

Working Animals Management

Chapter One

1. Introduction

1.1 Historical Importance of Draught Animal Power

One of the major milestones in the long march of humanity from nomadic existence to civilized life was the domestication of animals. In addition to gathering roots and fruits, man began milking livestock, while hunting animals for meat. With the discovery and development of agriculture, animals were trained to provide power to prepare land for the production of food grains. Cattle and equines were harnessed to vehicles of various designs, which cleared the bush in the Americas and Australia, making the land habitable for the colonizers.

Freed from manual labour, man attained leisure for cultural pursuits. The transportation of goods and people in animal-drawn carts, and riding on horses and camels, enabled human communities in different parts of the world to interact. Mobility helped to spread knowledge and culture to hitherto isolated parts of the world. Draught animals thus contributed significantly to physical mobility and the spread of knowledge and culture, thus paving the way for the globalization of humanity. Thus, mankind owes a great deal to the contribution of draught animals over the past 3,000 years. Advanced countries no longer need draught animal power; however, such countries can help developing countries which still depend on this power source. Over fifty developing countries still use draught animals for agriculture and small-scale transport, and this situation will continue for many years to come. Therefore, draught animal welfare is important even in this era of high technology, where advanced countries can assist with technology to improve the welfare and efficiency of draught animals.

1.2 Background, status and constraints of animal traction

Working animal is an animal, usually domesticated and trained to perform tasks. Such animals are sometimes called *draft animals*, *draught animals* or *beasts of burden*.

The history of working animals may predate agriculture, with dogs used by our hunter-gatherer ancestors. Around the world, millions of animals work in relationship with their owners. Animal traction is the use of animals to assist human beings in work, especially agricultural. It has a long history in Eurasia, Egypt, Maghreb and Ethiopia.

Animal traction includes both pack transport as well as the 'pulling' work of animals. In various parts of the world cattle, buffaloes, horses, donkeys, mules, camels, llamas, elephants, goats, dogs and etc. are used for transport, crop cultivation, water-raising, milling and land leveling. Animal power in Africa begins with the first drawings of oxen and ard ploughs in the Egypt of the III Dynasty (2778 - 2723 BC). Several ancient Egyptian illustrations clearly show that the animals used for ploughing were cows, not oxen. One possible explanation is that the ox was considered more sacred than the cow. In most parts of the world, oxen are the first bovids to be used for work. Cows are only used when smallholder farming becomes intensive, animal feed resources are limited and work operations are light or highly seasonal.

Ethiopia and the Horn of Africa

Ox-drawn plows appear to have been used in Ethiopia for at least two millennia, and possibly a much longer, although the origins of the maresha ard plow are not known. The single-handled Ethiopian scratch plow is very different in design from the two-handled plow used in Egypt. The Ethiopian maresha is not only old, it is highly persistent. To the present day, it is almost universally used by smallholder farmers. Although a variety of development programmes has attempted to introduce short-beamed steel plows for the past fifty years, there has been almost no adoption of these.

The plowing animals are generally oxen, yoked in pairs with withers yokes, and controlled by a single person. Where oxen are in short supply, horses, donkeys or cows may be used, but oxen are the work animals of choice. Camels are occasionally used for cultivation. Ox-carts do not appear to have been part of Ethiopian traditional systems, and they remain extremely uncommon. Transport of goods in Ethiopia has long been based on pack donkeys. Little is known about when donkeys started to be used in Ethiopia, and when they became common. Under the Pharaoh Pepi II (2270 BC) caravans with pack donkeys were trading with Punt (Ethiopia). Donkeys have long been important in the history of the salt trade in northern Ethiopia and

are represented in traditional Ethiopian art. The population of donkeys has been rising in recent history. With about five million donkeys, Ethiopia now has the second largest population of donkeys in the world. Pack donkeys are extremely important in both rural and urban economies. Despite the large numbers of pack animals employed in Ethiopia, transport of loads by humans (mainly women) is still common.

Horses and mules are mainly used for riding. Simple passenger-carrying two-wheel horse-drawn carts became common in Ethiopian cities around the middle of the twentieth century. They were banned by the authorities from central Addis Ababa around 1963, but remain common in other towns. They are almost invariably used as passenger taxis, and there is negligible use of horse carts for freight purposes.

Major Constraints of Working Animals and traction activity

For the working animal, the primary need is to raise food intake to achieve ME intakes of 1.3-1.8 times maintenance if energy intake is to match expenditure and body weight losses are to be avoided. With ruminant animals, voluntary intake of poor quality feeds may constrain energy intakes to maintenance levels or indeed less. The common health problem is the physical injuries such as lip, girth, chest and hip wounds, and hoof injuries and tail sore. The cause of these injuries is the carelessness in harnessing that is too tight or too rough which makes friction with their bodies. In addition to these some of the Constraints were presented as following:

Implements: Lack of appropriate implements can be an important constraint to the use of animal traction and farmers have sometimes found it difficult or impossible to obtain *suitable* equipment. The lack of knowledge or inadequate training responsible for poor use of implements reduces the overall efficiency of animal traction. While this is clearly important, it is unlikely to be a primary constraint to animal traction, although in extreme cases the difficulties experienced can lead to the abandonment of this technology.

Harnessing: Different people have strongly advocated the use of head/horn yokes, withers/shoulders yokes, collars, breast-bands, single yokes or double yokes. Oxen are yoked with double withers yokes or double head yokes (the latter mainly in the more humid zones where humpless, taurine cattle are common) and donkeys and horses are harnessed with breast bands. It could

be argued that harnessing is not a primary constraint, since the existing yoking systems (when used correctly) do allow animal traction to be used for agricultural development. Nevertheless it could be a secondary constraint and animal traction might be made more efficient, and/or more comfortable for both animals and farmers if harnessing were "improved", either by different designs or by better attachment of existing designs.

Human labour: Human labour can be a critical constraint in farming, and animal traction may ease or exacerbate this. The labour bottleneck of cultivation may be lessened if draft animals are used, although the overall effect may be **labour-switching rather than labour-saving**. For example, draft animals may save adult males valuable time at critical cultivation periods, but this may have to be "paid for" by children supervising the draft animals as they graze throughout the year. Farm households that do not have sufficient labour to manage draft animals throughout the year may be unable to adopt animal traction. Stumping fields to allow the use of animal-drawn plows itself requires much labour, and in some areas this may be a critical constraint to adoption.

It can be surprising to see how many people are involved in plowing in West Africa. Two to four people are often employed: one (usually an adult or strong youth) handling the plow, one guiding the animals, and one or two (often children) encouraging or beating the animals. In Ethiopia and most Asian countries it is rare to see more than one person working with a team of animals. It is interesting to try to identify specific reasons for this, rather than merely ascribing it to generations of experience. For example, where one person is used to control the animals, implements often have long-poles, and this may give the person plowing greater control over the animals.

Capital and credit: It is well known that lack of capital or credit can be a critical constraint to agricultural development, and the adoption of animal traction can be highly dependent on the availability of these resources. The market cost of oxen, cultivation implements and carts is relatively high to average farm incomes.

Environmental condition: In forest areas, the presence of trees and stumps constitute a major constraint to animal traction. However this constraint gradually "disappears" as population and land pressures increase and as the time required for land preparation and weeding under forest-fallow cultivations systems increases. In forest areas, animal disease, notably trypanosomiasis, may act as a constraint to the use of draft animals. In more

arid areas, the provision of water can be a constraint, and animals may have to walk long distances to water sources.

Animals: The limited availability of animals can be a serious constraint to the employment of draft animal power in some areas. In the humid and sub-humid zones of West and central Africa, there are very few cattle, and projects in southwestern Burkina Faso, Liberia, the south of Mali, southern Sierra Leone, central Togo and eastern Zaire have all reported animal supply as a serious constraint.

1.3 Economic and social significance of working animals

Household income can be increased by hiring out teams of animals for transport and field work. These service operations are often very important. In the same way, cattle herders can earn substantial extra capital by training and selling draught animals, if they manage them carefully. The owner of a draught animal team spends money and time on feeding, housing and taking care of his animals, but, accidents apart, revenues eventually exceed expenses. Generally, selling a team allows the farmer to buy new untrained animals and make a good profit. Majority of farmers in sub-Saharan Africa including Ethiopia practice small-scale mixed farming on areas of less than four hectares. For these people draft animal power offers a feasible alternative power source to manual power in the cultivation of food crops and cash crops. Changing from manual cultivation to draught animal cultivation usually involves a considerable increase in the area cultivated, thus considerable increase in yield/crop production.

Socially animal power has encouraged the emergence of more modern, individualistic agriculture, by helping to transform certain communal tasks into family tasks (weeding, preparing the land). Animal power leads to a significant reduction in working time and a considerable fall in the hardship of agricultural and household work. Domestic tasks, such as daily transport of water and wood are much less onerous. Carrying goods and people is more efficient and faster when pack animals used.

1.4 Possibilities for improvement of animal traction

Both tractors and draught animals can be used in agriculture. They can either be used on their own or combined to complement each other. Commercial farmers will continue to use mainly tractor power on large farms. For small commercial and emerging farmers the use of draught animals to

complement tractors may improve the economic viability of the farm. Animal traction is generally the best option for small-farmers as it is affordable, sustainable, profitable and environmentally friendly in most cases.

For animal power to use it effectively:

- an infrastructure, providing input supplies, and services backup should be established.
- the concept be included in the curricula of schools, agricultural colleges and universities.
- Government policy should provide animal traction trainings, research and extension services

Strategies for profitable production with animal traction

New strategies have been developed to improve the exploitation of draft animal power and the following areas were considered;

- I. Selection and training of draft animals
- II. Training farmers
- III. Development of animal-drawn equipment
- IV. Support services
- V. Use of donkeys for cultivation

CHAPTER TWO

Species of Working Animals and their importance in different parts of the world

2.1 Bovidae Family

The name "Bovidae" was given by British zoologist [John Edward Gray](#) in 1821. The word "Bovidae" is a combination of the prefix *bov-* (originating from the New [Latin](#) word *Bos*, meaning an ox) and the suffix *-idae*. Bovidae is a mammal family placed in the order Artiodactyla (which includes the even-toed [ungulates](#)).

Characteristics

All bovids have similar basic form - a snout with a blunt end, a oval or pointed ears, a distinct neck and limbs, and a tail varying in length and bushiness among the species. The bovids show great variation in size and [pelage](#) coloration. Most bovids bear 30 to 32 teeth. Most bovids exhibit sexual [dimorphism](#), with males usually larger as well as heavier than females. All bovids have four [toes](#) on each foot - they walk on the central two (the [hooves](#)), while the outer two (the [dew-claws](#)) are much smaller and rarely touch the ground.

Excepting some domesticated forms, all male bovids have horns, and in many species females too possess horns. The size and shape of the horns vary greatly, but the basic structure is always a pair of simple bony protrusions without branches, often having a spiral, twisted or [fluted](#) form, each covered in a permanent sheath of keratin. A study revealed that there was a high correlation between horn morphology and fighting behavior of the individual. For instance, long horns are intended for wrestling and fencing, whereas curved horns are used in ramming.

As a members of the suborder Ruminantia, bovids possess multi-chambered fore-gut adapted for cellulolytic fermentation and digestion. Thus, they are obligate herbivores, which is also reflected by their [hypodont](#) and [selenodont](#) tooth morphology. Their upper [incisors](#) are absent and their upper [canines](#) are either reduced or absent. Instead of upper incisors, bovids have an area of tough, thickened tissue known as the dental pad, which provides a surface for gripping plant materials. The lower incisors project forward and are joined by modified canines that emulate the incisors. Their modified incisors are followed by a long toothless gap known as a [diastema](#). Bovid's have a generalized dental formula of I 0/3, C 0/1, P 2-3/3, M 3/3.

Lifespan/Longevity

Bovid lifespan are highly variable. Some domesticated species have an average lifespan of 10 years with males living up to 28 years and females

living up to 22 years. For example, domesticated [goats](#) can live up to 17 years but have an average lifespan of 12 years. Most wild bovids live between 10 and 15 years, with larger species tending to live longer. For instance, [American bison](#) can live for up to 25 years and gaur up to 30 years. In polygynous species, males often have a shorter lifespan than females. This is likely due to male-male competition and the solitary nature of sexually-dimorphic males resulting in increased vulnerability to predation.

Importance of Bovidae family as working animal

For Draught power: Animal traction, therefore, avoids the drain of foreign exchange involved in the importation of tractors, spare parts and fuel. Draught animal power can be even more economic when one bullock is used instead of a pair or when a (cross-bred) cow is used instead of a male, since it reduces the cost of maintaining the larger herd necessary to satisfy both replacement and milk production requirements. [Oxen](#) are slow but strong, and have been used in a yoke since ancient times; the earliest surviving vehicle, Puabi's Sumerian sledge, was ox-drawn. The [Water buffalo](#) and [Carabao](#), domesticated water buffalo, pull wagons and ploughs in Southeast Asia and the [Philippines](#).

The domestication of artiodactyls for subsistence purposes lead to one of the most important cultural changes in human history, the transition from a purely hunter-gatherer society to a predominantly agricultural society. Economically, cattle are the most important domesticated animal worldwide. In 2001, the global population of domestic [artiodactyls](#) was greater than 4.1 billion, more than 31% of which consisted of cattle. For thousands of years [humans](#) have used bovids for hard labor tasks such as **hauling** materials, plowing fields, and transportation. Domestic bovids have also been used to control invasive plant species and enhance plant biodiversity through their selective feeding behavior.

2.2 EQUIDAE FAMILY

2.2.1 Horses

A draft horse (US), draught horse (UK) or dray horse (from the [Old English](#) *dragan* meaning to draw or haul; less often called a work horse or heavy horse, is a large [horse](#) bred for hard heavy tasks such as ploughing and farm labor. There are a [number of breeds](#), with varying characteristics but all

share common traits of strength, patience, and a docile temperament which made them indispensable to generations of pre-industrial farmers.

Characteristics

Draft horses are recognizable by their tall stature and extremely muscular build. In general, they tend to have a more upright shoulder, producing more upright movement and [conformation](#) that is well-suited for pulling. They tend to have broad, short backs with powerful hindquarters, again best suited for the purpose of pulling. Additionally, the draft breeds usually have heavy bone, and a good deal of feathering on their lower legs. Draft breeds range from approximately 16 to 19 [hands](#) high and from 1,400 to 2,000 lb (640 to 910 kg). Horses' anatomy enables them to make use of speed to escape predators and they have a well-developed [sense of balance](#) and a strong [fight-or-flight response](#). Related to this need to flee from predators in the wild is an unusual trait: horses are able to sleep both standing up and lying down. [Mares](#) carry their young for approximately 11 months, and a [foal](#), can stand and run shortly following birth.

Digestion: Horses are [herbivores](#) with a digestive system adapted to a [forage](#) diet of grasses and other plant material, consumed steadily throughout the day. Therefore, compared to humans, they have a relatively small stomach but very long intestines to facilitate a steady flow of nutrients. A 450 Kg horse will eat 7 to 11Kg of food per day and, under normal use, drink 38 to 45 liters of [water](#).

Temperament

Horses are [mammals](#), and as such are [warm-blooded](#), or **endothermic** creatures, as opposed to cold-blooded, or [poikilothermic](#) animals. However, these words have developed a separate meaning in the context of equine terminology, used to describe temperament, not [body temperature](#). For example, the "hot-bloods", such as many [race horses](#), exhibit more sensitivity and energy, while the "cold-bloods", such as most [draft breeds](#), are quieter and calmer. Sometimes "hot-bloods" are classified as "light horses" or "riding horses", while "cold-bloods" classified as "draft horses" or "work horses".

Sleep patterns: When horses lie down to sleep, others in the herd remain standing, awake or in a light doze, keeping watch. Horses are able to sleep both standing up and lying down. In an adaptation from life in the wild, horses are able to enter light sleep by using a "stay apparatus" in their legs,

allowing them to doze without collapsing. Horses sleep better when in groups because some animals will sleep while others stand guard to watch for predators. A horse kept alone will not sleep well because its instincts are to keep a constant eye out for danger. Unlike humans, horses do not sleep in a solid, unbroken period of time, but take many short periods of rest. Horses spend four to fifteen hours a day in standing rest, and from a few minutes to several hours lying down. The average sleep time of a domestic horse is said to be 2.9 hours per day. Horses must lie down to reach **REM** sleep. They only have to lie down for an hour or two every few days to meet their minimum REM sleep requirements. However, if a horse is never allowed to lie down, after several days it will become sleep-deprived, and in rare cases may suddenly collapse as it involuntarily slips into REM sleep while still standing. This condition differs from **narcolepsy**, although horses may also suffer from that disorder.

Scientific Classification

Kingdom	Phylum	Class	Order	Family	Genus	Species	Subspecies:
Animalia	Chordata	Mammalia	Perissodactyla	Equidae	Equus	E. ferus	<i>E. f. caballus</i>
Trinomial Name : <i>Equus ferus caballus</i>							

Lifespan and life stages

Depending on breed, [management](#) and environment, the modern domestic horse has a life expectancy of 25 to 30 years. Uncommonly, a few animals live upto 40s and, occasionally, beyond.

Terminology used to describe horses of various ages and others

Colt - un castrated male horse from birth till the age of 4.

Filly - female horse from birth till the age of 4.

Foal - infant horse of either sex.

Mare - adult female horse.

Stallion - adult, male horse that is capable of producing offspring.

Gelding - a castrated male horse of any age.

Horse - adult equine of either sex over 14.2 hands high.

Weanling - a young horse that has just been weaned from their mother (usually 6 months or a little older).

Yearling - male or female horse one to two years old.

Purebred - any horse whose recent ancestors are of the same breed.

Draft horse - heavy, muscular horse used mainly for pulling and driving.

Light Horse - light to medium horses used mainly for riding and fine harness.

Pony - equine 14.2 hh or less.

Green - inexperienced or untrained horse.

Hand - a unit of measuring a horse's height. One hand is equal to 4 inches.

Size and measurement

The height of horses is usually measured at the highest point of the [withers](#), where the neck meets the [back](#). This point is used because it is a stable point of the anatomy, unlike the head or neck, which move up and down in relation to the body of the horse. In English-speaking countries, the height of horses is often stated in units of [hands](#) and inches. The height is expressed as the number of full hands, followed by a [point](#), then the number of additional inches, and ending with the abbreviation "h" or "hh" (for "hands high"). Thus, a horse described as "15.2 h" is 15 hands plus 2 inches, for a total of 62 inches (157.5 cm) in height. The size of horses varies by breed, but also is influenced by [nutrition](#). Light riding horses usually range in height from 14 to 16 hands and can weigh 380 to 550 Kg. Larger riding horses usually start at about 15.2 to 17 hands, and weighing 500 to 600 Kg. Heavy or [draft horses](#) are usually at least 16 hands to 18 hh. and weigh 700 to 1,000 Kg.

Horses and humans interact in a wide variety of sport competitions and non-competitive recreational pursuits, as well as in working activities such as police work, [agriculture](#), entertainment, and [therapy](#). Horses were historically

used in warfare, from which a wide variety of [riding](#) and [driving](#) techniques developed, using many different styles of equipment and methods of control.

2.2.2 Donkey

The donkey or ass, *Equus africanus asinus*, is a [domesticated](#) member of the horse family, [Equidae](#). The wild ancestor of the donkey is the African wild ass, *E. africanus*. The donkey has been used as a working animal for at least 5000 years. There are more than 40 million donkeys in the world, mostly in underdeveloped countries, where they are used principally as draught or pack animals. Working donkeys are often associated with those living at or below subsistence levels. Small numbers of donkeys are kept for breeding or as pets in developed countries. Asses were first domesticated around 3000 BC, probably in [Egypt](#) or [Mesopotamia](#), and have spread around the world. They continue to fill important roles in many places today. While domesticated species are increasing in numbers, the African wild ass and another relative, the [onager](#), are endangered.

Scientific Classification

Kingdom	Phylum	Class	Order	Family	Genus	Subgenus:	Species	Subspecies
Animalia	Chordata	Mammalia	Perissodactyla	Equidae	Equus	Asinus	E. africanus	<i>E.a. asinus</i>

Trinomial Name : ***Equus africanus asinus***

Characteristics

Donkeys vary considerably in size, depending on breed and management. The height at the [withers](#) ranges from 7.3 to 15.3 [hands](#) (31 to 63 inches), and the weight from 80 to 480 kg. Working donkeys in the poorest countries have a life expectancy of 12 to 15 years; in more prosperous countries, they may have a lifespan of 30 to 50 years.

Donkeys are adapted to marginal [desert](#) lands. Unlike [wild](#) and [feral horses](#), wild donkeys in dry areas are solitary and do not form [harems](#). Each adult donkey establishes a home range; breeding over a large area may be dominated by one jack. The loud call or bray of the donkey, which typically lasts for 20 seconds can be heard for over 3 km, may help keep in contact with other donkeys over the wide spaces of the desert. Donkeys have large ears, which may pick up more distant sounds, and may help cool the

donkey's blood. Donkeys can defend themselves by biting, striking with the front hooves or kicking with the hind legs.

Breeding: A jennet is normally pregnant for about 12 months, though the gestation period varies from 11 to 14 months, and usually gives birth to a single foal. Births of twins are rare about 1.7 percent and both foals survive in about 14 percent of those.

Present status

About 41 million donkeys were reported worldwide in 2006. China has the most with 11 million, followed by Pakistan, [Ethiopia](#) and [Mexico](#). In 1997 the number of donkeys in the world was reported to be continuing to grow, as it had steadily done throughout most of history; factors cited as contributing to this were increasing human population, progress in economic development and social stability in some poorer nations, conversion of forests to farm and range land, rising prices of motor vehicles and fuel, and the popularity of donkeys as pets. Since then, the world population of donkeys is reported to be rapidly shrinking, falling from 43.7 million to 43.5 million between 1995 and 2000, and to only 41 million in 2006. The fall in population is pronounced in developed countries; in Europe, the total number of donkeys fell from 3 million in 1944 to just over 1 million in 1994. In prosperous countries, the welfare of donkeys both at home and abroad has become a concern, and a number of sanctuaries for retired and rescued donkeys have been set up. The largest is the Donkey Sanctuary of England, which also supports donkey welfare projects in Egypt, Ethiopia, India, [Kenya](#), and Mexico.

Economic use: On [the island of Hydra](#), because cars are outlawed, donkeys and mules form virtually the sole method of heavy goods transport. After human labour, the donkey is the cheapest form of agricultural power. They may also be ridden, or used for threshing, raising water, milling and other work. Some cultures that prohibit women from working with [oxen](#) in agriculture do not extend this taboo to donkeys, allowing them to be used by both sexes. In developed countries where their use as beasts of burden has disappeared, donkeys are used to sire mules, to guard [sheep](#), for [donkey rides](#) for children or tourists, and as pets. Donkeys may be pastured or stabled with horses and ponies, and are thought to have a calming effect on nervous horses. If a donkey is introduced to a [mare](#) and [foal](#), the foal may turn to the donkey for support after it has been weaned from its mother.

A few donkeys are milked or raised for meat; in Italy, which has the highest consumption of equine meat in Europe and where donkey meat is the main ingredient of several regional dishes, only about 1000 donkeys were slaughtered in 2010, yielding approximately 100 tonnes of meat. Asses' milk is used for soaps and cosmetics as well as dietary purposes. The niche markets for both milk and meat are expanding. In the past, donkey skin was used in the production of [parchment](#). In China, donkey meat is considered a delicacy with some restaurants specializing in such dishes, and [Guo Li Zhuang](#) restaurants offer the genitals of donkeys in dishes. [Donkey-hide gelatin](#) is produced by soaking and stewing the hide to make a traditional Chinese medicine product.

In warfare: According to British food writer [Matthew Fort](#), donkeys were used in the [Italian Army](#). The Mountain Fusiliers each had a donkey to [carry](#) their gear, and in extreme circumstances the animal could be [eaten](#). Donkeys have also been used to carry explosives in conflicts that include the [war in Afghanistan](#) and others.

HYBRIDE EQUINES

Equid (horse, donkey, zebra) hybrids are well known and some are bred commercially.

Father	Mother	Offspring
Horse	Donkey (jenny/jennet)	Hinny
Donkey (jack)	Horse (mare)	Mule (male), John (male), Molly (female)
Zebra	Donkey (jenny/jennet)	Zebrass, Zedonk, Zebronkey, Zonkey, Zebadonk, Zebryde, Zenkey (Japan), Hamzab (Israel)
Zebra	Horse	Zorse, Golden zebra, Zebra mule, Zebrule
Zebra	Pony	Zony
Zebra	Shetland Pony	Zetland
Donkey (jack)	Zebra	Zebret, Donkra
Horse	Zebra	Hebra

Zebras that are hand-reared or reared with domestic horses or donkeys can become tame enough to be led, ridden or used as draught animals. Those raised with horses or donkeys may prefer to mate with horses or donkeys rather than with zebras.

2.3 Camelidae Family

Camels known as the “SHIP OF THE DESERT”. Camel (*Camelus dromedarius*) is an important multipurpose livestock species uniquely adapted to harsh arid and semi-arid areas that can be used for meat, milk, wool, and hide production and transportation. Now it has become a source of entertainment, celebration and competition. There are 24,246,291 million one-humped camels in the world with 80% of them in Africa and the highest population in Somalia (7 million) and Sudan (4.25 million). In Asia about 70% of dromedaries are found in India and Pakistan. The value of the camel has been realized recently in two major areas, firstly as a good source for human food in areas where traditional livestock would not thrive, secondly in the areas of racing sport and beauty show. A good racing or beauty camel in the Gulf area could fetch as three to four million dollars.

The reproductive efficiency of camels under natural conditions is generally regarded to be low. This probably due to:

- ❖ Short breeding season,
- ❖ Long gestation period of 13 months,
- ❖ Delayed puberty,
- ❖ Prolonged (8-10 months) period of lactation,
- ❖ Poor pastoral management systems,
- ❖ Inadequate nutrition and
- ❖ The lack of use of assisted reproductive techniques such as embryo transfer and AI.

Camel is a seasonal breeder and their reproduction is different as compared to other livestock as both male and female come into heat during the breeding season. There are two groups of living camels. One, found in northern Africa and central Asia, consists of the dromedary (one-humped camel) and Bactrian camels (two-humped camel). Dromedaries and most Bactrian camels exist today only in domestication. The other group, the South American camelids, includes 2 to 4 species. Llamas and alpacas, sometimes considered to be the same species, may both have been derived from the guanaco through a thousand years or more of domestication.

Guanacos and vicuñas still exist in the wild, although wild populations of both are depleted and threatened.

The South American forms range in weight from 35 kg to almost 100 kg. Old World camels, however, are much larger, weighing 450 to 650 kg. Camelids vary in body shape from slender to stocky, but all have long, gracile necks; a small head; and long, slender legs. The upper lip is deeply and distinctively cleft. Their toes are splayed, and camelids are the only plantigrade or fully digitigrades ungulates (camels are sometimes grouped with several extinct families in the infraorder Tylopoda, which means "padded foot").

The skulls of camelids have an elongated rostrum, a well developed sagittal crest, and a complete postorbital bar. They lack horns or antlers. The cheek teeth are selenodont. Upper incisors are present; young have 3 on each side, but adults have only one, which is canine-like. The spatulate lower incisors project forward. The canines, which are present in both upper and lower jaws, are medium-sized and hooked. A wide diastema separates incisors and cheek teeth. The dental formula for (adult) Old World camels is $1/3, 1/1, 3/1-2, 3/3 = 32-34$; that for New World camels is $1/3, 1/1, 2/1, 3/3 = 30$.

Wild camelids generally live in groups. These are polygynous, each containing a harem male and his females. Bachelor males also form herds in some species. Males fight for dominance by biting and "neck dominance." All camelids are herbivorous and feed primarily but not exclusively on grasses. They are generally found in arid or semi-arid areas, and the much-studied Old World camels have a remarkable ability to conserve water.

Scientific Classification

Kingdom	Phylum	Class	Order	Suborder	Family	Genera	species
Animalia	Chordata	Mammalia	Artiodactyla	Tylopoda	Camelidae	Lama Vicugna Camelus †Paracamelus †Camelops	camelids

Characteristics

Camelids are large animals with slender necks and long legs, and are strictly herbivorous. They differ from true ruminants in a number of ways. Their

dentition show traces of vestigial central incisors in the upper jaw, and the third incisors are developed into canine-like tusks. Camelids also have true canine teeth and tusk-like premolars, which are separated from the molars by a gap. The musculature of the hind limbs differs from those of other ungulates in that the legs are attached to the body only at the top of the thigh, rather than attached by skin and muscle from the knee upwards. Because of this, camelids have to lie down by resting on their knees with their legs tucked underneath their bodies. They are pseudo ruminants with three-chambered stomachs, rather than four-chambered ones; their upper lips are split in two, with each part separately mobile; and, uniquely among mammals, their red blood cells are elliptical.

They do not have hooves, rather they have two-toed feet with toenails and soft foot pads (Tylopoda is Latin for "padded foot"). The South American camelids, adapted to steep and rocky terrain, can move the pads on their toes to maintain grip. Camelids are behaviorally similar in many ways, perhaps most notably in their walking gait during which both legs on the same side are moved simultaneously. The consequent swaying motion of camelids large enough for human beings to ride is legendary.

Dromedary camels, Bactrian camels, llamas and alpacas are all induced ovulators. Wild populations of the Bactrian camel are even able to drink brackish water, and some herds live in nuclear test areas. It is generally a long-haired sturdy animal, powerfully built and adapted to rigorous, cold climates. It is capable of marching in snow-covered mountains. The dromedary is sometimes referred to as the Arabian camel, after the area in which it is thought to have been domesticated and probably most extensively employed. Mason suggests that the dromedary was domesticated in southern Arabia around 3000 B.C. However, the evidence as to where, when and why these animals were first domesticated remains inconclusive.

Importance of camels as a working animals

It is possible to define two main types of dromedaries on an environmental basis; mountain and lowland. The former are coarse boned and compact with a shoulder height of 1.8-2 m vs 2.2 m for the lowland type. The latter include large dromedaries of the river zones which are used for packing and draft and the fine-boned, thin skinned desert camels employed for riding.

The camel is most widely used for riding and transporting of merchandise, but is also used for plowing, providing power for Persian water wheels, sugarcane presses, different types of mills, and pulling of carts.

Both males and females are used for work. Females can continue at light work during the first 8 months of gestation. Males are castrated between 3 and 6 years. Castration at 5 to 6 years is recommended to permit maximum physical development. Although castrates are not affected by rutting season, they are unable to bear as heavy loads as intact males. Training of camels for work normally commences at 2 to 4 years with full utilization ranging from 4 to 7 years. Age at time of training and mature working level is dependent on species, type, nutritional status, physical development, and work to be performed, i.e., riding, packing or draft. Camels should not be worked on a year round basis, but should be given a period of rest each year, ideally during the rainy season when working conditions are sub-optimum and forage growth begins to improve .

2.4 Elephant

Scientific Classification

Kingdom	Phylum	Subphylum	Class	Superorder	Order:	Family:	Genera
Animalia	Chordata	Vertebrata	Mammal	Afrotheria	Proboscidea	Elephantidae	Loxodonta Elephas

Elephants are large mammals of the family [Elephantidae](#) and the order [Proboscidea](#). Two species are traditionally recognised, the [African elephant](#) (*Loxodonta africana*) and the [Asian elephant](#) (*Elephas maximus*), although some evidence suggests that African bush elephants and [African forest elephants](#) are separate species (*L. africana* and *L. cyclotis* respectively). Elephants are scattered throughout [sub-Saharan Africa](#), [South Asia](#), and [Southeast Asia](#). Elephantidae are the only surviving family of the order Proboscidea; other, now extinct, families of the order include [mammoths](#) and [mastodons](#). Male African elephants are the largest surviving [terrestrial animals](#) and can reach a height of 4 m and weigh 7,000 kg. All elephants have several distinctive features the most notable of which is a long trunk or [proboscis](#), used for many purposes, particularly breathing, lifting water and grasping objects.

Their [incisors](#) grow into tusks, which can serve as weapons and as tools for moving objects and digging. Elephants' large ear flaps help to control their body temperature. Their pillar-like legs can carry their great weight. African elephants have larger ears and concave backs while Asian elephants have smaller ears and convex or level backs.

Elephants are herbivorous and can be found in different habitats including [savannahs](#), forests, deserts and marshes. They prefer to stay near water. They are considered to be keystone species due to their impact on their environments. Other animals tend to keep their distance, predators such as [lions](#), [tigers](#), [hyenas](#) and wild [dogs](#) usually target only the young elephants (or "calves"). Females ("cows") tend to live in family groups, which can consist of one female with her calves or several related females with offspring. The groups are led by an individual known as the matriarch, often the oldest cow. Elephants have a [Fission-fusion society](#) in which multiple family groups come together to socialize. Males ("bulls") leave their family groups when they reach puberty, and may live alone or with other males. Adult bulls mostly interact with family groups when looking for a mate and enter a state of increased [testosterone](#) and aggression known as [Musth](#), which helps them gain [dominance](#) and reproductive success. Calves are the centre of attention in their family groups and rely on their mothers for as long as three years. Elephants can live up to 70 years in the wild.

They communicate by touch, sight, smell and sound; elephants use [infrasound](#), and [seismic communication](#) over long distances. Elephant intelligence has been compared with that of primates and cetaceans. They appear to have [self-awareness](#) and show [empathy](#) for dying or dead individuals of their kind.

African elephants are listed as [vulnerable](#) by the [International Union for Conservation of Nature](#) (IUCN), while the Asian elephant is classed as [endangered](#). One of the biggest threats to elephant populations is the [ivory trade](#), as the animals are [poached](#) for their ivory tusks. Other threats to wild elephants include [habitat destruction](#) and conflicts with local people. Elephants are used as [working animals](#) in Asia. In the past they were used in war; today, they are often put on display in zoos and circuses.

Elephants as Working animal

Elephants have been [working animals](#) since at least the [Indus Valley Civilization](#) and continue to be used in modern times. There were 13,000-

16,500 working elephants employed in Asia as of 2000. These animals are typically captured from the wild when they are 10-20 years old, when they can be trained quickly and easily, and will have a longer working life. They were [traditionally captured with traps and lassos](#), but since 1950, [tranquillizers](#) have been used. Individuals of the Asian species are more commonly trained to be working animals, although the practice has also been attempted in Africa. Asian elephants perform tasks such as hauling loads into remote areas, moving logs into trucks, transporting tourists around [national parks](#), pulling wagons and leading religious processions.

In northern [Thailand](#), the animals are used to digest coffee beans for [Black Ivory coffee](#). They are valued over mechanized tools because they can work in relatively deep water, require relatively little maintenance, need only vegetation and water as fuel and can be trained to memorize specific tasks. Elephants can be trained to respond to over 30 commands. Musth bulls can be difficult and dangerous to work with and are chained until the condition passes. In India, many working elephants are alleged to have been subject to abuse. They and other captive elephants are thus protected under the Prevention of Cruelty to Animals Act of 1960.

Table 1. Work done by elephants utilized in timber operations

<u>Age (yr)</u>	<u>Type of work performed</u>
5-16	Training and light transport duties
16-24	Light extraction of small logs on level areas
24-30	Hauling logs over fairly rugged terrain
30-38	Heavy logging operations in rugged areas, aunging
38-46	Heavy logging operations in moderate terrain
46-53	Hauling of logs on flatlands or with wheeled dolly
53-60	Light work and minor transport duties

Source: Adapted from Ferrier (1947).

In order to utilize an elephant's strength most efficiently and to prevent physical injury, special types of harness, block and tackle and wheeled drays

are used for logging. Elephants are also hitched together in tandem and as one and two paired teams to move heavy logs or pull timber across muddy areas or up steep slopes. Two animals having tusks should not be hitched in tandem due to possible injury if a chain, cable or harness breaks or one of the animals falls. Elephants are also used for plowing and carting in certain areas of South and East Asia. However, extensive use of the elephant in this particular capacity is limited because of its large feed requirement, i.e., a large animal may consume 522 to 590 kg of herbage per day. In addition, the height of the elephant requires a specially designed harness in order to pull such large implements. These two factors suggest that the number of elephants employed for agricultural purposes will be minimal, and that where possible, horses, oxen, and buffalo will be the preferred source of power.

FACTS ABOUT ELEPHANTS

- Elephants are one of the most intelligent, sensitive, highly social species of land mammal on our planet.
- Elephants live in families led by a matriarch; the young bull elephants leave the family at the age of 12 or 13; the females stay together as a family unit for life.
- Elephants live up to **70** years. Their gestation period is 22 months, and calves nurse for up to two years.
- Elephants care for their young; if a calf is in distress the entire family will rush to touch and caress it.
- Elephants grieve for days over the bodies of their dead.
- Elephants cry, play, have incredible memories, and make joyful gestures to one another!
- Elephants have greeting [ceremonies](#) when a friend that has been away for some time returns to the group.

Advantages of Elephants over other draught animals

- 1) actually, elephants are more versatile than either horses, mules or oxen at logging, because these species can only pull logs, and elephants can pull, carry, push, and sort logs.
- 2) another advantage of elephants is ease of harnessing: they need only a breast strap and a back pad
- 3) drivers can work from the back, from behind and from the side

disadvantages:

1) The main disadvantage is that elephants are **not** fully domesticated, they are tamed wild animals. this means no selection work was done to reduce aggressiveness and to get a more reliable animal.

2) Bull elephants cannot be castrated without an operation. But more, they enter a phase known as “musth” when their sexuality awakens and they are extremely aggressive and tend to dominate everything around. An experienced mahout knows when his elephant is entering this phase and the only way is to chain the elephant to something solid.

3) Elephants have slower reproduction and growth cycle than horses and mules, and are rarely bred in captivity because an elephant matures too slowly.

4) They eat 500 pounds of roughage every day, and drink a lot of water.

5. In a bull elephant in Musth the liquid substance (secretion) flowing down the feet makes them extremely angry.