Jurnal Agro Veteriner (Agrovet)

https://e-journal.unair.ac.id/agrovet/

Original Article

Survey of types and use of traditional medicinal plants for beef cattle in Bontang City

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ABSTRACT

Bontang city is suitable for research due to the limited data on the use of traditional herbal medicine in beef cattle. This study aims to survey the types and usage of traditional herbal plants in beef cattle in Bontang city, providing new insights for local farmers. Data collection involved observation, recording, and photographic documentation. Samples were taken from Bontang city, including West Bontang, South Bontang, and North Bontang districts. Traditional medicinal plants such as garlic, brotowali, coconut, turmeric, temulawak, guava, and lime thrive in these conditions. The majority of respondents are beef cattle farmers aged 51-60 years with a low level of education. Experience in cattle farming for more than 4 years has improved their skills and productivity. The primary source of information on herbal plants is passed down through generations from their parents. The results of the survey on the types and usage of traditional herbal plants in beef cattle in Bontang city can be summarized as follows. Seven plant species are used by beef cattle farmers as natural remedies, namely garlic, brotowali, coconut, turmeric, temulawak, guava, and lime. These herbal plants are used to treat various cattle ailments, including diarrhea (guava leaves), bloating (coconut, turmeric, and temulawak), and skin itching (garlic, brotowali, and lime). The herbal preparations come in both solid and liquid forms. Processing methods include direct administration to the cattle, peeling, squeezing, and pounding. The medicinal plants are effective in treating diarrhea, bloating, and skin itching in beef cattle.

Keywords: Bontang city, traditional herbal medicine, medicinal plants, beef cattle, livestock healthcare

ARTICLE INFO

Original Research

Received: October 11, 2024
Accepted: November 27, 2024
Published: December 04, 2024
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DOI:
https://doi.org/10.20473/agrovet.v8i1.64448

Introduction

Indonesia is one of the countries rich in flora. Various types of forests are spread across Indonesia. Biodiversity in Indonesia is very complete and abundant (Magandhi and Lestari, 2023). This biodiversity also includes biodiversity for plants used as traditional medicine which is usually used by farmers. Medicinal plants are various medicinal plants that are known as plants for medicines. Medicinal plants can be easily found around us because Indonesia has known herbal medicine for thousands of years (Elfahmi *et al*., 2014). Medicinal plants are plant species that are known, believed and truly efficacious as medicine (Fadhilah *et al*., 2023).

The use of traditional medicine is recommended because in addition to saving costs, it can also reduce the dependence of farmers on factory-made livestock drugs that are usually lacking or even unavailable in rural areas (Oyebode *et al*., 2016). This phenomenon also

occurs in Bontang City, East Kalimantan. Indonesia has long known and utilized plants to overcome health problems from generation to generation (Saro, 2022). In addition to the benefits, the side effects of using traditional medicine and traditional herbal ingredients have not all been studied, the active ingredients of the content of traditional medicinal plants, if the dose given is not measured, it can cause side effects (Zhang *et al*., 2015).

Until now, there has been no data and research on the types and use of traditional medicinal plants for beef cattle in Bontang City. The population of beef cattle in Bontang City in 2020 reached 1,531. The success of beef cattle farming lies not only in efforts to increase the number of livestock raised, but also in care and supervision, so that the health of the cattle is also maintained (Edwards-Callaway and Calvo-Lorenzo, 2020). Disease not only causes economic losses due to decreased livestock productivity and even death, but can also have negative impacts such as decreased interest in farmers to develop their businesses (Kappes *et al*., 2023).

Efforts to control livestock diseases consist of prevention and eradication efforts. The goal of disease prevention is to reduce the spread of a disease to a minimum so that the losses incurred can be minimized as much as possible. While the goal of treating a disease is to completely eliminate a particular disease, so that the source of the disease can be eradicated (Wilson, 2014). The people in Indonesia who still use plants for livestock disease medicine are farmers in Bontang City. Farmers in Bontang City have a wealth of traditional knowledge in the field of traditional (natural) medicine, knowledge about the classification of diseases and the properties of medicinal plants, treatment methods, plant care methods, species of medicinal plants, and even herbal medicines for livestock.

The use of traditional medicine is generally considered safer than modern medicine. The side effects of chemical drugs have made many farmers switch to using natural medicine in accordance with the concept of returning to nature which is currently popular, by utilizing plants around them. In addition, the use of plants as natural medicine has been a habit of Indonesian people for a long time because it does not cause dangerous side effects on livestock production. Knowledge about herbal medicine concoctions is supported by various types of yard plants that can be used as livestock medicine by the community. The processing of these plants is carried out traditionally, known as ethnobotany (Susandari *et al*., 2021).

Based on the background above, Bontang City is worthy of being used as a research location because there is no data related to the use of traditional medicinal plants in beef cattle in Bontang City. This is because traditional medicine has relatively fewer side effects than modern medicine. Therefore, the author wants to survey the types and use of traditional medicinal plants in beef cattle in Bontang City.

Materials and methods

Research design

The time of this research was conducted from January 2023 to March 2023. The research location was in Bontang City. The sample size used in this study was 30 samples of beef cattle breeders in West Bontang, South Bontang, and North Bontang Districts. Each district took 10 samples of breeders.

Research Procedures

The procedures carried out in this study include observation and interviews. Observation is data collection carried out through direct observation of the activities of cattle breeders in raising beef cattle and Interview is data collection carried out through direct interviews with cattle breeders in Bontang Barat District, Bontang City. In order to facilitate the process of collecting data through interviews, a research instrument is used in the form of a questionnaire or a list of questions that have been prepared according to the needs of researchers such as respondent identity, number of beef cattle, types of medicinal plants used, efficacy of medicinal plants matching with references and frequently encountered disease disorders, drug dosage forms and how to use traditional medicine.

https://doi.org/10.20473/agrovet.v8i1.64448
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Data analysis

The data obtained were analyzed descriptively qualitatively, namely by describing with tabulations, pictures or photos and graphs between the nature and characteristics, morphology of roots, stems, leaves, flowers, fruit, seeds, rhizomes and the properties and methods of utilization of types of medicinal plants including dosage forms and methods of manufacture and disease disorders in livestock.

Result

Farmer data

Table 1. Data on livestock farmers in Bontang city

Farmer data	Variables	Percentage
Age	35-40 years	7%
	41-45 years	23%
	46-50 years	30%
	51-60 years	37%
	Over 60 years	3%
Gender	Man	93%
	Woman	7%
Educational background	Elementary School	53%
	Junior High School	47%
Long livestock experience	1 year	6%
	2 years	7%
	3 years	17%
	4 years	17%
	More than 4 years	53%
Number of livestock owned	1-3 beef cattle	50%
	4-6 beef cattle	37%
	7-9 beef cattle	7%
	10-12 beef cattle	3%
	More than 12 beef cattle	3%
Types of beef cattle	Balinese cow	100%

Based on table 1, the highest percentage of breeders' age range is 51-60 years, which is 37% and the lowest is over 60 years, which is 3%. The percentage of breeder gender is higher, male, which is 93% compared to female, which is only 7%. The percentage of breeder education history for elementary school graduates is 53% and junior high school graduates is 47%. The percentage of the longest livestock experience is over 5 years, which is 53% and the shortest is around 1 year, which is 6%. The percentage of the number of beef cattle owned is at most 1-3 beef cattle, which is 50% and at least 10-12 beef cattle and over 12 beef cattle, which are 3% each. The percentage of types of beef cattle found are all Bali cattle, which is 100%.

Data on traditional medicinal plants used

Based on table 2, it is known that the results of survey observations on beef cattle breeders in Bontang City obtained information about the identification of scientific names and plant families, there are 7 plants used as natural livestock medicine by beef cattle breeders in Bontang City including garlic, brotowali, coconut, turmeric, curcuma, guava, and lime.

Table 3. Data on the use of medicinal plants in beef cattle in Bontang City

Plant data	Variables	Percentage
Parts used	Leaf	28%
	Rhizome	43%
	Fruit	29%
How to process	Given directly	22%
	Pounded	22%
	Squeezed	34%
	Grated	22%
How to administer	Smeared	43%
	To drink	43%
	Mixed feed	14%
Dosage form	Solid	43%
	Liquid	57%
Goal of treatment	Treat bloating	43%
	Treat itching	43%
	Treat diarrhea	14%

Based on table 3, the percentage of the most widely used medicinal plant parts is the rhizome, which is 43% and the lowest is the leaves, which is 28%.

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Table 2. Types of plants used in beef cattle farming in Bontang City

Plant	Species	Parts used	Dosage form	How to process	How to administer	Utility	Frequency of administration
Garlic	*Allium sativum*	Rhizome	Solid	Given directly	Apply to itchy surface	Treating itching	2x a day
Brotowali	*Tinospora crispa*	Leaf	Solid	Pounded	Apply to itchy surface	Treating itching	1x a day
Coconut	*Cocos nucifera*	Fruit	Liquid	Given directly	Drink the water	Treating bloating	1-2x a day
Turmeric	*Curcuma domestica*	Rhizome	Liquid	Grated and squeezed	Drink the squeezed water	Treating bloating	1x a day
Curcuma	*Curcuma xanthorriza*	Rhizome	Liquid	Grated and squeezed	Drink the squeezed water	Treating bloating	2x a day
Guava	*Psidium guajava*	Leaf	Solid	Pounded	Mixed in feed	Treating diarrhea	2x a day
Lime	*Citrus aurantifolia*	Fruit	Liquid	Squeezed	Apply to itchy surface	Treating itching	1x a day

The highest percentage of medicinal plant processing methods is by squeezing, which is 34% followed by the method of processing medicinal plants by giving them directly, pounding them, and grating them, which are 22% each. The highest percentage of medicinal plant administration methods is by drinking them and applying them, which are 43% each followed by the method of administering medicinal plants mixed with feed, which is 14%. The percentage of solid drug dosage forms is 43% and liquid forms are 53%. The percentage of types of diseases treated using medicinal plants is higher for treating bloating and itching, which is 43% each and lower for treating diarrhea, which is 14%.

Discussion

Overview of the use of traditional medicine in beef cattle

Bontang City has a land height from sea level between 0 to 106 meters above sea level, with an annual rainfall of 875 mm. The topography of this city consists of flat to hilly with a slope range of 2 to 40%. The average air temperature in Bontang City is around 28°C to 29°C. This condition supports the fertile growth of plants used as traditional medicine in Bontang, such as garlic, brotowali, coconut, turmeric, temulawak, guava, and lime. Age is one of the factors that can affect a person's productivity in carrying out activities. A person's age will affect their ability to carry out heavy work, because there is an increase in physical ability with age, and at a certain stage there will be a decrease in productivity (McPhee *et al*., 2016). Based on table 1, the majority of beef cattle breeders in Bontang City are between 51 and 60 years old (37%). This shows that respondents are still in their productive age according to Central Statistics Agency (CSA). As a person ages, their tendency is to think more maturely and act wisely. In terms of physicality, this will affect productivity in livestock farming, where at a higher age, the work ability of farmers tends to decrease.

In livestock farming, education plays an important role in efforts to increase the production of livestock being raised. An adequate level of education will affect the management of the livestock business being carried out. Based on table 1, beef cattle farmers in Bontang City have elementary and junior high school education, where this level is still included in the low level of education according to McPhee *et al*. (2016). The low level of education of respondents affects their abilities and thinking patterns, in accordance with the views of Zhai *et al*. (2024). If education

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is low, then their thinking power becomes limited and this limitation will hinder their ability to adopt new innovations, so that the opportunity to advance becomes lower.

Experience is the best teacher. The more experience a farmer has, the better his skills in managing a livestock business will be. Experience in livestock farming is obtained by someone based on the length of time they have been involved in the livestock business. Livestock experience is the most important factor that a farmer must have in increasing productivity and work ability in the livestock business. Based on table 1, the most experience in raising beef cattle in Bontang City is more than 4 years with a percentage of 53%. According to Rusdiana *et al.* (2018), the more experience in raising cattle, the more knowledge is expected to be gained so that skills in running a livestock business will increase.

The people of Bontang, especially beef cattle breeders, obtain traditional medicinal plants in several ways, namely looking for them in the wild, planting them themselves, or buying them at the market. One example of a medicinal plant that grows wild in the area is brotowali. In addition, there are also medicinal plants that are planted in their own yards. Generally, these plants are rhizome plant species such as turmeric, temulawak, and coconut. These medicinal plants are not only used for livestock treatment, but also for human treatment. Some breeders also buy medicinal plants such as garlic and lime to be used as traditional medicine for beef cattle.

Based on table 1, the type of beef cattle raised and cultivated in Bontang City is Bali cattle. The reason some breeders raise Bali cattle is because Bali cattle are easy to control, tame, and able to adapt to less favorable environments. According to respondents' knowledge, the main source of information about plants used as medicine for cattle diseases is through parents and passed down from generation to generation. This is in accordance with the opinion of Susanti *et al.* (2023) who stated that Indonesian people have long known various plants used as medicine, and this knowledge is passed down from generation to generation as part of the culture. This shows that the majority of information about knowledge of plants as medicine comes from parents.

Types and utilization of traditional medicinal plants for beef cattle

Garlic (*Allium sativum*)

Garlic is used by beef cattle breeders in Bontang City as an ingredient in traditional medicine to treat itching disorders in livestock. Garlic contains axillin. Axillin is a compound that plays a role in giving garlic its distinctive aroma. Axillin contains sulfur and is easily broken down so that parasites that cause itching in livestock cannot develop further (Khoirani *et al.*, 2020). Garlic is used directly on livestock by peeling the rhizome from its skin first, then applying it to the itchy surface. The medicine is given twice a day.

Brotowali (*Tinospora crispa*)

Brotowali is one of the ingredients used for mixing ingredients in making traditional livestock medicine by beef cattle breeders in Bontang City, namely as a mixture of ingredients in making medicine for itching due to tick attacks, the content of picoretine (bitter substance) contained in brotowali makes ticks attached to the cow's skin fall off (Siti *et al.*, 2021). Brotowali leaves are used as traditional medicine by pounding them, then the pounded leaves are applied to the itchy surface. The medicine is given once a day.

Coconut (*Cocos nucifera*)

Coconut water contains glucose as a source of energy and protein as a source of protein. Coconut water also contains 12 types of protein such as alanine, arginine, aspartic acid, glutamic acid, histidine, phenylalanine, and tyrosine. In addition, coconut water also contains minerals such as calcium, potassium, sodium, magnesium, iron, and copper. There are also vitamin C, vitamin B such as nicotinic, pantothenic acid, biotin, riboflavin (B2), folic acid, thiamine (B1), and pyridoxine (B6) in coconut water (Yong *et al.*, 2009). This content has benefits as an antidote and can be used as a bloating medicine for beef cattle, especially in Bontang City. The use of

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coconut fruit as a traditional medicine is given directly to livestock by peeling the coconut using a machete until a soft surface is visible, then the surface is perforated and the water is taken. Then, the coconut water that has been collected is given to the livestock to drink. Coconut water is given one to two times a day.

Turmeric (*Curcuma domestica*)

Turmeric rhizomes contain various ingredients such as essential oils, phelkandrene, sabinene, curcumene, and dyes containing curcumin alkaloids. Curcumin is a yellow dye found in turmeric. On average, turmeric rhizomes contain 10.29% curcumin. Curcumin has various biological activities, such as antihepatotoxic, antibacterial, and antioxidant (Sohn *et al*., 2021). In Bontang City, beef cattle breeders use turmeric to treat bloating in livestock. Turmeric is used as a treatment for livestock by first grating the turmeric, then squeezing the grated turmeric until it produces turmeric juice. Then the juice is given to livestock twice a day.

Curcuma (*Curcuma xanthotthiza*)

The main components contained in curcuma rhizomes are curcumin and essential oils. Curcumin has benefits as an anti-inflammatory, antioxidant, and antibacterial (Sharifi-Rad *et al*., 2020). The curcumin content in temulawak rhizomes reaches 1.6-2.2% of the dry weight. Curcuma essential oil contains phellandrene, camphor, borneol, xanthorrhizol, and sineal (Dosoky and Setzer, 2018). Beef cattle breeders in Bontang City use curcuma as a medicine to treat bloating in livestock. The method of treating temulawak is the same as turmeric, the temulawak is grated first, then the grated results are squeezed until the turmeric juice is released. Then the juice is given to livestock twice a day.

Guava (*Psidium guajava*)

Guava plants are often used as medicine because the leaves contain various phytochemical compounds that are useful for preventing and treating diseases. Guava leaves are rich in antioxidants, anti-diarrhea, and anti-virus (Díaz-de-Cerio *et al*., 2017). The active components that are abundant in guava and provide antidiarrheal effects are tannins, flavonoids, essential oils, and alkaloids (Kumar *et al*., 2021). Guava leaves are used by beef cattle breeders in Bontang City as a diarrhea medicine for livestock. The treatment method is, the guava leaves are first ground until smooth, then the ground leaves are directly mixed into the prepared livestock feed with twice a day.

Lime (*Cocos nucifera*)

Lime contains flavonoid compounds, which are one of the largest types of polyphenol compounds with antioxidant and antibacterial activity. In addition, lime also has antifungal, larvicidal, and anthelmintic activities. These various activities are likely derived from the essential oil content in lime. Lime can be a safe antifungal alternative, replacing the use of chemical fungicides that are harmful to humans and the environment. In addition, lime can be used as a natural larvicide that has advantages such as rapid degradation and low toxicity (Lim *et al*., 2023). In Bontang City, beef cattle farmers use lime to treat itching in their livestock. The treatment method is, the lime is cut in half, then the cut lime is squeezed until the juice comes out. Then the lime juice is applied to the itchy skin surface with a frequency of application once a day.

Conclusion

In a survey study of the types and use of traditional medicinal plants for beef cattle in Bontang City, it can be concluded that seven species of plants used as natural livestock treatments by beef cattle farmers include garlic, Tinospora crispa, coconut, turmeric, Javanese ginger, guava, and lime. Types of livestock diseases that can be treated using plants by beef cattle farmers in Bontang City include guava leaves to treat diarrhea, coconut, turmeric and Javanese ginger to treat bloating, and garlic, Tinospora crispa leaves, and lime to treat itching in livestock. The dosage forms of medicinal plants used in beef cattle farming in Bontang City are solid and liquid. The method of processing

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traditional medicinal plants used in beef cattle farming in Bontang City is by giving them directly to livestock, grating them, squeezing them, and pounding them. Types of livestock diseases that can be treated using plants by beef cattle farmers in Bontang City include treating diarrhea, treating bloating, and treating itching.

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https://doi.org/10.20473/agrovet.v8i1.64448
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https://doi.org/10.20473/agrovet.v8i1.64448
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