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Space Requirements for Accommodation of Donkeys

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Abstract

The domestic donkey (*Equus asinus*) originated from the African wild ass (*Equus africanus*). Donkeys are resilient domestic animals that do not have particularly specific requirements for housing. It should be emphasized immediately that a tethering system in the stable is absolutely not applied. Donkeys must be kept freely, with enough space for lying down and moving around. The

primary role of the housing facility is to provide donkeys with shelter from adverse weather conditions, especially rain and intense solar radiation. The housing space must be sufficiently large so as not to interfere with the unimpeded consumption of food or cause overly close contact between the animals.

Keywords: Donkey, Housing, Requirements

Introduction

The domestic donkey (*Equus asinus*) originated from the African wild ass (*Equus africanus*). The African wild ass, the ancestor of the domestic donkey, had three subspecies:

a) Nubian wild ass (*Equus africanus africanus*), found in the territory of present-day Eritrea,

b) Atlas wild ass (*Equus africanus atlanticus*), and

c) Somali wild ass (*Equus africanus somaliensis*), inhabiting the southern region of Eritrea and northern Somalia.

The subspecies of the wild ass that lived in the Atlas Mountain range in North Africa is extinct, leaving only the Nubian and Somali subspecies. However, it remains a significant question as to how many of these animals still exist in the wild today.

The Nubian wild ass is characterized by a distinct dorsal stripe of hair running along the spine, intersecting with a transverse stripe over the shoulders that extends downward on both sides of the body. The Somali wild ass lacks such "cross" markings, but it does feature horizontal leg stripes, somewhat similar to those of zebras.

The theory and claim that the domestic donkey descended from the Nubian wild ass must be seriously questioned, as some domestic donkeys exhibit both horizontal leg stripes and a "cross" marking.

Regardless of which of these two wild ancestors is the progenitor of the domestic donkey, it is certain that in the natural environment where they originated, there were no shelters or facilities for their housing. Rainfall in these regions is minimal or nearly nonexistent, making protection from precipitation unnecessary. The only potential protection they might have needed was from heat, which they could occasionally find under the canopy of trees.

The domestication process, which began more than 8,000 years ago, not only led to changes in the behavior of wild animals toward humans and other animals but also caused significant physiological changes. One such change is their adaptation to the new climatic conditions of the environments where they are kept. Donkeys have demonstrated great adaptability, as they are now found on every continent.

This discussion focuses on housing donkeys in regions with a continental climate, characterized by relatively warm summers and relatively cold winters, with transitional periods. Notably, precipitation in the form of rain and snow is more or less present, and there are significant temperature differences between the summer and winter periods.

Housing

Donkeys are resilient domestic animals that do not have particularly specific requirements for housing. Considering the fact that in the wild, donkeys spend 14–18 hours searching for food (Vervuert, 2023), often covering distances of up to 30 kilometers, they do not necessarily require special shelters in such conditions.

However, in modern circumstances and environments, where their search for food is typically less intensive and the climate is different, it is essential to provide them with basic housing conditions, particularly protection from adverse weather.

When it comes to donkeys' needs and their basic housing requirements, they, much like with feeding, do not have overly demanding conditions. Older generations used to say that donkeys do not need any kind of shelter and that they can manage perfectly well under the open sky. While there is some truth to this statement, it does not entirely reflect reality.

It should be emphasized immediately that a tethering system in the stable is absolutely not applied. Donkeys must be kept freely, with enough space for lying down and moving around. The primary role of the housing facility is to provide donkeys with shelter from adverse weather conditions, especially rain and intense solar radiation. The housing space must be sufficiently large so as not to interfere with the unimpeded consumption of food or cause overly close contact between the animals.

Ivanković (2015) states that an adult donkey requires 4–6 m² of floor space. In the case of a female with her foal, the required area must be increased by 50%.



Picture 1: The best solution is when there is an opportunity for the mother to be alone with the cub in the box. (Foto: M.Urošević)

Flade (2005) specifies that for donkeys with a height of 115–120 cm, the stall within the housing facility must have a minimum size of 2 x 3 m.

Although donkeys have a specific, dense coat, especially during winter, it should not be overstated that they require no shelter at all. The coat change, transitioning from winter

to summer, begins in spring and lasts quite a long time, while the transition from summer to winter coat starts in autumn and is relatively short. The body quickly prepares itself for unfavorable climatic conditions.



Picture 2: Changed from shorter summer coat to longer and thicker winter coat (Foto: M. Urošević)

The donkey has a coat structure that protects it very well from temperature changes, however, its coat is dry, with insufficient oil coating around each hair fiber (Briese, 2000). This is why the coat is not a complete protector against intense rain and wet snow. Young throats are especially sensitive. Cubs' fur absorbs moisture very quickly and retains water, so they are particularly sensitive to precipitation.

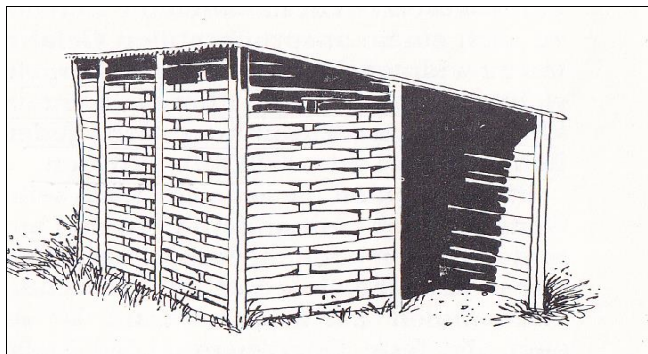


Picture 3: Nature Parc „Zasavica“ (Serbia), Donkeys are on pasture practically the entire summer (Foto: M.Urošević)

The facility for housing donkeys must have such a floor area that all animals can lie down at the same time and have their own comfort.

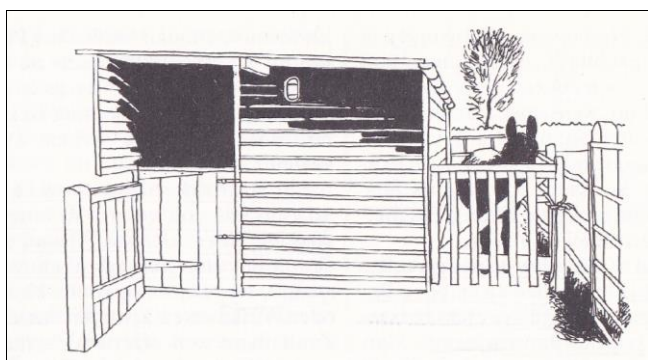
In the building, the air temperature can range from 0°C to 30°C. The relative humidity of the air is from 30 to 70%, and the rate of air exchange should be at the level of 0.2-2.0 m³/kg of body weight (Briese, 2000).

Borwick (1984) states that housing facilities should be kept quite simple. Additionally, the author emphasizes that simple wooden structures are the easiest to construct, but there is an objective risk of damage as donkeys are very prone to gnawing on wood. It is well known that they require a greater amount of cellulose than horses.



Picture 4: A simple donkey shelter built from wood (Borwick, 1984)

The author states that the smallest box area for one donkey is 3 x 2 m.



Picture 5: Possible shape of a wooden structure for a donkey (Borwick, 1984)

The building does not have to have a window, but the wooden wall is not built to the top, that is, it is not connected to the roof structure, thus enabling the circulation of the necessary amount of fresh air. This reduces the level of humidity in the air in the barn.

Reducing the intensity of damage to the wooden structure of the facility is achieved, if there are opportunities for this, by placing the facility for donkeys in the area with trees (forest).



Picture 6: A facility for donkeys to protect themselves during the intense summer heat. A facility for donkeys to protect themselves during the intense summer heat. National park „Neusiedler See“ (A) (Foto: M. Urošević)

In such a facility, there is an area with feeders, which is connected to the outside environment through a large opening, and a closed village (on the left in the picture) that has no communication with the outside environment, where

the donkeys take shelter in case of extreme adverse weather conditions.



Picture 7: An enclosed part of a building with a canopy in front of it (Foto: M. Urošević)

In the same National Park, a facility was built for donkeys to stay during the winter, in case of strong, cold winds or precipitation. Natural materials were used to the maximum.



Picture 8: Facility for possible winter accommodation of donkeys (Foto: M. Urošević)

By staying in the pasture, they consume enough fresh green mass, and it can be given to them, mowed, in the space under the canopy. In that space, they should, without fail, place a lump of rock salt so that they can lick it as needed and thus bring in sufficient amounts of minerals.



Picture 9: Hay rack under the canopy and a lump of rock salt (on the right in the photo) (Foto: M. Urošević)

Despite the fact that the objects shown in the previous photos are located near the area where there are trees, the donkeys still damaged the wooden structure. Obviously, dry wood fibers suit them better than the fibers in living trees.



Picture 10: Clearly visible damage to the wooden pillars holding up the canopy roof (Foto: M.Nemecek)

A simple, wooden structure, spacious enough for accommodation and to provide the necessary amount of air in the building, can be relatively easily constructed.



Picture 11: Simple, wooden building (RO) (Foto: M.Urošević)

In regions with a continental climate, stone structures are the least desirable. They are often insufficiently spacious, and their floors remain uncleared from autumn to spring. A thick layer forms from straw and feces, with a soft consistency resulting from urine seepage. Such environments have high concentrations of ammonia and other harmful gases, while the indoor air is extremely humid. The deep, soft "floor" provides an ideal breeding ground for numerous harmful microorganisms.

Additionally, standing on such a surface causes the hoof horn to soften, allowing bacteria—especially anaerobic ones—to penetrate even the smallest lesions in the hoof horn, creating favorable conditions for their growth and proliferation. Besides hoof problems, donkeys housed in such facilities often suffer from respiratory issues, and disorders affecting the eyes are also common, primarily due to the harmful effects of ammonia.



Picture 12: An absolutely unsuitable object, made of stone and other auxiliary materials (Foto: M.Urošević)

To make the problem worse, often, the roof does not cover the entire surface, in order to allow air in and out. However, in case of rainfall, the interior of the "barn" is wet. So the humidity of the deep mat increases significantly and the situation worsens.



Picture 13: A clearly visible hole in the "roof". In addition, the space is insufficient for the three donkeys (two are visible) that are housed in this facility (Foto: M.Urošević)

In regions where there is practically no winter, but the temperatures during the summer are quite high, buildings can be made of light solid material, or simply canopies can be made.



Picture 14: Donkey facility on the island of Rab (CRO) (Foto: M.Urošević)

On Mediterranean islands, such as Cyprus and Malta, donkeys are only provided with canopies, as protection from insolation and eventual, rare rain. On those islands, the rain does not have any particular negative effect because it is not cold.



Picture 15: An open shelter for housing donkeys in mild climates.(Cyprus) (Foto: M.Urošević)

In the regions where donkeys come from, there is not enough grass and it is often low, sparse grass. That's why donkeys almost always found food with their heads down. Even today, in cultivated conditions, where they have enough food, they are very happy to collect the remains of hay on the ground.



Picture 16: Donkey farm in Cyprus. The facility is built of metal to prevent damage from chewing. The donkeys are very happy to collect fallen leaves and parts of taro stems that have remained on the ground. (Foto: M.Urošević)

Antonelli, Brescianini, and Dotti (2010) state that a stall for housing a single donkey must have minimum dimensions of 3 x 3.5 m, with a minimum height of 2.60 m. The entrance door must be at least 1.5 m wide. In the case of group housing, 5 m² per animal should be provided.



Picture 17: A simple wooden shelter for housing donkeys (Antonelli et al. 2010)

In the available literature, the most detailed information on the zoo-hygienic conditions for donkey housing was provided by Marisa Hafner (2013). According to her, the minimum area of a stall for housing a donkey must be 5 m². The required stall size is calculated using the formula: withers height x withers height x 2. Regarding the ceiling height of the stall, it must be at a minimum height of 2 m, and the required stall height is calculated using the formula: withers height x 1.5. If there are multiple stalls in a facility housing donkeys, the partition walls between them must be at least 0.8 m high.

Donkeys need sufficient free space. Ideally, 100 m² should be provided per animal. If such space is not available, the paddock area should be at least double the stall area. The doors through which donkeys exit the stall must be at least 1 m wide, though 1.2 m is much preferable.

Donkeys, as is known, originate from arid, dry regions of Africa and tolerate high relative humidity with difficulty. In facilities where donkeys are housed, the relative humidity should not exceed 10% above the outdoor humidity. When it comes to air temperature, this is a significantly lesser issue. The indoor temperature can be slightly higher or even the same as the outdoor temperature.

Modern technologies and modern materials enable the construction of prefabricated buildings for donkeys. The advantage of such objects is that they can be moved if necessary. They provide very good protection from rain and wind, and donkeys can sleep in them if they want. Of course, care must be taken that this kind of facility provides enough space for each individu.



Picture 18: A prefabricated structure in the background of the photo, on the right, that provides protection for donkeys, if they wish (Foto: M.Urošević)

And while in a large part of the world the donkey is still not given enough attention and it is considered that it can withstand everything and can do everything, and it does not need any special conditions for its life, in Europe the situation has changed significantly. This is how it was in Austria back in 2010 (Verordnung des Bundesministers für Gesundheit über die Mindestanforderungen für die Haltung von Pferden und Pferdeartigen....) That act precisely defined the minimum size of an individual box, as well as the size of a group box, as well as the size of the outlet, stable climate conditions.

Table 1: Minimum area for individual boxes for housing donkeys ((BGBI. II Nr.485/2004 idf BGBI. II Nr. 219/2010)

Height at Withers	Box area	Minimum length of the shortest side of the box
To 120 cm	6,00 m ² for one donkey	180,00 cm/ for one donkey
To 135 cm	7,50 m ² / for one donkey	200,00 cm/ for one donkey
To 150 cm	8,50 m ² / for one donkey	220,00 cm/ for one donkey
To 165 cm	10,00 m ² / for one donkey	250,00 cm/ for one donkey
To 175 cm	11,00 m ² / for one donkey	260,00 cm/ for one donkey
To 185 cm	12,00 m ² / for one donkey	270,00 cm/ for one donkey
More than 185 cm	14,00 m ² / for one donkey	290,00 cm/ for one donkey

The sizes of the minimum areas of the individual box also apply to donkeys with a foal, until it is weaned, or for two foals up to the age of one year.

According to the definition of the smallest sizes for individual boxes, the minimums for group boxes are also defined.

Table 2: Minimum size of bosa for group housing of donkeys (BGBI. II Nr.485/2004 idf BGBI. II Nr. 219/2010)

Height at Withers	Box size for the first and second donkey	Area required for each subsequent donkey
To 120 cm	6,00 m ² for one donkey	4,00 m ² /
To 135 cm	7,50 m ² / for one donkey	5,00 m ² /
To 150 cm	8,50 m ² / for one donkey	6,00 m ² /
To 165 cm	10,00 m ² / for one donkey	7,00 m ² /
To 175 cm	11,00 m ² / for one donkey	7,50 m ² /
To 185 cm	12,00 m ² / for one donkey	8,00 m ² /
More than 185 cm	14,00 m ² / for one donkey	9,00 m ² /

In this case, the height at Withers was taken as the mean value in the group.

These surfaces do not include the necessary space for feeders in the box, if any..

Enclosure

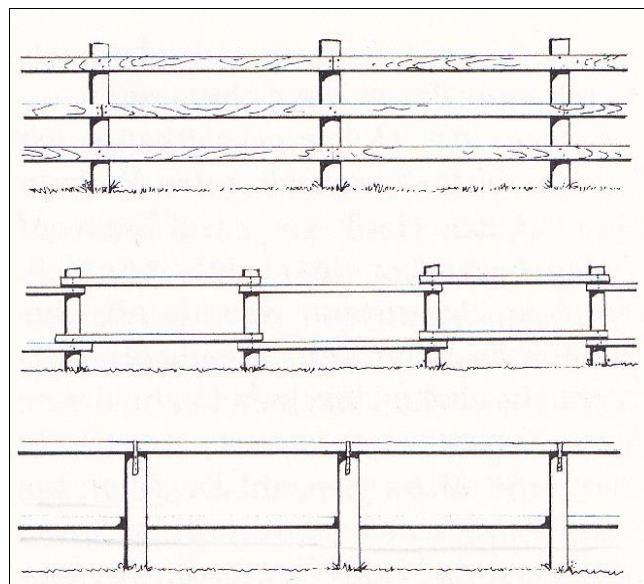
When it comes to the required size of the outlet, Briese (2000) states that for the enclosure, at least three times the usable area of the barn must be provided, and that, at least, one head must be calculated with 150 m².

These spaces are located around the stable. It is necessary to provide donkeys with space to move. At any moment, 500 m² must be available as space for movement. A maximum of 5 adults with young can be found on that surface.

Each enclosure must be fenced, and the fence must be sturdy enough to prevent donkeys from breaking or jumping over it. Naturally, fencing is not required if donkeys are on mountain pastures where boundaries practically do not exist.

**Picture 19:** Donkeys on free mountain pasture. Stara Planina (Serbia) (Foto:M.Urošević)

In such cases, donkeys have complete freedom of movement. Borwick (1984) recommends that the fence height should be at least 1 meter. Various materials can be used.

**Picture 20:** Different Types of Fences (Borwick, 1984)

In general, donkeys do not tend to jump over fences if the enclosure is sufficiently large. Fences can also be made from modern materials. Fences that are not made of wood have one significant advantage—donkeys cannot chew on them. In such cases, the need for cellulose fibers must be met in another way. They must be provided with a source of cellulose fibers to prevent them from damaging fences and structures.

**Picture 21:** The fence can also be made from materials found in the surrounding area. Donkey fence, "Beljanica" mountain, Homolje, eastern Serbia. (Foto: M.Urošević)

Modern technologies make lightweight, yet sufficiently strong materials that are easy to assemble and, if necessary, simply transportable.



Picture 22: Fences from modern material (Foto:M.Urošević)

The effect of gnawing on the wood is visible at every step. In the following photo, it is visible how the donkeys gnawed at the wooden boards that were placed as reinforcement on the front door.



Picture 23: Visible scratches on wooden planks (Foto: M.Urošević)

When donkeys have large areas at their disposal, the fence plays a more significant role in preventing unauthorized people or other animals from entering the space. Such areas are enclosed with an electric fence.



Picture 24: Baroque donkeys are not interested in exhibiting from their space (Foto: M.Urošević)

Electric fences today are, in most cases, the only way to enclose areas where donkeys live.



Picture 25: Electric fences are practically the most commonly used today. Dr. Urošević, in addition to enclosures for donkeys, also uses electric fencing. The area around the city of Turda (RO). (Foto: C. Margineanu)

Solid materials, such as metal and construction blocks, are generally more durable, as seen on a farm in Cyprus. The roof structure and fences are made of metal, while the troughs are built from sturdy construction materials.



Picture 26: Solid materials (Foto: M:Urošević)

In zoos, donkeys are used to many visitors, the fence is solid, but reinforced with an electric guard.



Picture 27: ZOO Schönbrunn, Vienna (A). (Foto: M.Urošević)

To ensure that the entrance and exit gates of the small enclosure around the stable remain intact, it is not uncommon for them to be made of metal.



Picture 28: These doors are the most durable. (Foto: M.Urošević)

Straw

A layer of straw must always be placed on the floor of the stable. It serves as an insulator, especially if the floors are made of stone or concrete, and provides an elastic surface, making it significantly more comfortable for donkeys to lie down.

It is essential to consider that donkeys will consume a portion of the straw daily, as it is an excellent source of cellulose fibers. Additionally, soiled straw must be removed from the stable every day and replaced with fresh bedding. In general, donkeys do not sleep for long periods. Despite being domesticated for thousands of years, they have retained a genetic predisposition to constantly search for food, as if it were scarce. As a result, they spend 14–16 hours a day feeding—nowadays, more eating than foraging—leaving little time for sleep.

In favorable weather conditions, donkeys are not particularly inclined to sleep indoors. They prefer to rest and sleep under shelters.

In many European countries today, donkeys are kept as "pets." They do not perform any work and are not milked; they simply serve as decorative animals in yards. For them, shelters are built that are enclosed on only three sides, usually made of wood, and equipped with hay racks. Even on such wooden floors, a certain amount of straw is placed for bedding.



Picture 29: A simple wooden building in which there is a manger for hay. Straw is placed on the wooden floor (Foto: M.Urošević)

A practical question arises: how much straw should be placed on the floor? Additionally, which type of cereal straw is best for bedding?

The thickness of the straw layer certainly depends on the season and climate zone. In areas with colder winters, it is recommended that the straw layer be 15–30 cm thick. This way, a donkey can adequately protect its body while lying down.

Regarding the type of straw, barley straw is the best choice. It is softer than wheat straw, making it more comfortable for lying down. Additionally, since it is softer, it is less likely to irritate the skin. The second-best option is oat straw. It is also soft, but since it has a higher nutritional value, donkeys tend to eat it.

In practice, wheat straw is the most commonly used because it is the most available. It has good hygroscopic properties. However, it is somewhat rougher than oat and barley straw. Donkeys also consume it. The least recommended straw is rye straw, as it is not comfortable, being sharp and coarse. However, if no other straw is available, it is still better to use rye straw than to leave the floor without any bedding. Since donkeys consume straw from the floor, it must always be hygienically safe, clean, and never moldy. Poor-quality straw can cause health problems.



Picture 30: The straw must be dry (Foto: M.Nemecek)

The amount of straw required depends on several factors, primarily the frequency of cleaning and bedding replacement. On average, 3–6 kg of straw per animal per day is needed. When calculated annually, this amounts to 1.1–1.2 tons per animal.

In humid conditions, straw consumption is higher since it absorbs moisture more quickly and needs to be replaced more often. In the case of "deep bedding," the required amount of straw is significantly lower. In this system, donkeys regularly leave a layer of hay on the straw bedding as they pull it from the hay racks. Interestingly, donkeys prefer to pull hay from the racks and then eat it from the surface.



Picture 31: Where rainfall is extremely rare (Cyprus), straw is given to the donkeys in the field/outlet. In that case, there is a real danger of contamination with feces and urin (Foto: M.Urošević)

It is interesting that donkeys are happy to accept a deep litter made of straw that is not taken out and added hay. The depth of such a litter is constantly increasing so that it can even reach the lower level of the hay rack.



Picture 32: A deep litter that reached the level of the hay rack in height (Foto: M.Nemecek)

Deep litter formation can be accepted in non-enclosed facilities. Since, by raising the floor level and increasing the thickness of the deep litter, the volume of the object decreases, and this causes a decrease in the amount of air in the object. In facilities that are not closed, this problem does not manifest itself, since fresh air has the ability to constantly circulate through the space where the donkeys are located.



Picture 33: Deep litter in an open-air facility (Foto: M.Nemecek)

It is interesting that donkeys, when they have enough free space, are not constantly in the barn and after eating hay or straw they can go outside, they usually do not defecate or urinate in the area where they consume food. In that case, eating food off the floor does not pose any danger.



Picture 34: A wooden, semi-open building, where the floor is cleaned daily (Foto: S. Fasching)

Donkeys are not provided with adequate housing in inadequate conditions, which unfortunately are more common as you go east from Europe. They do not have enough space, nor adequate protection from the weather. Hay is often thrown on the floor and then it should be both a mat and food.



Picture 35: Inappropriate box size, hay scattered on the floor (KZ) (Foto:M.Urošević)

Conclusion

The fact is that donkeys do not need special accommodation facilities, but it is still necessary to provide them with the possibility to protect themselves from precipitation or strong insolation. Facilities intended for donkeys must always be clean with the possibility of sufficient ventilation.

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