Ethnoveterinary Use of Plants to Treat Ruminant's Common Ailments in Rural West Java, Indonesia

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ABSTRACT

For generations, the inhabitants of rural people of Pasir Putih Village, Rancakalong Subdistrict, Sumedang Regency, West Java, have relied on medicinal plant to maintain the health of their livestock and treat various illness that may distress their livestock. Nowadays, however, the knowledge and practice of livestock treatment using various medicinal plants in rural areas of Pasir Putih Village has tended to eroded, due to the influence of commercial livestock businesses development. Consequently, to treat various livestock, farmers have to buy various modern medicines from the city and the prices are expensive. In addition, the Traditional Ecological Knowledge (TEK), particularly in the young generations has eroded. The aim of this study is to explore and to document the information regarding various ruminant livestock ailments, diversity of plant species used as ethnoveterinary medicine, plant part used and application method applied in treating ruminant ailments, and source of ethnoveterinary medicinal plants in the rural ecosystems of the study area. Method used in this study was mixed-method qualitative and quantitative with an ethnoveterinary medicinal approach. The study resulted showed that during the study recorded 14 common ailments of the ruminants, at least a total of 46 plant species in 41 genera and 17 families were used traditionally and their combination for the treatment of 14 diseases in the study area. Zingiberaceae found to be a dominated family with seven plant species followed by Asteraceae (5 species), Alliacea (5 species), and Fabaceae (5 species). The most commonly used plant parts were leaf (15 species), fruit (11 species), and rhizome (7 species). The wide application of medical plants as the form of drunk (66.67 %), followed by eaten (7.14 %), smeared (7.14 %), and put on (7.14 %). Based on the were the most important medicinal plants used to treat various ruminant ailments Fidelity Level (FL), it was recoded five medical plants, viz., *Allium sativum* (34.09), *Kaempferia galanga* (34.09), *Zingiber officinale* (34.09), *Curcuma longa* (34.09), and *Aloe vera* (34.09), in the study area. Regarding source of 46 plant species of ethnoveterinary medical plants was harvested from the homegarden 23 species (50.00 %), garden 11 species (23.91 %), and 12 species (26.05 %) acquired from both homegarden and garden. Thus, the agroecosystem of homegarden and garden are important role not only for the human food production but also livestock feed in the rural ecosystem.

Keywords: Ethnoveterinary, Medicinal plants, Ruminant

INTRODUCTION

Rural people of West Java, Indonesia, have traditionally raised various livestock, including chicken, sheep, goat, cow and buffalo. The livestock have an important role for ecological, and socio-economic-cultural functions for the rural people (Mutaqin, 2015; Partasasmita et al., 2016; 2017). The ecological functions, for example, most dung of livestock are traditionally used for the organic fertilizers applied in various rural agroecosystem types, including homegarden, garden, and rice field. While socio-economic and cultural functions, various products of the livestock, including egg, milk, and meat have provide benefits for fulfilling the household needs of the subsistent economy and some surplus products are sold to obtain a cash income of the rural people (Partasasmita et al. 2017).

The management of livestock that is undertaken by the farmers in rural area have been traditionally based on the local knowledge (LK) or the traditional ecological knowledge (TEK) and is strongly embedded with local tradition, and adopted the LEISA (Low-External Inputs and Sustainable Agriculture) system (Iskandar and Iskandar, 2023). As a result, in a raring various livestock of village farmers, including local chicken and ruminants (sheep, goats, and cattle), which some inputs of the farming systems, such as poultry and cattle breed, animal feed, and medicines are mainly utilized from the internal village natural resources. In other words, some internal inputs of the village farming systems have been maximized instead of paying from the market or externals.

The Traditional Ecological Knowledge (TEK) of the veterinary health care system acquired by traditional farmers and is orally transformed from one generation to other. It is transmitted by oral by using mother language instead of writing. As a result, the TEK is very profound, but local and vulnerable to extinction because it is not written down (Iskandar, 2018). Study on the TEK of the traditional people on veterinary is named ethnoveterinary. Ethnoveterinary knowledge is deeply rooted in many traditional culture and is integral part of subsistence of animal husbandry in many traditional communities across cultures in the worlds, including Indonesia, India, Nepal, Namibia, Ethiopia (Yirga et al., 2012; Verma, 2014; Eshetu et al, 2015; Iskandar, 2018; Dhakal, 2021; Eiki et al., 2021; Pratama et al., 2021; Uprety et al., 2022; Bath et al., 2023).

Ethnoveterinary medicines play an essential in animal production and livelihood development in many rural areas and is frequently the only option for farmers to treat their sick animals. So, the ethnoveterinary medicine, deal with traditional livestock health care which encompass the knowledge, skills, methods, practice and belief about livestock health care by using plant species (Verma, 2014; Dhakal et al., 2021). Traditionally, to keep animals healthy, traditional healing practices have been applied for centuries in many countries and have been passed down orally from generation to generation (Eshetu et al., 2015; Khan et al., 2019; Stucki et al., 2019; Adekunmi et al., 2020; Chaachouay et al., 2022; Rehman et al., 2022). Ethnoveterinary medicines are used extensively and quite effectively for primary health care treatment for the farmers in rural areas. Ethnoveterinary medicines play an essential in animal production and livelihood development in many rural areas and is frequently the only option for farmers to treat their sick animals. It therapies provide the best choices to farmers in the rural farmers of West Java and other village area of Indonesia, due to has a rich of the ethnoveterinary medicinal plants that are grown in various agroecosystem types, including homegarden, garden/mixed-garden, and rice field. However, due to intensive market economy and rapid development of modern livestock in rural area, the traditional management of rural people on livestock has dramatically changed. For instance, most all inputs of raring livestock, including day old chicks, cattle breed, artificial food, vitamins,

antibiotics, and factory medicines must be paid from market. In addition, various outputs, including egg, meat, and milk have been mainly traded instead of for fulfilling daily needs of the rural people. As a result, the rural livestock business is practiced based on the heigh-external inputs agriculture (HEIA) which are highly dependent on outsider inputs, and must be purchased at expensive costs, and are vulnerable to changes in various inputs and output prices nationally and globally. In addition, many ethnoveterinary medicinal plant species which are commonly grown in various village landscapes, including forest, garden or mixed-garden, rice field, and rice filed have been decreasing due to forest destructions and are converted to other land use types. As a result, the traditional ethnoveterinary practices of the rural people have been rarely practiced and traditional ecological knowledge of village farmers have eroded.

Some studies on ethnoveterinary have been carried out in Indonesia (Mutaqin, 2015; Kaunang et al., 2019; Pratama et al., 2021), but the number is on the whole still limited. The aims of this study is to explore and document the information regarding various ruminant livestock ailments, diversity of plant species used as ethnoveterinary medicine, plant part used and application method used in treating ruminant ailments, and source of ethnoveterinary medicinal plants in the rural ecosystems of Pasir Biru Village, Rancakalong Subdistrict, Sumedang Regency, West Java. In this article, the three kinds of ruminants, namely sheep, goats, and cattle, hereinafter are referred to simply as ruminants.

METHODS

Study area

This study was conducted in Pasir Biru Village, Rancakalong Subdistrict, Sumedang Regency (Figure 1). Pasir Biru Village is located at an altitude of around 900 meters above sea level. The air temperature in this village ranges from 25^{o} - 27^{o}Celsius, with air humidity is around 62 - 95%. The average rainfall in Pasir Biru Village is 2031 mm, with the number of rainy season reaching six months (Statistics of Rancakalong, 2022).

The agricultural system in Pasir Biru Village can be divided into two groups, namely dry land farming systems (*lahan darat*) and wet land farming systems (*lahan basah*). The land farming system consists of homegarden, gardens and mixed-garden, and bamboo gardens. Meanwhile, wetland agriculture is mainly planted by rice by supporting small-scale village irrigation system.

Most of the population in Pasir Biru Village (58%) are farmers. Farmers have raised various domestic livestock, such as local chickens, goats, sheep, and cow. The livestock have been managed by local knowledge or traditional ecological knowledge (TEK), strongly embedded with local culture aspects, including beliefs. Among the traditional ecological knowledge, concerning the used various medical plants for treating the livestock ailments.

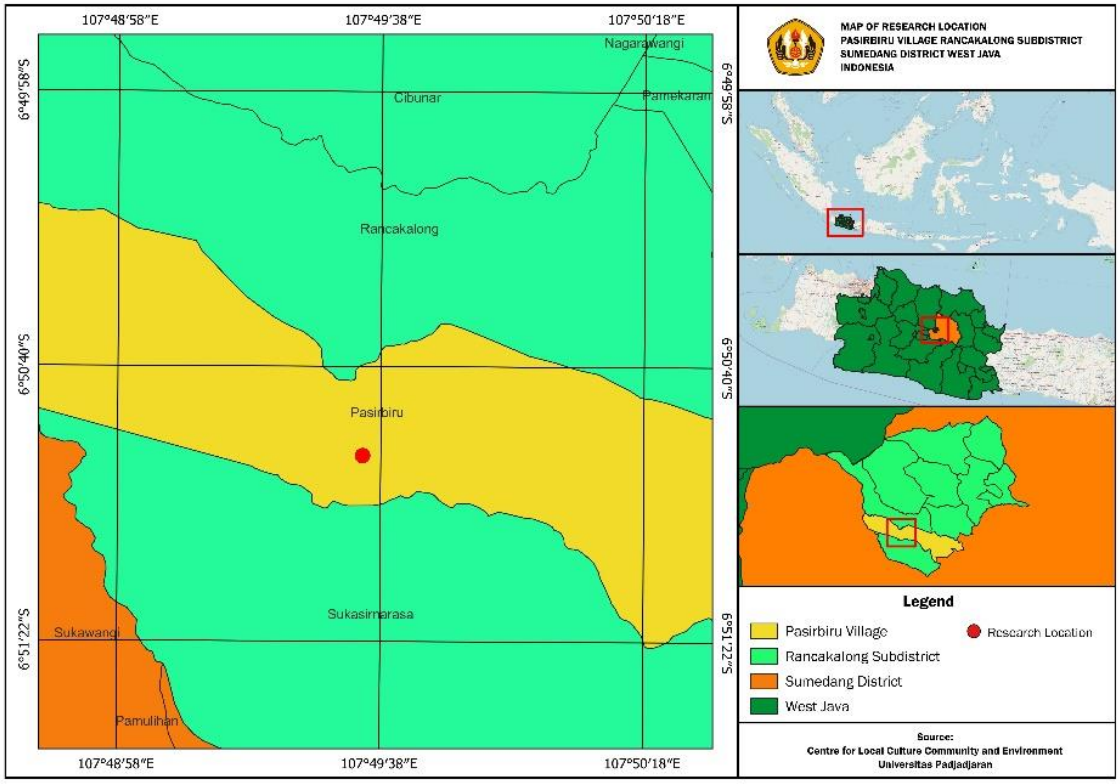

Figure 1. Study area

Data collection

The mixed-method, qualitative and quantitative with an ethnobiology and ethno-veterinary medicine approach was employed in this study (Abbass et al., 1994; Albuquerque et al., 2014). This study used primary and secondary data. Primary data were collected based on qualitative and quantitative data, conducted in 2011 and updated in 2022. The qualitative data collection techniques used observation and semi-structure interviews or deep interview. Field observations were carried out by observing the local environment in the research village, such as observing the condition of the residents' livestock and livestock pens, observing the condition of the homegarden and gardens in the village. In addition, researchers also observed residents taking species of medicinal plants for livestock, and observed residents preparing medicinal plant ingredients and treating livestock.

Semi-structured interviews were carried out by informants who were considered competent, selected purposively. The informants were livestock owners based on different types of livestock ownership, such as owners of goats, sheep and cattle. Informal leaders and formal village leaders, such as the village head and his staff. The informants were interviewed in depth using an interview guide that had been prepared previously. However, some of which arise naturally during the course of the conversation.

While, the quantitative data was carried out using structured interviews using questionnaires with respondents selected representatively for the number of heads of families. To determine the number of respondents using the formula (Iskandar, 2018), as follows:

$$n = \frac{N.Z^2.P.(1-P)}{N.d^2 + Z^2.P(1-P)}$$

whereby,
n = total of respondent
N = total of household heads (1.800) households
Z = normal variable value (1.96)
P = the largest possible proportion (0.50)
D = sampling error (0.1)

There are 1.080 house heads in Pasir Biru Village, thus 88 were randomly chosen using statistical formulas. Each respondent was interviewed using a questionnaire, with several questions related to various ethnoveterinary, such as kinds of ruminant ailments, various medical plants used, part used, plant sources, and application method used of medical plants for treating ailments.

To documented various medicinal plants farmed in the homegarden and gardens, 30 plot samples of the homegarden and 30 samples of the garden, were selected of sampling plot. Each species of medicinal plant in the sampling plots of the homegarden and garden were recorded, Moreover, to identified some unidentified plants, the vouchers plant species were made and analyzed in the Herbarium Jatinangoriense managed by the Department of Biology, Faculty of the Mathematics and Natural Sciences, Universitas Padjadjaran.

Data Analysis

Qualitative data was analyzed by several steps, namely cross-checking, summarizing and synthesizing from different sources, including the statistical data, reports, field observation, and made a narrative account with descriptive analysis (Iskandar et al., 2018; Newing et al., 2011).

Meanwhile, the quantitative data from interviews with respondents were analyzed statistically by calculating the frequency, i.e., the percentage of the respondent's answers of the questionnaires. The following is the statistical formula to calculate the frequency of respondent's answer which is later described in descriptive analysis (Newing et al., 2011; Iskandar et al., 2018).

$$Fi = \frac{n_i}{N} = 100\%$$

whereby,
Fi = percentage of total respondents
ni = frequency of respondents' answer
N = total respondents

To determine plant species as medicinal ruminant ailments based on respondents, it was analyzed by the Fidelity Level (FL). The fidelity level (FL %) was the percentage of the information who reported the uses of certain plant species to cure a specific ailment reported from the area of study. The fidelity level was calculated as follows (Rehman et al., 2022):

$$\mathrm{FL} = \frac{\mathrm{Np}}{\mathrm{N}}\ x\ 100$$

Where Np is the number of respondents that mention a use a plant species to cure a specific ailment and N is the number of respondents that use the plant to cure any ailments.

The determination of the medicinal plant floristic similarity between the homegarden and garden, the Sorensen's similarity coefficient was used. Sorensen binary coefficient (present/absent) was calculated using the following formula (Araujo and Ferraz, 2014):

$$SSC = \frac{2a}{2a + b + c}$$

Where:
SSC = Sorensen's similarity coefficient
a = number of medical plant species with simultaneous occurrence in samples of homegarden and samples of garden (12 species)
b = number species that occur only in samples of garden (11 species)
c = number of species that occur only in samples of homegarden (23 species)

RESULTS

Common ruminant's ailments

On the basis of the deep interview with competent informants, it repealed that 14 kinds of ruminant ailments or diseases, including sarcoptic mange (*borok kutu*), aphtha or mouth ulcers (*borok biwir*), helminthiasis (*cacingeun*), tetanus, furuncles (*bisul*), dyspepsia (*pudegdeg*), conjunctivitis (*nyeuri panon*), diarrhea (*nyeri beuteung*), mastitis (*budug susu*), gastroenteritis (*kabebeng*), and nasopharyngitis (*salésma*) are predominantly documented in study area (Table 1). The local rural people can recognize various ruminant ailments, particularly based on distinctive diagnostic signs of the sick ruminant. Individual ruminant is being ill of scabies, for example, it can be recognized that such ruminant has sores on the skin and hair loss. While the individual ruminant is being illness of helminthiasis, it can be recognized that such ruminant eats less or eats a lot but the livestock's body is thin, small worms are found in the feces.

Table 1. List of common ailment or disease, its vernacular term and common symptoms

No.	Sundanese term	English common name	Common symptoms
1	*Bisul*	Boil	Ruminants have small bumps on their bodies and if left untreated they will ooze pus from the bumps
2	*Borok*	Scabies	Sores on the skin and hair loss
3	*Borok biwir*	Ulcers on the lip	Lips were injured and blood was coming out of the wound in the mouth
4	*Budug dina susu*	Mastitis	Ruminants' breasts look swollen, do not produce milk, and make a bleating sound
5	*Cacingeun*	Helminthiasis	They eat less or eat a lot but the livestock's body is thin, small worms are found in the livestock feces
6	*Dipacok oray*	Snake bitten	The front legs or hind legs of ruminants can be observed with small scars from poisonous snake bites
7	*Karacunan*	Poisoning	Ruminants usually suddenly produce foam from the mouth. If not treated quickly, they may die
8	*Nyeri beuteung/diare*	Diarrhea	Ruminants usually produce very watery feces
9	*Nyeri panon*	Sore eyes	The eyes of ruminants turn red and usually produce tears
10	*Pateuh*	Fracture	The ruminant's leg bones were broken due to the ruminant falling into a hole

11	*Pikeun kasegeran tubuh*	Weak and no-appetite or feed supplement	Ruminant activity was observed to be lethargic and lacking activity
12	*Pudegdeg*	Dyspepsia	The ruminant's stomach enlarges and when it is hit, a distinctive sound is heard
13	*Salésma jeung batuk*	Cold and cough	Ruminants usually cough and thick mucus comes out of their nose
14	*Tetanus*	Tetanus	Ruminants have difficulty eating, their eyeballs are red, sometimes foam comes out of their mouths

Table 1 shows some ruminant ailments recorded in Pasir Putih Village are similar in that of other areas in Indonesia and other countries. For example, some ruminant ailments of Pasir Biru, including bone fracture, diarrhea, bloating or dyspepsia, snakebite envenoming, poisoning, helminthiasis were also recoded in that of Brojonegoro, East Java and Using Village Community of Banyuwangi, East Java (Kaunang et al., 2019; Pratama et al., 2021). Similarly, some ruminant ailments, including diarrhea, bloating or dyspepsia, fracture or bone dislocation, cough, snake bitten, eye problem, and helminthiasis were predominantly recorded in Nepal and Ethiopia (Eshetu et al., 2015; Uprety et al., 2022).

Diversity of plant species used as ethnoveterinay medicine

It was recorded a total of 46 species representing of 41 genera and 17 families different medical plants are traditionally used by the local rural people of Pasir Biru to treat 14 kinds of ruminant ailments (Table 2, Figure 2).

Table 2. List of plant used for treating ruminant ailments

No	Vernacular name	Source of plants harvested	Scientific and family names of medical plants	Kinds of treating livestock illnesses or Ailment	Parts of plants used	Compound of medical plants (Wijayakusumah, 1997; Iskandar et al. 2023).
1	*Asem*	Homegarden	*Tamarindus indica* L., Fabaceae	Cold and cough	Fruit	
2	*Awi haur*-o	Garden	*Bambusa vulgaris* Schard., Fabaceae	Helminthiasis, Diarrhea	Leaves	
3	*Batrawali*-o	Garden	*Tinospora tuberculata* Beumee, Menispermaceae	Scabies, Poisoning	Stem, Leaves	Alkaloids, soft resins, starches, picroretoside glycosides, pikroretin bitter substances, berbelin and palmatin
4	*Bawang beureum*-o	Homegarden	*Allium cepa* L., Alliaceae	Dyspepsia, Fracture of the bone	Bulb	Protein, fat, flying oil, calcium, phosphorus, iron, vitamin A, vitamin B1, and Vitamin C
5	*Bawang bodas*	Homegarden	*Allium sativum* L., Alliaceae	Scabies, Helminthiasis, Boil, Mammary gland inflammation	Bulb	
6	*Bawang kuncay*	Homegarden	*Allium tuberosum* Rottler Ex.Spreng, Alliaceae	Sore eyes, Fracture of bone	Leaves	Protein, fat, flying oil (diallyl-disulfide and alilpropildisulfida), calcium, phosphorus, iron, vitamins A, B1, and C

7	*Bintinu*-o	Garden	*Melochia umbelata* Houtt.Stapf, Malvaceae	Fracture of bone	Stem bark	
8.	*Cau*-o	Homegarden	*Musa x paradisiaca* L, Musaceae	Scabies	Flower	
9	*Cengkéh*-o	Garden	*Syzigium aromaticum* (L.) Merr and Perry, Myrtaceae	Dyspepsia	Fruit	Essential oils, eugenol, acetyl eugenol, alpha-beta caryophylline, furtural, eugenin, eugentin, isoeugenitin, iso-eugenitol, oleanolic acid
10	*Cikur*-o	Homerdaen, Garden	*Kaempferia galanga* L., Zingiberaceae	Dyspepsia, Fracture of bone, Cold and cough	Rhizome	Kaempferide, flying oil (pinen, methyl cinnamate, cineol, eugenol, sesquiterpenes), galangin, galangol, yellow crystals
11	*Cocor bébék*	Homegarden	*Kalanchoe pinnata* (Lmk.) Pers, Crassulaceae	Mastitis	Leaves	
12	*Dadap cangkring*-o	Homegarden, Garden	*Erythrina fusca* Lour, Fabaceae	Cold and cough, Supplement	Leaves	
13	*Gedang*-o	Homegarden, Garden	*Carica papaya* L, Caricaceae	Helmintiasis, Dyspepsia	Fruit seed, Fruit sap	Papain, carpalainal alkaloids, pseudo carpane, glycosides, saponins, saccharose, dextrose, levolusa, beta carotene, pectine, d-galactose, 1-arabnosine, papavotimine papain, phytokinase, glucoside cacirin, lysosine, beta carotene, pectine, d-galactose, 1-arabnosine, papavotimine papain, phytokinase, glucoside cacirin, lysosin, beta carotene, pectine, d-galactose, 1-arabnosine, papavotimine papain, phytokinase, glucoside cacirin, lysosin, beta carotene, pectine, d-galactose, 1-arabnosine, papavotimine papain, phytokinase, glucoside cacirin, lysosine, lipase, gentase and cyclotose
14	*Jahé*-o	Homegarden, Garden	*Zingiber officinale* Roxb., Zingiberaceae	Scabies, Mammary gland inflammation,	Rhizome	Isorhamnetin, kaempferide, galangin, galangin 3-methyl ether, rhamnocitrin,

				Fracture of bone		volatile oil, methyl cinnamate, cineol, d-pinen, eugenol as soon as the pen
15	*Jahé beureum*	Homegarden, Garden	*Zingiber officinale* Roxb., var. *rubrum* Zingiberaceae	Dyspesia	Rhizome	
16	*Jati*	Homegarden	*Tectona grandis* L, Verbenaceae	Diarrhea	Stem	
17	*Jambu batu*-o	Homegarden	*Psidium guajava* L., Myrtaceae	Diarrhea	Leaves	Tannins, eugenolm fatty oils, resins, tanners, triterpenoids, apple acids, amino acids, calcium, phosphorus, sulfur, vitamins A, B1, and C
18	*Jawer kotok*-o	Homegarden	*Coleus scuttelaroides* (L.) Benth, Lamiaceae	Scabies, Helmintiasis	Leaves	Essential oils, tannins, fats, phytosterol, calcium oxalate, pectic substances
19	*Jéngkol*-o	Garden	*Archidendron fauciflorum* (Benth.) I.C. Nielsen, Fabaceae	Helmintiasis	Fruit	
20	*Jeruk mipis*-o	Homegarden, Garden	*Citrus aurantifolium* (Christm. Et.Panz), Rubiaceae	Dyspepsia	Fruit skin	Amino acids (tritopan, lysine), flying oils (citral, limonene, veladren, camphor limon, cadinen, geramil acetate, linalylacetate, actilal dehyd, nonidehyde), resin, glycosides, citric acids, fats, calcium, phosphorus, cadinen, geramil acetate, linalylacetate, actilal dehydes, nonidehydes), resin, glycosides, citric acids, fats, calcium, phosphorus, iron, sulfur, sulfur, sulfuric acid and vitamins B_1 and C
21	*Jinten hideung*	Garden	*Nigella sativa* L, Ranunculaceae	Scabies, Helminthiasis	Seed	
22	*Jongé*-o	Homegarden	*Emilia javanica* (Burm.f) C.B. Rob, Asteraceae	Snake bitten	Flower	
23	*Kaca piring*	Homegarden	*Gardenia jasminoides* J.Ellis, Rubiaceae	Cold and cough	Leaves	
24	*Kacang koas*	Garden	*Mucuna pruriens* (L.) DC, Fabaceae	Snake bitten	Fruit	
25	*Kahitutan*	Homegarden	*Paediria foetia*	Dyspepsia	Leaves	

			L, Rubiaceae			
26	*Kalapa*-o	Homegarden, Garden	*Cocos nucifera* L., Arecaceae	Diarrhea	Fruit	Cocositol, lime, fiber, pentose, essential oils, fatty oils, carbohydrates, stymasterin, phytosterin, choline, ridekanoic acid, vitamins A, B, C, E
27	*Kapulaga*-o	Homegarden	*Amomum cardamomum* auct. Non L., Zingiberaceae	Dyspepsia	Rhizome	Flying oils (cineol, terpineol, and borneol), manganese starch, sugar, fat, protein and silicate
28	*Kawung*	Garden	*Arenga pinnata* Merr, Arecaceae	Helminthiasis, Dyspepsia	Flower	
29	*Kélor*	Homegarden	*Moringa oleiefera* Lam, Moringaceae	Helminthiasis	Leaves	
30	*Ketépéng badak*	Garden	*Cassia alata* L, Caesalpiniaceae	Helminthiasis	Leaves	
31	*Konéng*-o	Homegarden, Garden	*Curcuma longa* L., Zingiberaceae	Scabies, Tetanus, Boil	Rhizome	Essential oils (tumerone, zingiberine), phellandren, sesquiterpenes alcohol, borneol, curcumin, desmetoksikurkumin, metosikurkumin bides, starches, tannins, resin
32	*Konéng gedé*-o	Homegarden	*Curcuma xanthorrniza* Roxb, Zingiberaceae	Dyspepsia, Diarrhea	Rhizome	Flying oils (pelanolten and tulmerol), curcumin, starch
33	*Konéng hideung*	Homegarden, Garden	*Curcuma aeruginosa* Roxb, Zingiberaceae	Helminthiasis	Rhizome	
34	*Leunca*-o	Homegarden, Garden	*Solanum nigrum* L, Solanaceae	Mammary gland inflammation	Fruit	Glycos alkaloids, solanine, solamargine, solasidine, diosgenine, tigonenin, atropine and saponin
35	*Lidah buaya*-o	Homegarden	*Aloe vera* (L.) Burm.f, Asphodelaceae	Scabies, Helminthiasis, Boil	Leaves	Aloin, barbaloin, aloe-emodin, aloenin, aloesin
36	*Mahkota dewa*	Homegarden	*Phalarea macrocarpa* (Scheff.) Boerl, Thymelaeaceae	Diarrhea	Fruit	
37	*Mawar*	Homegarden	*Rosa pendulina* (L.), Rosaceae	Sore eyes	Flower petals	Sitrol, citronellol, geraniol, linalol nerol, eugenol, feniletila alcohol, farnesol, nonyl aldehyde
38	*Paria*-o	Homegarden	*Momordica charantia* L., Cucurbitaceae	Helminthiasis	Leaves	Mucus, saponins, fats, calcium, nitrogen, organic phosphate compounds, palmitate acid, linoleic acid, oleic

						acid, stearic acid, fatty acids, tannins, calcium oxalates and sulfur, momordisin, momordin
39	*Peuteuy sélong*	Garden	*Acaciella glauca* (L) L.Rico, Fabaceae	Helminthiasis	Fruit	Mimosine, leukanin, minerals, enzymes, protein, leukanol, fat, calcium, phosphorus, iron, vitamins A, B, C
40	*Sembung*-o	Homegarden	*Blumea balsamifera* (L.) DC, Asteraceae	Supplement	Leaves	Borneol, cineole, limonene, palmitin acid, myristin, sesquiterpenic alcohol, tannins, pirokatechin, glycosides
41	*Séréh wangi*-o	Homegarden	*Cymbopogon nardus* (L.) Rendle, Poaceae	Dyspepsia	Srem	Essential oils, hydroxicavicol, cavicol, cavibetol, carvabrol, eugenol, P-cymene, cineole, caryopniyllene, cardinene, estragol, terpene, phenyl propane, tannin, sugar starch
42	*Seureuh*-o	Homegarden	*Piper betle* L., Asteraceae	Scabies, Sore eyes	Leaves	Essential oils, hydroxicavicol, cavicol, cavibetol, carvabrol, eugenol, P-cymene, cineole, caryophyllene, cardinene, estragol, terpene, phenyl propane, tannin, sugar starch
43	*Sirsak*-o	Homegarden Garden	*Annona muricata* L., Annonaceae	Cold and cough	Leaves	Alkaloids and anonain substances
44	*Tapak liman*	Homegarden Garden	*Elephantopus scaber* L., Asteraceae	Poisoning	Leaves	
45	*Tataropongan*	Homegarden	*Equisetum ramosisimum* (Milde) Christenh & Husby, Equisetaceae	Fracture of bone	Stem	
46	*Tempuyung*	Homegarden	*Sonchus arvensis* L, Asteraceae	Mastitis	Stem, Leaves	

Note: *o-obat tradisional*, traditional medicinal plant for the humans

In this study, the highest number of plant species having ethnoveterinary medicinal used were found in family of Zingiberaceae (7), Asteraceae (5), Alliaceae (5), and Fabaceae (5) (Figure 1).

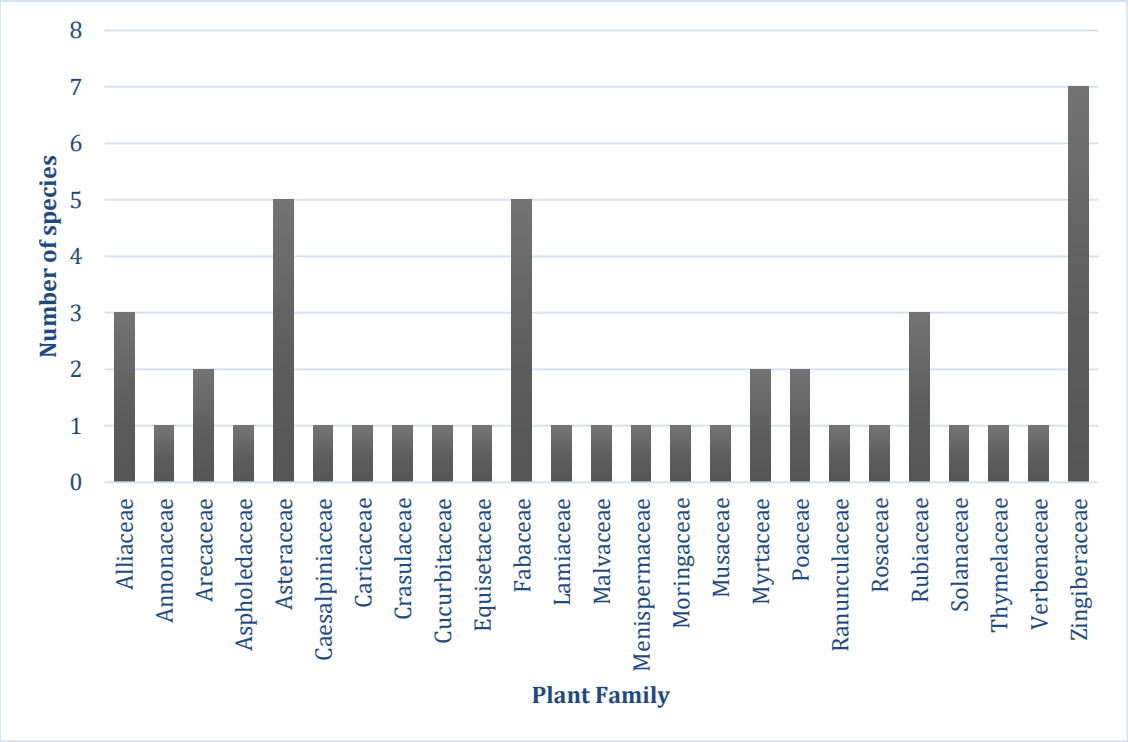

Figure 1. Represent of families and number of ethnoveterinary medical plants utilized by rural farmers for ruminant health care in Pasir Putih Village, Sumedang

Family of Zingibercaceae, for example, rhizome of *konéng hideung* (*Curcuma aeruginosa*) is traditionally used for treating helminthiasis; *konéng gedé* or *temu lawak* (*Curcuma xanthorrniza*) for treating diarrhea, dyspepsia; and *konéng* (*Curcuma longa*) for treating scabies, tetanus, boil, while *kapulaga* (*Amomum cardamomum*) is predominantly used for treating dyspepsia; *jahé beureum* (*Zingiber officinale*) for treating dyspepsia, *cikur* (*Kaempferia galanga*) for treating scabies, mammary gland inflammation, and fracture of bone (Table 2).

Based on the Fidelity Level (FL), it was recoded the FL medicinal plants varied between 11.36 and 34.09. Five medical plants, viz., *Allium sativum* (34.09), *Kaempferia galanga* (34.09), *Zingiber officinale* (34.09), *Curcuma longa* (34.09), and *Aloe vera* (34.09), were the most important medicinal plants used to treat various ruminant ailments in the study area. Although the various species of medicinal plants used by the rural people to treat various ruminant ailments have not been specifically laboratory tested, these species of plants are known to have various secondary bioactive which are important for health. *Konéng* (*Cucuma longa*), for example, consist of compound of medical plants, including essential oils (tumerone, zingiberine), phellandren, sesquiterpenes alcohol, borneol, curcumin, desmetoksikurkumin, metosikurkumin bides, starches, tannins, and resin (Table 2). In addition, various species of Zingberaceae plants have been practiced for generations by rural people to treat various diseases or health disorders in humans. For example, *jahé* is traditionally used for treating ringworm, rheumatism, and supplement. While, *konéng gedé* is commonly used for treating body ache and gastritis; and *konéng* is commonly used for treating gastritis, eliminate the body odor of new women giving birth (Iskandar et al., 2023).

Among the ruminant ailments, the helminthiasis, scabies, and dyspepsia, have applied a higher diversity of medical plants used compare to that of other ruminant ailments (Figure 2).

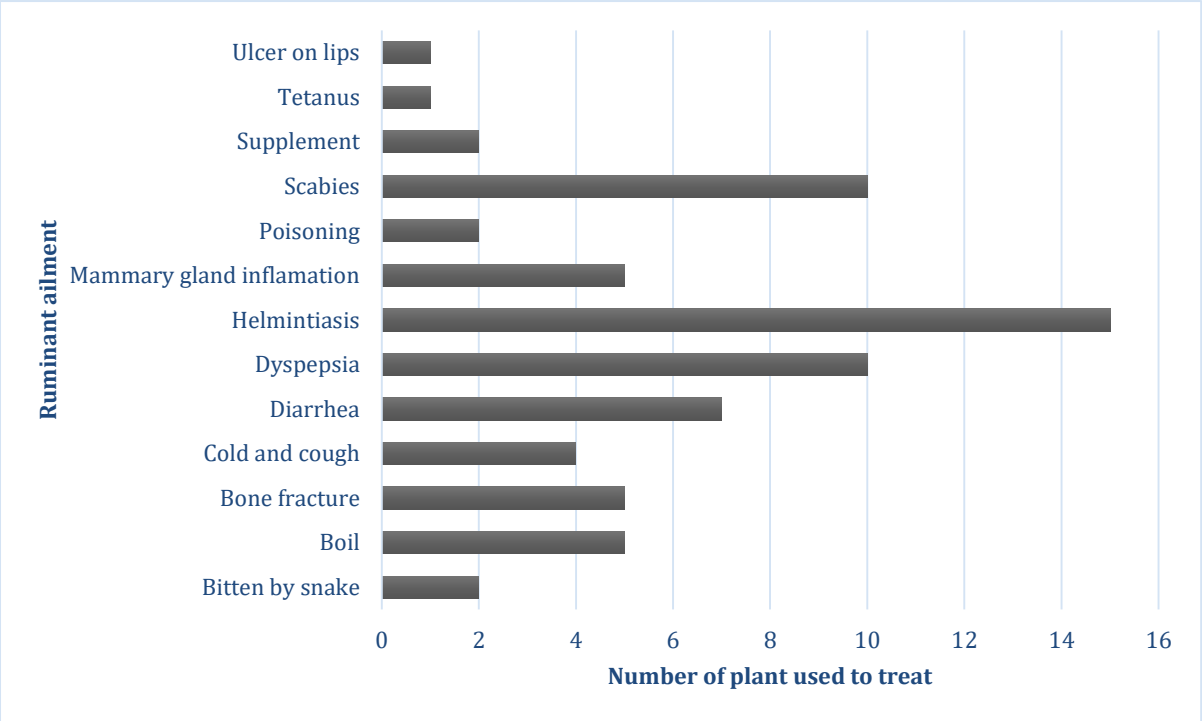

Figure 2. Represent of ruminant ailments and number of ethnoveterinary medicinal plant utilized by rural farmers for ruminant health care in Pasir Putih Village, Sumedang Regency

Plant part used and application method

Based on total of 46 medical plant species, recorded the most commonly used plant part for remedy preparation of ruminant ailment in Pasir Jambu Village were leaf (15 species), followed by fruit (11 species), and rhizome (7) (Figure 3).

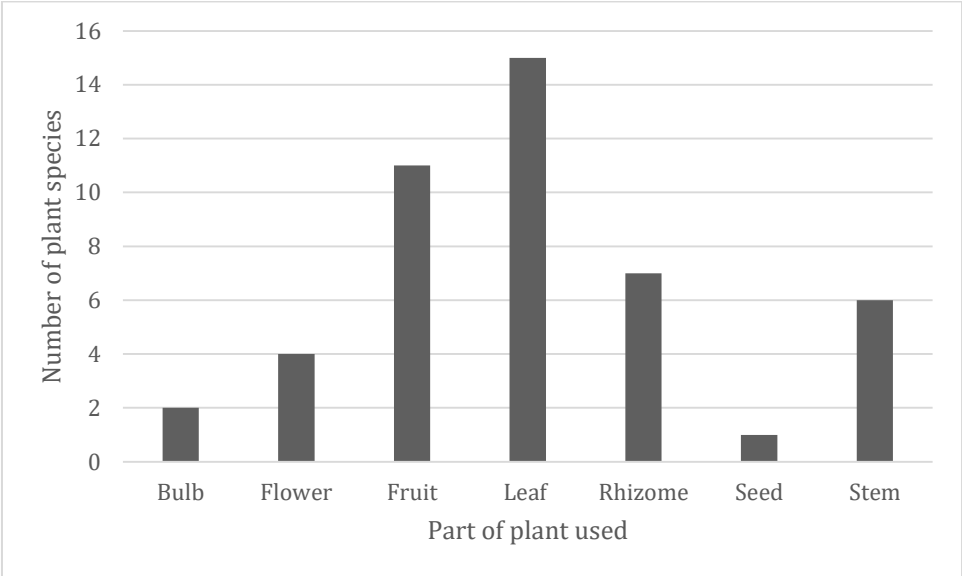

Figure 3. Part of ethnoveterinary medical plants utilized by rural farmers for ruminant health care in Pasir Putih Village, Sumedang Regency

Various application methods of ethnoveterinary medicinal plants were documented in this study based on type and form ruminant ailments being treated. Dominant methods were traditional applied for treating various ruminant ailments, namely the medicinal plants were usually pounded and directly drunk (66.67%), followed by eaten (7.14%), smeared (7.14%), and put on (7.14%) (Figure 4).

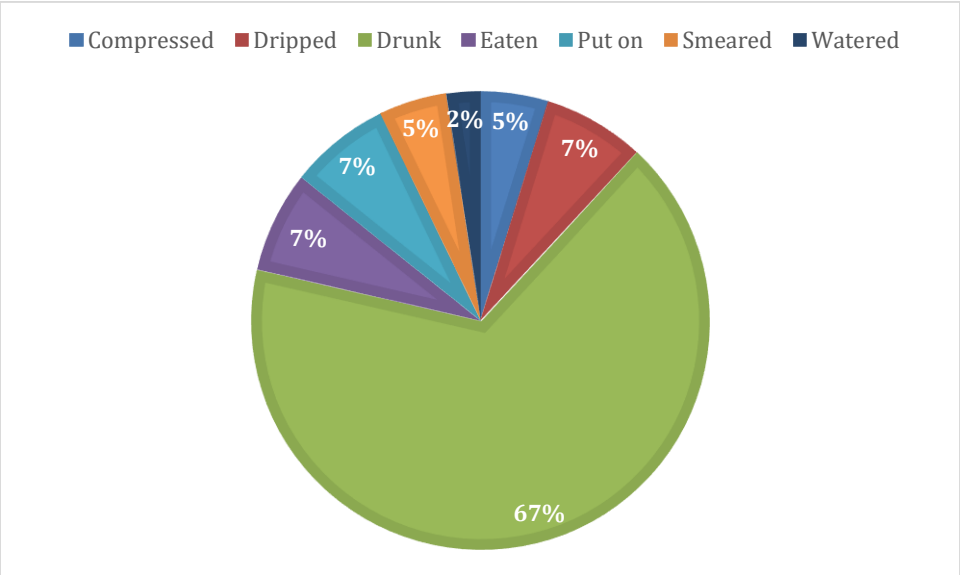

Figure 4. Application methods applied of ethnoveterinary medical plants utilized by rural farmers for ruminants health care in Pasir Biru Village, Sumedang

Figure 3 and Figure 4 shows the part used and application methods were traditionally employed for treating various ailments by rural people of Pasir Biru were similar to that among other rural people in Indonesia, such as in Bojonegoro, East Java. Rural people of Bojonegoro, for example, various part used of medical plants for treating cattle ailments, namely leaves (58.90%), rhizome (20.50%), root (10.20%), fruit (7.70%), stem (5.10%), seed (2.50%), and sap (2.50%). While application methods of medical plants were predominantly used for treating cattle ailments, namely by drunk and eaten (digestion) (Pratama et al., 2021).

Source of ethnoveterinary medical plants

Based on the perception of the rural people of Pasir Biru Village, they have commonly used various medical plants for treating ruminant ailments, it has some various reasons, including being considered cheap and having no side effects, easy to obtain, and easy to make.

Regarding source of 46 species medical plants of treating ruminant ailments in Pasir Biru, it repealed that 23 species obtained from the agroecosystem homegarden (50%), followed 11 species harvested from gardens (23.91%), and 12 species acquired from homegarden and gardens (26.08%) (Figure 5).

According to Sorensen's similarity coefficient analysis (Araujo and Ferraz 2014) of the species of plants recorded in the agroecosystem homegarden and garden are quite low, recorded 0.40. This means that many species of ruminant medicinal plants planted in the homegarden are the rather different as that of in the garden. In general, what differentiates the garden agroecosystem management system is that the management is usually less intensive

than the management of the garden agroecosystem, and diversity of plant is normally higher than that of garden (Iskandar and Iskandar, 2023).

DISCUSSION

Based on the ethnoveterinary studies, it has been recognized that the traditional people or the indigenous people in many countries, cross cultures, including Indonesia, Pakistan, India, Nepal, and Namibia have traditionally managed the livestock, such as treating various livestock diseases using medicinal plant species, based on the Traditional Ecological Knowledge and strongly embedded with tradition (Eiki et al., 2014; Verma et al., 2014; Eshetu et al., 2015; Khan et al., 2019; Pratama et al., 2021; Uprety et al., 2022).

According to the present study of the ethnoveterinary was undertaken in Pasir Biru Village, Rancakalong, on various ruminant livestock ailments in Pasir Biru Village, Rancakalong, it was recorded at least 14 ailments or diseases of the ruminants are predominantly recognized and used by the farmers of Pasir Biru. Like Pasir Biru, some livestock ailments or diseases, such as poisoning, diarrhea or dysentery were also documented that is based on the ethnoveterinary studies in other region or other countries across cultures, including Brojonegoro Esat Java, Indonesia (Pratama et al., 2021); India (Varma et al., 2014); and Nambia (Eiki et al, 2014). To contend various the ruminant ailments, the farmers of Pasir Biru, Rancakalong, have used various medical plants. Based on deep interview with informant of Pasir Biru Farmers, it was recoded at least 46 species of medical plants, representing 41 genera, and 17 families that are commonly used to treat various ruminant ailments. The diversity of Ethnoveterinary medicinal plants recorded in Pasir Biru that is considered higher than that of Namibia, recorded 15 plant species of 10 families (Eiki et al., 2022); India (documented 41 plant species belonging to 39 genera, and 25 families (Verma et al., 2014); and Bojonegoro Regency, East Java (recorded 41 species belonging to 24 families (Pratama et al., 2021). This is because most medical plants of ruminant livestock in Pasir Biru are commonly cultivated an homegarden and garden instead of growing wild in the forest, the plant diversity are higher.

According to parts of ethnoveterianary medical plants were commonly used in Pasir Biru, Ranacalong, Sumedang, are similar in that other areas, including leaves, rhizome, root, fruit, seed, and sap in Brojonegro (Pratama et al., 2021), leaves, rhizome, seed, root, latex, bark, flower in India (Verma et al., 2014), and leaves, bark, stem, and root in Namibia (Eiki et al., 2022). While, some application method of the treat ruminant ailments in Pasir Biru are also rather similar applied in other ethnics, including digestation (drunk, eaten) are documented in Brojonegoro, India, and Namibia.

Generally various species of plants that are used as medicinal ingredients to treat various ailments are similar that of function for human health. For example, 26 species of the total of 46 species (56.52 %) of ethnoveterinary medical plant that usually applied in Pasir Biru, were also used as medical for the human health care of Cibunar Village, Rancakalong (Iskandar et al., 2023). For example, the ethnoveterinary medical plant of koněng (*Curcuma longa*) have commonly used for treatment of scabies, tetanus, and boil. This species has also usually used as ingredients for treating human diseases, such as gastritis, and eliminating the body odor of new women giving birth to local people in Cibunar Village, Rancakalong Village (Iskandar et al., 2023). In addition, based ecological history, various species tropical plants for treatment of the human health and livestock diseases, for example, at the present time are known as medicinal ingredients in modern clinics. For instance, *Areca cathecu* (as an anthelminthic drug, contains arecoline), *Carica papaya* (as a proteolytic, mucolytic drug,

contains chymopapain), *Curcuma longa* (as a choleric drug, contains curcumin), and *Datura metel* (as a Scopolamine drug, for clinical use as Sedative) (Farnsworth and Soejarto, 1991).

In general, various species of medicinal plants of Pasir Biru are used to treat various the ruminant ailments, many of which are planted by rural people in the traditional agroforestry of homegarden. Therefore, the rural homegarden system has been important function for rural people, as source of ethnoveterinary medical plants, and various ecological, socio-economic and cultural functions, including in-situ conservation of various types of plants, protecting the soil from the dangers of erosion, helping to fertilize the soil, CO_2 sequestration, and habitat for wildlife (Suwartapradja et al., 2023).

Based on bio-cultural system theory, systems that have been jointly shaped by biological and cultural dynamics. Therefore, to protect various species of medicinal plants in rural areas, it is also necessary to protect the local culture and language of the population. This is because the disappearance or extinction of local languages has been an impact on the conservation of various plant species, and conversely, the extinction of plant species can also affect the language and culture of the rural people (Iskandar and Iskandar, 2023b) .

Consequently, the raring livestock in Pasir Biru is consider very complex that consist of many factors in rural ecosystems, including local people who reside in the human settlement, agricultural systems (homegarden, garden or mixed-garden, rice field), river, and forest. There is interaction among the components of the system. The change of components, including human population and their culture, will affect the other component, and subsequently it will affect the function of the entire (Iskandar and Iskandar, 2023). With regard to development process, we further suggest that, rather than ignoring, it may be useful to revitalization of the ethnovetrinary to support the sustainable rural development program.

CONCLUSION

In terms of the ethnoveterinary medical plants, in addition to use to treat various ruminant's livestock ailments, some medical plant species, including some species of Zingiberaceae has also recognized as an important role for the traditional medicinal ingredients for the treatment of various illnesses and human health in rural West Java. As a result, various plants in rural ecosystems, has an important role for some-economic and cultural functions, including staple foods, vegetables, fruits, handicraft material, rituals, and medicinal plant of livestock and human. With regard to the development process, we further suggest that, rather than ignoring Traditional Ecological Knowledge of local people on veterinary, it may be more useful to consider to be integrated with scientific knowledge that can be useful to support development program of the sustainable raring livestock systems in the rural ecosystem.

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