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SUSTAINABILITY OF EXTENSIVE SHEEP FARMING PRACTICES: PASTORALISM AND TRADITIONAL USE OF MEDICINAL PLANTS, CASE STUDY ON THE MĂRGINIMEA SIBIULUI AREA, ROMANIA

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ABSTRACT

The main purpose of the paper is to highlight the millennial tradition of large-scale sheep husbandry in Romania (transhumance practices from the past) by adapting technologies, to preserve this extensive system, even nowadays. The second aim of the paper is to identify the medicinal plants used by shepherds as part of extensive sheep farming. The phytogeographical resources underlying the development of the pastoral landscape are natural pastures and hayfields. Their floristic composition includes numerous plant species with a beneficial role for the health and wellbeing of sheep. The research was conducted in the "Mărginimea Sibiului" area (Sibiu County), Romania, in the period 2016-2020. The employed methodology is complex and it is based, on the one hand, on the study and analysis of bibliographic resources and, on the other hand, on site visits to representative pastoral villages and interviews with shepherds who practised transhumance in the past. Data was collected from local and national authorities. Classical or traditional transhumance represents the seasonal movement of shepherds with sheep herds from the mountains to the plains in the autumn (from the 1st of October to the 1st of April) and back, in the spring, until the end of summer. It involves the movement of large herds (generally between 500 and 2000 head) of Ţurcana breed sheep, over distances between 100 and 500 km. The commute between the mountains and the plains is necessary in order to make efficient use of all available forage resources. The findings include the following: the number of sheep in Romania varied from 18,000 thousand head in 1985, to 14,062 thousand head in 1990, with the lowest value in 2001 (7,251 thousand head). After Romania joined the EU, the number increased, reaching 10,281 thousand head in 2020 (16.8% of the EU population). The distribution of sheep breeds in the country is the consequence of the shepherds' long-term experience, being closely related to the landscape conditions and the pedoclimatic characteristics. In the areas with large herds of sheep, pastoral villages were formed, grouped into 4 main centres, as well as centres derived from them (in the south-eastern part of the country, namely Dobrogea, and in counties located in the western area). Regarding the use of medicinal plants from the spontaneous flora for animals, it can be stated that the literature cites 49 plant species identified in the area. Of these, only 33 plant species, belonging to 21 families, are used on sheep breeds.

Key words: extensive farming, sheep husbandry, traditions, transhumance.
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INTRODUCTION

Pastoralism is a topical issue, being particular especially for disadvantaged and mountainous areas. In this type of area, pastoralism represents the best sustainable development strategy, providing food, income, and jobs (FAO, 2015). Recently, interest has been renewed in understanding the interactions between traditional practices and the ecology of pastoral habitats. These aspects are being analysed as possible strategies for conservation and management of biodiversity, habitats, and cultural landscapes (Zogib Liza *et al.,* 2014). Skapetas B. and Kalaitzidou M. (2017) and Narayan G.H. (2019) showed that the world number of sheep in 2013 was 1,172,833,190 head, a 10.7% increase compared to the figure recorded in 2000 (1,059,082,358 head). The distribution of sheep across continents in the same year was as follows: Asia (44.9%), Africa (27.7%), Oceania (9.07), Europe (11.1%), EU 28 (8.32%), and America (7.24%).

In 2020, the number of sheep and goats farmed in the EU was 75 million head. For all livestock, EU registered an 8.9% decrease compared to 2000. Spain held 24.8 % of EU's sheep and the second largest sheep populations in EU were in Romania (16.8%) (European Commission, 2021). According to Eurostat data, in 2020, Romania is the second sheep meat producer in the EU (6,300,000 slaughtered head) which represents 17% (Eurostat, 2022). The value added in the agricultural sector as a percent of GDP in 2020 in Romania was

3.8%. Form the 10.3 million farms existing at EU level, 33.3 % are in Romania, where one in five persons was employed in agriculture (European Commission, 2021). The ratio of dairy and meet sheep varies greatly among EU countries and UK. As indicated by the data of an international project, Romania is the country with the most sheep used for milk, followed by Italy (SheepNet, 2019).

Although the use of medicinal and aromatic plants in sheep farming is very old, studies on this topic have been scarce. Romanians have a wide-ranging experience in the various uses of plants: treatment of animal diseases, enhancing milk production, or use as spices for local foods. Throughout history, the plant kingdom has been the livelihood of mankind, so it is no wonder that it has entered people's minds. It thus became an important part of folklore. A multitude of herbal products used in folk medicine has been observed and learned from animals. For instance, people have noticed that animals do not eat toxic plants; also, in case of an illness, they only eat certain plants. The spectrum of the Romanian geographical relief generated great plant diversity. Mention is made of 20,000 species, of which about 25% are included in the heritage of folk medicines.

The great botanists of the ancient period, including Dioscorides, who inspired Pliny the Elder in writing his encyclopaedia, state, with regard to the species found in the Carpathian-Danubian-Pontic area, that "67 were known to Dacians. Of these, 43 species are found as medicinal plants used by the Romanian people" (Drăgulescu, 2012). Platon, in his dialogue "Charmides and the Saving of Wisdom" is of the opinion that treatment should be viewed holistically, meaning that the whole, and not only the affected organ, must be treated (Platon, 2015). Some botanists believe that folk botany combines "empirical knowledge with magical, mythical, ritual, artistic and ceremonial elements" (Drăgulescu, 1992). The ethnobotanical factor with its entire content characterizes a community, it delineates and separates national cultures. It is inherited from generation to generation, with the power to prove a nation's ancient character and sense of belonging on the territory where it lives. The aim of the paper is to highlight the millennial tradition of sheep husbandry in an extensive system in Romania. Whereas past traditional practices involved a wide-scale transhumant herders' system, nowadays farming technologies have been adapted, while maintaining the extensive system. Also, the identification of the medicinal plants used by shepherds in the extensive husbandry of sheep was pursued.

MATERIALS AND METHODS

The paper is the result of a scientific research conducted in the Sibiu area, Romania, in the period 2016-2020. A complex methodology was used, based on the one hand on the study and analysis of various bibliographic resources and, on the other hand, site visits were conducted in representative pastoral villages such as Poiana Sibiului and Tilișca. Special attention was paid to data collection from local authorities and interviews with shepherds who practised transhumance.

The main goals pursued in the interviews were: the description of the routes used for transhumance, the farming technology, the organization of the shepherds' life. Classical or traditional transhumance represents the seasonal movement of shepherds with sheep herds, from the mountains to the plains in the autumn (from the 1st of October to the 1st of April the 1st) and back, in the spring, until the end of summer. It involves the movement of large herds (generally between 500 and 2000 head) of Țurcana breed sheep, over distances between 100 and 500 km. The commute between the mountains and the plains is necessary to make efficient use of all available forage resources. The Țurcana breed is characterized by its large size, special resistance to long trips, on rugged terrain, in various weather, humidity, and climate conditions. The sheep have long, thick wool, fluffy and rough.

Statistical data was collected from the National Institute of Statistics in Bucharest and from the Sibiu County Directorate for Agriculture. In order to learn the dynamics of the sheep herds, the data regarding their evolution in Romania and in Sibiu County (the "Mărginimea Sibiului" area) in the period 1985-2019 was processed and analysed statistically. Papers on pastoralism, transhumance, sheep farming, and folk botany were also analysed. The phytogeographical resources underlying the development of the pastoral landscape are natural pastures and hayfields. Their floristic composition includes numerous plant species with a beneficial role for the sheep's health and wellbeing. The medicinal and aromatic plants used for the treatment of sheep, as indicated in the literature and as described in interviews with breeders, were identified. In drawing up the list of medicinal plants underlying the local ethnoiatry, the information collected from the field was considered (Antonie, 2017), to which information from specialized literature was added (Pop, 1982; Drăgulescu, 1992, 2012, 2015).

RESULTS AND DISCUSSION

Sheep husbandry in Romania: Romania has a millennial tradition regarding sheep farming. The main breeds of sheep that are grown are Țurcana, Țigaia, Merinos de Palas, and the Transylvanian Merinos. Their distribution throughout the country is the consequence of the breeders' comprehensive experience, so capitalizing on growing traditions can maximize the technical and economic performance achieved (Dărăban, 2013; Pădeanu, 2016).

The pedo-climatic characteristics and the great variety of landforms in Romania required the application of sheep breeding technologies adapted to the area. The employed growth systems have had economic, administrative, cultural, and demographic effects over time. Thus, an extensive transhumant growth system resulted. Romania's agricultural area in 2014 was 14,630,072 ha, of which 9,395,303 ha was arable (64.20%), and 4,828,411 ha was made up of pastures and hayfields (33%). The high percentage of pastures and hayfields is the basis for capitalizing on the grass cover with the help of ruminants, mainly sheep. The extensively transhumant sheep breeding system is considered economical. It does not require high input for the construction of shelters or feed production, and it leads to the enhancement of the biological potential of the species. The Țurcana sheep breed is suitable for hilly and mountainous areas, while the Merino breeds are adapted to lowland areas.

In Romania, transhumance reached its peak in the first half of the 19th century, followed by a continuous decline due to the expansion of agriculture and the partial ownership of farmers in 1864. As a result, some sheep farmers turned to other occupations: agricultural, industrial, banking, commercial, and transport activities. After the Second World War, until the fall of the communist regime, shepherds continued to raise sheep. Starting from 1990, with the return of the lands to the owners and with the law imposing conditions for practising the transhumance system, the sheep farmers with large herds moved to western counties or to the south-east, namely Dobrogea. Sheep breeding and exploitation in Romania is currently an important sector of the national economy. In 2020, with a herd of 10,281 thousand sheep, Romania ranks second in EU27, after Spain. This number represents 73,11% of the number existing in 1990 (14,062 thousand head). The evolution of sheep herds in Romania, between 1990-2020 is presented in Figure 1.

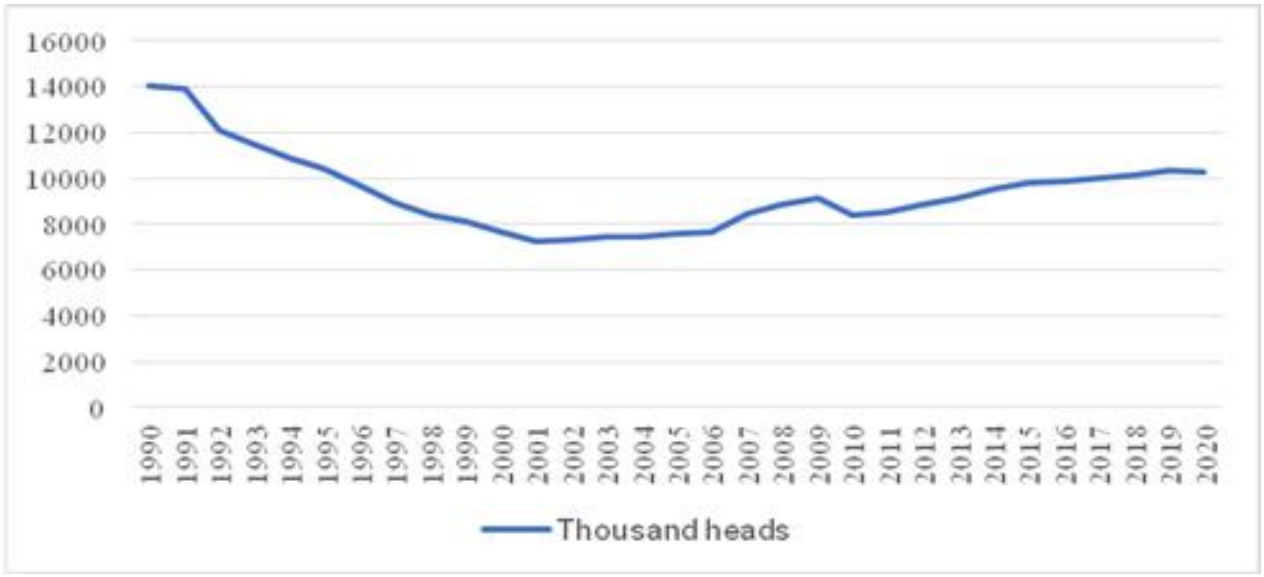

Figure 1 The evolution of sheep in Romania between 1990-2019 (data processed after Dărăban 2013; Stanciu *et al.* 2012b; Popescu, 2017; European Commission, 2018; information from National Institute of Statistics Bucharest, Tempo online, Retrieved March, 2022)

Data on the numerical evolution of sheep is provided in the literature, which indicates a herd of 10,087 thousand head in 1938. Between 1938 and 1982, the number of sheep in Romania increased by over 7,000 thousand heads, especially due to the increase in the number of sheep with fine and semi-fine wool. The number of sheep in Romania in 1982 was 17,288 thousand head. The lowest number of sheep exploited nationally over the past 30 years was seen in 2001 (7,251 thousand head). The tradition of sheep farming, the love of the Romanian breeder towards this species and the growing demand for meat on the European and world market have led to the revival of this sector. The number of sheep and goats per 100 ha of land varied, in the period 1990-2019, from 106.3 head in 1990 to 89.1 head in 2019, with a minimum of 57.3 head in 2000.

The issue of pastoralism and transhumance at the national level has been studied in the past, but it gives rise to research in various fields of science even today, as evidenced by Juler Caroline in her article published in 2014 (Juler, 2014). Currently, sheep breeders are organized in associations because they face problems related to the market, subsidies, lack of productive breeds, etc. If they want to survive on the European

market in this sector, breeders need to find quick solutions. Despite all the issues raised, there are still breeders who have achieved performance, both by breeding in purebred, but also by crossing the Țurcana and Țigaie sheep with rams of the German black-headed meat breed. The purpose of such crosses was to improve meat production performance and carcass quality. Shepherding is a simple lifestyle in Romania, closely related to nature. It includes raising animals, moving herds in search of food resources, and a calendar specific for shepherds' communities. Romanian transhumance took place in about the same areas of the country or in Europe, where the traces left are still visible, especially externally. In his research, Andrei Măgureanu marked the pastoral space and drew "innumerable sheep paths" on maps (Măgureanu, 2007).

The classification of pastoral types in Romania: The classification of pastoral types among Romanians is based on several criteria: the type and economic level of pastoral villages; the way sheep owners are associated or not; the shepherding stages and periods; the size and typology of the human group that participates, during the summer, in raising sheep in the sheepfold; categories of animals and their number; the type of sheepfold; milk and cheese weighing and distribution system; milk processing modalities; the magnitude of the shepherd. Specialized literature groups the villages famous for practicing transhumance into 4 centres: the "Mărginimea Sibiului" area, with 18 localities, the Bran area, with 10 localities, the Săcele-Brașov area, with 7 localities, and the Covasna area, with 3 to 5 transhumant villages. Two other centres derive from these: Vaideeni (Vâlcea County) and Vojvodina (Serbian Banat). Some shepherds from the above centres settled along their transhumance routes and caused the emergence of new centres in Dobrogea, in the south-eastern part of the country (Tulcea, Hârșova, and Cernavodă) (Matley, 1970; Drăgănescu, 1997, 1998; Dărăban, 2013; Mathe-Kiss, 2017; Pădeanu, 2016). The pastoral space included the homestead and the border of the villages, the area of the hayfields with huts, the mountains themselves, with alpine sheepfolds and the sheep routes between these points or between them and the remote transhumance areas. (Cărătuș-Stanciu, 2018). The issues pertaining to sheep breeders were tackled in the magazine "Sheepfold" published in Sibiu in the period 1934-1938. During the course of its five-year publication, the magazine responded to the current concerns of shepherd. Numerous articles brought to attention the issue of milk processing, its hygiene, the place used for cheese processing and storage, and the capitalization thereof. The magazine emphasized the need to set up schools for the sons of shepherds, as well as "demonstrative sheepfolds" (Sheepfold, 1934-1938).

Sheep breeding in Sibiu County and in the" Mărginimea Sibiului" area: Sheep farming in Sibiu County is a traditional activity, derived from the shepherds' love of sheep. The traditional practises of extensive breeding of this species have led to the emergence of activities related to the processing of the resulting products (cheeses, handicrafts) in this area (Stanciu and Todericiu, 2012a; Stanciu *et al.*, 2012b). Sibiu County has an agricultural area of 307,974 ha, of which the arable area is 116,276 ha (38%), natural pastures total 107,126 ha (35%), and natural hayfields 75,724 ha (25%). This structure of the agricultural area shows that the pastures and hayfields represent approx. 60% of the agricultural area, hence their use by ruminants, especially sheep. The data from Figure 2 shows the upward trend of sheep herds at county level, from 2000 to 2015. In 2020, the total number of sheep in Sibiu County was 548,166 head.

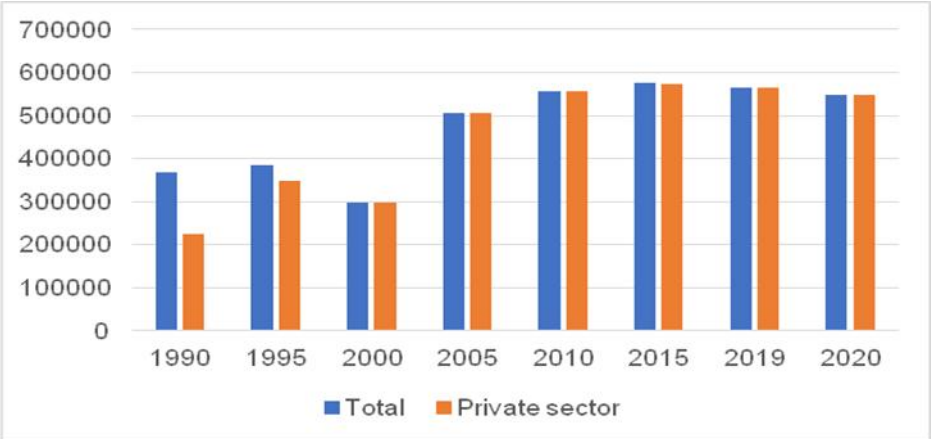

Figure 2 Evolution of the total number of sheep and form households in Sibiu County between 1990-2020 (head) (Source: processing based on National Institute of Statistics, Bucharest, Romania data Tempo online, Retrieved March, 2022, from http://statistici.insse.ro:8077/tempo-online/#/pages/tables/insse-table).

The research area – ”Mărginimea Sibiului”: The ”Mărginimea Sibiului” area is presented in Figure 3 and it is recognized as a pastoral area located in the mountainous area of Sibiu County, consisting of a chain made up of 18 settlements, with an area of about 1335 km^2 and belonging to 12 territorial administrative units.

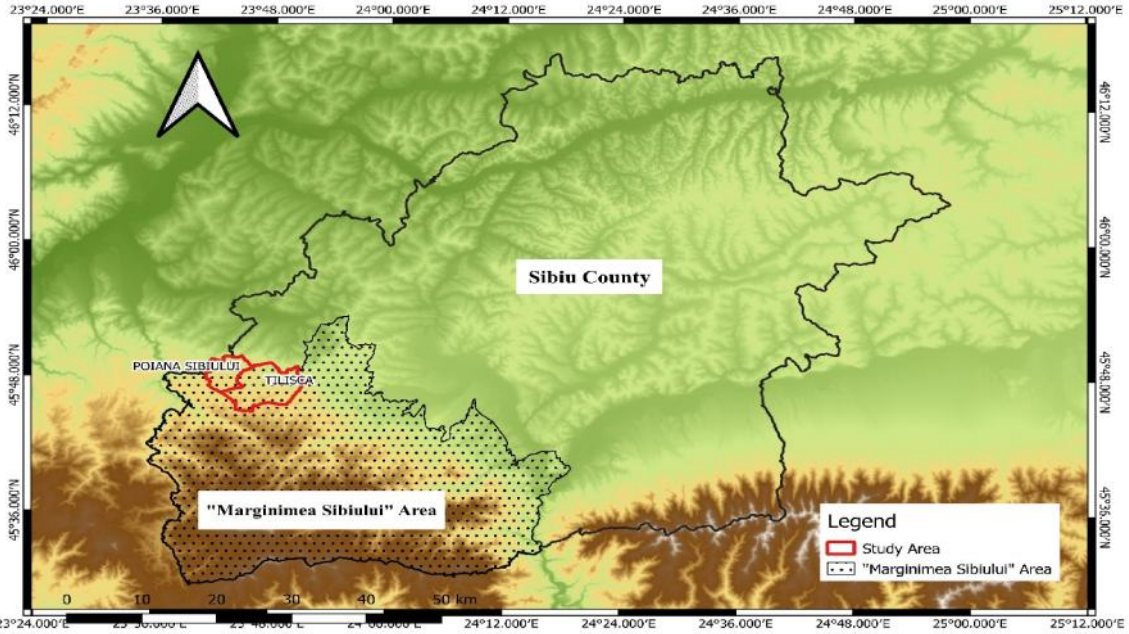

Figure 3 ”Mărginimea Sibiului” Area (Sibiu County, Romania), and settlements with the shepherd interviewed (source: own design)

The agricultural use of the land in the ”Mărginimea Sibiului” area is characterized mainly by pastures and hayfields, which make up a share of about 80%, resulting in their pastoral use and in the pastoral function of local communities (Bratu, 2019). The breeders from the pastoral villages from ”Mărginimea Sibiului” (Poiana Sibiului, Jina, Tilișca, Rod, Rășinari) used to practise transhumance in Romania and abroad. There were workshops in the area, which processed the products resulting from the exploitation of sheep. In the past 30 years, the economy of pastoral villages in ”Mărginimea Sibiului” is based on animal husbandry, forestry and, more recently, on rural tourism and agrotourism, promoting sustainable rural development. Local events, such as fairs and festivals, are organized in the localities of the area, some of them having reached over 50 editions: “Up on the Jina Mountain”, “Shepherds' Festival from Tilișca”, “Cheese and Brandy Festival” from Rășinari, “Peony Festival” from Gura Râului, and “Poienarilor Festival” at Poiana Sibiului. The Sibiu County Tourism Association proposes a tourist circuit called “Cheese Road“ in this area (County Tourism Association Sibiu).

Results regarding experience from transhumance and the use of medicinal plants for treating sheep, obtained from interviews with sheep breeders who practised transhumance in Poiana Sibiului and Tilișca localities, Sibiu County: The interviewed breeders are: Vulcan Constantin, age 91, and brothers Muntean Ioan and Muntean Dumitru, both over 80 years old, and, in 2018, the breeder Bunea Vasile, from Tilișca commune, Sibiu County. *Vulcan Constantin* has a wealth of experience in raising sheep, an activity he practised from the age of 11 to the age of 84. During his activity, he travelled for transhumance to Balchik, in the Quadrate (following the route Poiana Sibiului, Sibiu, Rucăr, Cheia, Ploiești, Dobrogea, Balchik). For about 2 months, the sheep grazed the remains left after harvesting the cabbage during the day, and at night they were led to the forest, where they grazed a mixture of green grass and dry grass. Along the way, the shepherds transported pots, corn, and water with the help of donkeys. The size of the herd left for transhumance was around 700 sheep, 4 donkeys, 7-8 guard dogs, led by 3 shepherds. The shepherds' food was polenta, cheese, and pastrami. The pastrami was obtained by deboning mutton meat, seasoning it with salt and garlic, rolled and dried in the sun. Communication with the family left at home was achieved through telegrams. The owners of the sheep met with the shepherds in the stations to supply them with food. After wintering in Balchik, they rented land or islets with an area between 100-200 ha from the boyars in the area. Lambing started late, after March 1, so that the lambs could benefit of green grass on the way back home. Rams were sold in

spring, when they returned from transhumance. Weaning occurred in June, when they reached the mountain. When organizing the improvised sheepfolds, the breeders built a pen for 1000 sheep with a milking lathe. The sheepfold always had a room for storing the resulted products and a room for sheep owners. For the preparation of cheese, they used lamb or veal rennet. It was salted, dried, chopped, kneaded, and strained. Milk had to be cold at the time of curdling to prevent the cheese from fermenting.

The curd was stored in special pantries, on shelves, where it was left to rise for 3-4 days. The fermented curd was ground, kneaded, and placed in the bladder or sheep's stomach, and its weight could reach 40-50 kg. The cheese was then given to the merchants for sale. The milk from the end of the lactation was made into "clabbered milk", a product specific to the mountain area. The milk was boiled for 30-60 minutes in almost full cans, then poured into wooden barrels. The wool production obtained from a sheep reached 4-5 kg / head. From a herd of 1000 sheep, between 4000 and 5000 kg of wool is sold. The wool was sold in Azuga (Prahova County) to specialized merchants, after it was previously soaked, washed in the lake with "lye". The breeder stated that before the Second World War the number of sheep existing in the commune of Poiana Sibiului amounted to 250,000 head. The breeder said that he was also a "shepherd" for many years in Balta Brăilei, in Chilia. During Lent, it was customary for shepherds to fast. Before it began, all the vessels were boiled with lye, so that the shepherds did not get sick. The traditional sponge cake was eaten at Easter and Christmas and was called "ostrich". The symbiosis of the shepherd from autumn to summer was represented by 25 sheep, which he marked and knew were his. In autumn, when the shepherds received, left for transhumance, they were given traditional Romanian clothes, which they did not change until the following spring. The shepherd's costume was represented by a shirt, traditional trousers, coats, traditional shoes, and woven socks.

Woven blankets were placed on donkeys, over which the saddle was placed. An essential element in the life of shepherds was the wooden bat, which was considered a weapon. Another transhumance journey he took was to Bessarabia. The return route to the house was travelled in approx. 13 weeks, as follows: Bessarabia, Buzau, Ploiesti, Cheia, Brasov, Sibiu. On the way back, they were often surprised by snow and blizzard. If this was the case, the sheep were in constant motion so the herd would not be covered by snow. The herdsmen who moved with their herds to Banat returned to the village in May. The breeder owned a house in Banat area, in Sân Petru, for 16 years, from where he sold cheese in Timișoara, Reșița, Turnu Severin. About his peers, he states that "shepherds are special, troubled people who have faced many difficult times in the world and who give their lives for their sheep or dogs" (Cărătuș-Stanciu, 2018). *The Muntean brothers Ioan and Dumitru* also owned sheep in Dobrogea, the Fetești-Cernavodă area, until 1956. In the current sheep breeding practise, wethers led the herd, and the sheep that could identify the better grass (called" ariparniță" or" cârniță") were at the margins. Sheep also eat mushrooms and differentiate between edible and poisonous ones (Cărătuș-Stanciu, 2018). Another shepherd, *Bunea Vasile from Tilișca commune*, reports that, in the autumn, towards the end of September, the herds of sheep were brought down from the mountain. After the necessary treatments for the sheep, the shepherds began to prepare for their departure for transhumance. The sheep were grouped in herds of 500-800 head (by associating 2-3 owners). They decided where to go depending on the amount of rainfall in the previous days. Thus, they ended up leaving with their herds to Banat or Bărăgan Plain and sometimes even to Cluj County, in search of food resources. The trip took three or four weeks, during which time they tried to cover as much distance as possible. During the journey, the animals fed on plant debris from various lands or on the grass that grew in the ditches on the side of the roads. The destination for wintering was chosen in places where the shepherds knew the people and knew that there was enough fodder. Around April 1, the shepherds left with their sheep back to the village. The return journey took about a month (Cărătuș-Stanciu, 2018).

The treatments applied to the sheep were traditional, being administered as needed. In autumn, for example, before leaving for transhumance, the sheep were treated preventively for scabies, by bathing in a solution resulting from the simmering of the plant *Veratrum album* L. This plant is found in the flora of hayfields and mountain pastures, and when its white-yellow flowers grow, the roots can be extracted and used in this way. A dangerous disease that sheep get is flukes, which settle in the liver and are taken from the grass. This condition was often difficult to detect, and shepherds had to sacrifice a sheep to make a correct diagnosis. Ticks were also a problem, as they could easily be taken from dry meadows or dry leaves at the edge of the forest. Against the ticks, the animals were washed with lye. Sheep could also be affected by yellow fever (fasciolosis), a serious disease caused by a parasite that infects them when they consume stagnant water from ponds. As a treatment, they were given green grass, raw wheat, or cabbage. Moniesiosis of lambs is a condition caused by tapeworms, which they may acquire when switching from feed based on corn kernels to green mass feeding, being transmitted by dogs. No treatment was known for this condition in the past. On their nails, the sheep could have "scales" which could be cleaned by cutting or they could suffer from "lameness", in which case they had to be disinfected with methylene blue. Frost was a hazard for animals, and they were not allowed to

eat grass until after the frost had risen. As a precaution, sheep were given salt bran before grazing.

When the sheep were wet and, in the sun, there was a risk for their ears, snout, and head to swell. They were said to be "flashed." To solve this problem, the affected areas were pricked with a needle and rubbed with fresh soil. If they hit their eyes and got "whiteness" they were given sugar in their eyes or dog hair was pulled through their ears. A very serious condition that occurs only in young animals and that was not treated was "neurosis". The parasite that causes the disease is transmitted by dogs and causes circular movements of the animal with their head in a tilted position and loss of balance resulting in the sheep hitting obstacles along the way. Even though they went through many difficulties, their love for animals motivated them not to give up, and today they have managed to transmit the customs of the past, in order to carry on the traditions (Cărătuș-Stanciu, 2018).

Advantages and disadvantages of transhumance: Summarizing the results of the study, both the advantages and the disadvantages of transhumance can be seen:

Benefits:

- Transhumance adds an ecological dimension to the human-animal relationship, being managed as part of the pastoral productive universe.
- Transhumance has contributed to human adaptability to the alternative ecology of the mountains and plains.
- Driving sheep herds in winter in lowland areas in all historical provinces of Romania (Banat, Crișana, Dobrogea, Moldova, Muntenia and Transylvania, with Maramureș), which involved the spread of language, traditions and a specific lifestyle.
- The shepherds have developed complex relationships with the local authorities in the mentioned regions, to establish and ensure the grazing rights of the sheep during the winter.
- Transhumant sheep farming has led to the emergence of a specific calendar for the life of local communities in pastoral villages.
- At present, for the young generation, shepherding can be the basis of a decent living through economic and tourist capitalization.
- The practice of pastoralism must adapt to the current socio-economic and political "times" becoming an agricultural phenomenon.
- The existence of the favourable natural environment, the variety of the landscape and the soil, the floristic richness of the vegetal carpet, correlated with the extension of the pastures and hayfields, favoured the development of Carpathian sheepherding.
- Ancient practices, passed down from generation to generation, regarding the knowledge and use of aromatic and medicinal plants for the health and wellbeing of sheep.

Disadvantages:

- The difficult life of transhumant shepherds.
- The animosity of farmers towards transhumance, because, along their routes, transhumant herds cause damage to crops.
- Lack of labour specialized in transhumance, because in the mountainous area there is an aging population, demographic decline, as well as a migration of youth.

Results regarding the species of medicinal plants existing in "Mărginimea Sibiului", indicated by scientific literature as being used by animal breeders in the treatment of sheep diseases: In Romania, around 20,000 species of plants have been identified, of which 3,600 are cormophytes from the spontaneous flora (Drăgulescu, 2012). Of these, it is estimated that only 918 species have a real economic importance. Some of them, 204 species, are used as medicinal plants (Pop, 1982). In the "Mărginimea Sibiului" area, 1,400 species were identified, of which 450 were considered medicinal, food, fodder and toxic plants (Antonie, 2017). Medicinal plants are a sector appealing to a wide audience, always current, underlying ancient traditional medicine is based. Most medicinal plants in the area are used in the treatment of human diseases, and only 49 species are used in the treatment of animal diseases (Drăgulescu, 1992). From this last category the species used empirically with a role in therapeutic practice, with remedial effects for sheep and even in their diet (Table 1), were identified.

Table 1. Plants used in traditional medicine for sheep from the "Mărginimea Sibiului" area.

No. crt.	Family	Species	Illness	Form of administration
			Pteridophyta twig	
1	*Equisetaceae*	*Equisetum arvense* L.	Lung, kidney, and cystitis of sheep	Decoction obtained from the whole plant (herb)
			It is sometimes used in animal feed	Herb
			Pinophyta twig	

2	*Pinaceae*	*Abies alba* L.	Against inflammation of the skin and subcutaneous tissue with accumulation of pus	Decoction obtained from resin. It is mixed with wax, tallow, and lard.
			In the treatment of liver flukes	Fir branches are mixed in sheep feed
		Picea abies (L.) Karst.	In the same conditions as Abies alba	It is administered in the same form as Abies alba.
		Pinus sylvestris L.	Use as previous species	Administration as the two species mentioned above
			Magnoliophyta twig	
3	*Aristolochiaceae*	*Aristolochia clematis* L.	Administered to sheep with scab	Decoction, mixed with cabbage juice
4	*Ranunculaceae*	*Helleborus purpurascens* W.et K.	"Sheep cold" that manifests itself as a cough, especially in the morning. The disease is due to the etiological agent Dictyocaulus filaria. It is in the bronchi and trachea; in the treatment of fasciolosis (liver flukes)	Decoction obtained from chopped rhizomes mixed with bran
			Treatment of anthrax, "sheep cold", rheumatic pain	Implant with rhizomes. They are pulled through the urea of sheep.
5	*Betulaceae*	*Corylus avellana* L.	Anthrax	The sheep is beaten over the ear to the blood with a hazelnut weevil
6	*Fagaceae*	*Quercus robur* L.	Deworming of sheep against scab	Lye (water mixed with oak ash)
			Treatment of gastroenteritis	Decoction made from bark powder
7	*Juglandaceae*	*Juglans regia* L.	In the treatment of fasciolosis (liver flukes or goiter)	Decoction made from green shells or inflorescences. It is mixed with the food
8	*Rosaceae*	*Prunus domestica* L.	Empirical treatment uses brandy against the contagious ectemia of sheep popularly called "shed".	Brandy obtained from fruit
9	*Linaceae*	*Linum usitatissimum* L.	In abscesses, anthrax	Poultices with seed flour.
			Treatment of irritations in the digestive tract.	Seed decoction
10	*Euphorbiaceae*	*Euphorbia amygdaloides* L.	Disinfection of wounds caused by wolves and bears	Decoction of leaves
			Used in deworming against scabies, lice, ticks	Whole plant decoction (herb)
11	*Cornaceae*	*Cornus mas* L.	Bleeding of sick sheep	Finely chopped leaves are mixed into the food
12	*Santaleceae*	*Viscum album* L.	In winter the sheep were fed this plant	Fury, grass
13	*Loranthaceae*	*Loranthus europaeus* Jacq.	Treatment of lambs to improve immunity	Powder obtained from dry branches is mixed with salt to feed the lambs.
14	*Cucurbitaceae*	*Cucurbita pepo* L.	Diarrhea in lambs, against intestinal parasites.	Oil obtained from seeds
15	*Ericaceae*	*Vaccinium myrtillus* L.	Diarrhea, gastroenteritis, kidney disease	In the form of cold macerated fruit product
16	*Polygonaceae*	*Rumex crispus* L.	Treatment of fasciolosis and haematuria in sheep	Decoction from roots

		Rumex alpinus L.	Against anthrax and various liver disorders. In some cases, the plant is also used against parasites such as Taenia echinococcus.	Decoction from the root obtained by boiling in milk or just the crushed root and administered orally. Some preparations use alcohol, water and stevia root.
		Rumex obtusifolius L.	It is used to treat sheep diseases like R. alpinus	Decoction
17	*Gentianaceae*	Gentiana cruciata L.	Intoxication, hepatitis in sheep (bile)	Decoction
18	Solanaceae	*Nicotina tabacum* L.	In deworming sheep against itching	Decoction obtained by boiling the leaves. To this is added ash or manure.
			In foot-and-mouth disease	Decoction
			In pneumothorax	Tobacco is used with the inhalation of smoke by the sheep.
19	*Asteraceae*	*Inula britanica* L.	Disinfection of wounds caused by wolves or bears	Decoction, the plant is used in its entirety (Herba)
		Tragopogon orientalis L.	Contagious agalaxia in sheep	Decoct, Herba
		Chondrilla juncea L.	Contagious agalaxia (puffiness). The disease is caused by Mycoplasma agalactiae which stops lactation	Decoction obtained by mixing the plant with bran.
			In the prevention of anthrax	Decoct, Herba
		Carlina acaulis L.	It is used to stimulate milk secretion	Herba
			Treatment of kidney disease, indigestion	Decoct
		Centaurea cyanus L.	Indigestion, diarrhoea, kidney disease	Decoction of flowers
		Matricaria chamomilla L.	Abdominal pain, constipation	Infusion of flowers
20	*Liliaceae*	*Veratrum album* L.	External deworming for sheep. River treatment in sheep.	Rhizome decoction.
21	*Poaceae*	*Agrostis stolonifera* L.	Very important in the sheep feed	Herba
		Avena sativa L.	Treatment of fasciolosis (liver flukes)	Herba
		Triticum aestivum L.	In cases of diarrhoea as well as against intestinal parasites such as Ascaris lumbricoides	Sick sheep are given bread crust or green manure.
		Triticum hybernum L.	Diarrhoea, intestinal parasites	As in the case of T. aestivum

This research highlighted 21 families comprising 33 species used in popular practice related to sheep breeding.

Families with only one representative: Equisetaceae (*Equisetum arvense* L.), Aristolochiaceae (*Aristolochia clematis* L.), Ranunculaceae (*Helleborus purpurascens* W.et K.), Betulaceae (*Corylus avellana* L.), Fagaceae (*Quercus robur* L.), Juglandaceae (*Juglans regia* L.), Rosaceae (*Prunus domestica* L.), Linaceae (*Linum usitatissimum* L.), Euphorbiaceae (*Euphorbia amygdaloides* L.), Cornaceae (*Cornus mas* L.), Santaleceae (*Viscum album* L.), Loranthaceae (*Loranthus europaeus* Jacq.), Cucurbitaceae (*Cucurbita pepo* L.), Ericaceae (*Vaccinium myrtillus* L.), Gentianaceae (*Gentiana cruciata* L.), Solanaceae (*Nicotina tabacum* L.), Liliaceae (*Veratrum album* L.);

Families with three representatives: Pinaceae (*Abies alba* L., *Picea abies* (L.) Karst., *Pinus sylvestris* L.), Polygonaceae (*Rumex crispus* L., *R. alpinus* L., *R. obtusifolius* L.);

Families with four representatives: Poaceae (*Agrostis stolonifera* L., *Avena sativa* L., *Triticum aestivum* L., *T. hybernum* L.).

Families with six representatives: Asteraceae (*Inula britanica* L., *Tragopogon orientalis* L., *Chondrilla juncea* L., *Carlina acaulis* L., *Centaurea cyanus* L., *Matricaria chamomilla* L.).

Of the 33 species of plants used as a drug (medicine) in traditional medicine in the researched area,

24 species are prepared as a decoction of either the whole plant (*Equisetum arvense* L., *Aristolochia clematis* L., *Euphorbia amygdaloides* L., *Inula britanica* L., *Tragopogon orientalis* L., *Chondrilla juncea* L., *Carlina acaulis* L.,), or from various plant organs such as: root (*Rumex crispus* L., *R. alpinus* L., *R. obtusifolius* L.); rhizome (*Helleborus purpurascens* W.et K., *Veratrum album* L.); bark (*Quercus robur* L.); fructification (*Juglans regia* L.); flower / inflorescences (*Juglans regia* L., *Centaurea cyanus* L.); seed (*Linum usitatissimum* L.); leaves (*Euphorbia amygdaloides* L., *Nicotina tabacum* L.) or resin (*Abies alba* L., *Picea abies* (L.) Karst., *Pinus sylvestris* L.).

A common procedure often used for sheep is the implant with rhizomes of Helleborus purpurascens. Other drugs are used less in the form of infusion (*Matricaria chamomilla* L.), poultices (*Linum usitatissimum* L.), macerations (*Vaccinium myrtillus* L.), brandy (*Prunus domestica* L.), powder (*Loranthus europaeus* Jacq.), Oil (*Cucurbita pepo* L.), inhalation (*Nicotina tabacum* L.), lye (*Quercus robur* L.).

For the treatment of various diseases, the medicinal plants were finely chopped and mixed with food (*Equisetum arvense* L., cetacean of *Abies alba* L., *Picea abies* (L.) Karst., *Pinus sylvestris* L., *Cornus mas* L., *Viscum album* L., *Carlina acaulis* L., *Agrostis stolonifera* L., *Avena sativa* L., *Triticum aestivum* L., *T. hybernum* L.).

The inclusion of medicinal plants in sheep feed contributes to animal welfare, stimulates milk secretion, and strengthens of the lambs. The main diseases that can be treated with their help are lung, digestive, kidney diseases; inflammation of the skin; rheumatic pain; abscess; wounds, bleeding; intoxications; pneumothorax; anthrax; laughs; yellowish, flaky; foot-and-mouth disease.

In the past, in the area, in treating various diseases in sheep, phytotherapy was also associated with magic spells. Thus, according to popular belief, plants such as *Rosa canina* L. (Rosaceae) and *Galium verum* L. (Rubiaceae) play an important role in driving away evil spirits from the sheepfold. Magical powers are also attributed to the species *Vincetoxicum hirundinaria* Medik. (Apocynaceae), which was used by shepherds in charms to keep wolves away from sheep. *Sambucus ebulus* L. (Adoxaceae) was thought to maintain fertility in sheep.

Conclusions: The high rate of pastures and hayfields in Romania (33%) is the basis for their capitalization with the help of ruminants, mainly sheep. The analysis of sheep dynamics in Romania starting from 1938 until 2020 attests to the fact that the exploitation of sheep in Romania remained an important sector of the national economy. In Romania, transhumance reached its peak in the first half of the 19th century, followed by continuous decline due to the expansion of agriculture and the partial ownership of peasants. In the past, transhumance established close links between the generations involved in sheep farming. The great transhumance involved traveling with herds of sheep in search of fodder resources to the low plains of Dobrogea or the western part of the country, even reaching beyond the country's borders. The small transhumance that is still practised today occurs between the mountain pastures of the villages in the ”Mărginimea Sibiului” area (in the summer) and the depression areas in Sibiu County and in the neighbouring ones (in the winter).

For sheep farmers with large herds, the extensive system based on transhumance is sustainable and allows for good production and reproductive parameters, without requiring large investments for shelters or the production and preservation of feed. The most important criteria based on which shepherding types can be established in Romania are the type and economic level of the villages and the spread of the shepherding area. In the past, breeders from the ”Mărginimea Sibiului” area administered to sheep mostly “classic” treatments in the form of decoctions, infusions, poultice, oils, powders, or they introduced the whole plant in the diet. In some cases, they resorted to other forms of treatment such as “pulling the rhizomes through the ear”, administration of brandy, washing with soap lye, etc. In the ”Mărginimea Sibiului” area, 33 plant taxa were identified, used as medicinal plants with a role in treating various diseases in sheep. They belong to 21 botanical families: Asteraceae (6 taxa), Poaceae (4 taxa), Pinaceae, Polygonaceae (3 taxa). The families Equisetaceae, Aristolochiaceae, Ranunculaceae, Betulaceae, Fagaceae, Juglandaceae, Rosaceae, Linaceae, Euphorbiaceae, Cornaceae, Santaleceae, Loranthaceae, Cucurbitaceae, Ericaceae, Gentianaceae, Solanaceae, Liliaceae each have a representation.

According to popular belief, four species of plants were identified, vested with magical powers and used by shepherds in various rituals for sheep. Folk medicine is the repository of knowledge regarding the name of plants, spread area, their use in various diseases, beliefs, and interpretations in which magic and the supernatural have their place. The management of animals in a pastoral system protects biodiversity and contributes to its maintenance and the flow of the ecosystem of goods and services. Shepherding is a simple, sustainable lifestyle in Romania, closely related to nature, reflected in the timeline of activities within the shepherds’ communities. Continuing the practice of Carpathian shepherding is imperative and this traditional practice can only be passed on to young people. The traditional seasonal movements of shepherds reflect the natural movements of herds of wild herbivores. Transhumant grazing is a major necessity for maintaining the fragile balance of the mountain anthropogenic

ecosystem. Through their transhumance work, shepherds have implemented "innovative" pastoral strategies for centuries.

The novelty of the paper consists in the association made between the extensive husbandry of sheep and the traditional use of medicinal plants for sheep.

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