





## TRENDS IN GOAT REARING IN POLAND AND ECOSYSTEM SERVICES PROVIDED BY THEM

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### ABSTRACT

Currently, goats provide many ecosystem services in Europe. This study analyzed the trends in goat rearing in Poland over recent years, as well as the ecosystem services provided by them. Data was obtained from ARiMR and GUS. A survey was conducted, which enabled the collection of data directly from farms. In the analyzed years from 2016 to 2022, a slow increase in the goat population in Poland was observed (36 percentage increase). In 50.3% of the surveyed farms, 10–50 goats were kept, small herds of 1 to 10 females accounted for 45.7%, and only in 4% of the herds were there more than 50 females. Among the ecosystem services stated by the surveyed breeders providing services in the form of milk/meat obtained from goats were noticed, as well as products from processed milk. A common reason for rearing goats was also cultural services – their companionship and the desire to enhance the attractiveness of the surroundings through their presence. Regulatory services provided by goats are marginally recognized by surveyed breeders.

**Key words:** goats, goat population in Poland, ecosystem services, goat breeding, short food supply chains

### INTRODUCTION

The domestic goat (*Capra hircus*) is one of the earliest domesticated animal species. It is found on most continents and is capable of adapting to diverse environmental conditions. Goats play an important role in the agriculture of many countries. They significantly contribute to food security by providing societies around the world with access to food: milk, meat, cheeses, butter, yogurts, but also hides, wool, traction power, and manure [Lohani and Bhandari 2021]. Over 60% of the world's goat population is raised in tropical and arid regions identified by the Food and Agriculture Organization of the United Nations (FAO) as low-income and food-deficient countries, where they can utilize low-quality resources and convert them into high-quality products. There, goat milk is a staple food, a sustenance that supports life [Skapetas and Bampidis 2016]. About 50% of the total global goat population is in Asia, 44% in Africa, 1.3% in Europe, 3.4%

in both Americas, and 0.4% in Oceania [FAO 2023]. Meanwhile, Europe as a whole ranks third in terms of the number of goats but leads globally in the industrialization of the market for goat-derived products.

In reality, goats currently provide many ecosystem services throughout Europe. This concept refers to the “direct or indirect contributions of ecosystems to human well-being” [Groot et al. 2010]. Among the ecosystem services provided by goats, we can distinguish three categories:

- providing services – directly provided by ecosystems (goats supply milk, meat, hides, wool, manure as fertilizer, and traction power)
- regulatory services – relate to the indirect contribution of ecosystem processes (e.g., maintaining soil balance, landscape aesthetics, fire protection in grazed areas, climate regulation)

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– cultural services – non-material contribution in ecosystems (socio-cultural interaction within the community, a sense of identity and cultural heritage, recreational impact on agritourism farms, animal-assisted therapies).

This multifunctionality is very important, especially in less privileged and remote areas of Europe, where small ruminants are often the last possible form of economic activity. Due to the large number of goat breeds within a single species, there is considerable morphological and utility diversity. This has been influenced by climatic factors and the demand for products and raw materials. Modern goats are reared for various purposes: dairy, meat, wool, down, and general-purpose (multi-purpose) [Bagnicka et al. 2017].

Changes are also observed in the trends in goat breeding and husbandry [Pulina et al. 2018, Ruiz Morales et al. 2019]. In Poland, goats gain increasing popularity not only due to the trend towards organic food but also due to agritourism. Goat milk is especially recommended for people allergic to cow's milk proteins. The popularity of goats in agritourism farms comes from their interesting behavior and the fact that they are easy to maintain due to their minimal environmental and dietary requirements. They are noted for their independence and adaptability to free-living conditions. Additionally, they are very intelligent animals, learn very fast, and are very sociable with humans and other species [Kuznicka et al. 2017].

Thus, there is a need to analyze the trends in goat keeping in Poland over recent years, as well as to analyze the ecosystem services they provide.

## MATERIAL AND METHODS

Data on the number of registered goat breeders in Poland, as well as the quantities and breeds of goats maintained, over the six years from 2016 to 2022, were obtained from the Agency for Restructuring and Modernisation of Agriculture and the Central Statistical Office. A survey was also conducted, which enabled to collect the data directly from farms. This study was carried out in the form of an electronic form using Google Drive, with respondents providing answers over the Internet. It was distributed among groups associating goat breeders in social media. The survey targeted individuals who rear goats in Poland. The questionnaire included ten questions, the first three of which concerned gender, age, and the province where the herd was located. The remaining questions concerned the characteristics of herds and the direction of production. Responses were collected over 31 days. The survey was participated in by 109 women and 42 men, aged 18–59, from all over Poland. The study was anonymous. A total of 153 surveys were collected, two were discarded due to incorrect and unreliable information. Consequently, 151 forms were used for analysis.

The results were collected, standardized and processed using Microsoft Excel. Due to manuscript volume limitations, results regarding gender, age, and the province of location of the breeders' herds were not presented.

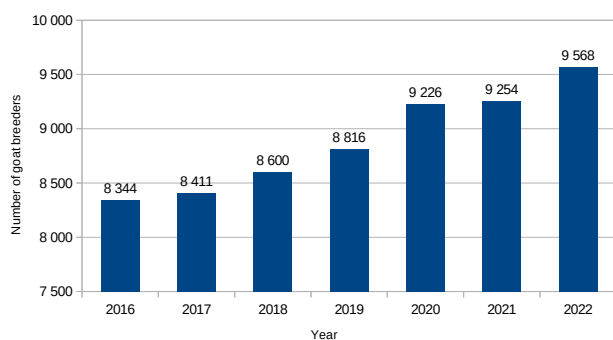
## RESULTS AND DISCUSSION

Every year during the period 2016–2022, an increase in the number of breeders was observed compared to the previous year (Fig. 1). The highest increase was observed in 2020, 4.6 percentage increase was observed compared to previous year. In the following years 2016–2022, there was 14.6 percentage increase in the number of goat breeders in Poland.

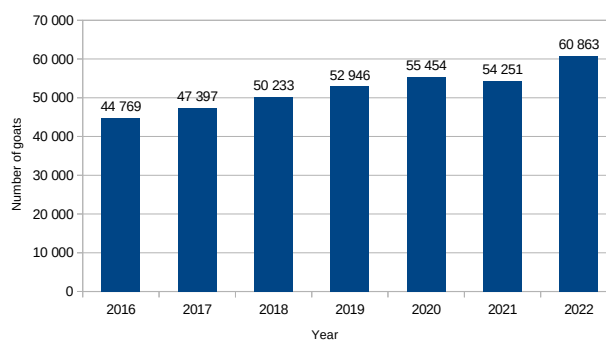
Over the analyzed years 2016–2022, a slow increase in the goat population in Poland was observed. In 2022, highest increase in heads was observed (12 percentage increase) increase in the compared to 2021 (Fig. 2). The increase in the goat population in Poland may be influenced by the growing popularity of agritourism and organic farms, and farmers are willing to breed goats due to their controlled handling, but also due to the possibility of selling products: milk or cheese. On farms, they often rear local breeds: Sandomierska, Kazimierzowska or Carpathian goat, that are well adapted to environmental conditions and are included to animal genetic resources protection program. Breeding of these goats is slowly gaining ground among breeders. The implementation of the programs stimulated the growth of these local breeds and their increasing population [Bojkovski et al. 2015]. The trends observed in Poland are contrary to those observed in European Union, where the goat population decreased from 12.3 million in 2016 to 11.2 million in 2022 [Eurostat 2023]. The goat population experienced the sharpest decline among other farming animals (–9 index points in 2022 compared with 2012) [Eurostat 2023].

Only 1.9% of the world's goat population resides in Europe and unlike to other parts of the world, the European goat sector is linked with milk production and industrial cheese production. The countries with the highest number of goats in the EU are Greece, Spain, Romania, and France (respectively 2.9, 2.5, 1.5, and 1.3 million heads) [Eurostat 2023]. Europe is also the continent with the greatest biological diversity of goats, featuring 187 goat breeds, which constitutes 33% of the recognized goat breeds worldwide, due to the large diversity of ecosystems on this continent [Ruiz Morales et al. 2019].

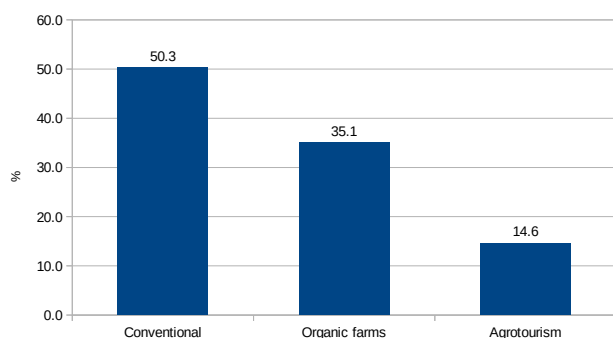
Survey results show that most breeders in Poland (50.3%) have conventional farms, 35.1% organic farms, and 14.6% of respondents have agritourism farms (Fig. 3). In 50.3% of the surveyed farms 10–50 goats were reared, small herds of 1 to 10 females accounted for 45.7%, and in 4% of the herds there were more than 50 females (Fig. 4). According to Sikora and Kawęcka [2015], in 2010 in Poland, most goats were reared in



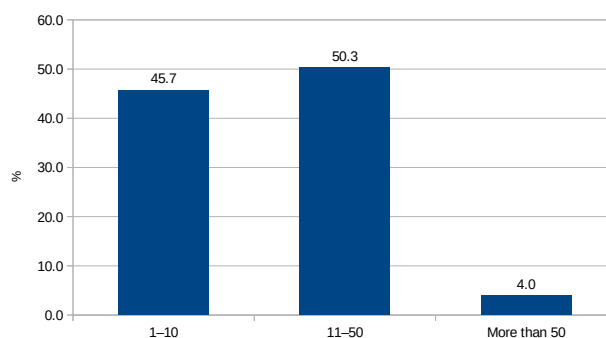
**Fig. 1.** Goat breeder in Poland in 2016–2022 [GUS 2023]



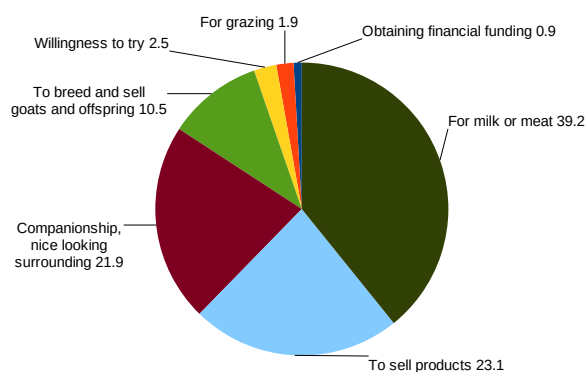
**Fig. 2.** Population of goats in Poland in 2016–2022 [ARiMR 2023]



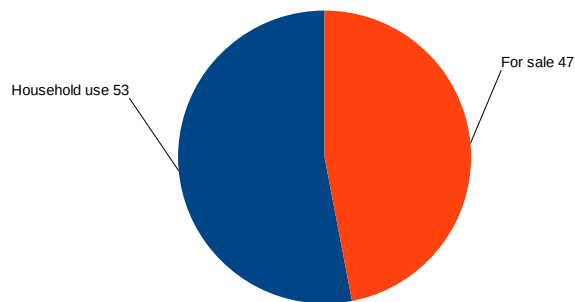
**Fig. 3.** Type of farm (survey results)



**Fig. 4.** Number of goats per farm (survey results)



**Fig. 5.** Reasons for farming goats on the surveyed farms (survey results, %)

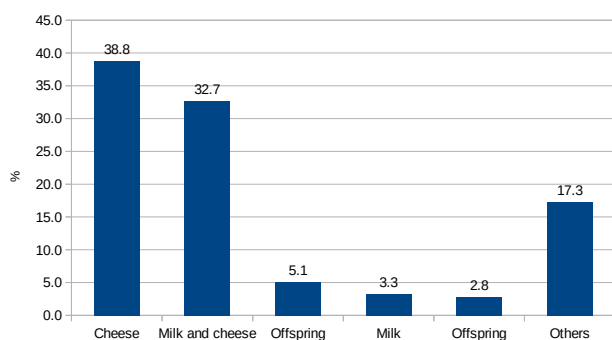


**Fig. 6.** Purpose of the harvested products (survey results, %)

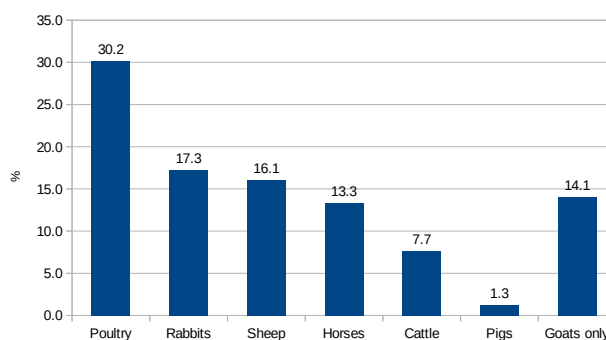
small farms with 1–4 goats, which constituted 81.5% of the total. Farms with 5–9 goats constituted 13.2%, and with larger numbers of goats accounted for only about 5% of all farms. Our survey results indicate a trend toward increasing the number of goats in farms. The dairy goat herds in Europe are larger, ranging from small (36 and 64 goats per farm in Italy and Spain, respectively)

to medium (160 and 190 goats per farm in Greece and France, respectively) [Pulina et al. 2018].

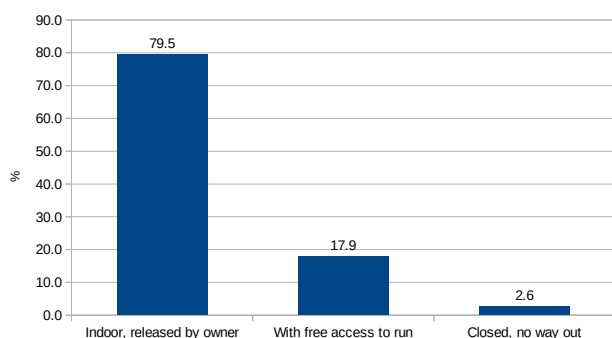
Breeders were also asked about the reasons for keeping goats on their farms (Fig. 5). The main reason among surveyed breeders was the desire to obtain milk/meat (39.2%). Breeders also declared selling products obtained from processed milk (21.9%). Surprisingly often reason was the company of goats and the desire to enhance the



**Fig. 7.** Products sold by farmers participating in the survey (survey results)



**Fig. 8.** Other farm animals present in the surveyed farms (survey results)



**Fig. 9.** Farming system (survey results)

attractiveness of the surroundings by presence goats on the farm (23.1%). This is due to the development of agritourism, and a significant part of the society opts to rest close to nature and seeks contact with animals [Kuźnicka 2017]. Small ruminants are curious, which affects the attractiveness of contact with them and choice for agritourism farms. Moreover, products obtained from small ruminants enable farmers to increase income by selling of products obtained from processed milk, which was equally a common reason for rearing animals. A relatively rare reason, mentioned was the use of animals for grazing to manage green spaces (1.9%). Goats are typical pasture animals, low-maintenance in terms of nutrition, which makes them a model species for green space management. The least common reason breeders declared for keeping goats was to obtain subsidies (0.9%).

Most breeders (53%) use products obtained from goats for their own use, the remaining 47% for sale (Fig. 6). Breeders most often sell cheese (38.8%) or milk and cheese (32.7%), and least often sell only milk (3.3%) and meat (2.8%, Fig. 7). In Greece, only 21% of goat milk is sold to dairy industries, and the most is used for cheese production on farms and mostly are sold directly to consumers [Miller and Lu 2019]. The highest milk yield per goat is obtained in Europe and is almost

four times greater than the average yield worldwide. On the other hand, Europe produces 16% of the world's goat milk but has only 1.3% of the dairy goat population [FAO 2023]. Most European goat milk is processed into cheese in large dairy plants, which coexist with small local industrial plants and artisanal dairy farms. Many types of cheeses are high quality and are covered as protected designation of origin (PDO) such as in France, Spain, Greece, Italy, the Netherlands, and Portugal, and consumers are willing to pay more for these products compared to dairy products obtained from cow's milk [Miller and Lu 2019, Ruiz Morales et al. 2019]. Therefore, the development of Short Food Supply Chains (SFSCs) has gained prominence in recent years, especially for their local characteristics and ecological, environmental and social dimensions. Shortening the FSCs is considered to be more economically, socially and environmentally sustainable therefore increasing the capacity of (short) food supply chains to make changes quickly to adapt to significant changes in the business environment is one of the political priorities of the "Horizon Europe 2021–2027" programme [Thomé et al. 2021].

According to survey results, besides goats, breeders most commonly rear poultry (30.2%), rabbits (17.3%), sheep (16.1%), and horses (13.3%). The least common

in farms with goats are kept pigs (1.2%). In 14.1% of the farms, goats are the only farm animals (Fig. 8). Moreover, the vast majority of farms keep animals indoors, but they are loosed by the owner (79.5%) (Fig. 9). In 17.9% of farms, animals are kept in buildings with the possibility of free exit. Deteriorating profitability causes a reduction or even cessation of intensive goat farming, where concentrated fodder are used. Breeders without permanent, inexpensive pastures are withdrawing from such production [Sikora and Kawęcka 2015]. Therefore, grazing goats on pastures is a good solution to reduce costs. Goats as ruminants show exceptional adaptation to grazing and the management of pasture lands, on which it is difficult to graze other animals. Particularly local breeds, adapted to specific feed bases and environmental conditions [Molik and Garstka 2022]. Additionally, grazing has also taken on an environmental dimension in recent years. Although the respondents declared a relatively small role of goats in grazing (1.9%) in Poland, goats are successfully used to control vegetation in national parks, e.g. Ojców National Park, and landscape parks [Czyłok et al. 2010]. For example, goat grazing conducted in Doñana National Park in southwestern Spain has enabled control of undergrowth vegetation, thereby reducing the risk of fires and increasing the structural diversity and biodiversity of forests [Mancilla-Leytón et al. 2013]. Moreover, the presence of goats on pastures has a positive impact on the environment as it helps maintain the balance between native and invasive species, shaping the landscape [Álvarez-Martínez et al. 2016]. It is worth emphasizing that maintaining goats on pastures instead of in enclosed buildings means that significantly less non-renewable energy is used, for example in the production and transport of fodder, and it also produces fewer greenhouse gas emissions, one of the main challenges covered by the European Union programme “Horizon Europe 2021–2027” [https://data.europa.eu/]. Grazing animals is also considered by society as having a strong, positive, naturalistic, and environmentally friendly image. From a socio-cultural point of view, goat farming helps preserve cultural traditions and ethnological typical products. It also contributes to anchoring the rural population in disadvantaged areas because goat farms are located on 70% of geographically marginal areas, including isolated, remote regions with difficult access.

## CONCLUSION

To sum up, from 2016 a systematic increase in the goat population and the number of breeders in Poland have been observed. These animals are kept mainly to obtain milk or meat, which are slowly becoming more and more popular among consumers. However, it is a species with great potential for use in many other areas, such as the

protection of green areas. Especially since it is characterized by relatively low living and feed requirements.

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## TRENDY W HODOWLI KÓZ W POLSCE I ŚWIADCZONYCH PRZEZ NIE USŁUGACH EKOSYSTEMOWYCH

### STRESZCZENIE

Obecnie kozy świadczą wiele usług ekosystemowych w Europie. W pracy przeanalizowano trendy w hodowli kóz w Polsce na przestrzeni ostatnich lat, a także świadczone przez nie usługi ekosystemowe. Dane uzyskano z ARiMR i GUS. Przeprowadzono ankietę, która umożliwiła zebranie danych bezpośrednio z gospodarstw rolnych. W analizowanych latach od 2016 do 2022 roku zaobserwowano powolny wzrost поголовья kóz w Polsce (wzrost o 36 proc.). W 50,3% badanych gospodarstw utrzymywano 10–50 kóz, małe stada liczące od 1 do 10 samic stanowiły 45,7%, a tylko w 4% stad było więcej niż 50 samic. Wśród usług ekosystemowych wskazanych przez badanych hodowców dostrzeżono usługi w postaci mleka/mięsa pozyskiwanego od kóz, a także produktów z mleka przetworzonego. Częstym powodem hodowli kóz były również usługi kulturalne – ich towarzystwo i chęć podniesienia atrakcyjności otoczenia poprzez swoją obecność. Usługi regulacyjne świadczone przez kozy są marginalnie uznawane przez badanych hodowców.

**Słowa kluczowe:** kozy, populacja kóz w Polsce, usługi ekosystemowe, hodowla kóz, krótkie łańcuchy dostaw żywności