

## Modern Use of Donkeys

### Review Article

D. Karatosidi<sup>1\*</sup>, G. Marsico<sup>1</sup> and S. Tarricone<sup>1</sup>

<sup>1</sup> Department of Animal Production, University of Bari, 70126, Bari, Italy

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\*Correspondence E-mail: [despinakaratosidi@yahoo.com](mailto:despinakaratosidi@yahoo.com)

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### ABSTRACT

In the early 90's, donkeys were in danger of extinction as species. In Italy, there were counted few heads of many breeds but, unfortunately, others had already been extinct. With the donkey in danger, there was a risk of disappearance of a part of ecosystem, a biodiversity particularly significant as it represents humans' history. All countries around the Mediterranean sea, countries of southern Europe from Spain to Greece and of north Africa from Turkey to Morocco, have seen the production and the progress of agricultural world related to the presence of equines. Today, in many parts of Italy, donkey is rediscovered for the potentiality and adaptability in different environments that can still have. The presence of donkey becomes once again useful inside farms, first of all, because of its milk production, milk that is similar to that of woman's breast milk and, also, for the use of this milk in the industry of cosmetics. Moreover, the use of meat produced by these animals is appreciated by today's consumers for its high chemico-nutritional quality which, nowadays, is used in many traditional recipes. Last but not least, we must consider the ultimate utility of this animal for therapeutically purposes such as its use in onotherapy, method that is frequently being used for people who have disabilities and discomforts with results that can be noticed quickly and can be documented. This work is just a descriptive picture of the Italian breeding reality with many possible suggestions for those countries where the donkey is still a solitary inhabitant of the countryside.

**KEY WORDS** donkey, meat, milk, onotherapy.

### INTRODUCTION

After the Second World War, agricultural production was concentrated mostly in valleys with rivers, along the coasts and in all those areas where agricultural land was more fertile in order to achieve higher production. Moreover, there was a massive mechanization of farming operations, a backstage in which are associated major and/or minor infrastructures. This operation was induced by a transition from an agricultural economy based on auto-consumption up to a kind of business that was confronted with a market constantly more globalized, where consumers base their choices on the quality and the relation quality/price of the product. The shift of business activity to areas agronomically more advantageous (e.g. more fertile) led the farming

population to abandon inland regions and / or mountains and foothills, leading these areas to marginalization of their production and the urbanization of the population with all the environmental problems that it entails. The abandonment of inland regions, mountains and foothills led the use of other areas for zoo technical- wild life- forestall purposes, or also all together the activities of production and/or tourism (usually integrated) based on a balanced use of the territory. In this context, it can also be added the zoo technical activities like the breeding of autochthonous genotype animals such as equines (donkeys, horses and their hybrids). Across Europe, as well as in the rest of the world, equines were always being used by man for labor purposes (e.g. shooting, saddle, packsaddle, etc). They were generally living with their owners until the moment they were

incapable of labor and then, too old and usually malnourished, were slaughtered for their meat. Their meat is rich in connective tissues, with pure organoleptic and nutritional characteristics. It appears to be of dark red color with yellow fat, rather scarce and with a characteristic smell and a sweetish taste. Nowadays, the situation is very different for equines and especially for donkeys as their number is reduced because of their uselessness in the economy of the agricultural farms; from a half million and more heads that existed in the 50 s to only a few hundred in the late 80 s. In order to save them from extinction, first the researchers and then the farmers had to identify uses for such animals in order to make them economically compatible inside their productive system. Consequently, in Italy some breeds of donkeys are being used in farms for trekking, for pet-therapy (onotherapy), for milk and meat production utilizing in such way their historical usefulness and docility.

In June 2006, the National Consortium of Donkey breeders (National Consortium of Donkey Breeders, 2010) were formed in Italy. The objectives of the project were:

1. The direction, coordination, supervision and support of the “new activities” of the consortium (e.g. pet-therapy, onotourism, etc).
2. The promotion and protection of the donkey’s milk.
3. The promotion of the donkey’s rearing system and protection of the donkey breeds, maintenance of biodiversity and animal welfare.
4. The monitoring activities at various levels of the production chain; livestock production must be qualified for the authenticity, traceability and foods safety. The consortium will provide and improve product quality for the health of consumers (quality assurance), supporting the scientific research and technology.
5. The organization of activities to support and promote the “rural development” which is focused on territorial vocations able to satisfy the new demands of the market.

### The meat

The production of meat comes from the demand to use foals (because not all donkeys can be used for farming) and especially males that can be used for high-quality meat production for a particular group of consumers. The relationship between cardiovascular diseases and fat composition of food is probably one of the most popular consumer topics (Pinto *et al.* 2002). Quality control of fat and cholesterol in the diet is considered to be important for the prevention of obesity and hypercholesterolemia due to which is demonstrated a connection with some disorders of the cardiovascular system. It seems that there are also relations between a high consumption of animal fat and an increased risk of certain cancers, especially those of colon, breast and prostate (Reddy, 1995). Faced with such dangers, the Euro-

pean consumers are changing their eating habits and are asking for more qualitative products. Consequently, there is a growing demand for safer foods. From this issue it should not be forgotten that the meat industry, which right from the beginning of the new millennium, faced a negative repercussion of beef consumption and also because of several other public health associated crises like the Bovine Spongiform Encephalopathy (BSE). All the above reasons made the consumers turn to alternative meats like those of equines (Pinto, 2007). The consumption of horsemeat in Italy is already common for a large number of consumers and according to Italian National Institute of Statistic (ISTAT) data in 2000, 268, 745 heads were slaughtered of which only 56% were in south Italy. The annual average consumption per/capita of horsemeat is estimated at 1.35 kg of a total meat consumption of 84.4 kg year per inhabitant (ISTAT, 2010). Donkey meat is very similar to that of horsemeat. In Italy, traditional consumption is particularly widespread in northern regions like Veneto, Emilia Romagna, Piedmont, but also in some southern regions like Apulia. In particular, in the valley of Padania, in recent years, the slaughter of old horses and donkeys helped inhabitants to add proteins to their daily meals that were mainly based on grains and vegetables. Donkey’s meat was used for the production of sausages or for stews and braises. It is appreciated for its protein balance (21.7g per 100 g of edible portion), for the iron and carbohydrates content, for the presence of proteins (higher than those found in beef), for the presence of low fat (2.7 g per 100 g of edible portion) of which the major part is unsaturated fatty acids (particularly the linoleic acid) and for the phosphorus and potassium content (Table 1).

**Table 1** Chemical characteristics of the *Longissimus dorsi* muscle of donkey carcasses

	1 <sup>a</sup>	2 <sup>b</sup>	Mean
Moisture (%)	73.70	71.83	72.76
Fat (%)	2.02	4.54	3.28
Proteins (%)	22.80	21.80	22.30
Ash (%)	1.01	0.99	1
Cholesterol (mg/100 g)	68.70	57.65	63.18

1<sup>a</sup>: data from Polidori *et al.* (2008) and 2<sup>b</sup>: data from Pinto *et al.* (2007).

Moreover, meat controllers confirm that donkey meat is better than that of horses because of its tenderness and sweetness. Typical characteristics of equines meat are its dark red color, due to the amount of myoglobin (and therefore iron) and its sweetness due to the high concentration of muscular glycogen and glucose (Table 2). It is rather thin, firm and consistent, with yellow fat rich in polyunsaturated fatty acids of the serie  $\omega 3$  and  $\omega 6$  (Table 3), light smell and it is easily digestible. Parts with a larger amount of connective tissue require longer cooking while other parts can be

roasted or grilled. There are many good examples of products like “bresaola” (typical sausage of Valtellina) that can be prepared also with horsemeat by using the same preparations, topped with cheese and served with salad. Another typical sausage is the donkey sausage, prepared with several spices, though not very spicy in flavor and lightly aromatic so as to highlight the characteristic smell and taste of this meat.

**Table 2** Mean value and range of *Longissimus dorsi* muscle of the donkey carcasses (mg/100 g)

Mineral	Minimum	Maximum	Mean
Calcium	6.12	11.50	8.65
Magnesium	18.50	33.60	24.80
Potassium	312.00	438.30	343.70
Phosphorus	185.50	334.50	212.90
Sodium	36.80	83.60	52.50
Zinc	2.99	4.71	3.67
Iron	2.86	4.77	3.80

**Table 3** Qualitative indexes of the intramuscular fat (Pinto *et al.* 2007)

UFA (%)	58.52
MUFA (%)	45.25
PUFA (%)	13.02
$\omega 3$ (%)	10.74
$\omega 6$ (%)	1.87
$\omega 6 / \omega 3$	5.74
Unsaturated / saturated	1.41
Index of atherogenicity (AI)	0.81
Index of thrombogenicity (TI)	1.10
Saturated / polynsaturated	3.19
PCL/PCE	1.03

### The milk

It is written that Cleopatra, queen of ancient Egypt, used donkey’s milk in order to preserve the beauty of her skin. It seems also that Poppea, second wife of Emperor Neron, did the same thing. Donkey’s milk is still being used for the production of soaps and moisturizers and it is much in demand by manufacturers of cosmetics. The father of medicine, Hippocrates, prescribed this milk for many diseases like liver disease, edemas, nose bleeding, poisoning, infectious diseases, healing of wounds and fevers. It was used until the early twenties as a substitute for woman’s breast milk because of its chemical composition that is considered closer to that of humans and, therefore, it is being used mostly for the feeding of children in the infant period, ensuring good growth and normal mental and physical development.

As far as regards the qualitative aspects of the milk, it can be noted that there is a considerable variability, mainly due to lipid and proteic levels which can depend on genetic and environmental factors. From various studies conducted in Europe certain characteristics have been identified as: the average energy value is 1.732 kJ/kg, the total dry is 8.8%,

the non-proteic nitrogen is very close to that found in human milk.

This is very important because it includes the fraction of milk’s serum protein ( $\beta$ -globulin,  $\alpha$ -lactalbumin, lysozyme and lactoferrin) in addition to leptin, urea, uric acid, creatine, amino acids, nucleotides and nucleic acids, that help the neonatal development because they represent all the specific components that are called biopeptides and hypo allergenic factors. Another important element in favor of donkey’s milk is its high content of lactose (Table 4) which, together with the low amount of microbial load and the high content of lysozyme, make this milk an ideal substance for the growth of lactic bacteria for nutraceutical and probiotic activities and, also, an excellent stimulator for the intestinal absorption of calcium, helping bone mineralization in early human development. Another molecule present in donkey’s milk, on which special attention is paid for its multifunctional activity on a human’s body, is the lactoferrin, a glycoprotein (peptone) of 80 kDa weight with two sites for iron-binding. Lactoferrin seems to be able to inhibit the development of adenocancers of the colon as it reduces significantly the number and size of cryptic out-breaks, considered as a precursor of this cancer and it is present in donkey’s milk. The lactoferrin can intervene in inflammatory processes and modify some components of the immune system through interaction with the monocyte / macrophage system and control the rate of iron (Tafaro *et al.* 2007).

Due to the high content of polyunsaturated acids of donkey’s milk, its use has been suggested in low-calorie diets and cholesterol-lowering drugs, whereas the high content of essential amino acids can be useful in the traditional diet of elderly people. Among the noteworthy aspects must be mentioned the possibility of using donkey’s milk in cases of intolerance or food allergies (Businco *et al.* 2000; Pinto and Bruno, 2009).

### The onotherapy

*Onos* is the greek word for the donkey and *onotherapy* is the term for the “therapy” with the help of donkeys. With the onotherapy can be valorized the physical and behavioral characteristics of the donkey (small in size, soft in touch, affectionate and patient, with slow movements). Due to these characteristics, the donkey can offer valuable services to those people who are affected by disability or discomfort, with results that can be noticed quickly and can be documented. The activities of “Mediation with the Donkey” propose a methodology of re-appropriation of man and animal. It gives the possibility to rediscover the cultural warmth of this relation through which it acquires a greater awareness of the donkey’s identity and the sense of man’s role in this story.

**Table 4** Chemical composition and physical properties of donkey, mare, cow and woman's milk (Guo *et al.* 2007)

	Donkey <sup>a</sup>	Mare	Cow	Woman
pH	7.00-7.20	7.18	6.60-6.80	7.00-7.50
Protein	1.50-1.80	1.50-2.80	3.10-3.80	0.90-1.70
Caseine	0.64-1.03	0.94-1.20	2.46-2.80	0.32-0.42
Fat	0.30-1.80	0.50-2.00	3.50-3.90	3.50-4.00
Lactose	5.80-7.40	5.80-7.00	4.40-4.90	6.30-7.00
Ashes	0.30-0.50	0.30-0.50	0.70-0.80	0.20-0.30
Serum proteins	0.49-0.80	0.74-0.91	0.55-0.70	0.68-0.83

<sup>a</sup>: data from Anantakrishnan (1941).

Nowadays, as a part of our culture, there is an ongoing attempt to reconcile man with the environment that he lives in; reconciliation with the world, with nature and particularly with animals. The rediscovery of the relationship between man and animal is a journey back in time to rediscover the harmonious relationship that they had in the past. It is a practice that uses donkey riding as a therapeutical "tool" and it is a combination of education and rehabilitation techniques, aiming to achieve success on a sensorial, motorial, affective or behavioral injury of man (Milonis, 2010). The "tools" of onotherapy are: the donkey, the body, the movement, the game, the report donkey-user-operator, all the possible expressions of communication that allow the approximation to body size by restoring a connection with emotions and feelings. It is an active method that never allows the person to remain passive or to be isolated. The donkey has an active role in the relationship with man and it is able to change its emotional attitude. The treatment is the "cure" of the whole person by taking into consideration the different levels in which human nature is expressed. The intervention of aid becomes more and more an educational intervention and rehabilitation; habilitation and rehabilitation that looks forward to uniqueness and authenticity. The activities of "Mediation with the Donkey", in particular, are aiming at the pursuit of improved living conditions of the person from a psychological point of view. There are also activities that cover a therapeutic purpose as they affect the general health of the person. Achieving a state of psychological well-being also has an effect on the general health of the individual. Positive moods dramatically affect behavior, mental processes, expression of emotions, good feelings within us and with others. In this sense, the work done during the onotherapy is aiming to achieve a higher state of well-being and it is the best foundation to allow therapeutical programs to act in the best way.

## CONCLUSION

The donkey faces again a glory due to the diffusion of the culture for the protection of the environment, the rediscovery of old traditions, the need for more direct contact with

nature, by producing new elements for alternative medicine for the treatment and prevention of typical human diseases (depression, loneliness, etc) of a deep technological and materialistic society. In the last few years, donkeys have become the principal "actor" of original and innovative processes with the idea to form an important area in the global zootechnical backstage.

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