

MYTHS OR MONEY?

# CHALLENGES AND IMPLICATIONS OF DONKEY FARMING



THE DONKEY  
SANCTUARY



# INTRODUCTION

Donkeys as a species have been part of communities for thousands of years, most commonly as a working animal with little monetary value. This has changed in recent decades with the rise in popularity of ejiao, a gelatin made from donkey skins. Ejiao is considered one of the most valuable products within Traditional Chinese Medicine (TCM) and is a commonly used health tonic medicine in China and for those using TCM in other countries, with rapidly increasing demand and prices over recent years.

The ejiao industry has experienced significant growth over the past eight years, characterised by increased consumer demand and regular price increases. In the three years from 2013 to 2016, the annual production of ejiao increased from 3,200 to 5,600 tonnes<sup>1</sup>, representing an annual growth of more than 20 percent. Research by the University of Reading suggests that an estimated 4.8 million skins were required to meet the 2016 production rates of 5,600 tonnes of ejiao<sup>2</sup>.

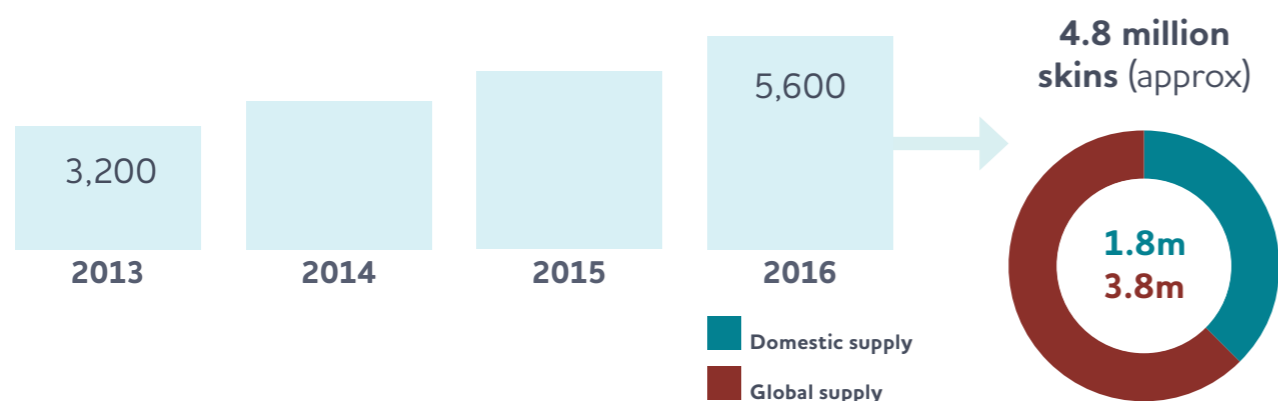
The industry is able to source approximately 1.8<sup>3</sup> million of these skins domestically: the remaining three million are sourced through the global donkey skin trade.

The ejiao industry has expressed concerns about the unsustainability of the trade due to reducing supplies of donkeys. In 2015, Qin Yufeng, the

president of China's largest ejiao producer, Dong E-E-Jiao, said that numbers were falling at a rate of three to five percent annually. "The ejiao industry is facing a major challenge due to the shortening supply of donkey hide. It's hard for us to expand capacity," Qin said<sup>4</sup>.

The ejiao industry is now facing a crisis of supply. Whilst large farms exist within China with the specific purpose to supply the industry with donkey skins, they are unable to meet the demand needed and the industry has turned to sourcing donkeys from across the globe to make up for the shortage. With a growing number of countries closing supply routes due to concerns about the dwindling national donkey populations, including Ethiopia, Kenya and Tanzania, there are simply not enough donkeys to sustain demand for ejiao. As a result, more countries are considering the viability of farming donkeys.

## ANNUAL EJIAO PRODUCTION IN TONNES



Ejiao products.

## BACKGROUND

The farming of donkeys is not a new enterprise and farms have existed in Europe and a handful of other countries for many years.

Products have historically been meat and milk. Donkey meat is considered a delicacy in some countries and is used in products such as salami in Europe. Donkey milk is used widely for cosmetics and is sought after in the health care industries.<sup>5</sup> There have also been moves into markets for cheese, which hold a high price tag. This has made the return on farming more lucrative and diverse despite low production rates.

The majority of farms have historically been on a small scale and have sold products at the 'farm gate'. The returns on production have been set against low costs and the use of extensive grazing of nutrient sparse grazing land unsuitable for other livestock, making this type of enterprise sustainable.

Rising production of ejiao demands an ever-increasing number of donkey skins to provide the collagen necessary for the demand for this product. The result is an increase in the number of donkey farms and particularly in donkeys farmed in large intensive units. It is not uncommon to see a farm with 3,000 donkeys in China.

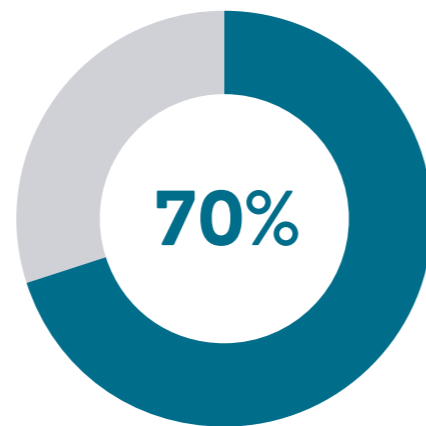
This raises the question of whether this species is suited to intensive farming. The unique requirements of the donkey is likely to lead to high levels of stress in an intensive farming scenario, with implications for welfare and for health, and consequently productivity levels. Any associated fall in productivity as a result will have a direct effect on profitability.

Farms exist with 6,000 or more donkeys in China and a recent Chinese paper notes the 'slow growth of donkeys and that profit is for long term'.<sup>6</sup> It also notes that a number of large-scale enterprises have ceased farming of donkeys. However, the farming of donkeys has been encouraged in China and has become a source of income for low income rural communities.<sup>7</sup> A recent survey reports that 'more than 70% of donkeys in China are raised under extensive conditions on small holder farms'.<sup>8</sup>

**“ A number of large scale enterprises have ceased farming of donkeys in China**

As more countries consider farming as a source of donkeys to supply the skin trade, we need to consider the implications, especially with regard to risks for disease spread and lack of traceability. This is particularly important where these premises are in

reality a centre for collection and holding of donkeys awaiting slaughter. Another significant consideration is whether or not the farming of donkeys is a sustainable solution to meet the demand of the ejiao industry.



**The percentage of donkeys in China raised under extensive conditions**



## WELFARE OF THE DONKEY AS A FARMED ANIMAL

It is important to consider the suitability of the donkey as a species to be farmed.

The species has evolved to live in small groups and as such, they may not thrive in large groups. But farming is expanding to keep donkeys in ever-increasing numbers. Donkeys can be seen on farms where management demands that they are kept in large groups of incompatible animals.

The species has unique behavioural requirements, and a lack of knowledge or understanding can result in problems associated with the methods used for handling and for management; an example being the inability to graze and browse for long periods and to express normal behaviour.

Stress is a recognised cause of a metabolic condition in the donkey, known as hyperlipaemia. This will reduce productivity at best, but is often fatal. High levels of stress in farmed donkeys could lead to increased mortality rates and therefore reduced productivity.

Donkeys are known to form strong bonds with other individuals and they will experience stress when separated from an animal, or a group of animals, that they have bonded with. Farming necessitates the need to reorganise groupings with a constant flux of population. This is essential for management purposes, such as providing the correct levels of nutrition at the different stages of production. Separation of bonded donkeys and constant reorganisation of groups may cause significant stress in the donkey and if the stress response is severe can lead to death from hyperlipaemia.

“ *The threat of disease spread between animals, groups and onwards to other farms, or even horses, is high.* ”

One Health, One Welfare recognises the links between welfare and health and it is acknowledged that failure to provide good welfare will lead to health issues, stress and an associated fall in fertility rates and productivity.

Similar health and welfare issues and conditions have been seen across multiple farms; regardless of location, type and size. Many of the issues arise as a result of a lack of understanding of the behaviour of the donkey and a lack of knowledge of the different clinical requirements of the species. Common health issues identified in the reports of assessments, carried out on farms where donkeys were kept for production purposes, were poor foot health, poor body condition and disease. Research has recently been published on the incidence of dental disease in farmed donkeys in China with a report of 100% prevalence of dental disorders in the population of female donkeys that were examined.<sup>9</sup>

Many of these issues arise as a result of the numbers of donkeys farmed; routine foot care is challenging in these large numbers as is any examination of the teeth or routine dental care.

A 2021 survey looking at smallholder farms in North-eastern China,<sup>10</sup> found that none of the donkeys in the study had ever been vaccinated or received dental care from a veterinarian or a dental technician.

Body condition and gut health will suffer when donkeys are restricted to twice a day feeding and when nutrition levels are not maintained according to the stage of production. Low body condition scores have been linked to low foaling rates in donkeys in China.<sup>11</sup>



Large numbers of donkeys meant for slaughter at holding base in Brazil.

Dental disease will often affect nutritional intake and could be a contributing factor to poor body condition.

Health issues affecting fertility rates and foaling rates are difficult to understand during the initial moves towards intensification of farming in China, but early indications are that *Salmonella abortus equi* is closely linked with abortion<sup>12</sup> and that Equine Herpesvirus-8 has been reported as a causative agent, and may be more prevalent than previously realised.<sup>13</sup>

Any disease will result in welfare issues, but where they affect fertility they will also have a significant effect on management of the replacement strategy on farms and ultimately on productivity.

The donkey is recognised as being hard to identify as suffering from an infectious disease, and some diseases present as being sub clinical in this species. Poor detection of an individual donkey suffering ill health is acknowledged as a risk in this species and is compounded by the numbers of animals to inspect on the intensive farms. A sick donkey may simply appear as being slightly dull or depressed, with a reduced appetite, which are subtle and non-specific signs of illness.<sup>14</sup> Alongside the likelihood of bringing infection onto these farms through the sourcing of donkeys and the poor biosecurity often seen, the threat of disease spread between animals, groups and onwards to other farms, or even horses, is high.

# IS FARMING SUSTAINABLE FOR PRODUCTIVITY AND PROFITABILITY?

We have limited knowledge, or data, about the farming of donkeys under any conditions. Intensive farming of donkeys is a relatively recent enterprise and experience of the management of donkey breeding and evidence of fertility rates, morbidity and mortality rates is limited.

Certainly, any selective breeding and genetic manipulation for traits such as shorter gestation or multiple births may result in lower fertility rates and an associated reduction in profitability. Fertility depression due to inbreeding has been identified in horses as well as a reduction in fitness of offspring due to the exposure of recessive genetic mutations.<sup>15</sup>

Observations from China<sup>6</sup> note the investment that has been put into the farming of donkeys and reports that, given the lengthy reproduction cycles, farming them requires a significant investment of time and money. It also notes that from a donkey population of 2.6 million, a total of 330,000 donkeys were slaughtered for production in China. This data is from 2020 and shows a return from production of 12.7%.

Modelling developed and published by the University of Reading suggests that, under highly favourable conditions, a farmed herd of 200,000 female donkeys would take at least 15 years or more to supply 1.2 million skins<sup>16</sup>.

This model was used for the analysis illustrated below which predicts that a herd of 1,000 female donkeys will produce 854 slaughter weight donkeys annually after a 5 year period. This equates to 854 carcasses for meat and 854 skins, which will be used for production of traditional Chinese medicine; ejiao. This productivity then remains fairly constant and is only likely to change if illness results in a loss of productivity.

Given that gestation is around 11 months, conception will not be immediate and donkeys will not be ready for slaughter until over 2 years of age; there is unlikely to be any production from the farms for a period of 4 years.

*Analysis conducted by Richard Bennett, University of Reading, based on modelling of donkey production outlined in Bennett & Pfuderer.<sup>16</sup>*

	YEAR 5	YEAR 10
<b>Jennies</b>	1000	1000
<b>Total births</b>	950	950
<b>Donkeys aged 2</b>	884	884
<b>Donkeys aged 3</b>	884	884
<b>Slaughter</b> (3 year olds minus mortality minus replacements)	754	754
<b>Total hides</b> (slaughter and replacements but excluding mortality)	854	854
<b>Total donkeys</b> (excluding breeding jacks)	<b>3717</b>	<b>3717</b>

Predictions here use the medium scenario from the research, which assumes good health and good fertility rates; both of which are unlikely in newly established farms with little experience of donkeys, especially when donkeys will be purchased from multiple sources with the associated implications of disease spread and stress related illness. It also allows for retention of a percentage of breeding females to maintain production.

The parameters set for these conditions assume excellent welfare, such as; a foal born every 17 months, and only 1% mortality. If, however, conditions were less than favourable, and donkey welfare less than excellent, it is anticipated that lower levels of productivity would be achieved, and the period to reach viability would be significantly longer. Currently the ejiao industry requires at least 4.8 million skins annually to meet demand.

Using the model we can predict that starting with a herd of 1,000 breeding females (jennies) a farm will be producing 854 slaughter weight donkeys annually after a 5 year period. This figure will stabilise and should remain constant after the initial 5 years.

## CASE STUDY – TANZANIA

A business plan prepared for Tanzania's Dodoma slaughterhouse, proposed a US\$3.2 million investment over four years to grow a donkey herd from 900 to 1,719 donkeys, an increase of only 819.

A plan for the Shinyanga slaughterhouse, also in Tanzania, showed a similar model, proposing a US\$3.7 million investment over four years to increase an initial stock of 296 donkeys to a total of 683. The slaughterhouse in Shinyanga was licensed to slaughter 60 donkeys per day<sup>17</sup>; a yield of 387 donkeys after 4 years would satisfy the slaughterhouse output for less than 7 days.

The detail in these business plans demonstrate the significant investment in time and money that is necessary to achieve even a small increase in herd size. They reinforce research from University of Reading and reports from China on the unsustainability of farming of donkeys. Both slaughterhouses have since been shut down by the government in Tanzania, and are no longer operating.

The figures in this case study clearly show a shortfall in numbers to meet the capacity of the now closed slaughterhouses. Concerns were around likely alternative sources of the numbers of donkeys required for slaughterhouse sustainability; government intervention is likely to have prevented donkeys being taken from the national herd to provide the shortfall in numbers.

## INVESTMENT REQUIREMENTS – IS DONKEY FARMING SUSTAINABLE?

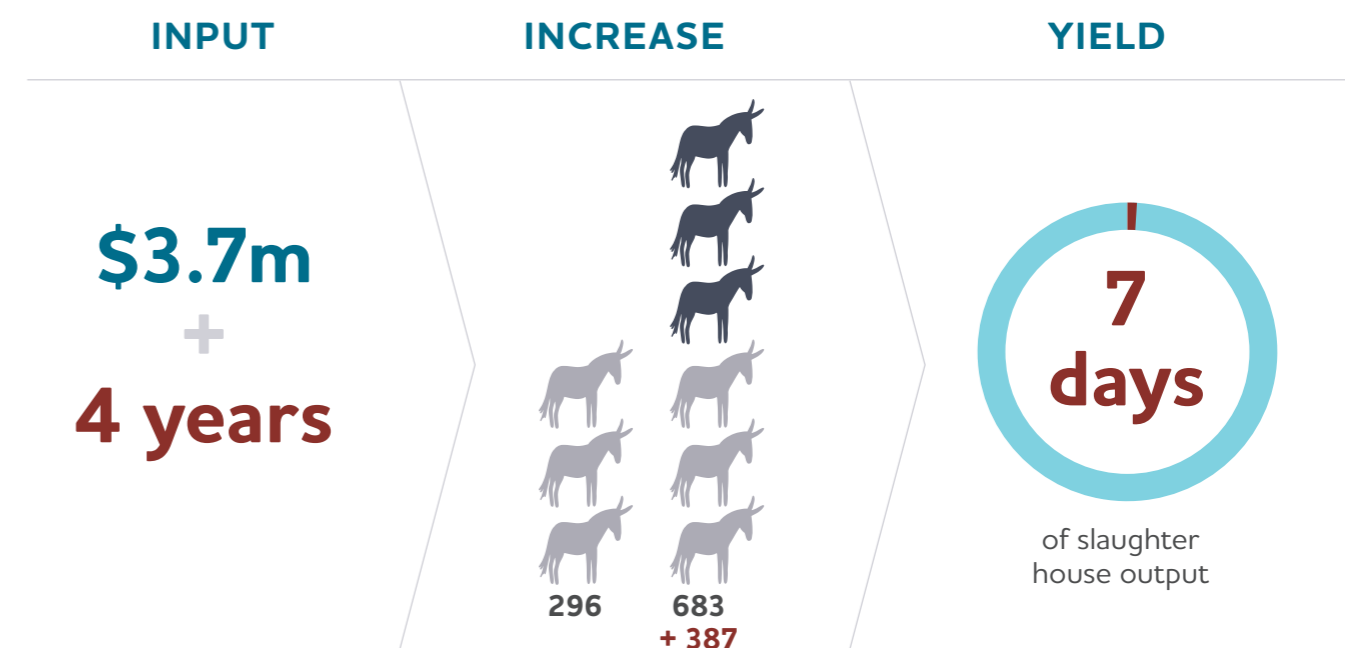


Illustration of business plan for Shinyanga donkey slaughterhouse as example of investments needed.

## DISEASE SPREAD

Intensive farming of donkeys is a relatively new enterprise, and implications are as yet unproven, but the risks must be considered alongside the impacts.

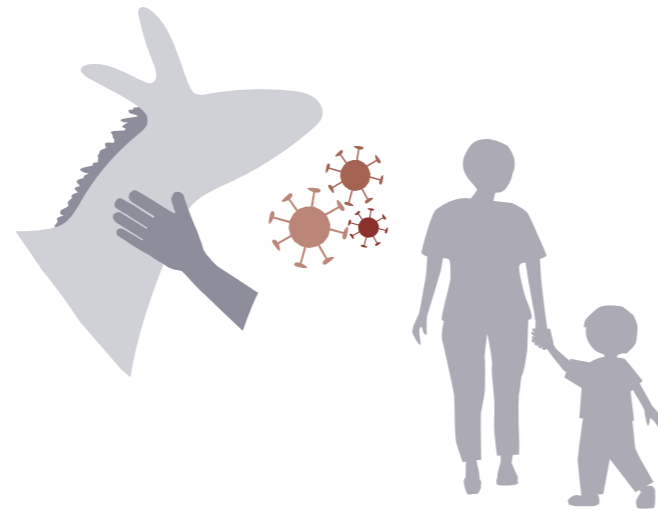
New farms must purchase donkeys, often in large numbers and from multiple sources, in order to expand to the projected number necessary for productivity levels. Sometimes these sources necessitate crossing country borders and often they involve journeys of considerable distances.

In many cases the disease status of the country of origin, or even the disease status of the donkeys themselves, will be unknown. Purchased donkeys will often join those already on the farm without a period of quarantine to limit disease spread. They will mix with groups after a long journey in crowded vehicles where stress may exacerbate any disease issues already present.

The potential for introducing disease to a farm is high and the impact unacceptable for the farm, as disease could incubate without being identified until it is affecting large numbers of donkeys and out of control. This is especially the case for donkeys as presentation of infectious diseases in this species may be subtle or even asymptomatic.

Escalation amongst the resident herd may be rapid due to the close contact between donkeys held in large groups and also the potential for spread by aerosol.

Transmission is possible to neighbouring farms or even to horses. This may include racing and sports horses and horses destined for production such as the horsemeat industry. Conversely, racing and sports horses could bring infectious disease into a country and transmit it to farmed donkeys or horses, where intensive farms could quickly become a reservoir of infection and onward spread is likely. An outbreak of equine influenza in China in 2007-2008 first occurred in Xinjiang Province in November 2007 and quickly spread to six other provinces within a year.<sup>18</sup> Considering



“ Some of the diseases carried by donkeys are zoonotic, meaning that they can be transferred to humans.

the equine influenza outbreak in Shandong province in China in 2017 where a herd of 300 donkeys were infected, there was a mortality rate of 25%.<sup>19</sup> Several amino acid changes in the haemagglutinin antigenic sites were observed in the Chinese strains circulating in 2017, compared with the strains isolated during the 2007-8 epidemic<sup>17</sup>. Such genetic evolution may be more common under intensive farming conditions and may pose further threats to equids across China and beyond as new strains may escape vaccines and immunity from previous infection.

Whilst equine influenza is preventable via vaccination, this may not be feasible in farmed donkeys in China due to the numbers involved, availability, costs and the mutation of virus strains leading to questionable vaccine efficacy.<sup>19</sup>



Scavenger animals and insects may carry disease from carcasses left to rot.

### BIOSECURITY ALERT

Wang et al<sup>13</sup> have reported the isolation of Equine herpesvirus-8 (EHV-8) in a donkey as the causative agent of abortion.

They have noted the increased numbers of intensive farms and the growth of pandemic illnesses as a result of this development.

**Indications are that prevalence on one such farm maybe as high as 25.3%, with resulting implications for foaling rates and productivity.**

The economic effect of widespread disease outbreaks in China could be significant, not only with the cost of controlling and eventually eradicating disease and loss of species population, but also the implications from a ban on international trade and movement and associated repercussions to the lucrative racing and sports horse industry.

Some of the diseases carried by donkeys are zoonotic, meaning that they can be transferred to humans. Staff on the farm, in production units or in slaughterhouses may become infected, or in some cases, infectious agents may be carried on the products of farming.

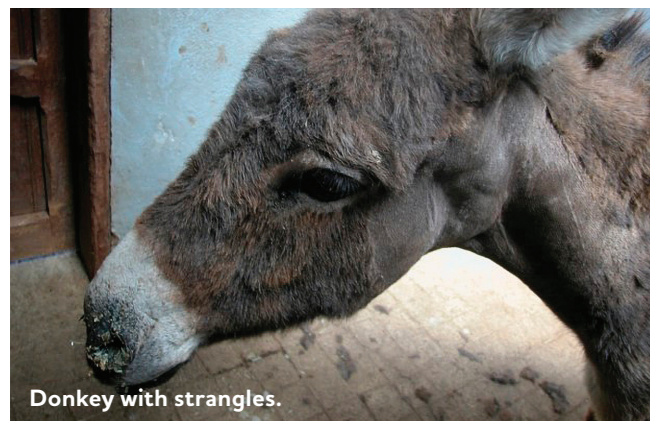
# DISEASES OF CONCERN

## Glanders

Glanders is a contagious zoonotic bacterial disease. The disease is incurable in equids and can lead to serious, potentially fatal disease in humans. Donkeys are most severely affected by this disease and it may lead to death, whilst horses and mules can become chronic carriers. Disease spreads by contact or by contamination with bodily fluids from an infectious animal, which is exacerbated by crowded or unsanitary conditions. The disease can spread when live animals are moved across borders and travel from endemic areas. Glanders is endemic in certain regions of the world and there are huge challenges associated with control and eradication of this disease.

## Strangles

Strangles is a bacterial infection of the respiratory tract of equids. Strangles is endemic in many countries and is highly contagious, especially amongst young equids that are yet to acquire immunity. Infection in naïve populations can lead to high levels of mortality and morbidity and asymptomatic carriers can develop after the cessation of clinical signs. Strangles spreads by contact or contamination of water troughs or objects with infectious bodily fluids. In a farm situation where there are regular purchases of stock as part of an expansion plan or replacement policy, along with frequent mixing of groups of animals, strangles represents a serious disease risk. It is not a threat to human health.



Donkey with strangles.

## Equine Influenza

Equine Influenza, commonly known as 'equine flu' is a common respiratory disease, caused by a virus. Equine flu is endemic in many countries, it is highly contagious and spreads via aerosolised droplets or contaminated objects (fomites). Clinical signs vary in severity from mild fever, coughing and loss of appetite to death from secondary pneumonia. Although the viral particle is fragile and killed by many disinfectants, flu spreads easily between equids and can travel up to 100m in the air. Donkeys have been known to develop a more severe clinical response than horses and influenza can be fatal in this species. Equine influenza is of concern wherever there are live movements of equids, and the potential for transmitting disease between racing and sports horses and donkeys is significant.

## African Horse Sickness

African Horse Sickness is a viral disease of equids, which is transmitted in the blood of infected individuals, either via infected blood products, or most commonly via an infected *Culicoides* midge, which is the insect vector for the disease. African Horse Sickness is endemic in many parts of sub-Saharan Africa, whilst occurrence in other countries is dependent on conditions being favourable for survival and multiplication of the vector. African Horse Sickness presents in four different forms with up to 90% mortality rate in horses. Donkeys and zebra may become sub clinically infected and may inadvertently transmit infection to new areas or countries. The nature of vector borne transmission makes this disease a challenge to control and eradicate. Transmission could be via live import, whether horse or donkey, or it is possible for a live infected vector to be brought into a country in a consignment of skins for example.

## Rabies

Rabies is a zoonotic viral disease that can infect a variety of hosts, including humans, dogs and equids, leading invariably to death once there is onset of clinical signs. Infection occurs from the bite of an infected animal or by contact through broken skin or mucus membrane with saliva from an infected host. The incubation period is highly variable and can last as long as several months. Bites from infectious donkeys are potentially fatal and it is highly possible that clinical signs may not be seen. This makes it a particular concern for people handling donkeys, particularly during transport or slaughter.

## Anthrax

Anthrax is a bacterial disease which affects many mammalian hosts, including humans and donkeys. The causative bacterial agent of Anthrax forms resistant spores that can survive for decades in the environment and may initiate disease in a new host when spores are transmitted via inhalation, ingestion or direct contact with skin abrasions. Anthrax is endemic in most continents and outbreaks or clusters occur sporadically, often when there has been ground disturbance. People at risk of exposure are those with access to the carcasses or skins of infected donkeys and infection is most often through skin abrasions or cuts. Carcasses of infected donkeys may leave spores in the environment, which are extremely resistant and likely to cause further infection. Correct disposal is essential for controlling this disease, but infection may not have been diagnosed in the donkey and if death has occurred during transport to a farm or collection centre correct disposal is unlikely or the carcass may be handled by slaughterhouse staff.

## Equine Infectious Anaemia

An infectious viral disease affecting equids, this disease is transmitted by infected blood, in blood products, contaminated veterinary equipment or by an insect vector such as *Tabanidae* (horse fly). Once infected, animals will be infectious for life. Horses have a 30% mortality rate while donkeys will often be asymptomatic. This disease does not affect humans but is a threat to equine industries and could easily be introduced to donkey farms should an asymptomatic carrier be introduced to a resident herd.



Donkey skins salted and stacked.



Donkeys in holding pen awaiting slaughter at Goldox abattoir, Kenya.

## HOLDING UNITS VS FARMS

A farm is a premises where animals are kept for production purposes, usually through several stages of life.

A holding unit or collection centre is a premises where animals are collected from various sources and gathered for a short period prior to movement to a slaughterhouse.

It is important to understand the definition of a farm and the differences between a farm and holding unit or collection centre. A holding unit carries more risk to health and to welfare and especially to disease spread. They are often located close to a slaughterhouse and take large numbers of donkeys from multiple sources.

This practice increases the risk of disease spread and escalation; donkeys are moved from locations with an unknown disease risk status, they are not easily identified as suffering from disease, they are mixed and travel long distances in close confinement and stressful conditions. When they arrive at the holding base they are

“ It also reduces the ability to maintain traceability of the animals and, by association, the products. One implication from this lack of traceability is the inability to regulate drug residues and the risk this carries to the products.

likely to be mixed further with donkeys from other destinations, and with donkeys that have been on the site for a period of time that could allow incubation of any infection they may have been exposed to.

It also reduces the ability to maintain traceability of the animals and, by association, the products. One implication from this lack of traceability is the inability to regulate drug residues and the risk this carries to the products.

Donkeys kept on these type of holdings will suffer immense stress and morbidity rates and mortality rates are likely to be high.



Sign at Goldox abattoir in Kenya.



## RISKS AND ECONOMICS

Risks at farm level are to animal welfare and production levels and the likely time period to reach ideal production levels. Profitability will be directly affected by productivity, but also by the time delay in realising full production rates.

The main areas of risk to productivity include fertility rates, foal mortality and herd morbidity.

Fertility rates are likely to be compromised by disease and stress and any disease outbreak could be devastating for the farm with loss of numbers, loss of production and costs of control and eventual eradication.

The high mortality of new-born donkey foals found in intensive systems is found to seriously affect the economic efficiency of donkey breeding.<sup>20</sup> Foals suffering from multidrug resistant isolates of enterococcal disease were found to have a mortality rate of 51%.

A model for farming of donkeys in China involves transportation from areas where breeding and fattening is concentrated to expanding farms. This involves long distance transport of donkeys. Transport is well recognised as a cause of severe stress and long distance transportation of

donkey foals for periods of more than 10 hours has shown increased mortality and morbidity rates of 1 to 3% and 10 to 15% respectively.<sup>21</sup>

Risks at a national level will be to international trade if infection is introduced to a country and results in an outbreak of a notifiable disease.

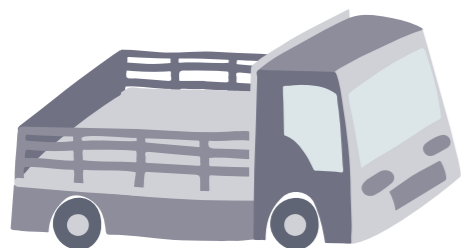
Loss of trade will have an economic impact and could extend across all equids, including racing and sports horses. Control of any disease, along with eventual eradication carries a huge cost; in reputational as well as in monetary terms.

Any disease infecting donkeys is likely to similarly affect horses. Any movement ban would therefore also extend to the lucrative and high profile racing and sports horse industry.

*“Risks at a national level will be to international trade if infection is introduced to a country and results in an outbreak of a notifiable disease.”*

### TRANSPORTATION RISKS

Transportation of donkey foals for periods of more than 10 hours has shown increased mortality and morbidity rates.



**10h+**

**+5%**  
Morbidity rate

**+2%**  
Mortality rate

*“The high mortality of new-born donkey foals found in intensive systems is found to seriously affect the economic efficiency of donkey breeding. (Wang, 2021).<sup>20</sup> Foals suffering from multidrug resistant isolates of enterococcal disease were found to have a mortality rate of 51%.”*



Newborn foal at donkey abattoir in Tanzania.

## SUMMARY

It is necessary to look at the wider impact farming of donkeys may have on One Health, One Welfare in terms of the disease threat, the economic impact to countries and the public health threat to people.

The unique requirements of donkeys raises questions about the suitability of donkeys as a farmed species and we need to ask ourselves if farming donkeys can ever be achieved in a way that will allow the species to live in a state of good welfare. (Mellor, 2017)<sup>22</sup>

Modelling shows that it takes significant investments of both time and money to reach viable production levels on intensive farming units, and only in favourable conditions where disease risk and animal welfare has been managed to the highest standards.

“ Due to the complexities of the species, the farming of donkeys cannot provide a quick turn around on investment, nor can it be relied upon to provide the annual demand for donkey skins for the ejiao industry.



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