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# Donkey Milk Exploitation: Health Benefits, Potential Applications and Prospective Invigoration of the Hellenic Economy



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**Keywords:** PDO: Protected Designation of Origin; PGI: Protected Geographical Indication; TSG: Traditional Specialties Guaranteed

## Introduction

Bovine or cow's milk is the dominant type of milk which is produced and consumed in large quantities at a global level. However, in some regions of the world milk from other animal species has a significant percentage in the total milk consumption. In contrast to cows milk, which represents the 85% of the world's milk production, a significantly high percentage holds buffalo milk (11%), followed by goats (2.3%), sheeps (1.4%) and camels milk (0.2%), respectively [1]. Regarding some other animals species, such as horses and donkeys, there is no extended information about their milk distribution, but it appears that the relevant contribution to the total global milk production is less than 0.1%. The relatively limited production and consumption are the main causes of non extended scientific and commercial knowledge which involves these types of milk. However, there is a number of research studies that deal with the high nutritional and/or therapeutic value of milk produced from non-ruminant domestic animals, such as donkeys [1,2].

In the recent literature, it is observed an intensive research on donkey milk. In Europe, this type of milk is used for the production of cosmetics and for human consumption. The literature contains limited research articles involving Hellenic donkey milk, indicating that there are great prospects for this innovative foodstuff. In particular, during the last five years the number of research articles that have been published on donkey milk is higher than 60. Indicative research findings show that donkey milk can be used as an alternative milk commodity for infants who are intolerant to cow's milk and in selected cases of allergy, but also as a preventive tool for a number of adult diseases [3,4]. The European regulation 92/46/EEC [5], lays down the health rules for the production and distribution of raw milk, heat-treated milk, and milk-based products, intended

for human consumption. In addition, the directive 2073/2005, as amended by the regulation 1441/2007, lays down the microbiological quality criteria involving pathogenic bacteria (*Listeria monocytogenes*, *Salmonella*, etc.) [6].

On the basis of healthy and of high quality food products, the European Union has recognized and supports the efforts made to identify the authenticity of local products by introducing the following indications: Protected Designation of Origin (PDO), Protected Geographical Indication (PGI) and Traditional Specialties Guaranteed (TSG) [7]. Such products with unique compositional and/or processing characteristics gain higher prices on domestic and international markets. Subsequently, FDA (Food and Drug Administration) has developed an integrated plan for food protection (Food Protection Plan 2007) involving the confrontation of changes in food sources, from production to consumption. The new plan presents a strong strategy for protecting each country's food at a national level, by both: contamination and deliberate attack. The protection plan is based on three major actions:

- a. Prevention
- b. Intervention and
- c. Solution

This new strategy will ensure safety of food products supplied from all over the world for the American consumers [8]. More recently, based on the regulation of the Hellenic Ministry of Rural Development and Food [9] all producing units of equines milk in the country, irrespective of the number of the farmed animals, will be able, in compliance with the requirements of the current National and European Community legislation involving animal health, welfare, and the hygiene of foods, to conventionalize

and dispose this type of milk and its milk based products in the market. The packaging of these products intended for human consumption should bear the words: 'Donkey Milk', depending however on the species of the farmed animal. Therefore, there is a well built environment worldwide for the exploitation of Hellenic donkey milk or donkey milk based products. However, a powerful mechanism for preserving and highlighting the quality of novel Hellenic products should have an ally at first the funding sources of the country.

### Potential Usage of Donkey Milk: A Quick Look

The following text presents in a quick look the potential usage of donkey milk including: a) health benefits, b) innovative applications and c) invigoration of the Hellenic economy.

#### Health benefits

In particular, the donkey milk is considered an ideal food commodity for treating various dermatological diseases such as dry skin and psoriasis. In addition, contributes to teeth strengthening and the treatment of joint pains, asthma, stomach ulcer, sore throat etc. It can be alternatively used by people who are intolerant to cow's milk, or to other allergies, and as a preventative tool for a number of adult diseases [10,11]. Hippocrates, the father of modern medicine, used donkey milk for the treatment of many diseases, such as liver problems, infectious diseases, fever, edema, poisoning and wounds. Donkey milk contributes significantly to anti-aging and to prevention of wrinkles. It has really a unique composition; 60 times higher vitamin C content than cow's milk and high amounts of vitamins A, B<sub>1</sub>, B<sub>2</sub>, B<sub>6</sub>, D, and E [12,13]. It is a rich source of calcium, magnesium, phosphorus, sodium, iron, and zinc. It should also be noted that, its high lactose content has a beneficial effect on the absorption of calcium from the intestine, serving thus, as a functional food for children or adults that suffer from osteoporosis.

#### Innovative applications and invigoration of the Hellenic economy

In terms of product's shelf life, in the Hellenic ministerial regulation [8] it is stated that it is responsibility of the manufacturers. Therefore, good practices in accordance with the domestic or the world regulations involving the safety and quality of milk [5,6,8,9] set the basis for a market that will grow dynamically in the near future, and of course donkey milk industry will attract the scientific community. The production and marketing of donkey milk is a new activity in the field of food production and, in general, in the entrepreneurship on the primary production of our country, with obvious characteristics of a highly innovative product, but also with a significant benefit that will enhance the nutritional casualties and health of Hellenic consumers. "Dietary training" and offer of new "dietary options" to the Hellenic consumers, on the use of functional foods and the embrace of healthy eating habits with beneficial health effects.

The Hellenic rural economy will be invigorated with the distribution of new quality donkey milk based products such as yoghurt, cheese, chocolates, etc. These products will serve as a "trigger" for engaging the unemployed people with a new and profitable product. It has been reported, that donkey milk is more expensive than French champagne. For example, one liter of donkey milk costs between 30 and 90 Euros, as mentioned in a domestic newspaper some years ago. Therefore, the money profit for donkey milk producers and exporters would be extremely high. Finally, the prospective marketing of PDO, PGI and TSG donkey milk based products at an international level will invigorate the Hellenic economy.

On the other hand, the young Hellenic scientists of the country will have the opportunity to help in the development of such products at all stages of the production process, which will contribute to a great turn in the Hellenic agricultural production by sketching the distribution into the global market of products of high quality. In that sense, the reinforcement of country's scientific staff and the fight against the "scourge of immigration" of Hellenic scientists abroad, recently termed as the "brain drain", will be minimized.

#### Conclusion

There is a great tendency for a "turn" in the Hellenic belief by cultivating Earth and exploiting new and of functional character food products. Coffee bars, alcohol "ghettos", restaurants, etc., are not the solution to surpass the prolonged financial crisis. Young scientists of Hellas may serve as an ally to these efforts.

#### Conflict of Interest

The authors need funding to carry out the research program entitled: "Physicochemical and microbiological characterization of Hellenic donkey milk and its products". The present scientific article is a part of the research program: "Chemical Characteristics and Microbiological Quality of Hellenic donkey milk" - Proposal number KYPE 7734/B49 (Action AgroETAK) (2014), designed by Dr. Ioannis K. Karabagias and is protected by the law according to a notarial deed.

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