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Research Article

THE DOMESTICATED DONKEY: III -ECONOMIC IMPORTANCE, UNCOMMON USAGES, REPRODUCTION TRAITS, GENETICS, NUTRITION AND HEALTH CARE.

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ABSTRACT

Donkeys are odd-toed, short-legged and long ears *Equidae*. Donkeys are used as traction animals in rural areas for small-scale farmers. They are an important farm animal species which adapted to the different environments, hard conditions and harsh climates. Changes in motorized agriculture and transport caused an unfavourable situation for donkeys. In the future donkey will be a rising start, so it should be defined. The purpose of this study is to define the aspect of economic importance, uncommon usages, reproduction traits, genetics, nutrition and health care.

Keywords: *Equus asinus*, species characteristics, genetic resource, farm animal.

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INTRODUCTION

Donkey is generally raised in developing countries. They are used as beasts of burden and draught animal in those countries. Donkeys are used by human for draught, pack, and ridden work, milking, breeding, and eating. Donkeys have many advantages. They can be raised in poor climate, management and environment conditions. Donkeys are tough and can survive in arid areas and on poor quality of food. They are obedient, docile, and easy to manage. They can be handled even by women and children. They are cheap to buy and economical to use by small-scale farmers.¹

The objective of this compilation was to provide information of economic importance, uncommon usages, reproduction traits, genetics, nutrition and health care of donkey.

RESULTS

Economic importance

Animals have many advantages over machinery, chiefly in terms of the environment, but also economically. Traction capability differs from animal to animal, mainly depending on their

body weight. For different species, however, the power proportion can vary: for bullocks it is 12% of body weight, for buffaloes also 12%, for camels 18%, whereas donkeys provide a traction capability of 24% of their body weight. The draught ability of donkeys is therefore superior to that of other draught animals.² An earlier study showed that a pair of donkeys can generate a draught force equivalent to 15-20% of their body weight with no abnormal sign of fatigue. The average weight of a pair of donkeys is about 250 kg and they can produce adequate force to do all tillage work in light soil.³



Figure 1. A white colour donkey originally imported from Iraq (Photo by Dr. Orhan Yilmaz)



Figure 2. Hoof care at Onderstepoort (www.donkeypower.donkecology.com)

For these and other reasons, donkeys remain of crucial economic importance in many undeveloped and developing countries. From before the dawn of recorded history, donkeys have been used in Africa, Asia and Europe to carry loads and riders and to pull carts. They have also been used for farm tillage, threshing, raising water, and milling. Though not as fast

as a horse, they are cheaper to possess and maintain than are horses.⁴ In South Africa, calculations have been made to assess the economic importance of donkeys (Table 1).

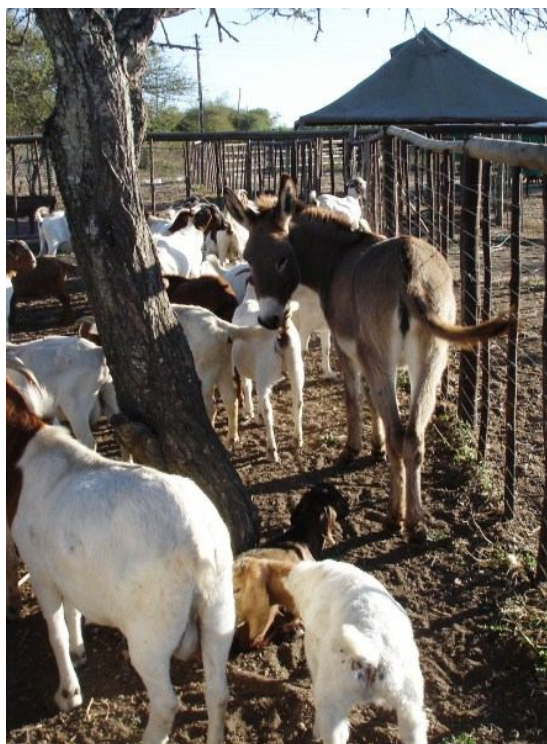


Figure 3. Goat guard (www.donkeypower.donkecology.com)

Table 1: Comparisons of costs and savings in S. Africa.^{5, 6}

Transport (a day's) – To carry 500kg 30 km	Cost in SA Rands	Savings if donkeys used *
Humans with head loads	340.00	315.00
Tractor & trailer or pickup	75.50	50.50
Donkeys with cart	25.40	-
Donkeys backloaded	23.67	-
* using round figure of R25 for donkey power		

Cultivation (one season) doing 100ha in 10 days/two weeks	Cost in SA Rands	Savings if donkeys used*
Human labour plus hoes (figures could vary considerably according to speed worked and daily rate paid)	41 000	39 360
Tractor with six-share plough	5 300	3 660
Oxen with double-furrow plough	4 910	3 300
Donkeys with single mouldboard plough	1 640	—
* using round figure of R1,640 for donkey power		



Figure 4. Lupenyo at 2 years (www.donkeypower.donkecology.com)

Although a donkey may be known as ‘the poor man’s horse’, it can survive in many places where the keeping of horses is difficult, such as in Africa, where African Horse Sickness is endemic. Even in countries where environments allow the keeping of horses, donkeys are still popular, such as in Swaziland, Turkey and Mexico.^{7, 8} A donkey of 250 kg live weight can carry a maximum load of 80 kg, but is often required to carry more, and does so. As a general rule, pack loads should be 25% of the animal’s bodyweight. A fit animal can be expected to carry this load for 7 hours a day. Thus a donkey could be expected to carry 60 kg over 40 km daily,⁹ although it will not do it unless habituated. Animal-drawn carts allow more goods to be transported, although they add to the expense. One study showed that animal-drawn carts increased the amount of goods transported at in a given time by threefold, and reduced the time spent in transporting these goods by half.¹⁰ However, if the animals are not hitched and harnessed properly, the damage and discomfort caused can reduce their efficiency, as can the nature and condition of the vehicle used.¹¹



Figure 5. Queing up to urinate (www.donkeypower.donkecology.com)

The vast majority of donkey owners keep their animals for work rather than meat or milk, so the animal’s most important characteristic is its adaptation, and it is difficult to agree on what else best suits a donkey for a work.¹² No animal empowers rural people, and thus their

communities, more than the donkey does. Donkeys do not usually provide meat, milk or have any ritual significance, so it can be argued that the works they do, and the variety of tasks involved, have a much greater value than mere food or tradition.¹³



Figure 6. Donkeys in tourism (www.donkeypower.donkecology.com)

For example, in Ethiopia donkeys are cheap to buy and they are able to survive heat and dehydration and can obtain nutrients and energy from poor quality foods in severe conditions. In city of Mekele, Tigray Region of Ethiopia, a donkey costs about 240 Birr (€11). Many households cut and transport firewood from surrounding areas to Mekele. Each family transports on average nine donkey loads per week, and can earn about 1404 Birr (€62) per year. This income is the family's sole source of revenue. Many families leave their donkeys to scavenge on what plant matter is available.¹⁴



Figure 7. Rolling donkeys (www.donkeypower.donkecology.com)

At the beginning of 20th century, donkeys began to be kept as pets in USA and some other developed countries, while remaining an important work animal in many poorer countries.⁴ In some developed countries donkey breeds have become less important than they were in the past, but in other countries prize donkeys serve as indicators of wealth or status.¹⁵ In China, which has the most crowded population in the world, including donkeys, all draught animals have played a significant part in its economic growth.¹⁶ In the Republic of Yemen, 53% of householders keep donkeys.⁹ "The jack and jenny" is a common pub name in Britain.⁴



Figure 8. Browsing on twigs (www.donkeypower.donkecology.com, 2011)



Figure 9. Browsing avocado tree (www.donkeypower.donkecology.com)

Donkeys have a high economic importance in many African countries, including Namibia and South Africa. In Namibia donkeys are involved in 25% of fatal road traffic accidents caused by fast driving, although cattle are involved in more and wild animals to about the same degree as donkeys. Animals lie down on the tarmac because it is warm and comfortable at night.¹⁶ To protect the donkeys, the Namibian Government provided some luminescent reflective ear tags so that they could be seen from 500 metres away.¹⁷ In South Africa in two widely-separated towns, donkey statues have been erected commemorating the importance of donkeys in the industrial development of South Africa.¹⁸⁻²⁰

Uncommon Usage of Donkeys

Donkeys generally are used as pack animals (beasts of burden) but they can also be used under saddle and in harness. In fact, they need very little equipment for controlling them, as they are easily trained and respond readily to verbal instructions and gestures. Because of their straight spines, pitched above the level of their ribs, what they mainly need is good padding or lifting over the spine, and back and front support for any load to prevent it sliding on gradients.¹



Figure 10. A young donkey rider (Photo by Dr. Orhan Yilmaz)

Although in most parts of the world donkeys are still used as they have been for millennia, as transport animals, their intelligence and ease of training has made them useful in a number of unexpected roles, including the old one of transport but with tourists involved. In France, Belgium and Switzerland there are about 300 professional donkey hirers. Donkeys serve as pack and/or riding animals in forested and hilly areas;²² they have also over the centuries proved useful in the smuggling of contraband goods,²³ as they can travel unaccompanied and not lose their loads.

The transport role has also become useful in education extension, in providing library outreach to isolated communities in countries such as Colombia and Zimbabwe.²⁴⁻²⁶ Donkeys are even used for police patrols in Still Bay, South Africa. Sergeant Theo Kluits says his patrol vehicle is “all-terrain, voice-activated, twin-engined and twin-exhaust”. It is hardier, more reliable and infinitely more people-friendly than any patrol car. A set of handcuffs is attached to the back of the cart, but that does not mean that a criminal gets a free ride: handcuffed suspects must walk behind the cart to the police station.²⁷

Aside from their role in transport, donkeys are increasingly used in soil preparation. Partly this is due to the growing recognition of the ease and efficiency with which they can do this, but also because they have a lighter impact on soils than the larger animals used hitherto, and of course they are more practical than tractors. The recognition of the economic as well as environmental advantages of ‘conservation agriculture’ or ‘ecological agriculture’ has introduced planting implements designed to disturb soils and ground cover as little as possible, and these are easily and much more appropriately drawn by donkeys.²⁸

In the US, Canada, Australia and South Africa donkeys have become popular guard animals for sheep and goats, being protective of smaller species but capable of aggression towards carnivores.²⁹⁻³² In Turkey, shepherds use donkeys to carry, among other things, lambs that are still too young to keep up with the flock when it is on the move. Anywhere where motor transport is awkward or impossible, donkeys are still useful: in Castelbuono, a small town in Italy, 6 donkeys have replaced 4 rubbish collection trucks. According to the mayor of the town, not only money is saved, but also fuel.³³



Figure 11. Carrying water with donkeys (Photo by Dr. Orhan Yilmaz)



Figure 12. Donkey measuring (Photo by Dr. Orhan Yilmaz)

With the increasing recognition of the special help that animals can contribute in promoting the healing of humans, donkeys have proven to be of great value in helping physically and mentally disabled children and adults to connect their minds with their bodies, and donkeys are also used to cheer up immobilized elderly people.^{34, 35}

The special properties of donkey milk are making it a high-value a commercial proposition in Europe and China, although there is as yet no breed of donkey that will produce milk surplus to the needs of its own young. In Canada an investor produces different kinds of beauty supplies such as soap, cream, body milk from donkey milk.³⁶ Donkey meat is consumed by people in China and in some African countries.^{37, 38}



Figure 13. Donkey, mule and horses altogether (Photo by Dr. Orhan Yilmaz)



Figure 14. Donkeys grazing (Photo by Dr. Orhan Yilmaz)

Reproduction

Female donkeys reach sexual maturity at 1.5 years of age but mostly they do not breed until they are 2-3 years old, but can continue for another 15 years or more. The most fecund age class of females is 4 years. Some 9-month-old males can produce sperm, but all males are sexually mature by 2 years of age. Donkeys are polyestrous and mate at all times of the year.³⁹ Females bray to call mates during oestrus.¹⁵ Mating activity gradually increases up to 2 days before females ovulate. Females in oestrus frequently adopt a copulatory stance, with their legs apart, and their tail held at a 45° angle, while making characteristic movements with their mouth. Males approach from behind and sniff the female genitals. Often the stallion vocalizes to initiate precopulatory interaction. The female kicks at the male in a ritualized manner and moves away from him in a slow canter. The male follows the female for ~20 m.

Both individuals stop and the female pushes back against the male. He mounts her and they move a few steps in a circle. Penetration occurs immediately, if rather clumsily, and the ejaculation occurs after several pelvic thrusts. If copulation is completed, the male dismounts and the female sheds a secretion from her vulva. The male sniffs at the secretion, displays flehmen (a rising of the upper lip with a simultaneous rising of the head), and urinates on it. They both then return to grazing or browsing. Gestation takes on average 365-370 days, and anything between 300 and 420 days – what causes such variation is not known. Females commonly give birth to one foal;³⁹ only 1.7% of donkey pregnancies result in twins, but both twins survive in only about 14% of cases.⁴⁰ The average birth weight of a foal is about 25 kg.¹⁵ Foals begin nibbling on vegetation at 5 days of age, but weaning does not occur naturally until 12-14 months,³⁹ and should not be attempted before a foal has reached 6 months.¹



Figure 15. Donkeys eating something (above) and looking for more food (below) (Photo by Dr. Orhan Yilmaz)

Genetics

Donkeys have 62 chromosomes, whereas horses have 64.⁴¹ Despite this, donkeys and horse can mate and produce hybrid offspring, see above for definitions of ‘mule’ and ‘hinny’. Such offspring have 63 chromosomes and are almost invariably sterile. Neither male nor female mule nor hinny can theoretically have progeny, but very rarely a female mule can give birth to a foal.¹⁵ All equine species can interbreed, but it does not normally happen in the wild and requires some training of the animals. Besides the donkey x horse crosses, donkeys can give breed with zebras. A male zebra and female donkey cross makes a zonkey, zebroid, zebras or zedonk. A rare female zebra and male donkey (jack) cross makes a zebra hinny, zebret and zebbrinny.⁴



Figure 16. Donkeys in a hut (Photo by Dr. Orhan Yilmaz)

Feed and water requirements

Donkeys have more endurance and tolerate reduced food and water better than other *equid* species. Donkeys are hardy and will live longer than other species in the same conditions. They can resist water deprivation, having a lower water requirement per unit of weight than other domesticated animals, except the camel.¹

Donkeys are browsing and grazing ungulates. Left to their own devices, donkeys consume dry grass, bark, leaves, twigs and roots of preferred species of plants, even creosote bushes in desert areas – not because they are hungry, but because they like them. In conditions of food scarcity they can usually therefore find enough to eat.⁴² They characteristically get by on less food than a horse of similar size, and need less protein in their diet. Good grass hay and pasture is usually all that a confined donkey needs. If the feed contains grain, the protein content should preferably be lower than 12%. Donkeys can become ill on rich food such as alfalfa/lucerne and lush spring grass, and may develop the painful hoof inflammation known as ‘laminitis’ or ‘founder’. Donkeys should not be over fed.³² Donkeys in high-density populations eat lower-quality forage, with a higher crude fibre content, than do animals in low-density populations,³⁹ so calculations of ‘carrying capacity’ for ‘livestock units’ are not simple where donkeys are concerned. In the wild, donkeys graze from dawn till late morning and again in the late afternoon; they rest in the heat of the day and around midnight.

Donkeys can survive with little water and can even tolerate limited amounts of salty water. Normally a fully-grown adult donkey requires water in the range of 10 to 25 litres per day, but they are amazingly able to withstand up to 30% dehydration and recover this loss when water becomes available, without over-drinking. In the wild they sometimes go for 2-3 days without water. However, young foals and nursing females need to be near water for daily intake. Foals

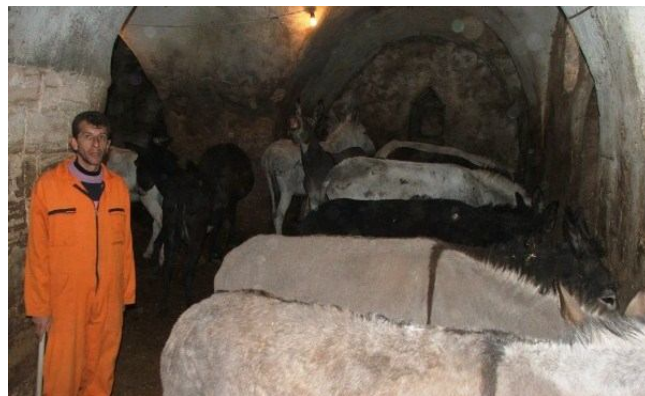
can begin nibbling plants at 5 days when their incisor teeth erupt, and they regularly browse on vegetation by the age of 2 weeks, but depend on their mother's milk for fluid.²⁴



Figure 17. Donkeys in three different colours (Photo by Dr. Orhan Yilmaz)



Figures18. Garbage collector donkey ready to work (Top) Garbage collector donkeys in hut (Middle) Garbage collector donkeys' stuff (Bottom) (Photo by Dr. Orhan Yilmaz)



Health and care

Donkeys should not be used for heavy work until their long bones have formed properly, i.e. after the epiphyses have knitted, at around 3 years of age. This is just about at the stage when all of a donkey's second-growth incisor teeth are beginning to show signs of wear.¹



Figure 19. Tuliyaende May 2011 (www.donkeypower.donkecology.com)



Figure 20. Mulonga 2011 (www.donkeypower.donkecology.com)

Donkeys need the same hoof care, worming and most of the vaccinations that horses need. Donkeys suffer from many of the same illnesses and pathologies as horses, although with some important exceptions. Donkey owners should be careful that regular horse medicines, dewormers and vaccinations are effective for donkeys, because sometimes they are species-specific. Also, antihelminths and tick remedies suitable for cattle can sometimes be fatal to equids.¹ A study carried out in Ethiopia found that deworming increased the life span of donkeys by an average of 5 years. Official studies have shown that parasites (helminths) are the major cause of death in donkeys in Ethiopia.¹⁴



Figure 21. Human, donkey, shepherd dogs and sheep altogether (Photo by Dr. Orhan Yilmaz)

Many farriers are nervous about working on donkeys. They think that they are too stubborn and will kick, even though it is known that they are much less given to nervous behaviour than are horses. Most donkeys do not need shoes unless they commonly carry heavy loads and work on particularly hard surfaces. Their hoofs can grow fast, and will need trimming unless they are used on surfaces that will provide wear.³²



Figure 22. Scars caused by a wolf (Photo by Dr. Orhan Yilmaz)

Usually donkeys are kept by poor people who do not have enough income to deal with donkey illnesses, let alone their own; it is estimated that 96% of the donkey population is found in developing countries, and is the basis for recommending 'alternative medicine' for donkeys.⁴³ This may be why donkeys seem to have evolved with so few serious illnesses; often they are carriers rather than sufferers. Owners and even veterinarians sometimes say, "I

have never seen an ill donkey”. It is not true; of course donkeys can be ill, although their powers of recovery can be impressive. Vaccinations are effective and important aspects of good care. In developed countries donkey owners are much more careful about their donkeys. For example, in the UK a total of 86% of the donkeys have a dental examination at least every 12 months and at least 45% have at least one dental problem.⁴⁴

Most donkey health problems, however, have their origin in the way donkeys are managed. Much of the pathology seen in donkeys, in modern times and from the archaeological record, comes from their use in carrying loads and transporting people. For example, evidence of significant skeletal damage caused by excess weight borne by donkeys was discovered on individual animals buried in an Egyptian tomb.⁴⁵ Donkeys may suffer from a number of parasites acquired from other animals, and may become an intermediate host for tapeworms, the cysts of which develop in the donkey lung or liver.¹⁵ Gas, blockages, foreign bodies, twisting or muscle spasms can affect the large intestines of donkeys that have eaten what they should not and at the very least this can cause colic. Colic is extremely painful for donkeys and if left untreated can be fatal.¹⁴



Figure 23. Two young riders (Photo by Dr. Orhan Yilmaz)

DISCUSSION

Donkey power is a one technology but this compilation showed that it can be good opportunity especially for small-scale farmers in developing countries. Donkeys are proper and important in rural farming system. They are ridden and sometimes eaten by human or some other farm animals such as dogs. They also provide milk and manure. They pull carts and other farming tools. They carry different kinds of stuff personal belongings, water, wood, tools etc. They are raised by nomadic, agro pastoralists, settled farmers, and even town residents. Further researches should be carried out into donkey usage. In spite of increased

usage of motorised transport and agricultural machines and tools, donkeys are able to be an important actor of in human life again.



Figure 24. Manda “w cross” visible (www.donkeypower.donkecology.com)

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