Historical geography of the pastoral system in Samtskhe-Javakheti, Georgia

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ABSTRACT

The Georgian region, Samtskhe-Javakheti, has a long tradition of pastoralism. Our research focused on the study of pastoral agriculture across XVI–XX centuries. The study is based on census documents, which provide information on the number of sheep and their distribution, statistical and modern field-based materials. The research goal was to study the pastoral systems and related socio-economic sectors and analyze their spatial and temporal dimensions. The paper presents thematic maps prepared by the authors, which reflect the state of pastoralism in the sixteenth to twentieth centuries and the present situation. The tabular and cartographic material presented allows to assess the changes that have taken place over a long time and to analyze modern conditions.

1. Introduction

The paper discusses the spatial and temporal aspects of the pastoral economy in the Samtskhe-Javakheti region. Pastoral farming is an important agricultural sector with a long development tradition and represents a "deep structure" (Braudel and Wallerstein 2009) of socio-economic activity. Like in Asia Minor and regions of the Caucasus, pastoralism in Georgia dates back to the Neolithic period, when the domestication of sheep, goats, and cattle entered an active phase (Chessa et al. 2009). The importance of sheep husbandry is high in the local economy and international trade. Sheep exports from Georgia to neighbouring countries repeat traditional trade relations and show a growing trend. The leading importers are Middle East countries (Gabriadze et al. 2019; Kandashvili et al. 2020). The low price of Georgian sheep is one of the attractive factors for exporters. Sheep and related products also serve the local market. In addition to meat and dairy products, wool and leather production was of great importance in the study area.

The economic and political challenges of the late Middle Ages were linked to changes in the natural environment and geopolitical shifts, and military interventions. The study region experienced Ottoman invasions in the 16-19th centuries (Svanidze 1971). The region was also threatened by the so-called "Lekianoba", which meant kidnapping and trafficking in captives (Alimbarashvili 2013). During the Middle Ages, the northern hemisphere was characterized by a drop in annual air temperature that often lasted for decades (Mann 2002; Matthews and Briffa 2005). Cold weather naturally increased the demand for warm clothing and wool production, which became a precondition for the growth of the agro-pastoral system in the study area. The same factor may have been one of the reasons why the number of sheep in Europe and the Middle East increased significantly during the Middle Ages, followed by increasing wool production. Sheep growth for this period is also observed on the Iberian Peninsula (Butzer 1988). In Britain, from the middle of the thirteenth century, there was a significant increase in the role of sheep economy. Thus, swampy areas were also used apart from the existing pastures for grazing (Mate 1987). The number of sheep decreased during the Black Plague pandemic in the mid-fourteenth century, and by the 16th century, its sharp increase was again observed (Oldland 2014). The importance of sheep farming was very high, and in international trade, this sector expanded its area significantly in the Middle Ages. The Caucasus, including the territory of Georgia, where the long tradition of pastoral farming was formed, should not be an exception.

Georgia has different sheep farming forms, including sedentary and transhumance. Samtskhe-Javakheti region has a mixed type, which implies both local sheep farming when pastures are used by local farmers and seasonal use of pastures by pastoralists from other regions of Georgia. This type of mixed sheep-herding has existed for at least several centuries, evidenced by the sixteenth-century census document, The Great Book of Gurjistan Vilayet, which was the primary source of our research. The document prepared by the officials of the Ottoman Empire dates back to 1595. The census had its political and economic preconditions and was carried out to collect taxes related to the expansion of the Ottoman Empire towards the Caucasus (Maisuradze et al. 2020). This description is the earliest and most well-documented source that has reached the present day. Until 1490, Georgia was united as one kingdom, later divided into Kartli, Kakheti and Imereti kingdoms, and Samtskhe-Saatabago. In 1490, the Kingdom Hall in Tbilisi officially confirmed the disintegration of Georgia into the kingdoms mentioned above. No earlier census documents have been preserved for the territory of Georgia, although such descriptive work had to be carried out as the centralized state needed to collect taxes in an orderly manner. The results of the census conducted by the Mongols in 1254 to collect taxes are also lost (Javakhishvili 1982). Foreign officials described the Kingdom of Georgia in 1254, Samtskhe-Saatabago in 1595 and the Kingdom of Kartli in 1728. After the formation of the USSR, another important document was prepared, based on the 1923 census of population and agriculture (Central Division of Statistics 1925). By the resolution of January 5, 1930, the Central Committee of the CPSU set 1933 as the date of complete collectivization of Georgia. This period began transferring most of the property owned by private households to collective farms. The 1923 agricultural census became the base of confiscating land and livestock from private owners and the subsequent commencement of the collectivization process, and unfortunately, this document was used for mass expropriation and infringement of private property. The agricultural censuses of 1254, 1595, 1728 and 1923, on the one hand, served one purpose – collecting monetary taxes from the population. In all these cases, the process was carried out due to the regime established after the external intervention and had no positive outcomes.

The censuses of 1595 and 1923 allowed us to determine the location of the main centres of the pastoral economy and the distribution of pastures by settlements or administrative units. Our interest was in studying the intensity of pastoral farming and the changes that have taken place in the fields related to sheep husbandry, as shown in the census materials. For comparison, we took three periods significantly different from each other, reflecting the changes and trends that have taken place. According to the census results, it was essential to assess the supply of sheep products to the population of Samtskhe-Javakheti, including wool. The analysis showed how vital pastoral farming was for the local population.

2. Study area

Samtskhe-Javakheti is located in the southern part of Georgia and unites six administrative units – Akhaltsikhe, Adigeni, Aspindza, Akhalkalaki, Ninotsminda and Borjomi municipalities. The region's area is about 6.4 thousand square kilometres, and its population comprises 160.5 thousand people (National Statistics Office of Georgia 2022). Part of the territory of modern Samtskhe-Javakheti, namely the gorge of the river Jamjama, a tributary of the river Ktsia, was not included in the so-called Gurjistan
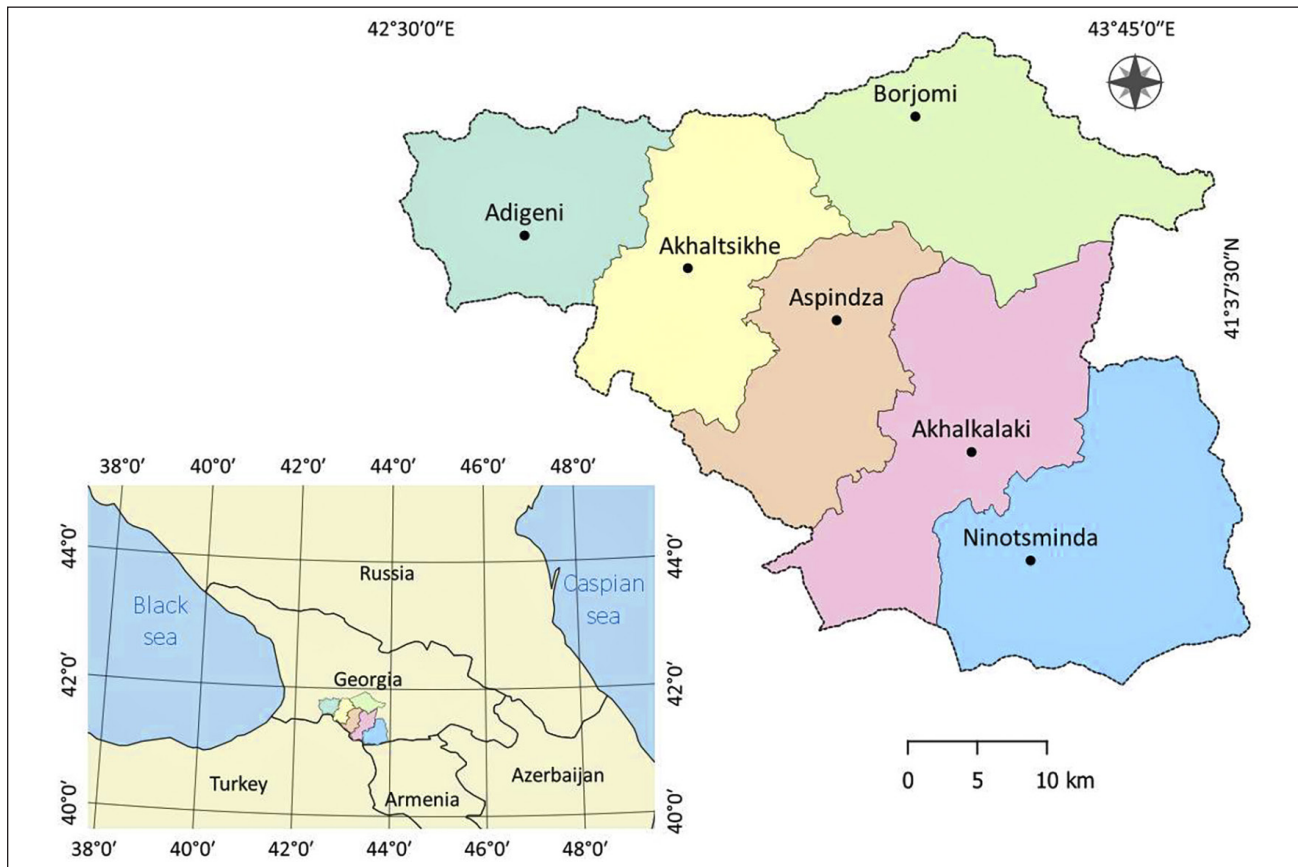

Fig. 1 Study area.
Source: Elaborated by the authors.

Fig. 2 Sheep grazing on Samsari Ridge, Javakheti.
Source: Photo by Roman Maisuradze, 2018.

Vilayet. Another clarification: the village of Kvishkheti, which was included in Gurjistan Vilayet in 1595, today belongs to the Shida Kartli region. Besides, the village Kikibo and the upper reaches of the river Kvabliani are located outside the Samtskhe-Javakheti, which were part of the Gurjistan Vilayet. Samtskhe-Javakheti is a mountainous region. The extreme low point lies near the village of Akhaldaba at about 740 m a.s.l., while the highest point is Mt. Didi Abuli (3301 m a.s.l.) (Maisuradze and Khardziani 2021). The region is characterized by vertical zoning of ecosystems and climate diversity. Quaternary volcanism and its remnants play an important role in landscape formation and different relief forms (Fig. 1).

The following large orographic units are distinguished in the region: 1. The Lesser Caucasus system, including Arsiani, Adjara-Imereti and Trialeti ridges; 2. Akhaltsikhe Valley, the lower and middle reaches of the river Kvabliani, the Mtkvari Gorge in the Atskuri-Aspindza section and the lower reaches of the Uraveli and Potskhovi gorges; 3. Volcanic canyon, Aspindza-Mirashkhani section in Mtkvari gorge and Khertvisi-Akhalkalaki section in Paravanistskali gorge; 4. Volcanic plateaus: in the form of Javakheti, Niali, Fersati, Bakuriani, Borjomi plateaus; 5. Ridges of volcanic origin, with cones and volcanic lakes, in the form of Abul-Samsar and Javakheti ridges (Maisuradze et al. 2021).

3. Materials and methods

3.1 Materials

We used the following materials in the study: 1. The Great Book of Gurjistan Vilayet is a document that describes the condition of the population and agriculture in the study region (Jikia 1941). For settlements, payment was recorded in monetary units (Akhche), although their respective natural units were also indicated, corresponding to the weight/volume of Akhche in the units of weight and volume at that time (Kila, Mani / Batman); 2. The agricultural census of Georgia was conducted in 1923, so-called community sums, where the local population, land fund, crops and livestock are described (Central Division of Statistics 1925); 3. The National Statistics Office conducted the 2004 and 2014 Georgian censuses. However, their differentiation by spatial units is much more general, and in public access documents, they are grouped by the municipalities (National Statistics Office of Georgia 2004, 2014); 4. Large-scale topographic maps were compiled during the Soviet period at a scale of 1 : 25,000, which we used to identify settlements and determine locations; 5. Google Earth satellite imagery (2018–2019); and 6. The sample plots were described during the field trips (2017–2018) to study the types of ecosystems, the main floristic composition, and the pastures' productivity.

3.2 Methods

The study focused on the main types of ecosystems typical in the region and conducted research activities to determine their species composition and grassland productivity (Braun-Blanquet 1932; Schils and Coppejans 2003). We took one square meter as a model plot, on which we determined the species composition and the scale of their coverage. We also summarized the grass cover mass that helped determine phytomass productivity (Beruchashvili 1983). Finally, we mapped the samples from the field and extrapolated the data by landscape units, for which we used a landscape map compiled by us during 2009–2012 at a scale of 1 : 200,000.

Quantitative analysis method: The exact number of sheep is not mentioned in the Great Book of Gurjistan Vilayet in contrast to the mentioned document, the number of sheep in the 1923 census was calculated accurately. The census document of 1595 had another advantage – the description was given according to the settlements. However, the levied taxes were clearly stated, including the taxes on sheep, allowing us to evaluate the number of sheep, which includes the number of sheep raised on both sedentary and seasonal summer pastures. Sedentary – when the sheep were owned by local residents and they were housed on site during the cold period of the year, and seasonal when the sheep were owned by residents of other regions and they were brought here only for summer pastures. The tax levied on one sheep was one Akhcha. The total tax had been levied for both adult sheep and lamb. For sheep grazing on summer pastures from other regions, there was a so-called Yataghi tax. Yataghi was levied on the entire flock. Typically, a flock of sheep consisted of an average of 150–250 sheep (Svanidze 1984).

Therefore, took the arithmetic mean number was applied 200 sheep, as the quantity of a separate flock of sheep. Yataghi tax on one flock comprised 25 Akhche; therefore, we assumed that 25 Akhche were collected on average out of every 200 sheep. For the administrative units, attribute tables were prepared, which included information on sheep by settlements. Finally, the number of local and external sheep was summarized and then compared them by administrative units (Liva, Nahia) they would graze. In addition to the 1595 census, we prepared tables in Exel format to calculate 1923 census spreadsheets and estimate the number of sheep in each administrative unit and their distribution by pastures and local households. The cartographic method involved using large-scale topographic maps and satellite imagery to identify and map the settlements described in the 1595 document. Determining their location was complicated because some settlements no longer exists today (Jikia 1958). We checked their location during the field works in 2017–2018. As a result, determined the location of the settlements on the maps and satellite images, which have disappeared.

Vector layers were created using a geoinformation system. A database was prepared to enter the calculated information according to the imposed tax on sheep. In addition to the large-scale map of administrative units (1 : 25,000), We digitized and created vector layers from satellite images (2018–2019) depicting the distribution of the land fund used for grazing and pasture and divided them into two categories: 1. Pastures suitable for mowing; and 2. Pastures, which were non-suitable for mowing. The second category included lands that could not be used for mowing due to the steep slope and thus were used for extensive husbandry. Based on the census documents (1595, 1923), created maps showing the distribution of pastures by administrative units for two periods, the end of the sixteenth century and the beginning of the twentieth century. In addition, conducted a sheep husbandry analysis according to the administrative units. The maps presented in the article were prepared using the QGIS program. Research also implied a method of comparative analysis that reflects the distribution of sheep and pastures for the sixteenth, twentieth, and twenty-first centuries. Because these are the only documents for the entire region from the few existing census documents that are available. Accordingly, the following has been conducted: 1. Comparative analysis of the structure of the land fund and the provision of population with pastures; 2. Comparative analysis of the sheep and sheep products provision.

4. Results

Of the sites named in the historical source, 644 were settlements, while 29 described units were croplands or hydrographic units. Only part of the described settlements is inhabited today. Many of them are uninhabited, and some of them are extinct and is difficult to determine their location. The settlements were united in administrative units called Nahia, referred to as regions (Jikia 1941). Each Nahia was united into a larger administrative unit, the Liva (Sanjak). There were nineteen Nahias in total, which were united in six Livas. Twenty-two settlements had the status of Castle Rabat (A settlement where residential buildings were located around the fortress), and in addition to them, Vardzia was a town carved into the rock. Besides, Baraleti and Gokia were referred to as small trading type towns. The rest of the settlements were villages, and their surroundings were also used for grazing.

Judging by the sample data taken in the field, the meadow used for grazing should have mixed species composition. Among the species forming meadows, there are formations suitable for feeding sheep.

Sample plot #1: It is located near the village Shalosheti (E 43°11′795″; N 41°26′168″), at 2051 m a.s.l. Dry surface phytomass equals 4.32 t/ha. The distribution of plant formations by tier, height, and projection coverage was tabulated to give a better idea of

which species were the dominant meadow-forming formations to be used as sheep feed (Tab. 1). The field data shows that meadow productivity is close to the average (3.7 t/ha) calculated for highland meadow landscapes from surveys conducted in the last century (Beruchashvili 1995). In addition, the condition of the described meadow is relatively well maintained as cattle grazing is less observed here.

Tab. 1 Meadow species composition by the sample plot #1. Source: Authors' own processing.

Species	Tier	Height (m)
Poa alpina L.	I	1.1
Phleum pratense L.	I	0.9
Trifolium pratense L.	III	0.3
Malva sylvestris L.	IV	0.2
Vicia tenuifolia Roth	II	0.5
Agrostis capillaris L.	II	0.4
Cirsium vulgare (Savi) Ten.	III	0.3
Taraxacum officinale Weber ex Wiggins	III	0.3
Achillea millefolium L.	IV	0.2
Scabiosa bipinnata C. Koch	III	0.3

Sample plot #2: The meadow near Lake Paravani (E 43°50′479″; N 41°26′122″) at 2091 m a.s.l. (Tab. 2). Here, the meadow-forming species are almost evenly distributed, and the floristic composition is relatively poor. As a result, the productivity of the meadow in this plot was lower than the average – 2.1 t/ha.

Tab. 2 Meadow species composition by the sample plot #2. Source: Authors' own processing.

Species	Tier	Height (m)
Trifolium pratense L.	I	0.3
Ranunculus repens L.	I	0.3
Potentilla recta L.	I	0.3
Achillea millefolium L.	II	0.2

The number of plants common in Samtskhe-Javakheti is relatively high and includes 1652 species (Shetekauri and Chelidze 2016). These include formations that are suitable for feeding sheep. Therefore, sheep husbandry in the region should have a good precondition. The total area of pastures exceeds 2.5 thousand square kilometres, which is about 40% of the study area. Our study does not cover forest landscapes because the forest area was not used for sheep grazing newer.

In order to assess the areas used for pasture at the end of the sixteenth century, we summarized the meadow areas. These areas were consistent with the data mentioned in the census document, which showed the tax imposed on sheep and goats. Research results showed that the pastures were quite unequally distributed across administrative units of that time (Tab. 3).

Tab. 3 Pasture areas in Samtskhe-Javakheti according to the administrative units as of 1595. Source: Authors' own processing.

Liva (Sanjaq)	Pastures suitable for mowing (ha)	Pastures non-suitable for mowing (ha)	Total (ha)
Akhaltsikhe	28,621.44	50,484.08	79,105.52
Kertvisi	23,469.84	19,877.62	43,347.46
Akhalkalaki	64,405.07	38,917.17	103,322.25
Childiri	11,397.99	4,004.64	15,402.63
Fotskhovi	1,859.34	1,095.98	2,955.32
Petre	5,422.81	7,191.85	12,614.66
Total	**135,176.50**	**121571.34**	**256,747.83**

As shown from the table above (Tab. 3), Akhalkalaki Liva is primarily distinguished by pastures. However, among the internal administrative units, Akhalkalaki Nahia stands out, meaning better pasture provision (Fig. 3).

The number of sheep in Akhalkalaki Nahia, distinguished by its grazing area, is high. However, it should be noted that the Tqe-Javakheti district is almost equal in quantity to Akhalkalaki (Fig. 4). Apart from them, Chacharaki, Khertvisi, Atsquri and Ude regions were distinguished by sheep numbers, and Aspindza district was slightly behind them. It is noteworthy that both local and external sheep grazed here, which means there was no lack of grazing land in these areas, and the locals allowed flocks brought from other regions to graze here. If we observe the numbers of external sheep, Chacharaki and Tqe-Javakheti regions were in the foreground. The same indicator is also high for Akhalkalaki, Khertvisi and Atskuri regions. The numbers of local sheep still distinguish Akhalkalaki Nahia, but it is notable that Ude and Tqe-Javakheti regions do not lag far behind. Today's Borjomi gorge, which mainly occupies the area of former Petre Liva, lags far behind other administrative units in the number of sheep. Moreover, sheep were not observed in Kashveti Nahia.

Although the number of sheep was high, the pastures could handle the pressure from grazing, indicating that sheep husbandry in the region was relatively stable. On land used for grazing suitable for mowing, the average pressure was 0.66 sheep per hectare, and on land used only for grazing, this indicator comprised 1.4 sheep per hectare. In the pasture category, which was suitable for mowing, the average number of sheep per hectare was 0.93. As for the total amount, there were 1.97 sheep per hectare, which means that the pressure on the pasture was not high in the region. This fact indicates the following: no shortage of pastures was observed in the region and a relatively low pressure allowed them to avoid pasture degradation.
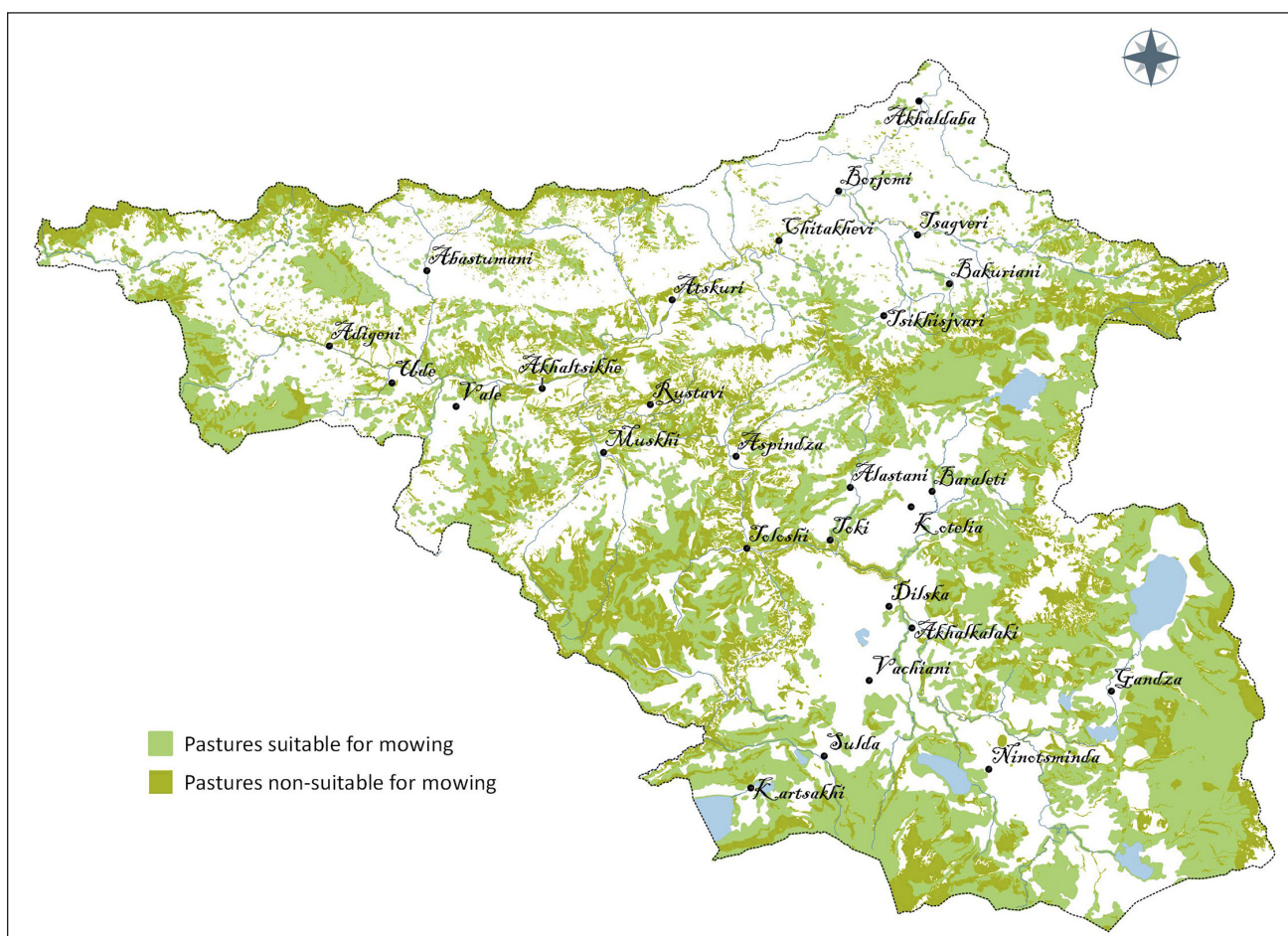

Legend:
Pastures suitable for mowing
Pastures non-suitable for mowing

Fig. 3 Samtskhe-Javakheti pastures.
Source: Elaborated by the authors.

The sheep per hectare varied between 2.5 and 4 in Atsquri, Chrdili (Potskhovi Liva), Ude, Khertvisi and Tqe-Javakheti regions. The territory of Khertvisi is characterized by steep, rocky slopes, where the grass of the mountain steppe and meadow is spread, and the slopes must have been under relatively high pressure. According to local narratives, the lack of forest and shrubs on the slopes could be not excessively grazed but fires during the wars across the fifteenth-sixteenth century were common. In the Atsquri area, where landslides are frequent and slope are dominated by soft rocks, washed slopes should be partly the result of sheep grazing. In addition to grazing, deforestation, fires, and other events that frequently altered the landscape were common (Maisuradze et al. 2018). In addition, the effect of the mountain valley climate is observed in the Atsquri district, which is manifested in increased dryness and hot, dry summers.

From the second half of the sixteenth century until 1829, most of the territory of Samtskhe-Javakheti was part of the Ottoman Empire and became a place of military confrontations. From the seventeenth century, the kings of Kartli were able to return the Borjomi gorge to the village of Dviri and made part of the Kingdom of Kartli again (Makalatia 1957). After that, a detailed census to collect the taxes is not confirmed. A census document was made for only some part of Samtskhe-Javakheti in 1728, and this section was incorporated in the so-called Tiflisi Vilayet in 1723. In particular, only Petre Liva entered the Tiflisi Vilayet from the territory of Samtskhe-Javakheti, while the rest remained part of Akhaltsikhe Eyalet. However, the Tiflisi Vilayet existed for only twelve years (1723–1735), and this document was less used in governance.

In the 1923 census, the amount of sheep was described with high accuracy. Community farms were to become the basis of collective farms. The territorial arrangement was based on the administrative division of 1897, which united the administrative units – the so-called Mazra and their communities. The territory of Samtskhe-Javakheti united three Mazras, twenty-five communities and three self-governing towns. Part of the territorial units was united in Akhalkalaki and Akhaltsikhe Mazra, while six communities and one self-governing town in the Borjomi gorge were united in Gori Mazra. Sheep farming was still practised in the region. However, unlike the second half of the sixteenth century, the population changed, the ethnic and religious structure and the spatial distribution also varied.

The number of sheep has decreased in the seventeenth-nineteenth centuries, significantly compared to

A

Number of local sheep (1595)
- 0 - 500
- 500 - 1000
- 1000 - 5000
- 5000 - 10000
- 10000 - 20000
- 20000 - 25000

B

Number of lataghi/external sheep (1595)
- 0 - 500
- 500 - 1000
- 1000 - 5000
- 5000 - 10000
- 10000 - 15000

C

Number of sheep (1923)
- 0 - 500
- 500 - 1000
- 1000 - 5000
- 5000 - 10000
- 10000 - 15000
- 15000 - 20000

Administrative division

A and B. Nahias in 1595: 1. Mzvare; 2. Chrdili (part of Akhaltsikhe); 3. Ude; 4. Kvabliani; 5. Atskuri; 6. Altunkala; 7. Otskhe; 8. Aspindza; 9. Chacharaki; 10. Khertvisi; 11. Tke Javakheti; 12. Buzmareti; 13. Akhalkalaki; 14. Tmogvi; 15. Nialiskuri; 16. Kanarbeli; 17. Chrdili (part of Potskhovi); 18. Petre; 19. Kashveti; 20. Kashveti (part of modern Shida kartli); 21. Ude (part of modern Adjara); 22. Kvabliani (part of modern Adjara); 23. Samtske-Javakheti (which was not part of Vilayet).

C. Communities in 1923: 1. Alastani; 2. Baraleti; 3. Gorelovo; 4. Diltska; 5. Estia; 6. Kondura; 7. Kulikami; 8. Okami; 9. Satkhe; 10. Khertvisi; 11. Akhalkalaki town; 12. Adigeni; 13. Atskuri; 14. Vale; 15. Varkhani; 16. Idumala; 17. Klde; 18. Lepisi; 19. Ude; 20. Uraveli; 21. Akhaltsikhe town; 22. Akhaldaba; 23. Bakuriani; 24. Borjomi; 25. Borjomi town; 26. Gujareti valley; 27. Dviri; 28. Tsagveri.
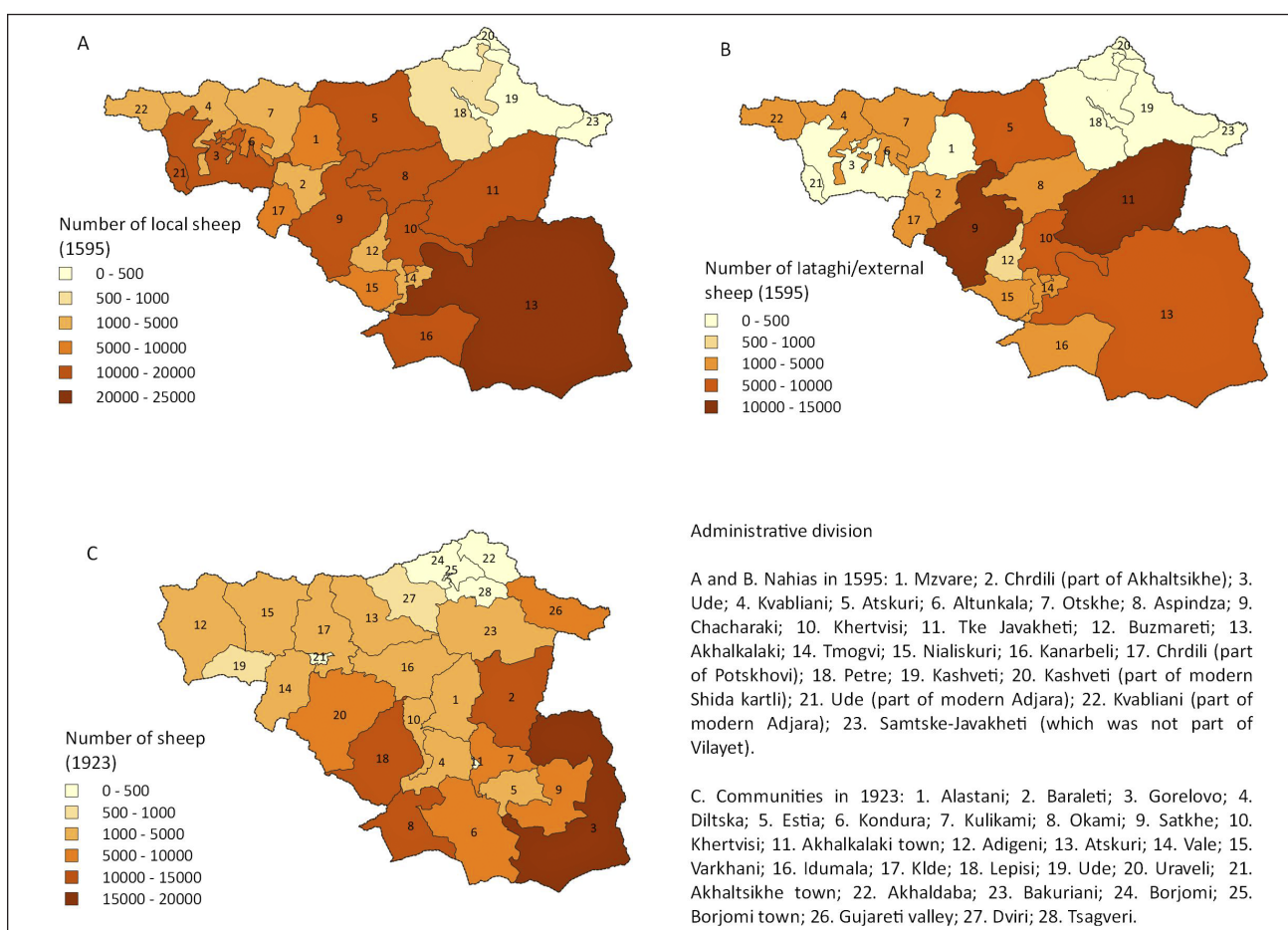
Fig. 4 Number of sheep by administrative units, state of 1595 and 1923. Source: Elaborated by the authors.

the second half of the sixteenth century. The number of local sheep is reduced by 26.73%, indicating that sheep farming has lost its position as an agricultural sector. At the end of the sixteenth century, the number of sheep in the territory of present-day Borjomi Municipality and the south-eastern part of the Javakheti Plateau was meagre, which changed at the beginning of the twentieth century. This indicates that herding was not recorded due to depopulation, and after the population returned here, they again started grazing sheep. The table below (Tab. 4) allows to understand pastoralism at the beginning of the twentieth century; Namely, sheep number, their distribution by communities, and the pressure on the pastures.

Amid the decline in the total sheep number in the entire study area, its number in the territory of Borjomi Municipality has almost doubled. Furthermore, in the Khanjali-Madatapa section, shepherding has regained its role, and the Gorelovo community is most distinctive in this respect. The role of sheep farming in the Samtskhe Valley has reduced; not even a third of the sheep are left compared to the 1595 census. The pressure on the pasture is further reduced. It should be noted that, unlike the 1595 census, while calculating the pressure on pastures, we could not consider the number of external sheep, as they were recorded within the region where their owners lived permanently. However, pressure on pastures is reduced here, especially in the Adigeni-Varkhani section, where pastures were busiest in the second half of the sixteenth century (Tab. 5).

Gorelovo community were located in the upper course of the river Paravani and was distinguished by pastures suitable for mowing. Gorelovo grasslands accounted for two-thirds of the pastureland within the entire Mazra (Fig. 5 B.), while pasture non-suitable for mowing more occupied a quarter of the Akhalkalaki Mazra and 13.6% of the whole study area (Fig. 5 C). Pasturelands (Fig. 5 B.) with more than 1000 ha had only four communities, three united in Akhalkalaki Mazra and covered the Javakheti plateau

area. Apart from them, only the Bakuriani community owned more than 1000 ha of the same category pastures, including Bakuriani, Tsikhisjvari, Tori plateaus and Trialeti ridge. The second category of pastures (Fig. 5 C), in total, based on the GIS layer, is evident that, apart from Gorelovo, only three communities owned more than 20,000 hectares of pastures: Kondura, Lepis and Uraveli. The pastures of more than 10,000 ha were owned by three communities in the Akhalkalaki Mazra, two communities in the Akhaltsikhe Mazra and two communities in the Gori Mazra. In Gori Mazra (Borjomi district), more than 10000 ha of pasture lands were owned by Gujareti and Bakuriani communities, using gazing land on the Tori-Tsikhisjvari-Bakuriani-Mitarbi plateaus and summer pastures of Trialeti ridge. The Tsagveri, Akhaldaba and Borjomi communities, and the Akhaltsikhe, had a minimal pasture area. The towns of Borjomi and Akhalkalaki did not had own pastures at all. The pastures of the Akhaltsikhe Mazra communities was bordered by, on the one hand, the Arsiani ridge, on the other hand, the Fersati plateau, the highland zone of the Adjara-Imereti ridge and the slopes of the Trialeti ridge, which is characterized by highland pastures.

The number of sheep in the study area increased significantly during the Soviet period. However, a declining trend began again in the 1990s. As a result, sheep number dropped to 85,000 at the 2004 census. This trend continued into the following period.

As can be seen (Tab. 6), a decreasing trend is observed everywhere except for Ninotsminda and Borjomi municipalities. The reasons for the reduction are as follows: difficult conditions for sheep care, which is directly related to infrastructural malfunctions: Roads, necessary resting areas for sheep on trails, drinking water, facilities for washing and grooming sheep, wool and care facilities and equipment for the processing and difficult living or working conditions for shepherds. Massive sheep disease and frequent predator (Wolf, lynx, Jackal) attacks have not been reported, but

Tab. 4 Number of sheep and pressure on pastures on the territory of Samtskhe-Javakheti in 1923. Source: Authors' own processing.

Mazra/Administrative unit	Sheep number	Sheep per ha of pasture suitable for mowing	Sheep per ha of pasture non-suitable for mowing
Akhalkalaki	69,941	4.32	0.60
Akhaltsikhe	38,242	19.60	0.39
Gori (Modern Borjomi municipality)	9,382	4.51	0.37
Total	**117,565**	**5.82**	**1.36**

Tab. 5 Pasture areas in Samtskhe-Javakheti (ha) by communities and regions (1923 census). Source: Authors' own processing.

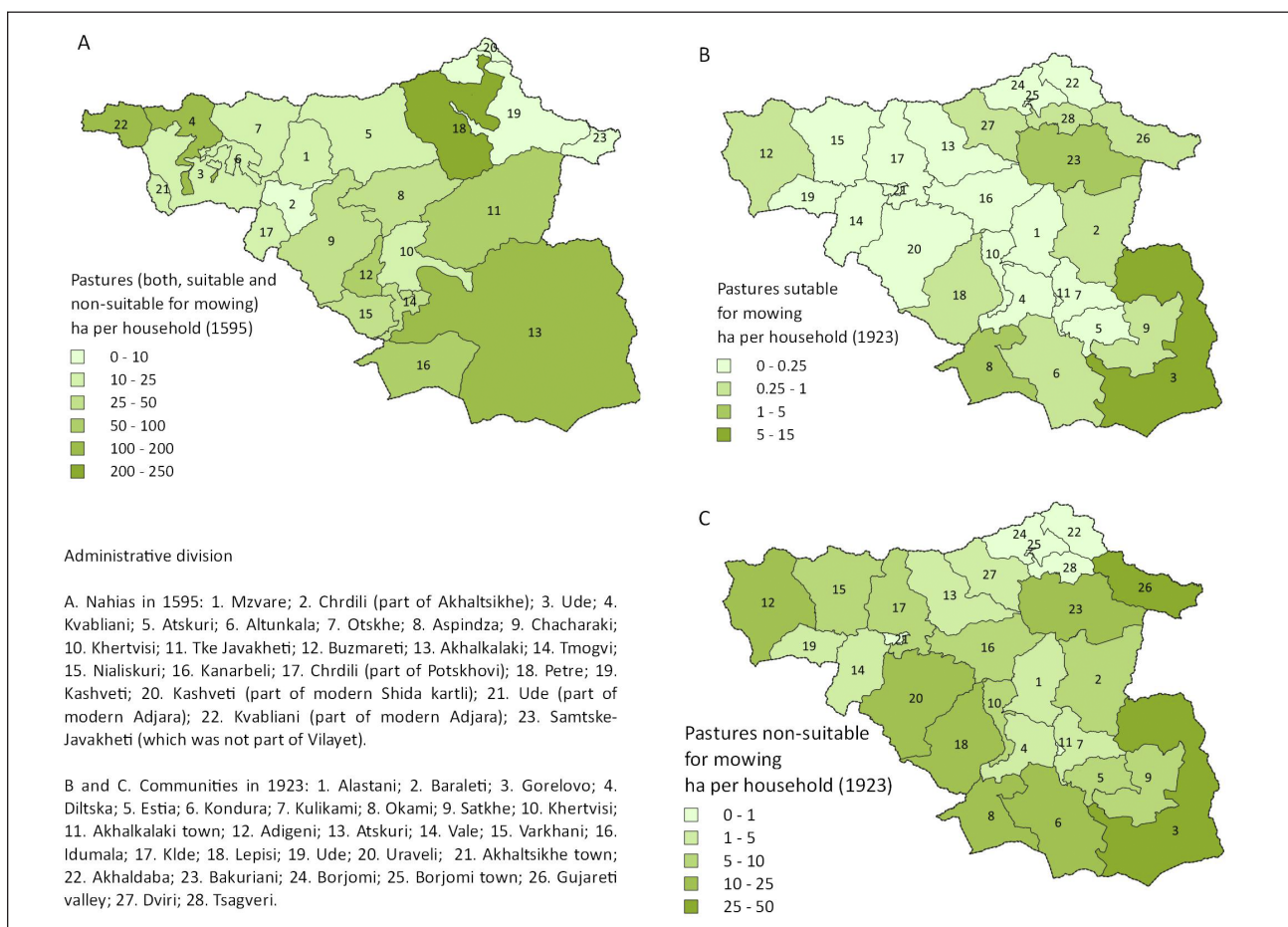| Mazra/Administrative unit	Pastures (ha)/ Census data	Pastures suitable for mowing (ha)/GIS-based calculations	Pastures non-suitable for mowing (ha)/GIS-based calculations
Akhalkalaki	16,173.92	86,948.88	45,735.76
Akhaltsikhe	1,951.31	36,417.75	63,389.02
Gori (Modern Borjomi municipality)	2,078.92	11,207.28	16,064.09
Total	**20204.15**	**134,573.90**	**125,188.87**

Fig. 5 Pastures per household, as of 1595 and 1923.
Source: Elaborated by the authors.

shepherds talk a lot about the problematic conditions of keeping sheep. In addition, the problem is that the price of mutton is relatively low in the local market. Demand for local leather and wool is also negligible. In the region and the country, the lack of leather and wool processing production and demand for the products harms the sector. The case could not be improved either by the start of sheep exports to Middle Eastern countries, as sheep husbandry could not take the form appropriate to modern standards. Consequently, the problem is not with the lack of pastures but with the malfunction of the sector in general.

Tab. 6 Number of sheep in Samtskhe-Javakheti region, according to the administrative municipalities based on the 2004 and 2014 censuses. Source: Authors' own processing.

Municipality	Number of Sheep	
	2004	2014
Adigeni	2,324	1,262
Aspindza	13,008	5,402
Akhalkalaki	27,718	16,694
Akhaltsikhe	4 343	3,675
Borjomi	4,365	8,116
Ninotsminda	30,577	32,250
Total/Samtskhe-Javakheti	**82,335**	**67,399**

In the second half of the sixteenth century, the population of modern Samtskhe-Javakheti was smaller than it is today. The small population distinguished Petre Liva, respectively Petre and Kashveti districts. This area covers most of the territory of present-day Borjomi Municipality, and the reason for its depopulation should have been increased war and forced migration.

If sheep farming had not been profitable, it would not have had such intensity in the region, although it required a lot of hard work and care. So it is evident that not all families pursued sheep farming, or some pursued it more for meat and wool than for dairy products. Nevertheless, on average, each family owned more than 25 sheep. Since not everyone followed sheep breeding, this figure is averaged over the population and is still high.

Sheep farming was pursued with little intensity in the Chrdili and Otskhe districts, where each family owned less than ten sheep. Therefore, a relatively small number of sheep is indicated in the Mzvare Nahia. This must be explained on the one hand by the extended forest cover of the Otskhe Nahia. But, in addition, in the Mzvare and Chrdili Nahias, grain crops, viticulture and fruit growing were relatively large, and consequently, pastures covered smaller areas. When we compared the number of sheep in

these Nahias to the pasture area per household. It was found that the pasture area here was smaller per household than in regions with high sheep numbers. In Tmogvi, Chacharaki, Chrdili (Potskhovi), Khertvisi, Ude, Nialisquri and Kanarbeli regions, the number of sheep per household was close to the average of the study area. It should also be noted that the population in Petre Liva and Kvabliani region was significantly reduced. There was also a large share of abandoned villages in the Buzmareti region. Consequently, these districts have a high rate of pastures per household at the expense of the small population size.

Buzmareti was the most distinguished by the number of sheep per household. This can be explained by the fact that highland meadows distinguish Buzmareti, it is rich in pastures, and the area is focused on livestock, including sheep farming. Therefore, the rate per capita is relatively high in the Akhalkalaki district, where the provision of pastures is high. However, the number of sheep per household in the Akhalkalaki is lower than in the Tqe-Javakheti, where the climatic and relief conditions were identical. It is also noteworthy that the Akhalkalaki is almost three times more provided with pastures than the Tqe-Javakheti. This seemingly strange difference must have been caused by the following fact: Akhalkalaki, at first glance, was characterized by a relatively high population – 605 households. There were many deserted villages here and in the Tqe-Javakheti, but in one part of Akhalkalaki Nahia, the lands around Khanjali-Madatapa Lake were wholly deserted, and the settlements located here were abandoned decades before the census.

Keeping sheep was quite difficult. However, in the second half of the sixteenth century, sheep farming was an important sector in the economy and activities of the region. It was also interesting to know how the development trend of this ancient agricultural sector run and what path it took in the following centuries.

By 1923 census, compared to the second half of the sixteenth century, the population increased significantly and, consequently, pasture use intensity (sheep/area) should have been higher. On the contrary, sheep number decreased, and the number of sheep per capita was less than at the end of the sixteenth century. This indicator was twice as high in Akhalkalaki Mazra as Gori and Akhaltsikhe. At the expanse of the number of sheep in Akhalkalaki Mazra, sheep per household was high for the entire study region. At the same time, the average data in Akhaltsikhe and Gori regions were almost equal and a little behind the average of the whole region. The communities of Gorelovo and Gujareti had an exceptionally high rate of sheep per household, which can be explained by the fact that the land fund in these communities was used more as grazing land than arable. The number of sheep per household is also high in Okami and Lepisi communities due to the abundance of highland pastures, and the Javakheti and Erusheti plateaus were in the best condition in this regard. The picture is similar in terms of pasture provision. Per household, it seems that there are two peaks in the cases of Gorelovo and
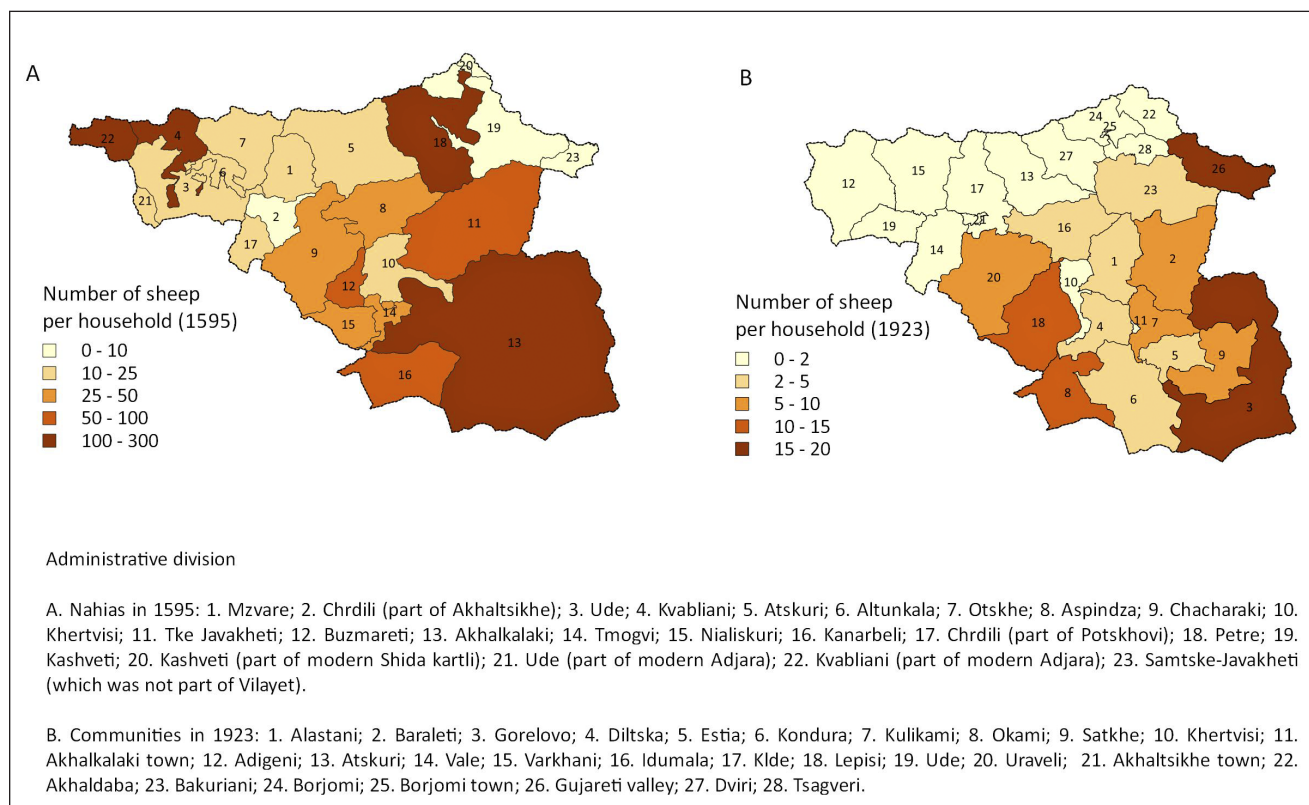

Administrative division

A. Nahias in 1595: 1. Mzvare; 2. Chrdili (part of Akhaltsikhe); 3. Ude; 4. Kvabliani; 5. Atskuri; 6. Altunkala; 7. Otskhe; 8. Aspindza; 9. Chacharaki; 10. Khertvisi; 11. Tke Javakheti; 12. Buzmareti; 13. Akhalkalaki; 14. Tmogvi; 15. Nialiskuri; 16. Kanarbeli; 17. Chrdili (part of Potskhovi); 18. Petre; 19. Kashveti; 20. Kashveti (part of modern Shida kartli); 21. Ude (part of modern Adjara); 22. Kvabliani (part of modern Adjara); 23. Samtske-Javakheti (which was not part of Vilayet).

B. Communities in 1923: 1. Alastani; 2. Baraleti; 3. Gorelovo; 4. Diltska; 5. Estia; 6. Kondura; 7. Kulikami; 8. Okami; 9. Satkhe; 10. Khertvisi; 11. Akhalkalaki town; 12. Adigeni; 13. Atskuri; 14. Vale; 15. Varkhani; 16. Idumala; 17. Klde; 18. Lepisi; 19. Ude; 20. Uraveli; 21. Akhaltsikhe town; 22. Akhaldaba; 23. Bakuriani; 24. Borjomi; 25. Borjomi town; 26. Gujareti valley; 27. Dviri; 28. Tsagveri.

Fig. 6 The number of sheep per household. Comparison of the 1595 and 1923 conditions.
Source: Elaborated by the authors.

Gujarati communities. The communities of Bakuriani, Uraveli and Lepisi are also distinguished by the high rate of pastures per household and the communities of Adigeni, Okami, and Kondura repeated similar patterns. Some communities, such as Dilska, Ude, Tsaghveri and Akhaldaba, experienced significant shortages in pastures due to various reasons. Dilska, as in the case of Ude, included mainly arable lands within the boundaries of the community. Tsaghveri and Akhaldaba communities were characterized by an abundance of forested areas with little land suitable for grazing.

Gorelovo community had 13.2 ha of pasture per household, which means that the residents of the upper part of the Paravanistsqali River and the surroundings of Paravani Lake were much better provided with grazing land than the residents of other communities. The provision of pasture to the population of the Borjomi was almost equal to the average. At the same time, one household in Akhaltsikhe Mazra received nearly five times less pasture land than the average for the region. This can be explained by the fact that most of the lands in Akhaltsikhe Mazra were used as arable, and it had a much larger population than the communities in Gori, Borjomi.

The decrease in the number of sheep was probably due to changes in the population's livelihood and economic factors. Samtskhe-Javakheti region during the Soviet period was not considered an important region in terms of wool production. The Soviet economy was characterized by a centralized character, which denied the development of local, relatively less productive but quality products. Furthermore, the mountains of southern Georgia did not occupy large areas against the background of other territories of the USSR, where a vast number of sheep were raised on collective farms. It was impossible to set up farms
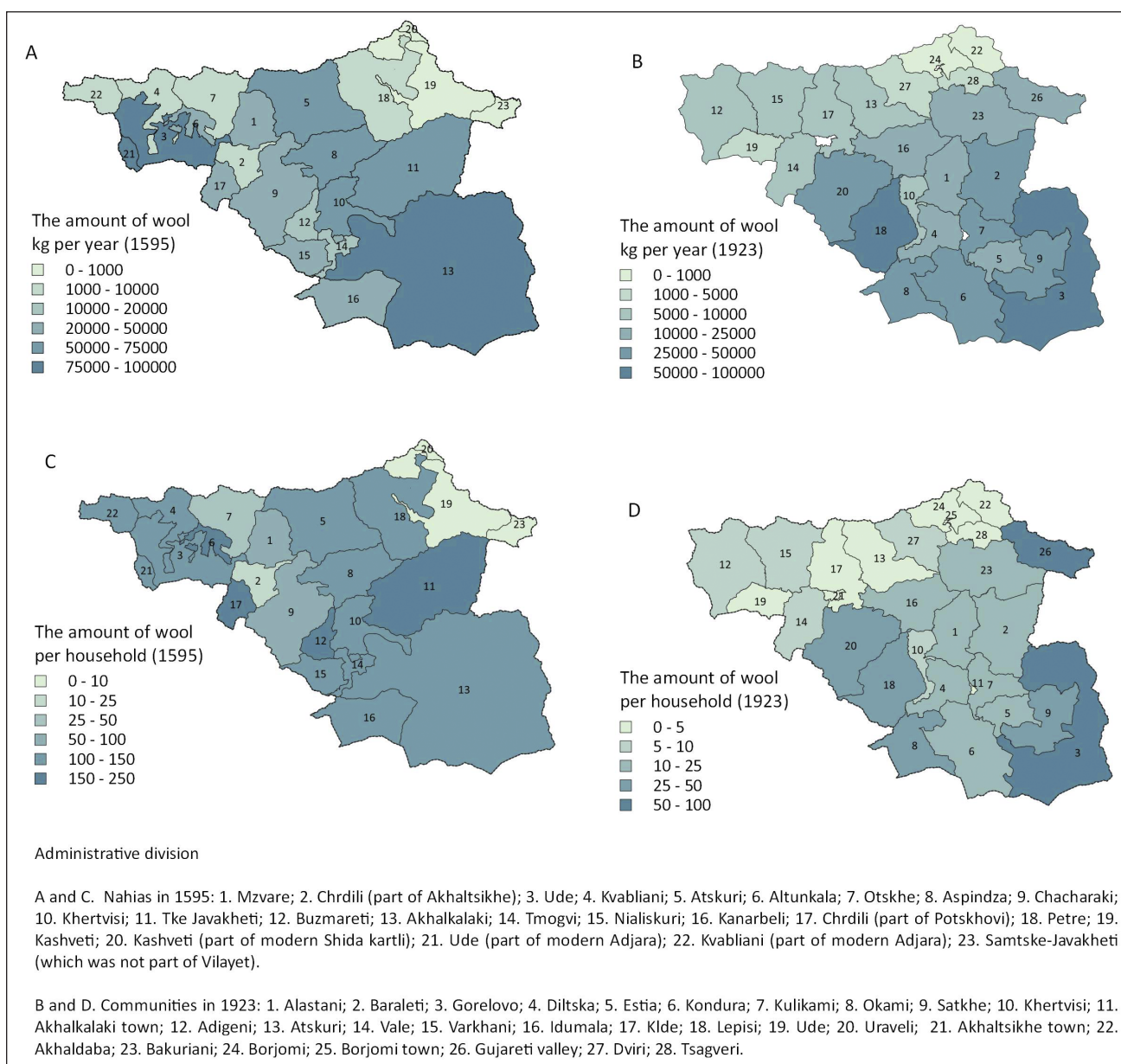

Administrative division

A and C. Nahias in 1595: 1. Mzvare; 2. Chrdili (part of Akhaltsikhe); 3. Ude; 4. Kvabliani; 5. Atskuri; 6. Altunkala; 7. Otskhe; 8. Aspindza; 9. Chacharaki; 10. Khertvisi; 11. Tke Javakheti; 12. Buzmareti; 13. Akhalkalaki; 14. Tmogvi; 15. Nialiskuri; 16. Kanarbeli; 17. Chrdili (part of Potskhovi); 18. Petre; 19. Kashveti; 20. Kashveti (part of modern Shida kartli); 21. Ude (part of modern Adjara); 22. Kvabliani (part of modern Adjara); 23. Samtske-Javakheti (which was not part of Vilayet).

B and D. Communities in 1923: 1. Alastani; 2. Baraleti; 3. Gorelovo; 4. Diltska; 5. Estia; 6. Kondura; 7. Kulikami; 8. Okami; 9. Satkhe; 10. Khertvisi; 11. Akhalkalaki town; 12. Adigeni; 13. Atskuri; 14. Vale; 15. Varkhani; 16. Idumala; 17. Klde; 18. Lepisi; 19. Ude; 20. Uraveli; 21. Akhaltsikhe town; 22. Akhaldaba; 23. Bakuriani; 24. Borjomi; 25. Borjomi town; 26. Gujareti valley; 27. Dviri; 28. Tsagveri.

Fig. 7 The amount of wool in total and per household. Comparison of the 1595 and 1923 conditions. Source: Elaborated by the authors.

that would combine tens of thousands of sheep into one farm and could not accommodate several million sheep in one space. Therefore, Georgian sheep breeds, such as Georgian semi-coarse, Imeretian and Tushetian sheep, were not considered competitive in wool production. Consequently, there was an established opinion about the wool product here that it was only suitable for producing poor quality shawls (Fig. 6, Fig. 7).

The total amount of wool collected in the region in 1595 was several thousand tons, and its amount was exceptionally high in the cooler areas, where there would be greater demand for warm clothing. As for the amount of wool produced per household, the areas with a cool climate were also distinguished here, where a kind of orientation towards the production of shawls is especially noticeable. For example, Buzmareti is characterized by highland settlements. Most of the villages in the 16th century were located above 2000 m, as well as the Tqe-Javakheti and Akhalkalaki districts. Altunkala (Golden castle), is an exception in this respect. However, the location of Altunkala itself and the roads passing through it provided an additional opportunity for better sales of sheep and wool.

By the beginning of the twentieth century, the situation had changed somewhat. The amount of wool produced by 1923 was reduced by almost one and a half times. The amount of produced wool per household here was reduced by about seven times, indicating that the interest in the production of shawl and maud has decreased. The decrease in the Samtskhe basin is even more noticeable. For example, at the end of the sixteenth century, more than 195 kilograms of wool per household were produced in the Altunkala region, at the beginning of the twentieth century in Adigeni and Varkhani bordering Altunkala, it was 6–7 kilograms in total. The population was mainly concentrated in the villages, the number of towns was small, and besides, the textile industry and manufactories were not developed here. Only the required amount of wool was produced for domestic consumption.

At present, wool is produced in small quantities only for domestic consumption. The list of products obtained is currently much more minor, mainly used for mattresses and blankets. Rarely used to spin yarn, this is done mainly by middle-aged women who weave by hand and use a local product for knitted garments. Pastoral farming is undergoing significant changes around the world. Technologies are evolving, the industry is becoming more knowledge-intensive, and it is intertwined with many contiguous areas, as competitive product reception and the well-being of citizens involved in the sheep industry are linked to maintaining a high level of industrial technology. The problem of the development of pastoralism in the study region is the issue because sheep breeding is maintained in sharply primitive forms. There are no wool enterprises in the region, including even small ones, which will develop shale products under modern standards and try to establish themselves in the market. Shepherds conditions and pastoralism infrastructure are poor. These and other reasons affect the weakening of local wool production, which does not positively impact pastoralism. However pastoralism here has a very high potential and could become an economically successful branch in case of support.

5. Conclusion

Pastoral farming is a traditional field in the study area. Its development during the Middle Ages was related to the demands of the local production and trade market. By the end of the sixteenth century, the field was well developed, and the role of the sheep in the economy was significant. From the second half of the sixteenth century, the population began to migrate to other regions of Georgia. Due to the difficult geopolitical situation, the role of towns was weakened, and the production of wool, which was one of the essential areas of capital accumulation in the late Middle Ages, could not find ways of development here. In the nineteenth century, the population increased, but the role of towns and the importance of manufacturing did not increase. As a result, sheep farming became an less important agricultural sector solely to meet domestic needs. Consequently, the number of sheep decreased, and its importance in the local economy gradually diminished. During the Soviet period, the number of sheep here increased. The region, however, was not considered a primary sheep-breeding zone, and the focus here was on potato growing, which stemmed from a planned economy. During the Soviet era, the focus was on mobile pastoralism, for which the lower reaches of the Mtkvari and the Kizlar Valley in the North Caucasus which is located in the Russian Federation, were used as winter pastures, which is currently inaccessible due to its location in another state. After gaining Georgia independence, the number of sheep began to decrease gradually. Production efficiency became a problem, which was manifested both in the production of wool and leather and dairy products. Difficulties were created in production technologies and in meeting the market standard, which is a necessary prerequisite for establishment in the international market. The problem of infrastructure development still remains an unresolved issue. Because the infrastructure necessary for housing, hygienic-sanitary and processingis still unorganized. Currently, Georgian sheep are of interest mainly to Middle Eastern countries. In the case of support, proper funding and governance, the sector's importance will increase and positively impact the local economy. It is necessary to consider the centuries-old pressure on the pastures to promote the development of pastoralism. However, it is essential to improve pasture quality and maintain productivity in the long run.

Acknowledgements

References

Alimbarashvili, I. (2013): "Lekianoba" and military-defensive system of Kartl-Kakheti kingdom from the XVIII century to the 30s of XIX century. PhD thesis, Tbilisi. (In Georgian.)

Beruchashvili, N. (1983): Landscape-geophysical research methods and mapping of natural-territorial complexes. Tbilisi. (In Russian.)

Beruchashvili, N. (1995): Caucasus: Landscapes, Models, Experiments. Tbilisi. Tbilisi University Press. (In Russian.)

Braudel, F., Wallerstein, I. (2009): History and the social sciences: the longue durée, Review. Fernand Braudel Center.

Braun-Blanquet, J. (1932): Plant Sociology: The Study of Plant Communities. New York. McGraw-Hill book Company.

Butzer, K. W. (1988): Cattle and sheep from Old to New Spain. Historical antecedents. Annals of the Association of American Geographers 78(1), 29–56, https://doi.org/10.1111/j.1467-8306.1988.tb00190.x.

Central Division of Statistics (1925): Agricultural Census of Georgia in 1923: community sums. part I. Tbilisi. (In Georgian.)

Chessa, B., Pereira, F., Arnaud, F., Amorim, A., Goyache, F., Mainland, I., Kao, R. R. et al. (2009): Revealing the history of sheep domestication using retrovirus integrations. Science 324 (5926), 532–536, https://doi.org/10.1126/science.1170587.

Gabriadze, I., Beradze, R., Zabakhidze, M. (2019): Analysis of the Agricultural Sector in Georgia: Value Chain and Export Potential. Policy and Management Consulting Group, http://hdl.handle.net/11540/11309. (In Georgian.)

Javakhishvili, I. (1982): Essays in Twelve Volumes, Volume III. Tbilisi. Tbilisi University Press.

Jikia, S. (1941): Great Defter of Gurjistan Vilayet, part II. Tbilisi. Publishing House of the Georgian Academy of Sciences of Soviet Socialist Republic of Georgia. (In Georgian.)

Jikia, S. (1958): Great Defter of Gurjistan Vilayet, part III. Tbilisi. Publishing House of the Georgian Academy of Sciences of Soviet Socialist Republic of Georgia. (In Georgian.)

Kandashvili, T., Kochlamazashvili, L., Koblianidze, T. (2020): Trade and economic relations between Georgia and Iran. Innovative Economics and Management 7(1), 46–51, https://doi.org/10.46361/2449-2604.7.1.2020.46-51. (In Georgian.)

Maisuradze, R., Elizbarashvili, M., Khardziani, T., Tatishvili, M. (2018): Landscapes of Samtskhe-Javakheti region, transformation degree and forms. International Multidisciplinary Scientific GeoConference: SGEM 18, 487–494, https://doi.org/10.5593/sgem2018/5.1/S20.063.

Maisuradze, R., Khardziani, T. (2021): Hidden Geographies of the Sixteenth Century Road Network and Trade in Georgia's Portion of the Silk Road. In Hidden Geographies. Springer, Cham, https://doi.org/10.1007/978-3-030-74590-5_10.

Maisuradze, R., Khardziani, T., Eradze, T. (2020): Retrospective mapping of the XVI century Samtskhe-Javakheti viticulture and fruit farming. Miscellanea Geographica 24(1), 5–15, https://doi.org/10.2478/mgrsd-2019-0027.

Maisuradze, R., Khardziani, T., Eradze, T. (2021): Landscapes, Settlements and Traditional Housing in Samtskhe-Javakheti, Georgia. Quaestiones Geographicae 40(1), 85–95, https://doi.org/10.2478/quageo-2021-0007.

Makalatia, S. (1957): Borjomi Valley. Tbilisi. Sakhelgami. (In Georgian.)

Mann, M. E. (2002): Little ice age. Encyclopedia of Global Environmental Change 1, 504–509.

Mate, M. (1987): Pastoral farming in south-east England in the fifteenth century. Economic History Review 40(4), 523–536, https://doi.org/10.2307/2596391.

Matthews, J. A., Briffa, K. R. (2005): The 'Little Ice Age': re-evaluation of an evolving concept. Geografiska Annaler: Series A, Physical Geography 87(1), 17–36, https://doi.org/10.1111/j.0435-3676.2005.00242.x.

National Statistics Office of Georgia (2004): Census of the Republic of Georgia. Tbilisi.

National Statistics Office of Georgia (2014): Census of the Republic of Georgia. Tbilisi.

National Statistics Office of Georgia (2022): Statistical information about Samtskhe-Javakheti region, https://www.geostat.ge/regions/ [Accessed 14/02/2022].

Oldland, J. (2014): Wool and cloth production in late medieval and early Tudor England. Economic History Review 67(1), 25–47, https://doi.org/10.1111/1468-0289.12024.

Schils, T., Coppejans, E. (2003): Spatial variation in subtidal plant communities around the Socotra Archipelago and their biogeographic affinities within the Indian Ocean. Marine Ecology Progress Series 251, 103–114, https://doi.org/10.3354/meps251103.

Shetekauri, Sh., Chelidze, D. (2016): High mountain flora of Meskheti and Javakheti (Lesser Caucasus). Tbilisi. Saari. (In Georgian.)

Svanidze, M. (1971): From the history of Georgian-Ottoman relations in XVI–XVII centuries. Tbilisi. Metsniereba (In Georgian.)

Svanidze, M. (1984): Agriculture of South-West Georgia in the XVI century. Tbilisi. Metsniereba. (In Georgian.)