8. The contemporary importance of goats (individual breeds) - in the production of food extremely necessary for people with disease problems

The topic of today's lecture is The contemporary importance of goats (individual breeds) - in the production of food extremely necessary for people with disease problems. The lecture is part of Module 4: Precision Livestock Farming, that is a part of the ISAGREED project. This presentation was supported by Erasmus+ KA2 Cooperation Partnerships Grant "Innovation of the content and structure of study programmes in the field of management of animal genetic and food resources using digitalization".

As part of the lecture, we will first talk about domestication and worldwide distribution of goats. Then we will explain goat breeds classification. Next, we will briefly talk about goat products and their utilization, namely goat milk, goat meat and goat fat.

The domestic goat belongs, together with sheep, to the oldest domesticated species of animals used for economic purposes. The area of the so-called Fertile Crescent is considered to be the center of domestication, from where goats then spread throughout the world, and the beginnings of domestication are dated to approximately 11,000 years before the present.

The conclusions of the studies are not entirely uniform on the origin of the domestic goat. Previously, a so-called polyphyletic origin was assumed, meaning several possible wild ancestors species. According to the latest studies, there was probably only one ancestor, the Bezoar goat. The bezoar goat is currently found in the mountain regions of South-Eastern Europe, Asia Minor, and Central Asia as far as Afghanistan. In Europe, it is still found in the wild in the territory of Greece, especially in Crete. The name of the bezoar goat is derived from the bezoars, spherical formations of glued fur, and plant debris found in its foreguts. In the past, bezoars were attributed to magical or healing powers, and goats were widely hunted for them.

From the above figure, it is clear that goat farming is currently most widespread in the developing countries of Asia and Africa. The countries with the highest number of goats include India, China, Pakistan, Nigeria, Bangladesh, Ethiopia, Chad, Kenya, and Sudan. From European countries, it is Greece and Spain.

In total, there are more than 850 million of goats, representing about 1.150 different breeds.

Breeds represent the basic taxonomic unit of animal breeding. The breed is a specific group of domestic animals having a homogeneous appearance (phenotype), homogeneous behavior, and/or other characteristics that distinguish them from other organisms of the same species. These characteristics are genetically determined; therefore, they are passed to the progeny.

We can classify breeds according to various criteria. Here is a classification of goat breeds according to their performance presented.

We distinguish between meat breeds, which include, for example, the Boer goat, dairy breeds, which is, for example, the Saanen goat. Then woolly or hairy breeds include the Angora and Cashmere goats, and last but not least, there are many dual or multipurpose breeds, for example, the Anglo-Nubian goat.

So now we will move on to specific products and start with milk production.

According to FAO statistics, the global production of goat's milk is around 19 million tons annually. More than half of this value is produced in Asia, followed by Africa with roughly a quarter, European countries contribute 15%. America and Oceania have the lowest production. The graph also shows a continuous increase in production, especially in Asia, where this increase between 2007 and 2017 amounts to almost 28%. The increase can be explained by a higher need for food and made possible by increasing productivity due to breeding and improving breeding conditions.

Goat milk characteristics

Goat's milk, like cow's milk, belongs to the so-called casein-type milk, where casein is the predominant protein. The content of the main components of goat's and cow's milk is shown in the table, where you can see that the differences are not significant. Goat's milk contains, on average, 84.8 - 88.8% of water, 11 - 15% of solids, 4.2 - 4.6 % of lactose, 3.2-4.2% of fat, 3.3-3.8% of protein, and 0.75-0.95% of ash.

If we look at the composition in more detail, there are specific differences. In some cases, goat's milk can be more suitable than cow's milk from a dietary perspective, especially regarding various allergies.

Average size of the fat globules are much smaller in goat milk compared to that of the cow milk.

Goat milk contains higher level of essential fatty acids and higher level of caprylic and caprin acids.

Lactose is the major carbohydrate in goat milk and the content is slightly lower than in cow milk.

Goat milk is significantly rich in lactose-derived oligosaccharides compared to cow milk.

Goat milk has a higher vitamin A content than cow milk, it is also a good source of vitamins such as D, E, thiamine, riboflavin and niacin.

Goat milk is reported to have a higher content of Potassium, Calcium, Phosphorus, Selenium, Zinc and Copper than cow milk.

Goat milk contains a significantly lower level of αs-1 casein, a major allergen in bovine milk.

Due to these characteristics, goat's milk is often referred to as a so-called "functional food", which contains easily digestible fats and proteins. Due to the overall better nutrient uptake efficiency, it is considered ultra-nourishing. The low lactose content and lower representation of allergenic proteins are also appreciated. It is also reported to have an anti-inflammatory effect, strengthening heart activity and immunity. Goat's milk is often recommended as a prebiotic dietary supplement. Some studies also looked at its anti-carcinogenic effect. Despite all these favorable properties, goat's milk also has certain negatives, including a specific taste and smell that some people may be sensitive to.

Many products, such as cheeses, butter, and yogurts, are made from goat's milk. Goat's milk is also used in various cosmetic products, most often different skin creams and body milks.

The second main product of goat breeding is meat.

It is clear from the graph that, similar to goat milk, most goat meat is produced in Asia and Africa. The top three goat meat producers in 2021 included China, with a production of more than 2.5 million tons, followed by India and Pakistan. A year-on-year comparison shows a continuous increase, with global production rising from around 2.7 million tonnes in 1990 to around 6.4 million tonnes in 2021.

A significant advantage of goat meat is that, unlike beef or pork, its consumption has no restrictions for cultural or religious reasons.

Most of the production is made up of slaughtered kids, which provide the best quality meat and have a better carcass yield of 60 - 65 % compared to adult animals. The dressing percentage for adult animals usually is at most 50%. The dressing percentage is determined as a percentage of the weight of the processed carcass body, which you can see in the picture from the animal's live weight.

Goat meat can be characterized as red meat with good nutritional value, low-fat content, high protein, vitamin B, and iron content. Disadvantages are a stiffer texture and less juiciness, possibly also a specific taste and smell associated with the content of 4-ethyl octanoic acid.

As for the nutritional value, 100 g of cooked goat meat contains approximately 144 kilocalories, 3 g of fat, 27 g of protein, and 75 mg of cholesterol. Compared to other types of meat, goat meat comes out well in all parameters.

Thanks to the low content of fats, especially saturated, it is a suitable food for overweight people. The advantage is also a lower risk of LDL cholesterol deposition. It also has a high iron content, which is important for the formation of hemoglobin. It is a source of vitamin B12, which is important in the energy metabolism of cells, DNA synthesis, the function of nerve cells, and the formation of red blood cells. It is also a good source of potassium, which helps regulate blood pressure and cellular functions. The specific taste and smell have already been mentioned as a disadvantage. If the goat meat is not well prepared, it can be tough and not very tasty. The fact that excessive consumption of red meat is cited as one of the possible risk factors for the development of cancer is not only linked to goat meat but refers to red meat in general.

Here are presented several examples of the use of goat meat for the treatment or prevention of specific problems. As already mentioned, goat meat is very suitable for a reduction diet and stabilizing the metabolism. Furthermore, it can be used for the prevention of cardiovascular diseases, especially atherosclerosis, and the prevention of Alzheimer's disease. Its consumption is also associated with improving joint function, thanks to supporting the development of chondroblasts.

The last product is goat fat, mainly used in traditional Chinese medicine, often in ointment formula, but sometimes its direct consumption is also recommended. It can be used, for example, in treating upper respiratory tract diseases, treating purulent wounds, preventing kidney disease and failure, and treating gastritis. It is also used in various cosmetic products. Thanks to its anti-aging and antioxidant effect, it supports cell regeneration and preserves moisture balance.

Another, in this case, non-production use of goats is related to the fact that the goat is relatively easy to tame and contact animal and can thus be successfully used in a variety of therapeutic or

assistance activities, which are currently very popular, as people require contact with nature and living animals. Since breeds that do not have high productivity can also be used within these programs, this can partially contribute to their preservation and maintenance.

At this moment I would like to thank you for your attention. If you have any questions, you can use the email listed here.