

The current situation and trend of donkey industry in Europe

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Abstract

Due to the mechanization in agriculture and in transports, the number of donkeys reared in Europe was reduced of 50% in the last 20 years and more than 80% since the middle of the last century. During this period, no attention was devoted to the breeding selection and biodiversity conservation, with the results that, nowadays, most of European breeds of donkey are threatened of extinction. The remaining donkey, in Europe, are employed for niche purposes as mule production or maintenance of soil and landscape. The consumption of donkey meat is not popular in Europe and a few animals are sent to the slaughterhouse. A new interest is growing in Europe for donkey milk, mostly for human consumption, but also for the production of beauty products. Marginal areas of donkey employment are the social and leisure uses. In spite the fact that interest for donkey in Europe is very marginal, and that very few or even no funding for research were provided from national or European authorities, more or less one third of paper published on different aspect of donkey sciences in the last 20 years where produced in Europe.

Keywords: donkey, Europe, uses, research

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1. Introduction

Donkeys (*Equus asinus*) were domesticated in Northeast Africa around 6,000-7,000 years ago and played a key role in the expansion of human populations as well as in trading activities across the Old World. Today, donkeys are still working animals that contribute to the subsistence of millions of people in less industrialized countries.

In Europe, before the Second World War, donkeys were employed as tractor force, and transport of people and goods in agriculture, e.g. milk, hay, mostly in South-West part of the Continent; what it is now a car for a family was at that times a donkey. With the improvement of mechanization in agriculture, the development of the automobile industry and with the progressive movement of people from the country to the towns, the importance and the number of donkeys dramatically fell. As a consequence of low profitability, small farms and marginal lands have been progressively abandoned with serious consequences for the management of countryside and for the contrast to adverse natural events. Today, European agriculture is more and more intensive and concentrated in limited areas with dramatic consequences for the quality of the environment to which European Citizens are exposed, on daily basis. Moreover, intensive agriculture and livestock farming result in soil exhaustion and groundwater pollution and raise questions in the public related to the type of crops farmed and to the quality of animal well-being. The donkey has been the livestock species most affected by this industrialization, depopulation of rural districts and mechanization of agriculture: this has led to a population decline of up to 80% in the twentieth century resulting in a dramatic situation of donkeys [1] and in the lack of information on donkey's numbers, breeds and uses in Europe.

The aim of this manuscript was to revue the current situation of donkey in Europe, in terms of animals stock

and breeds, principal uses and perspectives, and status of research.

2. Donkey stock in Europe

The number of donkeys reared in the world in 2014 was around 43 million, stable in the last two decades [2]. On the other hand, the production of asses in Europe accounts for only the 1.6 % of the total production in the world (Asia 42.6 %, Africa 38.7 %, Americas 17 %) and is more or less half compared with the production of 20 years ago (967,000 asses in Europe in 1994 and 515,000 in 2014) [2].

The stock of donkeys in 2014 is reported for exactly half of the countries considered as European (25/50) or included in the EU (14/28). The highest number of donkeys, 170,000, are reared in Turkey and, among the EU states, in Spain, 140,000 [2].

As table 1 clearly show, the decline of donkey popularity is observed mostly in the Southern and Eastern Europe, where this animal was used in agriculture, while in the Northern and Western Europe, where donkeys are kept mostly as pet or for the free time, the number is stable or even increased. Never the less the decreasing donkey number observed in the South and East was more pronounced than the increase seen in North and West, accounting for the reduction of around 50% of donkeys reared in Europe in the last 20 years [2].

Europe	1994	2014
Northern	6,800	6,100
Southern	555,600	371,000
Western	20,000	34,000
Eastern	384,657	103,491
Total	967,057	514,591

Table 1: Number of donkeys reared in Europe in 1994 and in 2014 [2]

Two typical examples of this donkey numeric reduction are Italy and Greece. The donkey population in Italy between 1938 and 1968 deduced itself by the half or more, and declined of the 97% from the Second World War to 2008 [3]. This decline is reflected in the risk status of Italy's donkey breeds, all of them, according to the figures available at the time of writing [4], classified as being at risk of extinction.

In Greece, over the last decades, the population of donkeys has also decreased dramatically. From 508,000 animals in 1955, there were only 14,570 animals in 2008 corresponding to a numerical reduction of about 97% [5]. Recently, the number of donkeys in this country has slightly increased to 16,443 [6].

3. Donkey breeds in Europe

Donkey breeds in Europe are often not identified. Where breeds are known, the number of breeding animals is dramatically low, and often the reproduction is managed with very poor or no attention on breeds preservation [1]. In the last 10 years, the situation became, probably, less dramatic: according to DAD-IS [4], in Europe 60 breeds of donkey are recognised. However, this list seems scarcely accurate, in fact, out of the 60 breeds recorded, 2 are reported as extinct, 5 are synonymous, for 6 only the past consistency is reported, for 5 the consistency is reported but no description of phenotype or photos are provided, for 14 no data are reported and only for 28 breeds a more or less accurate morphological description and the actual consistency are reported. The table 2 shows the data, divided by country, available today, on the situation of these 28 donkey breeds reared in Europe [4].

Country	Breed	Consistency	Trend	Sires	Jennies
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Croatia	Istrian donkey	490	Increasing	80	266
	Littoral Dinaric donkey	2150	Increasing	479	1,087
	North Adriatic donkey	100	Stable	11	48
France	Ane Bourbonnais	50	Stable	11	39
	Ane de Provence	271	Stable	37	239
	Ane des Pyrénées	227	Stable	37	190
	Ane du Cotentin	435	Decreasing	11	424
	Ane Grand Noir du Berry	172	Decreasing	12	190
	Ane Normand	221	Decreasing	16	205
	Baudet du Poitou	515	Stable	10	505
Hungary	Hungarian Plain donkey	354	Increasing	27	318
Italy	Asino dell'Amiata	1972	Increasing	84	514
	Asino dell'Asinara	128	Increasing	6	17
	Asino di Pantelleria	76	Increasing	6	15
	Asino Sardo	1624	Increasing	68	302
	Grigio Viterbese	170	Increasing	1	15
	Martina Franca	1086	Increasing	68	292
	Ragusano	2481	Increasing	54	619
	Romagnolo	643	Increasing	24	169
Portugal	Burro de Graciosa	80	Stable	31	26
	Burro de Miranda	1400	Stable	40	760
Spain	Andaluza	795	Increasing	100	445
	Asno de las Encartaciones	336	Increasing	28	248
	Balear	464	Increasing	43	235
	Catalana	957	Increasing	308	481
	Majorena	82	Decreasing	29	53
	Zamorano-Leonés	1338	Decreasing	91	551
Serbia	Balkan donkey	750	Increasing	13	211

Table 2: Inventory of donkey breeds reared in Europe [4]

According to FAO, set criteria to classify the degree of endangerment of a breed are as follows [1]:

Extinct: no sires and/or mare for breeding remaining

Critical: mares 100, sires 5

Endangered: mares 1000, sires 20

Not at risk: mares > 1000, sires > 20

Employing these criteria, 7 of the 28 European breeds are in a critical status, 20 endangered and only one not at risk.

Table 3 clearly shows the differences between the actual numbers of donkeys reported for each country [2] and the number of donkeys registered as pure breeds [4], the first being much higher than the latter. This is due to the absence of a program of donkey reproduction, that is without a selection strategy or even attention for the genetic preservation. In Greece, for example, the common practice in donkey breeding programs was the importation of jacks of foreign countries' breeds: as Cyprus, Sicily and France (Baudet du Poitou). Such practice led to numerous donkeys' crossbreeds resulting in, among the donkeys examined in a study, less than 5% animals shared distinctive morphological characteristics of the Arcadian donkey, the only original Greek breed [5].

Country	DAD-IS, 2017 [4].	FAOSTAT, 2017 [2].
Croatia	2,740	2,153

France	1,891	15,000
Hungary	354	2000
Italy	8,180	24,900
Portugal	1,480	115,000
Spain	3,972	140,000
Serbia	750	-

Table 3: Number of donkeys in Europe: differences between the number of animal registered as pure breed [4] and the total number for each country [2]

These data show that there is the need for a different approach in donkey breeding and conservation in Europe, but they should be considered with caution: for example, the figures reported by the Italian Ministry of Agriculture for donkeys reared in Italy and donkeys registered as one of the eight recognised Italian pure breeds are 78,687 and 9804, respectively [7], the first number being much higher than the number of 24,900 reported of FAOSTAT [2].

4. Why are donkeys reared in Europe (uses of donkeys)

A quite recent survey reported four principal types of uses of donkey in Europe: in agriculture, for meat and milk productions and for social activities [8]. To this uses it is possible, nowadays, add the use for tourism and leisure.

4.1 The donkey in agriculture.

The use of donkeys in agriculture regards old and new purposes; between the first, is noticeable the reproduction, with the production of donkeys and mules to be employed as harness and pack animals. Among the new donkey employments, it is possible to consider the landscape maintenance, the use as livestock guardian and as attraction for the hosts of the farmhouses. The survival of donkey breeds, and the possibility of an increase of the number of these animals, obviously, is related to the economic interest in the donkey and his products.

4.1.1 Mule production.

Mule production is, today, a residual activity in Europe. Mules, as donkeys, have been employed for thousands of years as pack animals, including the military use, mostly in the hard conditions of the European mountains. Today, the use of mules is dramatically reduced, but still present in some region where it is impossible or forbidden to work with mechanical tractors (e.g. national conservation parks). It is well known that today, in Europe, it is not easy to find and to buy a good mule trained for work and that its price is similar to the price of a medium quality horse. In some of the European countries more devoted to the breeding of small ruminants, there is the problem of the predation of herds by wild dogs and wolves. In the central regions of Italy, for example, this has become an economical problem and a political issue, with two factions of citizens fighting each other: the sheep breeders and the animal protection activists. The ability of the mule to defend a flock of animals, including horses, against wild dogs and wolve attacks is well known since old times. Horse breeders in the Abruzzo region (Italy), for example, use to add a female mule to the herd of horses when free grazing in the mountains during the summer. In fact, they agree that the mule instinct to protect the new-born foals against predators is stronger than that of the mother itself. Also, donkeys, which are kept already as young animals in a flock of sheep, defend this against wolves, even if with different results [9] and, probably, less strongly than mules. Successful attempts of herd protection are currently carried out on alpine pastures, where donkeys are usually used in addition to guarding dogs [8].

4.1.2 Maintenance of the soil and landscapes

It has been shown that endangered species of plants and insects are encouraged by the selective feeding behaviour of donkeys. Examples of successful projects of donkey grazing on dry meadows demonstrate the

value of donkeys for keeping open scrubby meadows and pastures, which are no longer of interest for agriculture. In many countries of Central Europe, this type of usage is being examined or even applied successfully [8]. In some Italian region, donkeys are used as controllers of grass growth in low mountainous olive groves, where the soil is too fragile to support the weight of larger animals such as cattle or horses.

4.2 Donkey meat

The consumption of donkey meat in Europe is very scarce and limited to some countries of the southwest part of this Continent. According to official data [2], in the last years, production of donkey meat is reported only for Spain. In this country, in 2014, 3011 donkeys were slaughtered, with an average Yield/Carcass weight (= the average dressed carcass weight expressed as hg/animal) of 1430 and with a total production of donkey meat of 431 tonnes. To have an idea, the same figures for China in the same year, 2014, were 2,411,256 heads, 800 hg/animal and 193,000 tonnes, respectively [2].

For the year 1976, the slaughtering of 8626 donkeys was reported in Bulgaria; this number progressively decreased until 1986 and the following years, when no more production of donkey meat was reported for this country [2]. An issue exists about the accuracy of these data. In Italy, for example, it is well known that donkey meat is included in typical dishes in some region of the northeast and, in Italy and in others European countries, donkey salami is produced and consumed. The production of donkey meat in Italy is also certified by ISTAT (National Institute of Statistics) [10] that reports, in 2012, the slaughtering of 1434 donkeys with the production of 146 tonnes of donkey meat. These figures represent a small increase compared to the production of ten years before, 2002, when 1168 animals produced 141 tonnes of donkey meat.

According Polidori et al [11], donkey meat has recently been recognized as a nutritive food for human consumption with good quality proteins, vitamins and minerals. The acceptance of donkey meat as an appealing food for humans has changed along the centuries: in the past, this kind of meat was obtained from animals that were slaughtered at the end of their working lives. Consequently, the meat was mostly destined for salami production or other salted horse meat-based products. Today's consumers require leaner meat, with less fat and a consistent quality, and thus donkey meat is mainly produced from young animals [12]. Moreover, donkey foal meat showed an interesting content of essential amino acids and a notable percentage of unsaturated fatty acids, giving a high nutritional value to this alternative red meat [11].

For the future, it is possible to foresee an increase of donkey meat availability in European Mediterranean countries: the continuous increase of jennies breeding for milk production in this region (see after), will lead to the production of an increasing number of foals with the consequence of a probably significant increase of availability of male donkeys for slaughtering.

4.3 Donkey milk

In the last years, the properties of donkey milk were more and more demonstrated by the research and more and more appreciated by European citizens (see the manuscript of Mina Martini on this book, io citerei un suo lavoro). This revival resulted on the improvement of small or medium size farms devoted to donkey milk production, mostly in the Mediterranean area. The milk produced is either employed for human nutrition or as ingredient for the cosmetic industry.

4.3.1 Donkey milk for human consumption

The probably largest donkey milk farm in Europe, is located in Italy, breeds more or less 700 jennies of different breeds and produces milk that is sold also in the online market as liquid, ready to drink whole donkey's milk, in "Tetra Pack". The price of this product is of 2.99 Euros for 100 ml that corresponds to 30 Euros per litres. In the internet market, it is possible to buy donkey milk powdered by lyophilisation. In this case, the price is higher and it is equal to 32.80 Euros for 120 gr that roughly corresponds to 375 Euros for a kilogram [13]. Recently, the same industry, in association with a famous Swiss chocolate maker, launched on

the market the first non-bovine milk Swiss chocolate at a price of 9,90 Euros for a bar of 25 gr that corresponds more or less to 400 Euros /kg [14].

A survey, conducted in Italy on 35 different donkey milk farms, operating in 13 different Italian regions, resulted in the following results [15]:

- around 40% of producers sell milk donkey exclusively for human nutrition, while 60% sell the milk, both for human consumption and for processing into cosmetics;
- around 51% of producers sell only raw milk, 38% only pasteurized milk, while the remaining 11% sell, both atomized or powdered milk;
- in 70% of cases the producers sell the donkey milk to private citizens who withdraw the milk directly from the farm; the remaining producers, 30%, sell the milk to private citizens, but also to companies (especially those specialized on pharmaceutical and cosmetic products, herbalists, confectioners and retailers of nutraceuticals);
- the medium price of donkey milk, in Italy, was 13 Euros/litre (9-15) for raw milk, 14,7 Euros/litre (14-17.5) for pasteurized milk and 27,5 – 36 Euros/100 grams for atomized or powdered milk (only 4 producers).

4.3.2 Donkey milk for beauty

Other uses of donkey milk are, of course, the production of beauty creams and soap. In fact, the extraordinary quality of donkey milk to protect the woman skin against aging are well known since the times of the antique Egyptians and Romans.

Typing donkey milk on e-bay (June 2017), resulted in 237 results: 164 beauty creams and soap, the most part coming from Thailand, and 51 from Europe (26 from Greece, 11 from Portugal, 6 from The Netherlands, 3 from UK and Serbia, 1 from Cyprus and France) and 44 vintage art (7 from Europe: 6 from UK and 1 from The Netherlands).

A quantitative market analysis, carried out in Southern Italy, a region where donkey breeding is quite popular, to deepen the knowledge on some qualitative and quantitative aspects of jenny milk and cosmetics, showed that around 70% of consumers had familiarity with jenny milk, but only 20% were aware of the cosmetic properties of this product. The panel expressed a low expenditure propensity toward the proposed cosmetics. For these products, the study on packaging identified a type of matte paper as the favourite by the consumers [16]. Nevertheless, official information about production of donkey milk in Italy and in Europe are not available and the category “donkey milk” is not included in the FAO database.

4.3.3 Donkey milk production and donkey welfare

The new interest of donkey milk production stimulated the development of many farm breeding donkeys for this purpose. This enforced the need for the development of guidelines for rearing donkeys. The Donkey Sanctuary, one of the most important Charity in UK, with the mission to transform the quality of life for donkeys, mules and people worldwide through greater understanding, collaboration and support, and by promoting lasting, mutually life-enhancing relationships [17], has begun a collaboration with an University of Milan team, to look for donkey milk farming protocols. The study aims to look at ways to improve the lives of dairy donkeys by driving consumer demand for kinder and more responsible farming practices. This is based on the concept that “production systems worldwide need to be able to combine profitability with the responsibility of protecting human health, animal health, animal welfare and the environment. Dairy donkey farmers should apply good practices in order to ensure that safe and quality donkey milk is produced in a sustainable manner from an animal welfare, social, economic and environmental perspective.” The guidelines, grounded on results from the pilot project on dairy donkey welfare assessment, will be academic driven and developed by a Stakeholder platform using a considered judgement process informed by systematic reviews of the evidence [18, 19].

4.4 The social use of donkey

In the last years, assisted therapy with donkeys (onotherapy) is emerging as part of animal assisted therapies of different human pathologies. Compared to horses, donkeys are smaller and slower, they have a longer and soft hair that enhances tactile sensations and that make easy and profitable the simple contact with this animal. One study, for example, reported that “there was an improvement in autonomy and social integration for subjects with intellectual disability, undergoing horse and donkey therapy. Onotherapy emerged as a suitable and effective alternative to equestrian therapy” [20]. The diffusion of this approach to human disability depends, of course, on the politics of the different countries that may or may not finance the application of this procedure. In Italy, for example, the different activity with animals were recently officially recognised and regulated by the law and collaborations between private farms offering this service and the National Sanitary Service are sporadically founded.

4.5 The donkey for tourism and leisure

Consulting the web page named “Professionals of the donkey” [21], it is possible to discover that nowadays, there are over 300 professional donkey hirers in France, Belgium and Switzerland that provide donkeys for country walkers, to carry their luggage and give small children a ride [22]. Many donkey hirers also run lodges or guest rooms and home-cooked meals for the walkers.

In the same pages, the different activities offered by 145 professionals of donkey are reported as follows:

- 122, walks with the donkeys
- 25, stages,
- 44, animation,
- 40, donkey breeding,
- 10, riding,
- 25, attacks,
- 10, materials,
- 21, milk production
- 49, with specific facilities and animals for accepting disables

5. The research on donkey in Europe

Referring to the last 20 years and typing on the web page of ISI web of Science the word Donkey AND Genetic (June 2017), 182 results were obtained; the affiliation of the first author showed that 58 studied developed in Europe. The figures for Donkey AND Reproduction were 35 studies, 22 of which from Europe, and the obtained number for Donkey AND Behaviour was 137 studies, 44 developed in Europe. However, the most impressive data are those concerning research on donkey milk: around 266 papers were reported, between 1988 and 2017, 160 of which edited in Europe, 135 in Italy. This big interest of researchers, of course, reflect an increasing interest on donkey production and corresponds to great expectations of a continuous development of the market of the donkey products, especially milk. Moreover, the Convention on Biological Diversity, the Nagoya Protocol, Council Regulation EC 870/2004 [23, 24] promotes the conservation of biological diversity in-situ and ex-situ, and it is evident that research is a prerequisite for biodiversity safeguard. Never the less, the European political authorities seem not receptive to the expectations of researchers and simple citizens. In fact, studies on economic aspects of donkey breeding are lacking and, apparently, the word “donkey” was not mentioned in the EC publication “A decade of EU-funded animal production research” [25].

The example of Italy in this contest is very representative: the most important national funding instrument (PRIN, National Interest Project) funded one research investigating population, genetic and reproduction of one of the donkey Italian breeds at risk of extinction. This project was mentioned from two Italian Ministry, including the Ministry of University, as typical example of nonutility of the research done in some University,

in Italy. In spite of the fact that this was an extreme example of poor consideration of the possible role of donkey in Italian and European context, no research in donkey was supported anymore by PRIN.

6. Conclusions

Since the middle of the last Century, the explosion of industrialization and mechanization of agriculture was followed by the depopulation of rural districts and a dramatic decline of donkey breeding in Europe. These phenomena account for the reduction of donkey stock and donkey pure breeds in Europe. In many Countries of the North of the Continent, donkey is considered just as a pet. Fortunately, in the last years, European Citizens seems more receptive to the necessity of environment preservation and biodiversity, with the possibility of rediscovering the role of the donkey in a perspective of more sustainable agriculture. In the Mediterranean Countries, the most promising use of donkey is milk production: the interest in this new/old use resulted in an improvement of small and medium size farms devoted to the breeding of donkey for milk production, promoted the study of donkey welfare and research in different aspects of donkey sciences. Nevertheless national and a European politics for funding research on this animal are completely lacking and research in donkey populations, welfare, health, nutrition and management has had a very low priority at a politic level. These reasons prevent a reasonable understanding of donkey situation in Europe and that represent a serious limitation to the exploitation of the potential of donkey breeding in the Old Word.

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