Ethnoveterinary practices of Covasna County, Transylvania, Romania

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Abstract

Background: Ethnoveterinary medicine is a topic of growing interest among ethnobiologists, and is integral to the agricultural practices of many ethnic groups across the globe. The ethnoveterinary pharmacopoeia is often composed of ingredients available in the local environment, and may include plants, animals and minerals, or combinations thereof, for use in treating various ailments in reared animals. The aim of this study was to survey the current day ethnoveterinary practices of ethnic Hungarian (Székely) settlements situated in the Erdővidék commune (Covasna County, Transylvania, Romania) and to compare them with earlier works on this topic in Romania and other European countries.

Methods: Data concerning ethnoveterinary practices were collected through semi-structured interviews and direct observation in 12 villages from 2010 to 2014. The cited plant species were collected, identified, dried and deposited in a herbarium. The use of other materials (e.g. animals, minerals and other substances) were also documented. Data were compared to earlier reports of ethnoveterinary knowledge in Transylvania and other European countries using various databases.

Results: In total, 26 wild and cultivated plants, 2 animals, and 17 other substances were documented to treat 11 ailments of cattle, horses, pigs, and sheep. The majority of applications were for the treatment of mastitis and skin ailments, while only a few data were reported for the treatment of cataracts, post-partum ailments and parasites. The traditional uses of Armoracia rusticana, Rumex spp., powdered sugar and glass were reported in each village. The use of some plant taxa, such as Allium sativum, Aristolochia clematitis, and Euphorbia amygdaloides was similar to earlier reports from other Transylvanian regions.

Conclusions: Although permanent veterinary and medical services are available in some of the villages, elderly people preferred the use of wild and cultivated plants, animals and other materials in ethnoveterinary medicine. Some traditional ethnoveterinary practices are no longer in use, but rather persist only in the memories of the eldest subset of the population. A decline in the vertical transmission of ethnoveterinary knowledge was evident and loss of practice is likely compounded by market availability of ready-made pharmaceuticals.

Keywords: Veterinary medicine, Traditional knowledge, Livestock, Székelys, Covasna

Background

The term “ethnoveterinary” refers to traditional therapeutics prepared by humans for the purposes of maintaining or restoring animal health. The ethnoveterinary pharmacopoeia often contains ingredients sourced from various locations within the environment, and may include plants, animals and minerals. Ethnoveterinary medicine dates back to ancient times and records of this practice can be found in various cultures across the globe. The study of ethnoveterinary medicine through a scientific lens began in the 1970s when it was defined by McCorkle [1], and this subject encompasses theory, taxonomy, diagnosis, practice, resource, and social organization of the health of livestock and pets. Traditional curative and preventive treatments of domesticate and semi-domesticate animals play a significant role in several regions of the world where livestock is a main source of livelihood for rural peoples [2-17].

In Romania, mostly in isolated settlements, several works have been published from the 1960s encompassing data on veterinary health problems of domesticated...
animals and their management [18-34]. Recently, declines in the transmission and implementation of traditional knowledge have been exacerbated by alteration and degradation of the environment, decreasing numbers of herds, and more expanded availability of officinal medicines and modern pharmaceuticals in several regions of the country. Nevertheless, several ethnic groups preserve the old traditions through home practices and oral transmission of knowledge.

Covasna County, located in the eastern part of Transylvania (situated in central Romania) is inhabited by a population of ethnic Hungarians known as the Székelys. This ethnic group has lived in the Carpathian Basin since the 9th century.

The flora of this area has been studied and published in valuable works [35-39]. Based on these descriptions, the region has a rich flora including relict and endemic species, as well as several medicinal plants used in traditional human and veterinary ethnomedicine [40,41]. In the summary of Rácz and Füzi [41], medicinal plants were listed with local Hungarian, Romanian and scientific names, used part, village and amount of collection (kg/year). Their work highlights the decreasing occurrence of some wild species due to over-harvesting.

Based on our previous ethnobotanical surveys [42,43], the aim of this study was to document and analyze the ethnoveterinary practices of 12 settlements of the Erdővidék commune of Covasna County, Romania, focusing mainly on plant uses, common ailments and homemade therapeutics for livestock (e.g., cattle, horses, sheep and pigs). As no comparative fieldwork has been conducted on veterinary care in Covasna, our collected data were evaluated and compared to records of animal health management practices in Romania and other European countries.

**Methods**

**Study area**

Covasna County is located at elevations ranging from 460 to 1,777 m.a.s.l. in eastern Transylvania, situated in central Romania (longitude: 25°28'-26°28', latitude: 45°32'-46°18') (Figure 1). The territory encompasses 3,705 km². This region, which connects to the eastern part of the Carpathian Mountains, has been divided into four large zones: Baraolt Basin, Cimpul Frumos, Superior Basin of Trei Scaune, Intorsura Buzăului and their surroundings [41]. Erdővidék (“Timberland”) is found in the Baraolt Basin at the north-western part of the county, with a total area of 600 km². The name “Timberland” comes from the territory being covered with forestland. Average temperatures vary from 2–7°C and the region has a precipitation of 500–1,100 mm per year [44]. The rock-bed consists of vulcanian and sedimental elements. Due to the postvulcanian movement, about 150 mineral springs (“borvízforrás”) were discovered in the region, and are reputed for their
medicinal effects. The geological relief of the region is diverse and comprises basins, mountains, valleys, plains and rivers (e.g. Olt, Kormos, Barót and Vargyas). The vegetation is also diverse and comprises beech, birch, hornbeam, oak, and pine forests, and alpine dwarf scrubland at different sea level. In total, the land use area of the county is divided into agriculture (48%), forestry (47.2%) and non-productive surfaces (4.8%) [41].

A 2009 population survey reported the presence of 8,600 ethnic Hungarians (Székely) distributed across 23 villages in Erdővidék [44]. The following settlements were selected in our study: Aita Seacă (in Hungarian: Szárazajta), Bățanii Mari (Nagybacon), Bățanii Mici (Kisbacon), Biborfeni (Bibarcfalva), Bodos (Bodos), Filia (Erđőfűrde), Herculian (Magyarhermány), Oznunca-Bái (Uzonkafürdő), Račoșul de Sus (Felsőrákos), Tălișoara (Olsztelek), Valea Zălanului (Zalănpatak), and Vărghiș (Vargyas) (Table 1, Figure 1).

Native people of the county speak Romanian and Hungarian, while in the selected villages the predominant language is Hungarian. The majority of villagers were born in the area and have lived there for most of their lifetime. Many are engaged in traditional agricultural and pastoral activities, working as farmers, ranchers and shepherds. Cattle, goats, horse, sheep and pigs are commonly raised in farms and around the home. They continue to play a key role in the production of dairy products and other traditional foods in the district, as has been the case for centuries. Although some of these villages have access to allopathic medical and veterinary care, as well as access to pharmaceutical drugs (Table 1), most people know of several home treatments for veterinary health problems using materials of various origins.

**Field work and data collection**

Field studies were carried out in the summers of 2010–2014. A total of 99 informants were asked with snow-ball technique in semi-structured interviews in Hungarian. Prior informed consent was obtained prior to conducting interviews and all researchers adhered to the ethical guidelines of the International Society of Ethnobiology [45]. During interviews, details concerning common ailments of domesticated animals, ingredients to traditional therapies (coming from plant, animal, and mineral origin) as well as local healing methods were recorded. Informants were followed into the local agro-ecosystem (e.g. fields, meadows, pastures, ploughlands and road-sides) surrounding villages in order to show and gather the cited wild and cultivated plants (Figure 2). Regarding the cited plant taxa, data concerning the following topics were collected: local name(s), frequency, habitat, time of collection, method of storage, used part, preparation, category and way of use, treated ailments and animals with local name(s), possible beliefs and rituals. Interviews were documented with tape recordings and photos were taken of plants and their habitat as well as the final therapeutic products. Voucher specimens of the cited plants were prepared and deposited at the Department of Pharmacognosy of the University of Pécs. Scientific nomenclature of for botanical taxa followed the systematic work of Tutin et al. [46].

**Data analysis**

A search for ethnoveterinary studies in some major databases was conducted and the data collected in this study was compared to earlier documented records in

| Study area     | Latitude  | Longitude  | Informants/Inhabitants [44] | Medical service | Veterinary practice | Pharmacy | Local features [63] |
|----------------|-----------|------------|----------------------------|-----------------|---------------------|----------|---------------------|
| Aita Seacă     | 46° 02’ 17" | 25° 41’ 23" | 7/782                      | —               | —                   | —        | saline fountain      |
| Bățanii Mari    | 46° 05’ 22" | 25° 41’ 29" | 15/1936                     | +               | —                   | —        | mineral springs      |
| Bățanii Mici    | 46° 06’ 13" | 25° 41’ 42" | 8/538                       | —               | —                   | —        | mineral springs      |
| Biborfeni      | 46° 05’ 37" | 25° 39’ 22" | 5/775                       | +               | —                   | +        | mineral springs      |
| Bodos          | 46° 04’ 34" | 25° 39’ 36" | 9/446                       | —               | —                   | —        | charcoal-burner ("baks") |
| Filia          | 46° 08’ 38" | 25° 37’ 17" | 8/1240                      | +               | —                   | +        | iron forge, wooden headboards in the cemetery |
| Herculian      | 46° 08’ 02" | 25° 42’ 35" | 7/1168                      | +               | —                   | +        | mineral springs      |
| Oznunca-Bái    | 46° 06’ 20" | 25° 47’ 20" | 3/54                        | —               | —                   | —        | mineral springs, medicinal bath |
| Račoșul de Sus | 46° 04’ 45" | 25° 32’ 53" | 6/893                       | —               | —                   | —        | mineral springs      |
| Tălișoara      | 46° 06’ 18" | 25° 35’ 19" | 5/743                       | —               | —                   | —        | mineral springs      |
| Valea Zălanului| 46° 00’ 40" | 25° 45’ 22" | 12/149                      | —               | —                   | —        | mineral springs      |
| Vărghiș        | 46° 07’ 41" | 25° 33’ 25" | 14/1647                     | +               | —                   | +        | mineral springs      |

* Aita Seacă, Bățanii Mici, Račoșul de Sus: no permanent medical service; temporary medical service is available twice per week from from neighbouring communities.
Transylvania and other European countries [3-5,7-17, 19-22,25-31,33,34,47-57]. During comparison, similarity and differences of the records were taken into consideration.

Results and discussion
There are several small private herds widespread in the county. People keep fewer livestock nowadays than in the past, which has resulted in a significant decrease the number of cattle herds. In addition, the prevalence and increased use of agricultural mechanization has led to the reduction in the number of horses necessary for agricultural activities. Nevertheless, domesticated animals continue to play an important role in their everyday life in the region.

Among the 99 informants (63 women and 36 men) aged between 27 and 99 years, only 75 villagers reported that they currently raise cattle, horses, sheep or pigs and use ethnoveterinary treatments. While the other 24 informants do not currently rear livestock, they did in the past and where able to provide information regarding past ethnoveterinary practices used during their lifetime. Declines in the transmission of traditional ethnoveterinary knowledge are apparent, and is likely linked to emigration trends among young people seeking employment in larger cities and even foreign countries. In addition, many informants commented on a sense of greater faith in modern veterinary medicines prescribed by veterinarians than their own home remedies.

Altogether, 11 ailments reported to be most frequently treated via ethnoveterinary means (Tables 2,3,4). Among the cited ailments, “hotness” (stomach disorders), inflamed udder (mastitis), respiratory diseases (roaring = “kehesség”, infectious cold, cough, pneumonia), rumination disorders, wounds and skin injuries, diarrhea, and cataracts were listed, and local methods were also used in post-partum therapies and as anthelmintic, diuretic, antiparasitic, repellent and insecticide drugs. The majority of ethnoveterinary therapeutics were observed to treat the ailments of cattle (48 records), while 26 remedies were mentioned for horses, 15 for pigs, and 5 for sheep.

A total of 45 ingredients were documented in this survey, including 26 plant taxa (18 wild and 8 cultivated species; 57.8%), 2 animals (4.4%), and 17 animal-based substances, minerals or materials of other source (37.8%). Considering the frequency of citations, the use of Allium sativum, Aristolochia clematitis, Armoracia rusticana, Potentilla anserina, Rumex acetosella, and R. obtusifolius, as well as Mustela nivalis, “szénmurha”, powdered glass, sugar and water showed the highest prevalence (Tables 2 and 3).

The highest number of remedies involving plants were for the treatment of diarrhea (7 taxa), as anthelmintics (6), for rumination (5), stomach problems and wounds (4), while a few taxa were cited for mastitis (3), respiratory ailments and as a repellent drug (2) (Table 2). Local names of plants varied from 1 to 6 per species. Some names correspond with the official Hungarian terminology using in single form or with vernacular names together (vernacular names are listed in italics in Table 2).
| Used plants and voucher code | Family                  | Local name                                      | Medicinal use                                                                 | Status* | Number of citations |
|------------------------------|-------------------------|------------------------------------------------|--------------------------------------------------------------------------------|---------|---------------------|
| Achillea millefolium L. (EV-03) | Asteraceae              | cikkafark, cikkafarkkőrű, pulykafű, egérfarkű virág, egérfarkűkővirág | herb as a tea for rumination [cattle]                                        | W   | 3                   |
| Allium sativum L. (EV-22)    | Amaryllidaceae          | fokhagyma                                      | bulb for anthelmintics [pig]                                                  | C       | 76                  |
| Aristolochia clematitis L. (EV-23) | Aristolochiaceae      | farkasalma                                      | leaf for wounds and skin injuries [cattle, horse, pig, sheep]                 | W   | 54                  |
| Armoracia rusticana G. Gaertn., B. Mey. & Schreb. (EV-11) | Brassicaceae            | torma                                           | root for respiratory disorders [horse]                                       | C       | 71                  |
| Artemisia absinthium L. (EV-13) | Asteraceae              | üröm, fehér üröm                                | herb for stomach heat, inflammation, and ache [cattle]                        | W   | 4                   |
|                        |                         |                                                | for diarrhea [cattle, horse]                                                  |         |                     |
| Calendula officinalis L. (EV-12) | Asteraceae              | sárgavirág                                      | flower as a cream for inflamed udder and mastitis [cattle]                    | C       | 4                   |
| Cucurbita pepo L. (EV-21)    | Cucurbitaceae           | tők                                              | ground seed and seed oil for rumination [cattle]                             | C       | 3                   |
| Daucus carota L. subsp. sativus Hoffm. (EV-04) | Apiaceae                | murok                                           | for anthelmintics [pig]                                                      | C       | 2                   |
| Eryngium planum L. (EV-17)   | Apiaceae                | kék tilinkő, szamárcsipke, bojtorján             | herb for inflamed udder and mastitis [cattle, horse]                         | W   | 7                   |
| Euphorbia amygdaloides L. (EV-01) | Euphorbiaceae          | árió                                             | herb for wounds and skin injuries [horse, pig]                               | W   | 6                   |
| Gentiana asclepiadea L. (EV-15) | Gentianaceae            | gyertyagyőkerű, gyertyagyőkerű, sárgagyökér  | root as a tea for stomach heat, inflammation, and ache [cattle]              | W   | 4                   |
| Juglans regia L. (EV-16)     | Juglandaceae            | dió                                              | leaf against flies as a rub [horse]                                          | C       | 47                  |
| Juniperus communis L. (EV-14) | Cupressaceae            | borsika                                         | pseudofruit for respiratory disorders [horse]                                | W   | 6                   |
| Matricaria chamomilla L. (EV-10) | Asteraceae              | kamillavirág                                    | flower as a tea and wash for inflamed udder and mastitis [cattle]            | W   | 11                  |
| Petroselinum crispum (Mill.) Fuss (EV-09) | Apiaceae                | zöld petrezselyem                              | leaf for rumination and after delivery [cattle]                             | C       | 9                   |
| Plantago lanceolata L. (EV-25) | Plantaginaceae         | kiegőnyelvű hegyesúrtulipai, kiegőnyelvű útűfű, keskeny útűfű lándzsás/keskeny útűfű | leaf for stomach heat, inflammation, and ache [cattle]                        | W   | 12                  |
| Polygonum minus Huds. (EV-02) | Polygonaceae            | árió, veresszárúfű                               | herb as a washing for wounds and skin injuries [cattle, horse]               | W   | 11                  |
| Potentilla anserina L. (EV-05) | Rosaceae                | pipeli, ládlábű, ládlű                        | leaf for diarrhea [cattle, horse, pig, sheep]                                | W   | 71                  |
| Quercus petraea (Matt.) Liebl.(EV-19) | Fagaceae               | cserefa, cseremakk, cserháncs                  | nut for anthelmintics [pig, cattle]                                          | W   | 4                   |
| Quercus robur L. (EV-20)     | Fagaceae                | cserefa, cseremakk, cserháncs                  | young bark as a tea for diarrhea [pig]                                        | W   | 5                   |
|                              |                         |                                                 | nut for anthelmintics [pig, cattle]                                          | W   | 4                   |
| Plant Taxa                                      | Family           | Use                                    | Status | Quantity |
|-----------------------------------------------|------------------|----------------------------------------|--------|----------|
| *Rumex acetosella* L. (EV-07)                  | Polygonaceae     | lősödsi, lősőska                       |        |          |
| *Rumex obtusifolius* L. (EV-06)               | Polygonaceae     | lősödsi, lősőska                       |        |          |
| *Salix alba* L. (EV-24)                       | Salicaceae       | fűzfá                                  |        |          |
| *Secale cereale* L. (EV-26)                   | Poaceae          | rozs                                    |        |          |
| *Symphytum officinale* L. (EV-18)             | Boraginaceae     | fekete nadály, nadály, farasztókű      |        |          |
| *Veratrum album* L. (EV-08)                   | Melanthiaceae    | ászpa, (fehér)ázsza                      |        |          |

young bark as a tea for diarrhea [pig] 5
fruit for diarrhea [cattle, horse, pig, sheep] W 75
fruit for diarrhea [cattle, horse, pig, sheep] W 75
leaf as fodder for stomach heat, ache, inflammation, and rumination, leafy branches and bark for rumination [cattle] W 24
fruit for anthelmintics [horse] C 4
root with bran for rumination [cattle] W 5
ground root as a rub against lice [horse] W 5

*Status: W = growing in wild habitat; C = cultivated in gardens.*
Regarding the plant parts used, the whole herb was the most frequently used part of the cited taxa (21.9%) followed by leaf and fruit (18.6% each), root (15.6%), bark (9.4%), flower (6.3%), pseudofruit, seed and bulb (3.2% each) (Table 4). Herbal remedies were applied internally and externally as a single tea (40%) or tea mixture (2.8%), in raw form as fodder (37.2%), in washes (8.6%), rubbing agents (5.7%), creams and liniments (2.8% each). Plants containing toxic compounds (e.g. *Aristolochia clematitis*, *Veratrum album*) are only reported for external use. In the case of *Eryngium planum* and *Matricaria chamomilla*, two types of preparation were mentioned, similarly to the application of salt, vinegar and water.

Preparations based on other substances are commonly used with other materials (73.7%), with plants (5.3%), or in single form (21%) as a liniment, wash or fodder (Table 4). Although modern veterinary practice is expensive and not as easily available as homemade remedies, the use of injectable medicaments was also noted in the region (Table 3).

Comparing data recorded in the selected 12 villages, the use of *Armoracia rusticana* for respiratory illness in horses, *Rumex* spp. for diarrhea, and the application of sugar and glass powders for cataracts in cattle proved to be consistent and a commonly used treatment in each community surveyed (Table 4). Intracultural variance was documented in the frequency of some records, such as in the use of *Allium sativum* as an anthelmintic (in 10 villages), *Aristolochia clematitis* for wounds and *Potentilla anserina* against diarrhea (in 9 villages). There were also some interesting cases of unique ethnoveterinary practices that were restricted to one village each. For example, *Gentiana asclepiadea* (Figure 3) was used with milk for stomach disorders; clay or water with salt for mastitis; *Juniperus communis*, “szénamurha” with urine and turpentine for respiratory ailments; cooking oil, *Cucurbita pepo* and *Petroselinum crispum* to improve rumination; the use of *Eryngium planum* and *Euphorbia amygdaloides* for wounds; *Quercus* species for diarrhea and as an anthelmintic drug used similarly to whey powder; “hótszén” against diarrhea; and *Petroselinum crispum* to dispel the placenta in cattle after delivery.

Some similarities were found between the indications reported earlier in other Transylvanian regions and other countries, and the present uses of home remedies

| Animals | Medicinal use | Number of citations |
|---------|--------------|---------------------|
| Menyet (Mustela nivalis L.) | skin as an embrocation by itself or soaked in milk for mastitis [cattle] | 29 |
| Tetsű (lices) | put into the urethra as a diuretic [horse] | 3 |

| Minerals and other substances | Number of citations |
|-------------------------------|---------------------|
| Bread | for rumination [cattle] | 11 |
| Clay | by itself or with salt as an embrocation for mastitis [cattle] | 9 |
| Cobweb | as an embrocation for skin injuries [horse] | 3 |
| “hótszén” (hot embers quenched in water) | for diarrhea [pig] | 4 |
| Glass (powdered) | blown into the eyes for cataract [cattle] | 63 |
| “szénamurha” (hay) | by itself or poured with urine for respiratory diseases [horse] | 31 |
| Injection | for respiratory diseases [horse] | 3 |
| Milk | for stomach heat, inflammation, ache [cattle], with *Allium sativum* sativum as an anthelmintic [pig] | 22 |
| Oil | for stomach heat, inflammation, ache, rumination [cattle] | 25 |
| Salt | with water and vinegar as a wash or embrocation for mastitis [cattle] | 7 |
| Sugar (powdered) | blown into the eyes for cataract [cattle] | 61 |
| Turpentine | for respiratory diseases [horse] | 2 |
| Toast | for rumination [cattle] | 9 |
| Urine (human) | poured onto “szénamurha” for respiratory diseases [horse] | 5 |
| Vinegar | with water and salt as a wash or embrocation for mastitis [cattle] | 18 |
| Water | with vinegar and salt as a wash or embrocation for mastitis [cattle] | 19 |
| | poured beside the animals as a diuretic [horse] | 7 |
| | put into the shed to vaporize and induce urination [sheep] | 6 |
| Whey powder | anthelmintics [pig] | 3 |
| Diseases treated in ethnoveterinary practice | Ethnomedicinal treatments in the studied villages* | Earlier reported data in Romania | Data in other countries |
|---------------------------------------------|--------------------------------------------------|---------------------------------|------------------------|
| "hotness" (stomach heat, inflammation, ache) | Used ingredients Parts used and preparation<br>Artemisia absinthium herb<sup>1,9</sup> [cattle] | Used ingredients Parts used and preparation<br>Centaurium erythraea Rafn. (Gentianaceae) herb as tea [pig] [47] | Achillea millefolium<br>flowers as infusion [53] |
| Plantago lanceolata | leaf with the herb of A. absinthium<sup>1</sup> [cattle] | Levisticum officinale W.D.J. Koch (Apiaceae) herb with rancid pork fat and bitter salt [48] | Matricaria chamomilla<br>flowers as infusion [calves] [51] |
| Gentiana asclepiadea (Figure 3) | root with P. lanceolata as a tea<sup>17</sup> [cattle] | Peucedanum oerselium Moench (Apiaceae) herb as fodder [48] | Potentilla erecta (L.) Ræusch. (Rosaceae) root as a tea [51] |
| Salix alba milk oil | leaf as fodder<sup>12</sup> [cattle] | Rumex crispus L. (Polygonaceae) seed soaked in brandy for digestive problems [48] | milk [7] |
| "inflamed udder, mastitis" | Calendula officinalis flower as a cream<sup>3</sup> [cattle, horse] | Brassica oleracea sour leaf sap with human urine and dung of horse as a cream [47] | Brassica oleracea roasted leaf as an embrocation [14] |
| Eryngium planum | herb as a tea<sup>2</sup> or washing<sup>12</sup> [cattle, horse] | Calendula officinalis flower as a cream [47] | Calamintha nepeta (L.) Savi (Lamiaceae) leaf as a wash [15] |
| Matricaria chamomilla | flower as a tea and wash<sup>12</sup> [cattle] | Digitalis grandiflora Mill. (Plantaginaceae) herb [26] | Malus sylvestris (L.) Mill. (Rosaceae) cider vinegar of fruit with grain as fodder [11] |
| Mustela nivalis | skin as an embrocation by itself<sup>2,6,11,13</sup> or soaked in milk<sup>7</sup> [cattle] | Malus sylvestris vinegar of fruit on slate as impregnant, as an embrocation [cattle] [28,47] | Malva sylvestris fresh leaf boiled and placed into sack using as a warm compress [15] |
| cold water | as a wash<sup>1,2,6,12</sup>, with vinegar<sup>2,3</sup> and salt<sup>7</sup> as a wash<sup>7</sup> or embrocation<sup>7</sup> [cattle] | Mustela nivalis as a rubber [49] | Olea europaea L. var. europaea (Oleaceae) fruit as an ointment [16] |
| clay | by itself or with salt as an embrocation<sup>7</sup> [cattle] | Papaver somniferum L. (Papaveraceae) seed as fodder for “reszfug” (= mastitis) [cattle, sheep] [26] | Sambucus nigra L. (Adoxaceae) flower in fumigation [cattle] [16] |
| | | Scorpiularia nodosa L., reszfugburján (Scrophulariaceae) as a wash [26], mixed and cooked with salt and flour of Zea mays [19] dried and mixed into the flour as fodder [20] | Thymus vulgaris L. (Lamiaceae) decoction of flowering stem as a wash [cattle, dog, sheep] [8] |
| | | Picea abies (L.) H. Karst. (Pinaceae) resin by itself, or with sour cream or tallow as an embrocation [Papp, unpublished data, Uz-valley] | Zea mays L. (Poaceae) seed as a decoction in water and/or milk as a washing [cattle] [8] |
| | | flour with salt [26] | |
| Ethnoveterinary practice | Species | Methodology |
|--------------------------|---------|-------------|
| Respiratory diseases: roaring ("kehesség"), cold, cough, pneumonia | Armoracia rusticana root as fodder | 1–12 [horse] |
| | Allium cepa L. (Amaryllidaceae) | 3 slices of the bulb grated and soaked in brandy, and mixed with saltpetre [29] |
| | Allium cepa bulb | 16 |
| | Armoracia rusticana root by itself | 34, 47, or with Avena sativa and urine for “száraz kehe” (dry cough) of horse [28,29], or in boiled milk with one spoon of honey, tallow, yeast, 7 slices of Allium sativum, and 9 fruits of Pimenta dioica (L.) Merr., Myrtaceae and Syzygium aromaticum (L.) Merr. & L.M. Perry, Myrtaceae and Piper nigrum L., Piperaceae [horse] [29], or with “büdöskővirág” (sulphur powder) [34] |
| | Atropa belladonna L. (Solanaceae) leaf | [horse, dog] [8] |
| | Avena sativa Poaceae | warmed by itself [28], or with urine, turpentine or “büdöskővirág” put into a sac and pull onto the head of horse as a steaming injection | [horse] [1] |
| | Brassica oleracea | leaf sap dropped into the nostrils with dried and ground rat snake [horse] [19] |
| | Eucalyptus globulus Labill. (Myrtaceae) | leaf | [horse] [16] |
| | Juniperus communis pseudofruit as fodder | 7 [horse] |
| | Datura stramonium L. (Solanaceae) leaf | 30 |
| | Helleborus foetidus L. (Ranunculaceae) leaf inserted into the ears for bronchitis and pneumonia [cattle] | 12 |
| | Hordeum vulgare L., H. vulgare convar. vulgare (Poaceae) steaming with warmed seed [27,31], flour with honey and water | 29 |
| | Juniperus communis as a tea | [horse] [25] |
| | Mercurialis annua L. (Euphorbiaceae) root as a tea | [dog] [8] |
| | Levisticum officinale W.D.J. Koch (Apiaceae) aerial part as a tea | [21,48] |
| | Origanum heracleoticum L. (Lamiaceae) aerial part | [4] |
| | Sugar | on hot coal as a fumigant | [4] |
| Item                        | Description                                                                 |
|-----------------|-----------------------------------------------------------------------------|
| Matricaria chamomilla | *Malus sylvestris* - vinegar of the fruit as an embrocation [47] |
|                  | *Pulmonaria officinalis* L. (Boraginaceae) - flower for pneumonia [pig] [19,20] |
|                  | *Secale cereale* L. (Poaceae) - flour for “fojőkehe” for steaming [28,29] |
|                  | *Triticum aestivum* L. (Poaceae) - bran by itself [29] |
|                  | *bear, goose and pork fat*                                                  |
|                  | *salt*                                                                      |
|                  | *sulphur powder*                                                           |
|                  | *venesection*                                                              |
|                  | *Achillea millefolium* herb as a tea [cattle]^{12}                          |
|                  | *Allium sativum* bulb with bread [28,29, or with wine and egg [33]         |
|                  | *Angelica sylvestris* L. (Apiaceae) leaf [21]                               |
|                  | *Artemisia absinthium* aerial part as a tea [10]                            |
|                  | *Artemisia dracunculus* herb as a tea [29]                                  |
|                  | *Beta vulgaris* L. convar. crassa (Amaranthaceae) grated root [21]         |
|                  | *Beta vulgaris* L. (Beta vulgaris) L. (Beta vulgaris) fruit as an elixir [10] |
|                  | *Cannabis sativa* L. (Cannabaceae) seed in oil [29]                        |
|                  | *Carum carvi* L. (Apiaceae) fruit [21]                                      |
|                  | *Cucurbita maxima Duchesne* (Cucurbitaceae) seed with bran [22]             |
|                  | *Cucurbita pepo* ground seed with milk [28,30]                             |
|                  | *Daucus carota* ssp. sativus Hoffm. root [21,47]                           |

^12 rumination
| Plant Name                  | Part Used                  | Uses in the Study Area |
|----------------------------|----------------------------|------------------------|
| Euonymus europaeus         | L. (Celastraceae)          | fruit [21]             |
| Equisetum sylvaticum       | L. (Equisetaceae)          | herb [27,31]           |
| Fragaria vesca L.          | (Rosaceae)                 | fruit [30] or root as a tea [28] |
| Helianthus annuus L.       | (Asteraceae)               | pressed seed coat [21,47] |
| Iris germanica L.          | (Iridaceae)                | root [20]              |
| Juniperus communis         |                           | pseudofruit with milk, roasted on bread [28], or with the leaf of Salix alba, rusty fat, oil and bulb of Allium cepa [30,47] |
| Levisticum officinale      | W.D.J. Koch (Apiaceae)     | herb [21]              |
| Linum usitatissimum        | L. (Linaceae)              | seed as a tea [21,24,31,34] |
| L. usitatissimum convar. Transitum (Linaceae) | ground seed with the seed of Helianthus annuus [29] |
| Malus domestica Borkh.     |                           | vinegar with yeast and Artemisia dracunculus [29] |
| Matricaria chamomilla      |                           | flower as a tea [20]   |
| Petroselinum crispum      |                           | leaf with bran and oil [22] |
| Peucedanum oreoselinum Moench (Apiaceae) | herb [21] |
| Prunus domestica L. ssp. Rotundica (Rosaceae) | leafy branches [28] |
| Raphanus sativus L. cv. niger f. subglobosa (Brassicaceae) | tuber [21,24,31,34], or with cooking soda [22] |
| Rumex stenophyllus Ledebe (Polygonaceae) | herb [31] |
| Rubus idaeus L. convar. hortensis | fruit as a syrup [29] |
| Herb/Plant Name         | Part Used                  | Preparation/Use                                                                                      |
|------------------------|----------------------------|------------------------------------------------------------------------------------------------------|
| Aristolochia clematitis| leaf as an embrocation     | [cattle, horse, pig]                                                                                   |
| Eryngium planum        | herb as a tea              | [cattle, horse]                                                                                       |
| Euphorbia amygdaloides | herb as a tea              | [horse, pig]                                                                                          |
| Polygonum minus        | as a washing               | [cattle, horse]                                                                                       |
| cobweb                 | as an embrocation          | [horse]                                                                                              |
| Crataegus monogyna     | fruit or leafy branches    | as a decoction [ox]                                                                                   |
| Daphne mezereum L.     | bark [sheep]               | as an infusion [horse] [Papp, unpublished data, Uz-valley]                                           |
| Euphorbia amygdaloides | ground herb as an embrocation | [26] or as a wash ([28,30,47] Papp, unpublished data, Uz-valley)                                    |
| Euphorbia cyparissias  | herb as a wash             | [28,30]                                                                                                |
| Euphorbia palustris L. | herb as a wash             | [28,30]                                                                                                |
| Polygonum lapathifolium L. | leaf as an embrocation   | [26]                                                                                                  |

**Table 4 Ethnoveterinary practices in the study area compared with earlier records in Romania and some European countries (Continued)**

pevar. inermis (Rosaceae) lower layer of the bark [30]
Sambucus nigra leafy branches [28,30]
Salix alba leafy branches [31]
Salix spp. leafy branches [28]
Szaturea portulaca L. (Lamiaceae) herb [28]
Sisymbrium strictissimum L. (Brassicaceae) root [28]
Triticum aestivum fruit [29]
Zea mays stem [29]
copper sulphate [34]
white wine with egg [sheep] [33]
wounds, skin injuries

Aristolochia clematitis decoction of the stem and leaf as a wash, or the leaf as an embrocation [21,28,30]
Arthalia officinalis L. (Malvaceae) root [9]
Betula pendula Roth. (Betulaceae) leaf for bruised skin ("pecsendzsia, pokolszökés") as a tea [50]
Agave americana L. (Asparagaceae) leaf [9]
Chelidonium majus L. (Papaveraceae) leaf sap [47]
Artemisia absinthium aerial part with honey [horse] [10]
Crataegus monogyna Jacq. (Rosaceae) fruit or leafy branches as a decoction [ox] [25]
Bovista dermoxantha Pers. (Lycoperdaceae) old fruiting body [horse] [10]
Cardopatum corrosivum (L.) Pers. (Asteraceae) leaf [sheep,cattle, dog] [8]
Carpinus orientalis Mill. (Betulaceae) bark as a decoction [3]
Centauraea alba L. ssp. tartesiana Talavera (Asteraceae) leaf [horse] [8]
Daphne gnidium L. (Thymelaeaceae) stem as a liniment [9]
Ecballium elaterium (L.) A. Rich. (Cucurbitaceae) fruit [4]
| Plant Name                        | Part Used                  | Uses in Ethnoveterinary Practice |
|----------------------------------|----------------------------|----------------------------------|
| Symphytum officinale             | root [20]                  | Euphorbia hirsuta L. (Euphorbiaceae) [sheep, cattle, horse, dog] [51] |
| Veronica beccabunga L. (Plantaginaceae) | herb as a wash [19]     | Gentiana lutea L. (Gentianaceae) root as a bath [9] |
| cobweb                           | [19]                       | Geranium rotundifolium L. (Geraniaceae) aerial part [9] |
| hot fat                          | [19]                       | Hypericum perforatum aerial part [3,8,51] |
| lime                             | [19]                       | Juniperus oxycedrus L. (Cupressaceae) pseudofruit as an ointment [9] |
| urine                            | [19]                       | Lilium pyrenaicum Gouan (Liliaceae) bulb as a liniment and a poultice [9] |
| Malva neglecta Wallr. (Malvaceae)|                           | aerial part [3], leaf [51] |
| Marrubium vulgare L. (Lamiaceae) |                           | aerial part [sheep, cattle] [8] |
| Nicotiana tabacum L. (Solanaceae) | leaf [sheep] [9]          |leaf as an ointment and bath [51] |
| Peucedanum ostruthium (L.) W.D.J.Koch (Apiaceae) | root as an ointment and bath [51] |
| Prunus domestica                 | fruit by itself [8], or in fermented and distilled form [7] |
| Pulicaria odorata Rchb. (Asteraceae) |                           | flowering top in alcohol or as a decoction [cattle, sheep, dog, horse] [8] |
| Quercus ilex ssp. ilex, Q. petraea (Matt.) Liebl. (Fagaceae) | bark as a bath [9] |
| Ruta chalepensis                 | aerial part as an embrocation and liniment [9] |
| Sambucus nigra                   | leaf as a decoction [14] |
| Symphytum officinale             | root as an ointment and bath [51] |
| Valeriana officinalis L. (Caprifoliaceae) | root or leaf in mules [14] |
| fat                              | fox fat for pimples [horse], hen fat for sores [oxen] [2] |
| Sulphur                          | in water for burns [10]    |
| Cobweb                           | [7]                        |
| Practice | Plant | Preparation | Uses |
|----------|-------|-------------|------|
| **Anthelmintics** | *Allium sativum* | bulb of by itself[^3,8] or soaked in milk [pig][2,12] | *Allium sativum* bulb by itself [28,30,34] or in milk [34] |
| | *Cucurbita pepo* seed | [pig][3,12] | *Artemisia absinthium* leaf as a decoction [dog][8] |
| | *Daucus carota ssp. sativus* root (horse) | | *Avena sativa* roasted fruit [28] |
| | *Quercus petraea, Q. robur* nut | [pig, cattle][3] | *Cannabis sativa* seed with lime-water, or with *Allium cepa*, goose fat and milk [28] |
| | *Secale cereale* fruit as fodder (horse) | | *Chelidonium majus* L. (Papaveraceae) leaf in water [3] |
| | *whey powder* (pig) | | *Daucus carota ssp. sativus* root (horse) |
| | *Hordeum vulgare* | roasted seed [27,29,31] | *Hypericum maculatum* Crantz (Hypericaceae) aerial part as a tea [7] |
| | *Phaseolus vulgaris* L. Fabaceae | fruit as a decoction without salt [29] | *Menha suaveolens* Ehrh. (Lamiaceae) aerial part as a tea [16] |
| | *Quercus petraea, Q. robur* ground nut or bark as a tea | [28] | *Ruta chalepensis* aerial part [3,16] |
| | *Sambucus nigra* bar kin milk | [25,30] | *Scabiosa columbaria* L. (Caprifoliaceae) aerial part as a tea [16] |
| | *Secale cereale* fruit or flour | [30] | *Simethis mattiazzi* (Vand.) Sacc. (Xanthorrhoeaceae) root as a decoction [3] |
| | *Triticum aestivum* bran with butter, fat, salt and soap as a decoction | [29] | *Teucrium scorondoni* L. (Lamiaceae) aerial part [3,16] |
| | *Achillea collina* (Becker ex Rchb. f.) Heimerl, *A. millefolium* (Asteraceae) aerial part as a tea [22,26] | | *Achillea millefolium* aerial part [calf][10] |
| | *Potentilla anserina* leaf as a tea [cattle, horse][3] | | *Alchemilla vulgaris* L. (Rosaceae) aerial part as a tea [41] |

[^3]: Bartha et al. Journal of Ethnobiology and Ethnomedicine (2015) 11:35
Table 4 Ethnoveterinary practices in the study area compared with earlier records in Romania and some European countries (Continued)

| Plant Name                  | Use                                                                 | Reference(s) |
|-----------------------------|----------------------------------------------------------------------|---------------|
| Rumex acetosella, R. obtusifolius, Rumex spp. | fruit as a tea (cattle, horse, pig, sheep) | 1-12          |
| Quercus petraea, Q. robur   | bark as tea [pig]                                                   | 3             |
| "hótszén"                   | as fodder [pig]                                                    | 2             |
| Alnus glutinosa, Gaertn.    | Aerial part as a tea                                               | [28]          |
| Agrimonia eupatoria         | Aerial part                                                       | [16]          |
| Artemisia absinthium        | Aerial part as a tea                                               | [28]          |
| Brassica oleracea ssp.      | Aerial part as a tea                                               | [16]          |
| Aesculus hippocastanum L.   | Seed (cattle, pig)                                                 | [28, 29, 34]  |
| Ceratonia siliqua L. (Fabaceae) | Leaf as a tea                                                   | [3]           |
| Chelidonium majus           | Aerial part as a tea                                               | [26]          |
| Chelidonium majus           | Leaf as a tea                                                     | [3]           |
| Equisetum arvense L. (Equisetaceae) | Seed as a decoction [cattle] | [19, 20, 22, 28, 30, 48] |
| Citrus limon (L.) Burm.     | Epicarp of the fruit with the seed of Oryza sativa L. (Poaceae) as a soup | [51]          |
| Fagus sylvatica L. (Fagaceae) | Bark as a decoction [cattle] | [34, 47]      |
| Eriobotrya japonica (Thunb.) Lindl. | Leaf as a tea                                                   | [16]          |
| Hordeum vulgare             | Roasted seed [pig, horse] or with salty flour with the seed of Secale cereale | [29]          |
| Daphne gnidiium             | Stem [16]                                                         |               |
| Juniperus communis          | Pseudofruit as a tea                                               | [25]          |
| Hypericum maculatum         | Aerial part as a tea                                               | [7]           |
| Quercus cerris L.           | Ground bark as a tea                                               | [47]          |
| Lythrum salicaria L. (Lythraceae) | Aerial part as a tea                                             | [16]          |
| Quercus petraea             | Ground bark in fodder                                              | [22]          |
| Phlomis purpurea L. (Lamiaceae) | Aerial part as a tea                                               | [8]           |
| Rumex acetosa L., R. confertus Willd., R. crispus | Seed as a decoction [19, 20, 21, 28, 30, 48] |               |
| Quercus rubra L. (Fagaceae) | Branch [rabbit]                                                   | [8]           |
| Rumex patientia L., R. stenophyllus Ledeb. | [cattle, horse, pig]                                              | [31]          |
| Polygonum aviculare L. (Polygonaceae) | Aerial part as a tea                                               | [8]           |
| Ruta graveolens L. (Rutaceae) | Aerial part as a tea                                               | [29]          |
| Potentilla reptans L. (Rosaceae) | Aerial part as a tea                                               | [8]           |
| Sambucus racemosa L. (Adoxaceae) | Fruit as a tea                                                   | [48]          |
| Rosmarinus officinalis L.   | Aerial part as a tea                                               | [16]          |
| Sisymbrium strictissimum L. (Brassicaceae) | Root as a decoction [cattle] | [30]          |
| Rumex acetosella            | Aerial part [cattle]                                               | [5]           |
| Solanum tuberosum L. (Solanaceae) | Tuber with the leaf of Robinia pseudococca L. (Fabaceae) | [48]          |
| Rumex sp.                   | Boiled seeds in water [pig]                                        | [64]          |
| Sorbus domestica L. (Rosaceae) | Bark as a decoction                                               | [20]          |
| aerial part as a tea        | [16]                                                              |               |
| Practice | Plant/Ingredient | Application/Use | Reference(s) |
|----------|-----------------|-----------------|--------------|
| Diuretics | *Petroselinum crispum* | Leaf [horse] | 3 |
| | *Allium cepa* | Bulb as a decoction [cattle, horse] | [34], or into the urethra [horse] [19-21] |
| | *Capsicum annuum* | Fruit | [29] |
| | *Herniaria hirsuta* | Aerial part | [16] |
| | *Narcissus stellaris* | Flower [cattle] | [30] |
| | *Simethis mattiazzi* | Root | [3] |
| | *Zea mays* | Stigma as a decoction | [3] |
| | *Peucedanum sp.* | Boiled herb as fodder | [48] |
| | *Polygonum bistorta* | Rhizome | [26] |
| | *Sambucus nigra* | Flower as a decoction [cattle] | [33] |
| | *Urtica dioica* | Root as a tea | [19] |
| Cataract | *Anagallis arvensis* | Dried and ground petals mixed with powdered sugar | [22] |
| | *Malus sylvestris* | Dried and ground pungent fruit [cattle] | [21,48] |
| Table 4 Ethnoveterinary practices in the study area compared with earlier records in Romania and some European countries (Continued) |
|---|
| *Matricaria chamomilla* | vinegar of the fruit as an embrocation [47] |
| *Nicotiana tabacum* | tea of the flower as a wash [22] |
| *Tilia cordata* Mill. (Malvaceae) | ground leaf spilt with saliva into the eyes [47] |
| “szentgyörgybéká” (Bombina variegata L., Bombinatoridae) | yellow part under the bark with milk as an embrocation [47] |
| put into the eyes [19,49] |
| *ash* | blown into the eyes [cattle] [49] |
| *salt* | blown into the eyes [horse] [19,33] |
| *sugar* | blown into the eyes [cattle] [19,33,49] |
| *powdered glass* | blown into the eyes [horses] [19,33] |
| *powdered porcelain* | blown into the eyes [33] |
| *Petroselinum crispum* leaf to promote expulsion of the placenta as fodder [cattle] | after delivery |
| *Hordeum vulgare* cvnr. *vulgare* roasted seed as fodder | antiparasitic, repellent, and insecticide effect; for scab |
| *Aconitum moldavicum* Hacq. (Ranunculaceae) root against lice and ticks | |
| *Capsicum annuum* fruit in oil | |
| *Veratrum album* ground root as a rub against lice, flies and mosquitoes [horse] | |
| *Artemisia absinthium* aerial part strewed against lice, spray with lime in the chicken pen | |
| *Ceclorum parqui* L. ‘Hér.’ (Solanceae) | |
| *Ballota nigra* L. (Lamiaceae) aerial part put under hen against lice | |
| *Brassica oleracea, B. oleracea var. capitata* sour sap of the leaf against scab [sheep] [19,20], salty leaf sap against ox warble fly [28] and lice | |
| *Laurus nobilis* L. (Lauraceae) fruits in olive oil | |
| *Cucurbita pepo* runner against flies as a rub | |
| *Pteridium aquilinum* (L.) Kuhn (Dennstaedtiaeae) leaf against fleas | |
| *Ballota nigra* L. (Lamiaceae) leaf against flies as a decoction | |
| *Juglans regia* leaf against flies as a rub | |
| *Laurus nobilis* L. (Lauraceae) fruits in olive oil | |
| *Euonymus europaeus* L. (Celastraceae) dried and ground fruit against lice [cattle, hen, pig] | |
| *Matricaria chamomilla* flowering top against fleas [cattle, sheep, dog] | |
| *Olea europaea* var. *europaea* seed oil as a repellent poultice | |
| *Peridium aquilinum* (L.) Kuhn (Dennstaedtiaeae) leaf against fleas | |
| Plant Name                  | Ethnoveterinary Practice                                                                 | Plant Name                  | Ethnoveterinary Practice                                                                 |
|-----------------------------|------------------------------------------------------------------------------------------|-----------------------------|------------------------------------------------------------------------------------------|
| *Helianthus annuus*         | seed oil smeared onto the animals against lice [cattle, hen, pig] [28,29]                 | *Ruta chalepensis*          | aerial part against flies as a rub [horse] [8], and against fleas [16]                   |
| *Helichrysum petiolatum*    | root as a decoction against scab [30]                                                     | *Sonchus oleraceus*         | aerial part in oil and as a poultice against flies [horse, cattle] [14], leaf and root as a decoction against lice, and as a bath against scabs [17], root as a decoction and wash against lice and scabs [sheep] [9] |
| *Juglans regia*             | leaf against flies as a rub [29]                                                          | *Urginea maritima*          | bulb in oil [16], or placed in shed as a repellent [cattle] [13]                        |
| *Nicotiana tabacum*         | leaf as a wash against lice, scabs and moths [20,33]                                      | *Veratrum album*            | aerial part as a tea [sheep] [16], root [calves] [55]                                   |
| *Persica vulgaris*          | sap of the ground leaf smeared onto the body against flies [pig] [33]                     |                             |                                           |
| *Polygnum lapathifolium*    | leaf as a wash against lice, scabs and moths [26,30]                                      |                             |                                           |
| *Rumex crispus*             | root against scab as a decoction [26]                                                     |                             |                                           |
| *Tussilago farfara*         | leaf against scab as a decoction [26]                                                     |                             |                                           |
| *Veratrum album*            | root dried and smeared onto the hair [19,20,22,25,33,41,48], or boiled with the leaf sap of *Brassica oleracea* against lice [sheep, cattle], or with goose fat [hen] [30] |
| cart-grease                 | as a rub against lice [34]                                                                |                             |                                           |
| copper sulphate             | in water with vinegar as a wash [sheep] [34]                                              |                             |                                           |
| fat                         | rancid fat against lice [hen], or with mercury [34]                                       |                             |                                           |
| lye-ashes                   | smeared onto the body [pig, sheep] [33]                                                    |                             |                                           |
| petroleum                   | smeared onto the body [pig, sheep] [33]                                                    |                             |                                           |
| potash-lye                  | in water as a bath [poultry] [33]                                                         |                             |                                           |

*Number superscripts refer to the specific villages studied in Covasna: Biborți [1], Bodó [2], Făilla [3], Răcoșul de Sus [4], Bățani Mici [5], Bățani Mare [6], Herculani [7], Tâlția [8], Aita Seacă [9], Oznica-Băi [10], Vârghiș [11], Valea Zălanului [12].

Full botanical citations for plants documented in this study are provided in Table 2.
for mastitis, skin problems, diarrhea, cataract, and in anthelmintic and diuretic drugs (Table 4).

Compared to the earlier records in Transylvania, we found 18 similar uses of the following (Table 4, Figure 4): *Calendula officinalis* flowers, as well as water with vinegar and salt to treat mastitis; *Armoracia rusticana* for respiratory ailments in Racu [34] and Lueta [47]; *Aristolochia clematitis* for external injuries in Ţara Călatei [21] and Homoród; and *Euphorbia amygdaloides* in Homoród [28,30] and Ghimeş [26]. *Allium sativum* has been documented in Romania for its widespread use as a vermifuge [29,34], similar to reports from Spain [3], Algeria [8], and Italy [14]. Similar to our findings, *Quercus* spp. fruits have been reported as vermifuges in Homoród [28]. The anti-diarrheal effect of *Q. rubra* has been observed in Morocco [8], and similar use of *Q. ilex* ssp. *ilex* have been reported in Catalonia [16], corresponding to our data on *Quercus petraea* and *Q. robur*. Furthermore, the use of *Artemisia absinthium* has been reported for diarrhea in Homoród [28], while for *Rumex* species (which are well-known for their anti-diarrheal effects), the use of *R. acetosella* has also been described in Lueta [47] and Croatia [5]. In contrast to the documented use of *Petroselinum crispum* leaves in the present work, the root has been recorded as a diuretic drug in Racu [34], Ţara Călatei [21], and Ghimeş [19,20].

For respiratory disorders, the cones of *Juniperus communis* were mentioned as a fodder in our survey, but as a tea in Moldova [25], while in Algeria the leaf of *J. phoenicea* has been documented [8]. The use of *Salix alba* has been similarly reported for rumination in Homoród [28,30], while *S. purpurea* has been documented in Albania [10]. In addition to the treatment of rumination disorders, *Petroselinum crispum* is used by itself in Covasna, but with bran in Trei Scaune [22]. In contrast to the use of *Polygonum minus*, the leaf of *P. lapathifolium* has been observed for wounds in Ghimeş [26]. The seed of *Cucurbita pepo* has been used for skin problems by itself in Covasna, but with castor oil in Harghita County [29].

Veratrum album root has been reported as a widespread repellent and antiparasitic drug in Covasna [41], Ghimeş [19], Ţara Călatei [21,48], Trei Scaune [22], Moldova [25,33], and Lueta [47]. *Juglans regia* leaves have also been reported for their use as a repellent in Harghita County [29]. Similar use of sugar and powdered glass has been observed for cataract in Ghimeş [19], Trei Scaune [22], and Moldova [33].

Comparison is represented between our data and those of the mountain regions of Pyrenees, Italian and Albanian Alps, which covers the overlap of each ingredient (Figure 4). Similar to our records, the use of *Achillea millefolium* was mentioned for rumination and digestive disorders in the Lombardy [54] and Albanian Alps [56]. As anti-lice treatment, the root of *Veratrum album* was mentioned in Italy [55], and the aerial part of the plant in Catalonia [16]. Similar to our records, *Allium sativum* was documented as vermifuge in Galicia [3], *Rumex* species...
against diarrhea [64], and haemostatic use of cobweb and milk for intestinal aches in the Albanian Alps [7].

Rituals and beliefs connected to local uses were sporadically mentioned in the region. The skin of Mustela nivalis was reported against udder inflammation caused by weasel bites, similarly to data recorded in Uz-valley [49]. To stimulate urination, animals should hear the sound of rippling stream or poured water (Table 4).

Some of the present uses were not found in earlier Transylvanian reports nor in databases of other countries, such as remedies for “hotness” and for applications following delivery (e.g. for stimulating expulsion of the placenta). In addition, several practices are no longer used today, but rather survive only in the memory of the villagers, such as the use of cobweb for wounds, “hótszén” for diarrhea, and the placement of lice into the urethra as a diuretic.

Conclusions
From an ethnoveterinary point of view, Covasna has proven to be one of the most interesting regions of Romania due to the diversity of knowledge concerning plant-, animal- and other substances-derived remedies. These traditions are practiced mostly by the more elderly subset of the population, forming a significant part of the local animal healthcare and cultural heritage of the region. Although some data survive only as memories from the past, people are proud of their traditional knowledge, which is still maintained in rural areas. In addition, holders of this knowledge have an important role as natural resource managers.

Although ethnoveterinary service is cheaper and easily available compared to modern veterinary medicine and pharmaceuticals, factors such as the size and prevalence of herds, as well as the frequency of citation of traditional ethnoveterinary practices are diminished in comparison to earlier records of Romania, and other European countries. This change has also been influenced by shifting sociocultural factors concerning local economies and emigration patterns, as well as less frequent opportunities for the vertical transmission of traditional knowledge. Future studies to support our further understanding of the role that ethnoveterinary practices can play in managing animal health are certainly merited. Such studies are useful not only for the purposes of folkloric preservation, but can also form a foundation on which to support sustainable development efforts aimed at promoting environmentally friendly, cost-effective means of maintaining livestock health.

Competing interests
The authors declare that they have no competing interests.

Authors’ contributions
SGB, LB and NP conducted the fieldwork. SGB and NP performed the comparative literature analysis. CLQ performed statistical analyses of the data. All authors participated in the writing and revision process and read, discussed and approved the final manuscript.
Acknowledgments

We are grateful for the help and contributions of the study participants. This work was supported by a grant from the OTKA (Hungarian Scientific Research Fund, PD 108534).

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Received: 11 March 2015 Accepted: 13 April 2015

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