysis of the case histories of 77 breeding females studied in the north of Sokoto State, in the northwest of Nigeria, in 1990. Prices given in the paper also refer to 1990 unless otherwise stated.

Distribution and breeds of donkey

Although the donkey, *Equus asinus*, occurs throughout most of semi-arid Africa today, much of its distribution is recent and it is still spreading in eastern and southern Africa. The ass was probably domesticated in northeast Africa. It seems to have spread to sub-Saharan West Africa relatively late (Groves, 1986; Epstein, 1984; Eisenmann, 1995; Blench, 1995). In Nigeria, donkeys are associated with areas of Islamic influence, and were probably introduced via the trans-Saharan caravan trade. There is some evidence that donkeys were also introduced from the Nile across Sudan and Chad and reached the northeast via an East-West route (Blench, 1997).

Although there are donkeys in villages throughout the semi-arid north, their susceptibility to internal parasites and trypanosomiasis restrict their all year-round use in the more humid southern states. However, FulBe pastoralists use donkeys for dry season transhumance as far as the Niger-Benue valley. Figure 1 shows the distribution of village donkeys and the southern limits of transhumant donkeys. The map also includes the approximate location of the states referred to in the text, as they were in 1990.

Donkeys are usually distinguished by coat colour. Although some colours are favoured by buyers, there is little evidence that these colours are linked to the productivity or hardiness of donkeys. Four breeds or types of donkey are recognised in Nigeria as shown in Table 1.

The highest prices are paid for the *Idabari*, as it is said to have a stronger body and can carry heavier loads than the other breeds.

Ownership and use

The two groups of people who own donkeys in northern Nigeria are FulBe pastoralists and village farmers. The Teda people, who are professional donkey breeders, are confined to Niger.

Pastoralists

FulBe use donkeys mainly as pack animals when migrating from one grazing area to another. During transhumance, donkeys are loaded with tents and camp utensils, and carry children, women and old people to new locations. They also carry poultry, in cages, and lambs and kids too young to trek. During migration women normally control the donkeys, while the main herds of other livestock are driven by the men. Donkeys are usually hobbled and tethered at night, and are untethered, but still hobbled, during the day and allowed to scavenge for grazing in the vicinity of the camp.

Table 1: Names and colours of donkey breeds in Nigeria

<i>Hausa name</i>	<i>Colour</i>
<i>Auraki</i>	Rust or red
<i>Duni</i>	Dark brown to black
<i>Fari</i>	Pale cream to white
<i>Idabari</i>	Grey to light-medium brown

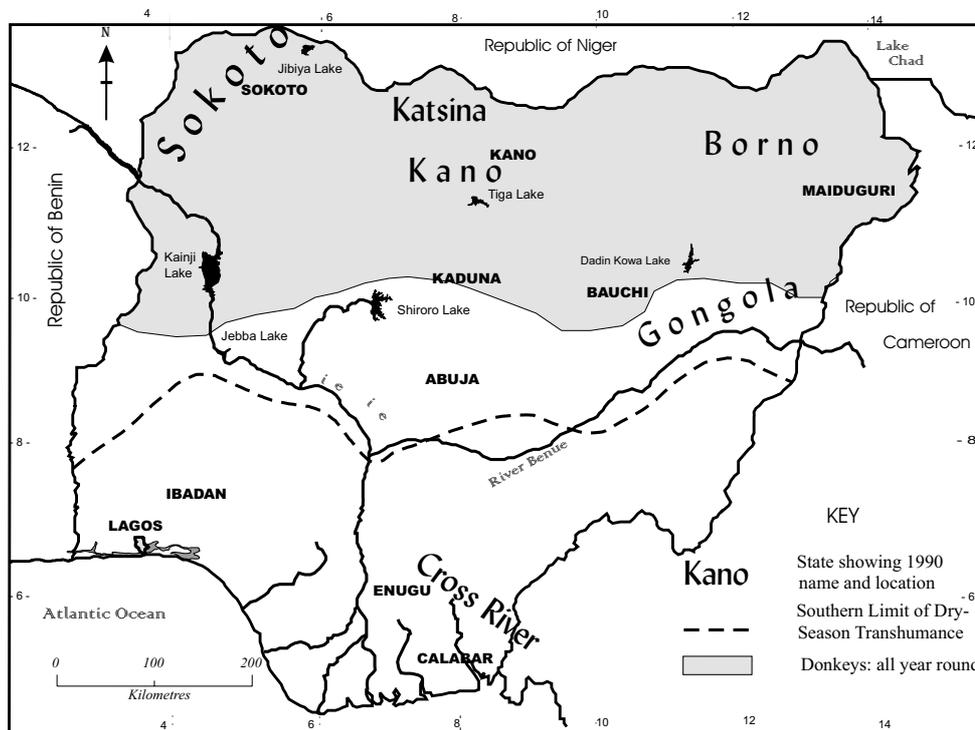


Figure 1: Distribution of donkeys in Nigeria

Village donkeys

In most parts of semi-arid Nigeria farmers aspire to own donkeys, although donkeys are much more common in the northwest and north-central regions than in Borno and the Northeast. Donkeys are kept primarily to carry loads and as personal transport. They are used mainly for:

- carrying and drawing water
- carrying mud to repair compound walls
- moving manure from compounds to fields
- transporting crop residues from fields
- bringing harvested crops back to compounds
- carrying goods to market.

Not all farmers own donkeys, and it is common to hire out donkeys to transport goods such as crops or residues from the fields to the compounds. As many rural villages lack adequate transport to the main roads, some villagers have great difficulty in getting produce to and from the bus 'drop-off' point to their compounds. Farmers often use donkeys to carry goods out of isolated rural villages to roads, where they leave their animal with a professional 'minder' while they take a bus into town. A person (usually a man) is employed

every market day to look after villagers' donkeys. The villagers arrive with laden donkeys in the morning. They unload their animals and wait at the main road for a bus to the market. The person is paid 1 Naira (US\$1 = 40 Naira) for every donkey in their charge. For this they guard and water the donkeys until their owners return at the end of the day. The owners are responsible for providing food for their donkeys and normally bring bundles of grass with them in the morning.

Drawing water

In Borno, donkeys frequently draw water for pastoralist herds. Wells suitable for donkey traction are approximately 45 metres deep. The leather bucket weighs 30 to 35 kg when full. One, two or even three donkeys are roped together and attached to the bucket rope by a stopper knot. The donkeys have padded harnesses around their girths, and are joined to the well rope by a toggle peg. Around the Maiduguri, Dikwa and Baga areas in Borno an adult fills the large leather bag with water and a child controls the donkey(s). The leather bag is drawn up out of the well using a wooden roller on a metal bar positioned by wooden stays approximately one metre above the

This paper is published in: Starkey P and Fielding D (eds), *Donkeys, people and development*. A resource book of the Animal Traction Network for Eastern and Southern Africa (ATNESA). ACP-EU Technical Centre for Agricultural and Rural Cooperation (CTA), Wageningen, The Netherlands, 244p. ISBN 92-9081-219-2. This publication was supported by CTA and Neda, The Netherlands. For details of ATNESA and its resource publications see <http://www.atnesa.org>

ground level. This toggle is disconnected when the animals have brought the leather bag to the surface. The adult then transfers the water to a trough before lowering the water bag back down the well. At the same time the child brings the donkey(s) back to the well mouth.

Donkeys are capable of working for most of the day with breaks for rest, watering and rough grazing. Owners start training their donkeys from 12–18 months of age.

Plowing and carting

Although the use of donkeys for plowing is well-known in neighbouring Sahelian countries and donkey plows are specifically manufactured for use in Mali and Niger, donkey plowing is virtually unknown in Nigeria. Examples of donkey plowing were recorded in Sokoto, Niger, Gongola and Borno States, but in each case the idea had been introduced by migrants from the Republic of Niger, along with the plows themselves. The main constraint on donkey plowing appears to be the availability of plows, which are not manufactured in Nigeria and are expensive to import.

Although carting is known, because donkey carts are used in Niger, only a few examples of donkey carts in Nigeria were recorded during the survey. Like ox carts, these were made from the chassis of wrecked vehicles.

Consumption

The distribution of the donkey in Nigeria largely coincides with the distribution of Islam. Muslims have always considered donkey-meat forbidden food, although in many parts of the Islamic world donkey meat enters into magical recipes. Further south, the donkey is an exotic to which no culinary taboos attach and donkeys are eaten widely.

Management, feeding and breeding

Herding

Where there is a substantial donkey population, as in many parts of north-west Sokoto, the donkeys are herded rotationally by the sons of owners. Depending on herd size, a number of boys will graze the donkeys on roadsides and fallow lands and avoid areas of cultivation. Donkeys are similar to cattle in their grazing habits and so are easy to herd as a group.

In the dry season after harvest, many areas release their donkeys to scavenge crop residues and food scraps around the villages. In other areas, such as several villages near Danbatta north of Kano,

donkeys are tethered in the compounds during the dry season and fed with crop residues and dry grass. This is the result of a substantial increase in the theft of donkeys while they are grazing unrestricted in the bush.

Because of their heavy workload, and due to the lack of fodder, pack donkeys are usually given supplementary feeding, particularly crop residues, in the dry season. The only example found of mineral supplementation was in Sokoto State, where some owners gave *kanwa* in small quantities to their donkeys throughout the year.

Breeding female donkeys

The rearing and use of breeding female donkeys varies across Northern Nigeria. In northern Borno, Kano and Katsina most working donkeys are 'entire' males and are bought in the local markets at 2–3 years old and then trained as pack animals. These farmers say that they will not rear female donkeys because they cannot work for long periods, cannot carry heavy loads, command a lower market price and cannot work for the last five months of the gestation period.

This contrasts with north-central Sokoto State where most compounds have females as well as males. The females carry loads and are used for the same tasks as the male donkeys, except during the last five months of pregnancy.

Donkeys usually breed freely in the bush, but where they are tethered, stud males are brought in to service the females. In Danbatta north of Kano, stud fees of 30 Naira were charged, but elsewhere service was free. Owners of male pack donkeys may be reluctant to let their animals be used for mating because there is a belief that stud males do not work as well, or for as long, as other males. Despite this, farmers do not castrate males to eliminate their libido.

Productivity and reproductive parameters

Fielding (1988) has reviewed existing data on the reproductive characteristics of female donkeys worldwide. No published material on the productivity of Nigerian donkeys is available, and the only studies with comparable data are Wilson (1980) for two different systems in Mali, and Wilson et al (1984) for the Twareg pastoral herds of Niger. A study of the breeding history of some 77 female donkeys in north-central Nigeria was therefore made in May–June 1990. Table 2 shows the main reproductive parameters calculated from this dataset.

There is substantial variation in the age at first foaling. Figure 1 represents the distribution of age classes at first foaling as a curve. The mean age at first foaling, 57 months, is substantially higher than in temperate countries where about three years is considered usual. Donkeys in Nigeria are allowed to mate freely when herded, but restrictions on access to males when jennies are used for work can mean that oestrus is overlooked. Estimates from the literature suggest that the length of the oestrous cycle is about 24 days and the length of the oestrus itself 6–7 days (Fielding, 1988).

Variations in the annual pattern of foaling most likely reflect nutritional differences. Figure 2 shows the seasonal distribution of 83 parturitions recorded from the sample of breeding females. Donkeys are usually seasonal breeders in temperate regions but in tropical climates they come into oestrus throughout the year. Figure 2 shows that there is no marked trend in the pattern of foaling over the course of the year. Donkeys have a gestation period of almost precisely a year (374 days is quoted in Fielding, 1988). The body condition of breeding females never seems to deteriorate so far as to inhibit fertility completely, and an even conception pattern reflects the ability of donkeys to thrive on the poorest of diets.

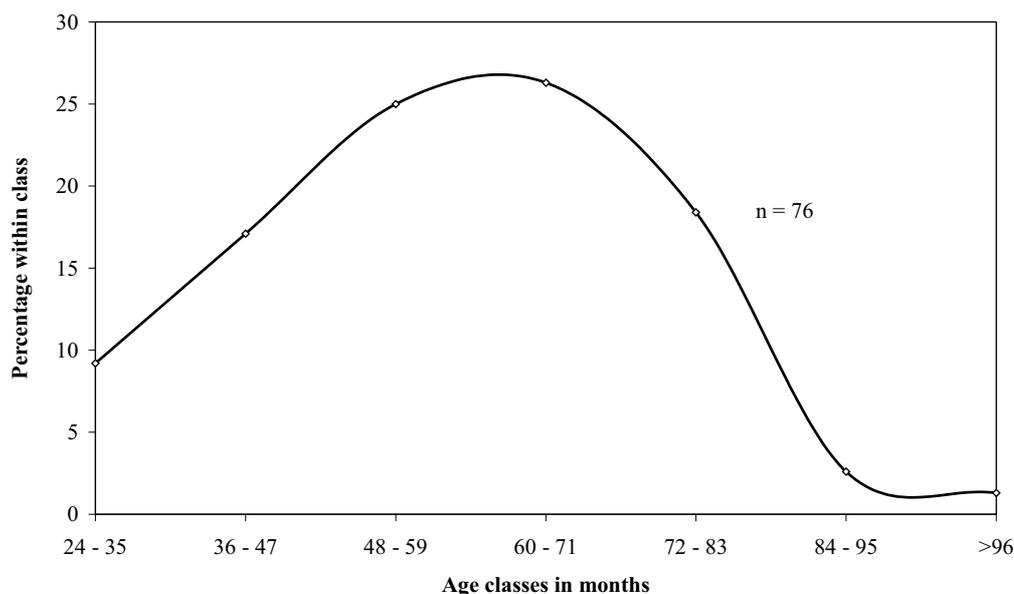
Table 2: General reproductive parameters of donkeys in Nigeria

<i>Category</i>	<i>Value</i>	<i>SD</i>	<i>n</i>
Mean age of breeding females	96	29	77
Mean age at first foaling	57	17	76
Foaling interval	26	-	12
Mean number of previous parities	2.1	1.3	77

Table 3 represents the population structure of donkey herds in which breeding females are kept. It has been calculated from the ages of all breeding females and the ages of their progeny still present in the herds, excluding mortalities, sales and transfers. The overall proportions of males to females are very similar.

A demographic pyramid such as that shown in Figure 3 should be used with caution; in the case of a work animal such as the donkey it illustrates the strategies of the producers. Almost all males are sold soon after weaning, with only a few kept for breeding and work. However, the male donkeys do not leave the system as they are bought for work by farmers who accept that they do not reproduce and must be replaced at the end of their working life. Data from temperate regions

Figure 1: Distribution of age at first foaling in donkeys



This paper is published in: Starkey P and Fielding D (eds), *Donkeys, people and development*. A resource book of the Animal Traction Network for Eastern and Southern Africa (ATNESA). ACP-EU Technical Centre for Agricultural and Rural Cooperation (CTA), Wageningen, The Netherlands. 244p. ISBN 92-9081-219-2. This publication was supported by CTA and Neda, The Netherlands. For details of ATNESA and its resource publications see <http://www.atnesa.org>

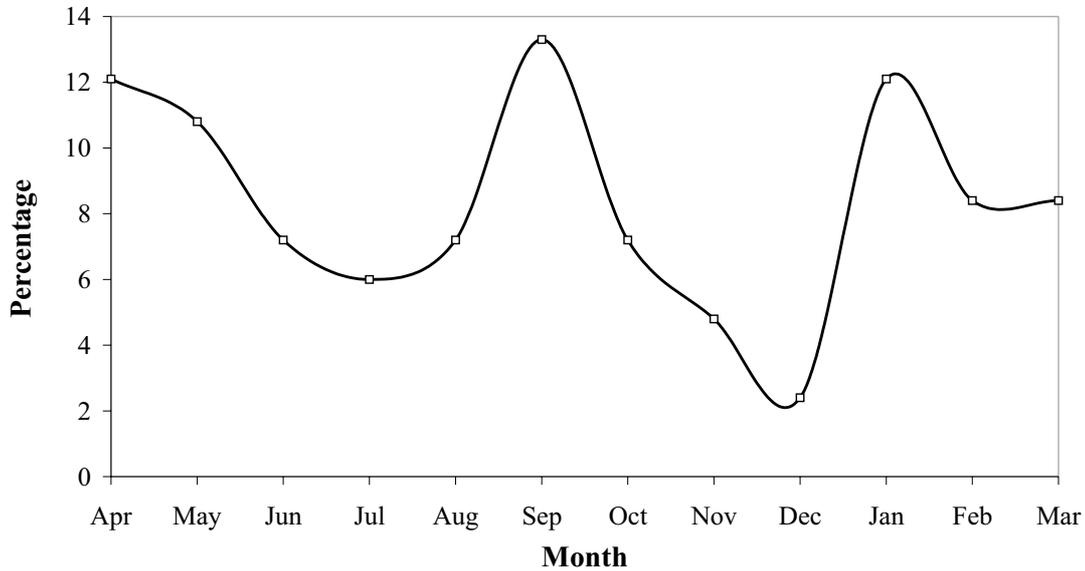


Figure 2 Seasonality of foaling in donkeys

suggests that donkeys have a potential working life of up to 30 years (Fielding, 1988) but among the animals examined it was rare for owners to claim they were more than 12 years old.

Table 3 compares the results from Nigeria with herd structures reported elsewhere in West Africa. The present study parallels closely results from rural Niger in a similar environment. The very different figures in the peri-urban regions in Mali undoubtedly reflect the importance of working males near large towns and a similar figure would be expected near Kano and Katsina.

A total of 84 progeny left the herd during the study. The reasons for leaving the herd are shown in Table 4. No abortions were recorded. The data in Table 4 shows that 7% of donkeys born within the herd died within it, and that death accounts for only 14% of the total exits. The low mean age of

death suggests that most of these deaths are before weaning. The generally low mortality reflects donkeys' hardiness and resistance to disease as well as the milking ability of jennies. Milk is not taken off for human consumption, which benefits the foal by comparison with camels and ruminant stock.

Farmers can afford to eliminate almost all the males from their herds because of the effective circulation of males within small rural communities, and the absence of prestige attached to males.

Figure 4 shows the age of progeny when sold divided into age-classes. The mean age at sale was 21 months. Two-thirds of the offspring are sold when they are between 18 and 30 months old, which is usually before the next foal is born.

Table 3: Comparisons of donkey herd structure

Country/system	Males (%)	Females (%)	% females breeding	Source
Niger/pastoral	30	70	52	Wilson et al, 1984
Mali/urban	85	15	11	Wilson, 1980
Nigeria/rural	30	70	50	This study

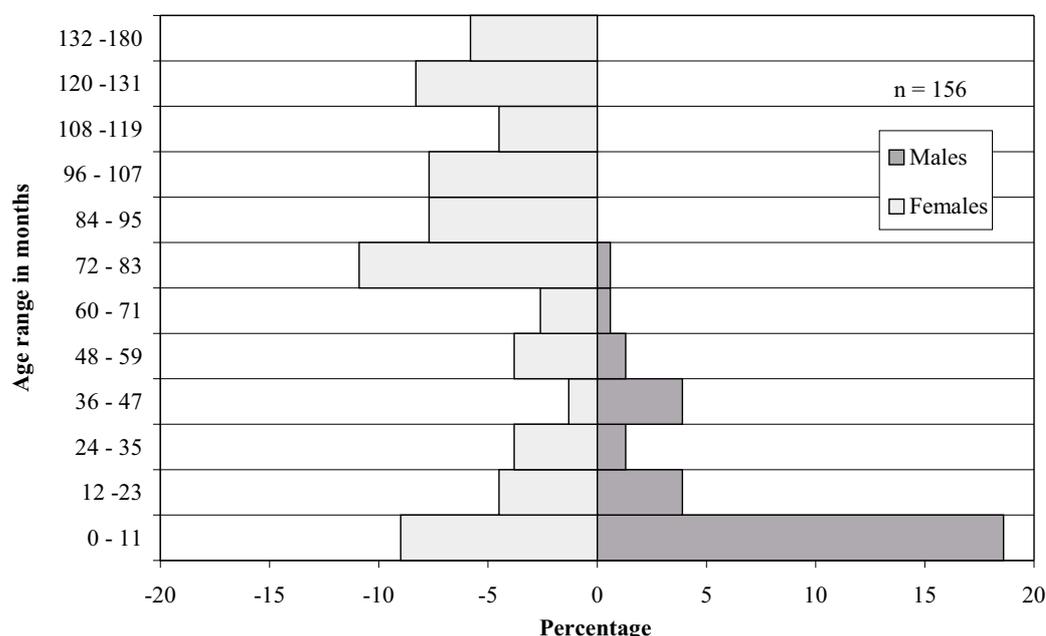


Figure 3: Donkey herd structure: demographic pyramid

Owners generally sell foals before they are trained for work.

Disease

The most common health problems of donkeys arise from overuse, misuse and under-nutrition (Fielding, 1987). Donkeys are susceptible to internal parasites, particularly of the lungs, as well as skin conditions such as mange and ringworm. However, neither foot and mouth disease nor rinderpest affect them, and low stocking rates limit the spread of contagious diseases. The majority of the donkeys observed during the survey were in good physical condition and showed little sign of disease or malnutrition. According to Svendsen (1986), donkeys may live for 30 to 40 years under

good management. Table 5 shows the diseases reported by donkey-owners in northern Nigeria.

Trade and marketing

Work animals

Donkeys are sold in Nigeria for three reasons: as work animals, for breeding and to eat. The country is a net importer of donkeys because they are used as work animals in many parts of northern Nigeria where they are not bred. The great majority of these donkeys are brought in from the Republic of Niger, although a few come from northern Cameroon and from Chad. Donkeys are generally brought to the markets along the Niger/Nigeria border by specialised traders, but migrant FulBe pastoralists also sell them directly to farmers.

Table 4: Classification of exits from the study herd

Category of exit	Number (n=84)	% of exits (n=84)	% of population (n=164)	Mean age at exit (months)
Died	12	14	7	6
Sold	69	82	42	21
Gift	3	4	2	25

Note: no abortions were recorded

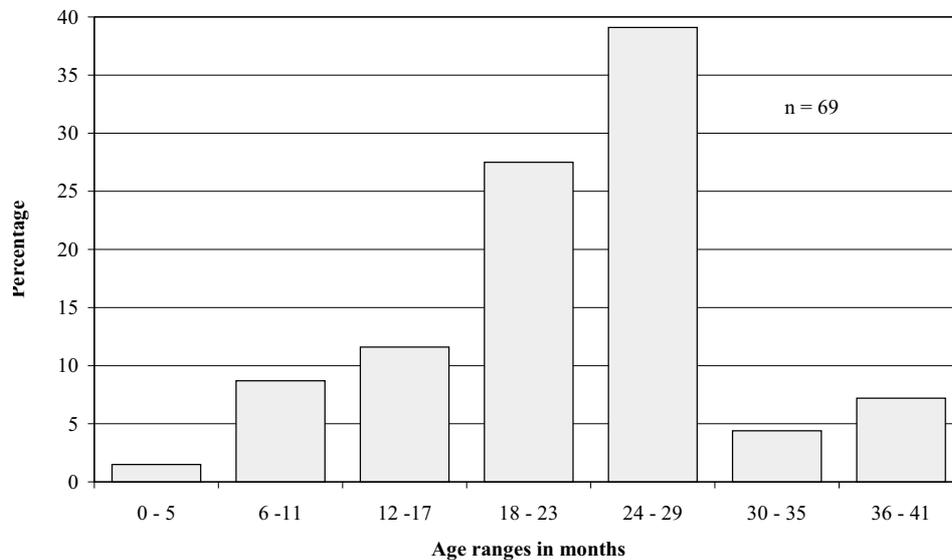


Figure 4: Age distribution of sales of donkey progeny from the study herd.
The mean age at sale is 21 months

Male work donkeys are then transported to small rural markets throughout northern Nigeria.

The main trade is between the peoples in Niger that own large numbers of donkeys and Nigerian traders that buy and sell between the two borders. Nigerian traders (known as *Yan'baranda* in Hausa) are from the Hausa, Gobirawa and Zarma ethnic groups. The Bugaje, Bare, Abzinawa, Gelehi and Buzaye peoples are the main sellers of donkeys in the Niger Republic. In the Cercles of Maradi, Kazawai and Ader the Twareg keep large herds of donkeys for the specific purpose of breeding. In most cases, Hausa and Zarma traders buy the donkeys directly from the producers and take them to the border markets where they enter the Nigerian trade system.

The principal markets are:

Maigatari, Mai-Adua, Babura and Garki in Kano State

Garken-Daura and Zango in Katsina State
Shinkafe, Kauran Namoda and Sabon Birni in Sokoto State

Gashua and Nguru in Borno State.

The only two areas in northern Nigeria where breeding female donkeys were reared to any extent were villages in Danbatta in Kano State and Silame in Sokoto State.

The present pattern of trade may be something new and brought about by the development of the

meat trade and the increasing professionalism of thieves. In northern Borno State it was said that, until the 1950s, donkeys were semi-feral and were allowed to graze freely by rivers. Individuals who needed pack animals captured the wild donkeys, trained them, and sent them back to the river when they were not needed. As the taste for donkey meat developed thieves came from outside and loaded all the feral donkeys into trailers and sent them for slaughter. This created a shortage, and farmers who previously had considered donkeys a free resource were now obliged to buy them and to tether them in order to discourage thieves.

Slaughter stock

The trade in donkeys for meat is essentially of old, sick or exhausted animals that have been used for work in the villages of the semi-arid zone. There is a thriving trade in donkeys reaching southern markets, especially in the Igbo regions and the Cross River area. Formerly, much of the trade was in smoked meat, as donkeys bought in intermediate markets were slaughtered and skinned and the meat prepared by drying and smoking. This practice seems to have largely disappeared and the trade is confined to live donkeys.

The main focus of this trade is Eha-Amufu in eastern Anambra State, which was established in 1970, and by the mid-1990s was receiving some 150 to 300 animals daily (Onyezebeh, 1989). The

Table 5: Local names and descriptions of some donkey diseases in Nigeria

<i>Alaf</i>	Lameness develops in all the hoofs of the animal without visible cause. The animal is eventually unable to move. Possibly laminitis.
<i>Anumari</i>	Small cuts on the tongue which bleed and do not heal.
<i>Daburi</i>	Sensitivity and swelling of the gums, preventing the animal from eating properly.
<i>Dankashi</i>	A condition which affects the joints, causing lameness.
<i>Dasusu</i>	A lice condition which makes the skin look rough and can result in inflammation and scuffing of the skin.
<i>Fatattakashi</i>	This disease is first seen as a swelling around the anus which develops into an anal prolapse, making defecation increasingly difficult. The coat of the animal becomes tarry and the animal rapidly becomes lethargic, stopping feeding and drinking. The local treatment for this condition is to brand the anus daily for three days, usually in the early morning. This treatment, if begun before the animal stops feeding, can succeed; otherwise it usually weakens progressively until death.
<i>Hida</i>	Lameness in the hip area.
<i>Rinkyau</i>	A condition of the ears whereby they stay erect. Sometimes fatal.
<i>Shirr</i>	A swelling at the intersection of the mane and withers.

meat is sold as donkey meat locally, but is sometimes passed off as the more expensive beef outside the area. The extent to which donkeys are eaten is probably underestimated greatly, since this is something of a taboo area for many observers. Because of its ambiguous status, the trade in donkeys remains poorly documented.

Muslims in northern Nigeria have taken the attitude that it was acceptable to sell donkeys to southerners as long as they did not consume the animals themselves. The same practice also applied to the dog trade in the semi-arid regions. However, during the 1980s a feeling grew up that even this was contrary to Islam. Many Muslims now consider that it is forbidden to sell donkeys for meat, whosoever eventually eats them.

In addition, pressure on poor farmers in periods of drought has led them to sell breeding stock and there is believed to be a shortage of good breeding animals within Nigeria. The Council of Northern Emirs has proscribed the trade in donkey-meat, and several northern states have passed ordinances forbidding the large-scale shipping of donkeys.

Although large-scale dealing in donkeys can still be observed in some livestock markets, including Gashuwa in Borno, the open trading in slaughter

donkeys is not now allowed in many markets. However, the trade in 'meat' donkeys clearly continues, since slaughter stock continue to reach southern markets. It is likely that some donkeys, sold as pack animals, are diverted to the donkey meat traders, who then transport them south. As small-scale trading evidently continues, the effect of these ordinances has been to drive the trade underground rather than to eliminate it.

Conclusions

The donkey has had a particularly unfortunate history in Nigeria, because the availability of motor transport following the oil-boom years caused many breeders to give them up, and to switch to pickup trucks, especially in the Middle Belt, where there are more health constraints on donkeys. As a result, many donkeys were sold for meat, and the breeding stock declined; a history rather similar to that of the decline of Muturu cattle following the Nigerian civil war.

Even now, the donkey has not regained its former position. Little is being done to promote it as an alternative to expensive, and now often unavailable, vehicles. Nonetheless, the virtues of donkeys are well recognised by rural communities, and the donkey population seems to be increasing.

Donkey plowing is now widespread in the Sahel, and there is every reason to believe that it would spread further in Nigeria if the lighter plows required were more generally available. The present problem appears to be one of re-establishing a breeding stock to supply rising demand in the future. Health problems of donkeys in the subhumid region also need to be more fully explored and overcome. Although the trade is no longer encouraged in the north, donkeys should not be ignored as a source of meat where beef prices are too high for many low income urban families.

Acknowledgements

The authors are grateful to the Federal Department of Livestock and Pest Control Services, Nigeria, and to Resource Inventory and Management, for permission to adapt material presented in the Nigerian National Livestock Resource Survey (RIM, 1992).

References

- Blench R M, 1995. A history of domestic animals in north eastern Nigeria. *Cahiers de Science Humaine*, **31**(1):181–238.
- Blench R M, 1997. *The westward wanderings of Cushitic pastoralists: explorations in the prehistory of Central Africa*. Paper presented at the Megachad conference, Orléans 15–17 October 1997.
- Eisenmann V. 1995. L'Origine des ânes: questions et réponses paléontologiques. *Ethnozootechnie* **56**: 5–26.
- Epstein H. 1984. Ass, mule and onager. pp. 174–184 in: Mason I L (ed), *Evolution of domesticated animals*. Longman, London, UK.
- Fielding D, 1987. Donkey power in African rural transport. *World Animal Review* **63**:23–30.
- Fielding D, 1988. Reproductive characteristics of the jenny donkey - *Equus asinus*: a review. *Tropical Animal Health and Production* **20**:160–166.
- Groves C P, 1986. The taxonomy, distribution and adaptations of recent equids. pp 11–15 in: Meadow H and Uerpman H P (eds), *Equids in the Ancient World*. Ludwig Reichert, Wiesbaden, Germany.
- Onyzebeh D C, 1989. *Eating of donkey meat in the Eha-Amufu area*. DVM dissertation, Faculty of Veterinary Medicine, University of Nigeria, Nsukka. Nigeria
- RIM 1992. *Nigerian National Livestock Resource Survey*. (VI vols). Report by Resource Inventory and Management Limited (RIM) to Federal Department of Livestock and Pest Control Services (FDL&PCS). Abuja, Nigeria.
- Svendsen E D (ed), 1986. *The professional handbook of the donkey*. The Donkey Sanctuary. Sidmouth, Devon, UK.
- Wilson R T, 1980. *Livestock production in Central Mali: structure of the herds and flocks and some related demographic parameters*. ILCA Programme Document, Bamako, Mali.
- Wilson R T, Wagenaar K and Louis S, 1984. Animal production. pp. 69–144 in: Swift J J (ed), *Pastoral development in Central Niger*. Final report of the Niger Range and Livestock Project. Government of the Republic of Niger, Niamey, Niger.