

Effectiveness of the leaf of Guava, Turmeric, and Javanese ginger (GUMAVIT) capsules against diarrhea in rabbits

Efektivitas daun Jambu Biji, Kunyit, dan Temulawak (Kapsul GUMAVIT) terhadap diare pada kelinci

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ABSTRACT

Diarrhea is a serious health problem in rabbits that can reduce productivity and increase mortality risk, highlighting the need for safe, natural treatment alternatives. This study aimed to evaluate the effectiveness of GUMAVIT herbal capsule supplementation, containing guava leaf powder, turmeric, and Javanese ginger, in reducing diarrhea severity in rabbits. This is the first study to evaluate the combination of these three herbal ingredients in a specific capsule formulation (GUMAVIT) as a natural therapy for rabbit diarrhea. The research was conducted from month September to November 2024 using six local rabbits aged 1–3 months with an average body weight of 897.5 ± 143.96 g, divided into two treatments: T0 (without GUMAVIT/chemical medication) and T1 (600 mg GUMAVIT supplementation). Supplementation was administered once daily for one day following diarrhea induction. Observed parameters included fecal color, fecal texture, defecation frequency, and overall body condition, and data were analyzed using an Independent T-Test. Results showed that GUMAVIT supplementation had no significant effect ($P > 0.05$) on fecal color or texture but significantly affected ($P < 0.05$) defecation frequency and body condition. Supplementation with 600 mg GUMAVIT effectively reduced defecation frequency and improved rabbits general condition, indicating its potential as a natural herbal alternative for diarrhea treatment.

ABSTRAK

Diare merupakan masalah kesehatan serius pada kelinci yang dapat menurunkan produktivitas serta meningkatkan risiko kematian, sehingga diperlukan alternatif penanganan yang aman dan berbasis bahan alami. Penelitian ini bertujuan mengevaluasi efektivitas suplementasi kapsul herbal GUMAVIT yang mengandung serbuk daun jambu biji, kunyit, dan temulawak dalam menurunkan tingkat diare pada kelinci. Penelitian ini merupakan studi pertama yang mengevaluasi kombinasi ketiga bahan herbal tersebut dalam formulasi kapsul khusus (GUMAVIT) sebagai terapi alami diare pada kelinci. Penelitian dilaksanakan pada bulan September–November 2024 menggunakan enam ekor kelinci lokal umur 1–3 bulan dengan bobot rata-rata $897,5 \pm 143,96$ g yang dibagi menjadi dua perlakuan, yaitu P0 (tanpa GUMAVIT/diberi obat kimia) dan P1 (suplementasi 600 mg GUMAVIT). Suplementasi diberikan satu kali sehari selama satu hari masa pengobatan setelah induksi diare. Parameter yang diamati meliputi warna feses, tekstur feses, frekuensi defekasi, dan kondisi tubuh kelinci, dengan analisis data menggunakan Independent T-Test. Hasil penelitian menunjukkan bahwa pemberian GUMAVIT tidak berpengaruh nyata ($P > 0,05$) terhadap warna dan tekstur feses, tetapi berpengaruh nyata ($P < 0,05$) terhadap frekuensi defekasi serta kondisi tubuh kelinci.



Kata kunci: Suplementasi 600 mg GUMAVIT terbukti mampu menurunkan frekuensi defekasi dan memperbaiki kondisi umum kelinci, sehingga berpotensi menjadi alternatif terapi herbal alami dalam penanganan diare pada kelinci.
Diare
Daun jambu biji
Temulawak
Kelinci
Kunyit

INTRODUCTION

Rabbits are pseudo ruminants that have the potential to be meat producers because they grow and reproduce quickly. Although they only have one layer of stomach, the fermentation of feed in rabbits takes place in the large intestine and cecum, resembling the digestive mechanism of ruminants. Rabbits have a monogastric digestive system, so their ability to digest coarse fiber from plant feed is relatively limited (Hasanah et al., 2021). Crude fiber is difficult to digest in the rabbit's digestive system, thus affecting the absorption of other nutrients such as protein, fat, minerals, and vitamins. Undigested crude fiber will carry some nutrients, especially protein and energy, out with the feces, resulting in less than optimal protein utilization in the ration (Armayanti et al., 2024). According to Risyahadi et al. (2022), the crude fiber requirement in rabbit feed is approximately 10-12%. Rabbits ability to digest crude fiber increases after 5-12 weeks of age (Marhaeniyanto et al., 2015).

One common health problem affecting the digestive system of rabbits, often triggered by an imbalance in water content or a lack of crude fiber in the diet, is diarrhea. Diarrhea in rabbits is a digestive disorder characterized by increased frequency, looseness, and volume of feces. Diarrhea in rabbits is a serious problem that can lead to severe dehydration due to the loss of fluids and electrolytes through the feces (Purwanti et al., 2017). This condition can lead to death, especially in young rabbits before weaning. Common symptoms of diarrhea in rabbits include loose stools, weight loss, and a tendency for the rabbit to become more withdrawn.

Treatment for diarrhea in rabbits generally uses chemical-based antidiarrheal medications, such as antibiotics or commercial antidiarrheal medications, including Rebung-K. Although effective in suppressing clinical symptoms, repeated use at inappropriate doses has the potential to trigger drug resistance in rabbits (Hamid et al., 2022). Therefore, safer and more

sustainable alternative treatments based on natural ingredients are needed. The use of traditional herbal medicine has been recognized and supported by the WHO in efforts to maintain health, prevent, and treat disease (Mutmainah et al., 2022). These traditional medicines are typically given in varying doses, based on human doses, which are then converted to doses used in animal studies. Some herbs that have potential as antidiarrheals include guava leaves, turmeric, and Javanese ginger. Guava leaves contain tannins, flavonoids, essential oils, alkaloids, and quercetin, which act as antidiarrheals (Fратиwi, 2015; Kurnia et al., 2020; Ramahyani et al., 2023). Turmeric is known to contain secondary metabolites such as alkaloids, tannins, saponins, polyphenols, flavonoids, and triterpenoids that function as astringents and antibacterials through curcumin and essential oil compounds (Yuliati, 2016; Meliala et al., 2020; Ningsih et al., 2020). Meanwhile, Javanese ginger contains tannins that are anti-inflammatory, antiseptic, and antiviral, and can help improve digestion and increase appetite (Lestari, 2016; Fitriani et al., 2023).

Previous studies have reported that a combination of guava leaf powder and Javanese ginger in a 1:1 ratio at a dose of 600 mg/kg body weight can accelerate the healing of diarrhea in sheep (Luhur et al., 2023). However, this research is still limited to two herbal ingredients and is applied to ruminant livestock, which have different digestive system characteristics than rabbits as pseudo-ruminant. Studies on the combination of three herbal ingredients in a more practical and applicable powder form for rabbits are still limited. A 1:1:1 combination ratio was chosen to provide a balanced proportion so that each bioactive compound could contribute optimally. The capsule formulation was used to ensure accurate dosing based on body weight, guarantee drug consumption, maintain the stability of active compounds from environmental degradation, increase ease of application in the field, and minimize the decrease in palatability due to herbal aromas. Based on this description, this study

was conducted to determine the effectiveness of GUMAVIT capsules as a natural combination medicine of guava leaves, turmeric, and Javanese ginger compared to the use of chemical drugs in the treatment of diarrhea in rabbits.

MATERIALS AND METHODS

Time and Place of Research Implementation

The time and place of this research were carried out in September-November 2024 at the Integrated Laboratory of Tidar University, Magelang City, Central Java, and the Bandongan Teaching Farm.

Tools and Materials

The tools used in this study were knives, stainless steel containers, drying tools (oven), blenders, measuring cups, sieves, capsule bottles, capsule filling tools, and experimental animals (six male local rabbits aged 1–3 months with an average body weight of 897.5 ± 143.96 g were used as experimental animals. The rabbits were kept individually, fed twice a day and given water ad libitum, and adapted for 7 days before treatment). The materials used in this study were guava leaves (*Psidium guajava* L.), turmeric (*Curcuma longa*), Javanese ginger (*Curcuma xanthorrhiza* Roxb), capsules, and clean water.

Research Variables

The research variables used were the color and texture of feces, frequency of defecation, and the general condition of the rabbits before and after being given a mixture of guava leaf powder, turmeric, and Javanese ginger.

Procedure

Make Guava leaf powder, Turmeric, and Javanese ginger

The preparation of guava leaf, turmeric, and Javanese ginger powder was carried out by first preparing all required tools and materials. The guava leaves, turmeric, and Javanese ginger were then washed thoroughly to remove impurities. After cleaning, the materials were dried in an oven at 105°C for 6 hours. Once drying was completed, the guava leaves, turmeric, and Javanese ginger were removed from the oven and ground using a blender. The blended materials were subsequently sieved to obtain a fine and homogeneous powder for optimal results.

Diarrhea medication formulation

a. Powder mixing

Guava leaf powder, turmeric, and Javanese ginger are mixed homogeneously in a 1:1:1 ratio and then placed into capsules. This weight-based ratio of each ingredient ensures a homogeneous mixture and a balanced contribution of active ingredients to the capsule formulation, which serves as a natural treatment.

b. Dosage determination

Several dosage levels of a mixture of guava leaf powder, turmeric, and Javanese ginger were tested in rabbits to determine the most effective dose for treating diarrhea and to assess safety for use without causing side effects. Based on preliminary testing results, 600 mg was chosen as the treatment dose because it was deemed to provide optimal effects without adverse side effects.

Effectiveness test

The effectiveness test was conducted as an experimental study using rabbits experiencing induced diarrhea as test animals. Twenty local rabbits were initially prepared for the study and underwent an adaptation period to the rearing environment and treatment diet. However, during the adaptation period, some of the test animals died, leaving six rabbits with body weights ranging from 630 to 1,100 g that met the health criteria for further study. Diarrhea induction was carried out by gradually feeding high-fiber forage such as moringa leaves or grass until symptoms of digestive disorders appeared, characterized by increased defecation frequency and changes in stool consistency. Rabbits exhibiting diarrhea were then used as test animals.

Rabbits were randomly divided into two treatment groups, each consisting of three replicates. Group T0 served as a control and was given a commercial chemical antidiarrheal medication, branded Rebung-K, while group T1 was given capsules containing a combination of guava leaf powder, turmeric, and Javanese ginger at a dose of 600 mg/kg body weight. The treatment was administered orally according to the prescribed dosage, once daily. Observations were conducted before and after treatment, including recording the frequency of defecation, the color and texture of the feces, as well as the

general condition of the rabbits, to evaluate the effectiveness of the administered treatment.

Ethics approval

This research was conducted in accordance with animal welfare principles and ethical standards for the use of experimental animals. All research procedures, including maintenance, diarrhea induction, and treatment of the rabbits, were approved by the Tidar University Animal Research Ethics Committee prior to the study.

Parameters

The parameters assessed in this study included fecal color, fecal texture, defecation frequency, and the rabbit's general condition. Data collection on these parameters was conducted using a scoring method with the following specifications.

1. Color: Rabbit feces are assessed visually by human observation, with the following scores:
 - a) Score 1: Greenish yellow
 - b) Score 2: Bright green
 - c) Score 3: Dark green to black
2. Texture: Rabbit feces are assessed using the human sense of touch, with the following assessment categories:
 - a) Score 1: Loose feces
 - b) Score 2: Soft feces
 - c) Score 3: Solid feces
3. Defecation frequency: Defecation frequency is assessed by observing the number of times the rabbit experiences diarrhea and passes feces per day, with the following scores:
 - a) Score 1: 6-8 times a day
 - b) Score 2: 3-5 times a day
 - c) Score 3: 1-2 times a day
4. General condition: The rabbit's general condition is assessed by observing its behavior before and after treatment, with the following scores:
 - a) Score 1: Dead
 - b) Score 2: Weak
 - c) Score 3: Healthy

Data Analysis

The data analysis used an Independent T-Test, which compares the frequency of defecation, stool texture, stool color, and general condition of rabbits before and after being given a combination of guava leaf, turmeric, and Javanese

ginger powder capsules. This test was used to see if there are any significant differences after the treatment is administered. Before conducting the analysis, basic assumptions of the t-test such as normality and homogeneity of variance were tested. In addition, the results of the analysis were interpreted carefully, taking into account the limitations of the sample size and the possibility of low test power. This analysis was used to evaluate the effectiveness of herbal powder capsules made from a combination of guava leaves, turmeric, and Javanese ginger in treating diarrhea in rabbits.

RESULTS AND DISCUSSION

The research results are presented in tabular form to provide a comprehensive overview of the rabbit feces color, texture, defecation frequency, and general condition. The collected data are presented in Table 1.

Based on Table 1, the results of the study indicate that administering guava leaf powder, turmeric, and Javanese ginger (GUMAVIT) as a diarrhea medication did not significantly affect the color and texture of rabbit feces ($P > 0.05$). However, it did significantly affect the frequency of defecation and the rabbits general condition ($P < 0.05$).

General Condition of the Rabbit

The general condition of rabbits refers to the comparison of the physical and physiological state of rabbits. The physical and physiological condition of rabbits can be assessed based on body weight, abdominal condition, hair, eyes, nose, ears, mouth, teeth, legs, fecal condition, respiratory rate, heart rate, and body temperature (Hamidi et al., 2017; Utami et al., 2019; Fajrin et al., 2025). Meanwhile, the behavior of healthy rabbits can be seen from their appetite, feces, and activity, such as rabbits that are weak and lazy to move (Pangasturi et al., 2020; Wijaya et al., 2020). Typically, this parameter is used to conduct health checks. Based on the results of the data analysis of the general condition variable of rabbits, it can be concluded that T1 significantly affects the general condition of rabbits. T0 shows a value of 0.016 ($P < 0.05$), and T1 shows a value of 0.057 ($P < 0.05$). Rabbits were given a combination of guava leaves, turmeric, and Javanese ginger tended to have improved conditions and increased appetite, while rabbits were given the chemical drug died. The cause of death of the

Table 1. Clinical parameters of rabbits

Variable	Treatment		Description		Sig. (2-tailed)	
	T0	T1	T0	T1	Equal variances assumed	Equal variances not assumed
General condition of the rabbit	2	3	Weak	Healthy	0.016	0.057
Frequency of defecation	1	3	Often	Rare	0.007	0.038
Texture	2	3	Soft	Dense	0.519	0.519
Color	3	3	dark Green-black	dark Green-black	0.374	0.423

Note: The analysis results did not significantly influence the color and texture of rabbit feces ($P>0.05$) but significantly influenced the frequency of defecation and the general condition of the rabbit ($P<0.05$).

rabbits was suspected to be the side effects of the chemical drug containing Sulphaquinoxaline 0.8%, Diaveridine 0.7%, and Flumequine 1.0%, as well as a weak body response to the treatment, so that it was unable to recover from diarrhea. The high mortality rate in the T0 group suggests a potential toxicity or hypersensitivity to the chemical compounds (Sulphaquinoxaline, Diaveridine, and Flumequine) when administered to rabbits in a severely weakened physiological state. This indicates that the chemical dosage might have a narrower safety margin compared to the herbal treatment in T1, which provided a more gradual and supportive recovery through its antioxidant properties. Furthermore, rabbits have a very sensitive digestive system especially on hindgut fermenters (Nasihin, 2025). The use of board-spectrum antibiotics such as Flumequine or Sulphaquinoxaline often causes dysbiosis (an imbalance in the gut microflora), which can worsen diarrhea or even lead to sudden death.

Guava leaves contain flavonoids and tannins that function as antidiarrheals. According to Luhur et al. (2023), guava leaves contain flavonoids that can reduce epithelial cell colonization and enterotoxin production in diarrhea-causing bacteria. Javanese ginger is a rhizome plant that can inhibit the growth of *Escherichia coli* bacteria. Javanese ginger and turmeric can be used as diarrhea remedies because they contain several compounds such as curcumin, turmerol, felandrean, glucosides, and camphor. Turmeric plays a role as an herbal remedy for diarrhea because it contains antibacterial and anti-inflammatory properties. Javanese ginger can improve the immunity of rabbits, because the curcumin compound can act as an antibacterial,

antioxidant, antiviral, and anti-inflammatory (Fadhil et al., 2024). Curcuminoid compounds are able to damage the cytoplasmic membrane and denature cell proteins in bacteria, thereby inhibiting bacterial metabolism (Pratiwi et al., 2022).

Frequency of Defecation

Knowing how often a rabbit defecated each day is an important aspect of monitoring its health. Generally, rabbits defecated between 6 and 10 times per day, although this number can vary. The average frequency of defecation in rabbits is approximately 6.75 times per day (Wang et al., 2022). The graph of defecation frequency is shown in Figure 1.

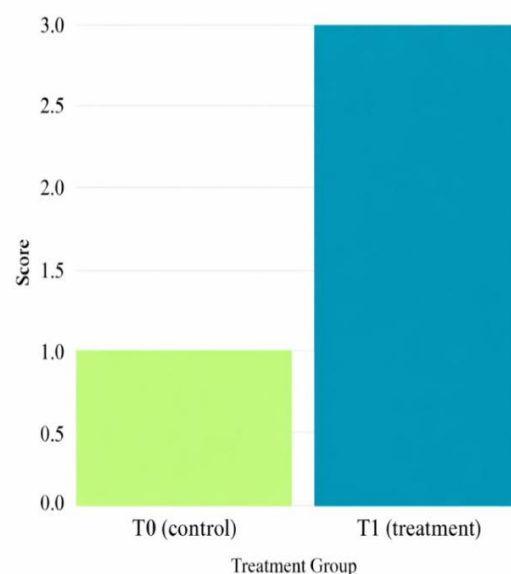


Figure 1. Defecation frequency (T0 = untreated with GUMAVIT capsules; T1 = treated with GUMAVIT capsules 600 mg/kg).

Based on the defecation frequency variable, supplementation of guava leaves, turmeric, and Javanese ginger showed an increase in rabbit recovery in T1 compared to T0 ($P < 0.05$, Table 1). Supplementation of guava leaves, turmeric, and Javanese ginger significantly affected the decrease in diarrhea frequency in rabbits. Observations of defecation frequency were carried out after oral supplementation was given to rabbits. It was concluded that T0 and T1 had a significant effect on reducing defecation frequency in rabbits. The results in the equal variances assumed section, the Sig. (2-tailed) value was $0.007 < 0.05$, while in the equal variances not assumed section, the Sig. (2-tailed) the value was $0.038 < 0.05$, which indicated that there was a significant difference between the averages of T0 and T1. This decrease in diarrhea frequency is thought to be due to the role of tannins and curcumin contained in turmeric.

According to Sutardi et al. (2022), turmeric contains secondary metabolites in the form of tannins and curcumin, which can reduce fluid secretion into the intestines and act as an antibacterial in the digestive tract of rabbits. Furthermore, guava leaf supplementation in powder form also plays a role in reducing the frequency of defecation in rabbits. Guava leaves contain pharmacological phytochemicals in the form of tannins and flavonoids, which function to reduce anti-diarrheal activity. Furthermore, guava leaves also contain flavonoid derivatives in the form of quercetin, which functions as an antidiarrheal agent that can increase intestinal contractions due to irritation caused by diarrhea-causing bacteria, such as *Staphylococcus aureus*, *Escherichia coli*, *Salmonella enteritidis*, *Bacillus cereus*, and *Vibrio cholera* (Fratiwi, 2015). Specifically, quercetin acts as a competitive antagonist on muscarinic receptors within the intestinal smooth muscle. This biochemical interaction inhibits the release of acetylcholine, which is responsible for the hyper-motility of the gut during infection. By stabilizing these receptors, GUMAVIT effectively slows down peristaltic movement, allowing for increased fluid reabsorption and a significant reduction in defecation frequency ($P < 0.05$).

Fecal Texture

Fecal texture is one indicator of a rabbit's health. Abnormal feces, such as loose, watery,

or even slimy stools, can indicate digestive tract problems, dietary changes, or even stress (Utami et al., 2020). The graph of fecal texture is shown in Figure 2.

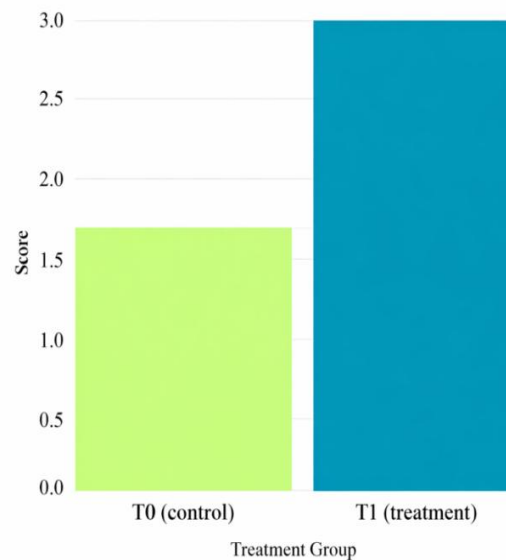


Figure 2. Fecal texture (T0 = not given GUMAVIT capsules; T1 = given 600 mg/kg GUMAVIT capsules).

Based on the results of the data analysis of the fecal texture variable, there was no significant difference between the treatment group (T1) and the control group (T0). In the equal variances assumed and Equal variances not assumed sections, the Sig. (2-tailed) values were 0.519 and 0.519, respectively. This indicated that the significance value for both groups is greater than α or Sig. (2-tailed) > 0.05 , so H_0 is accepted. The fecal texture in treatments T0 and T1 was mostly soft to solid. The absence of a significant difference in the T0 and T1 treatments on fecal texture may be influenced by internal factors such as age, health status, and gender. Age and gender affect the results of the experiment. According to Tetuko et al. (2016), at the right age and stage of an animal's life, the resulting pharmacological effects will be better. Health status will influence the results of the experiment because it impacts the physiological responses elicited.

Although there was no significant difference in stool texture parameters, the addition of GUMAVIT is still considered important because the bioactive content of guava leaves, turmeric, and Javanese ginger has synergistic potential in increasing body immunity, improving digestive

function, and accelerating overall recovery. Furthermore, the lack of significant difference in fecal texture ($P>0.519$) between T0 and T1 indicates that GUMAVIT supplementation does not interfere with the complex dehydration process in the rabbit's distal colon. In rabbit physiology, the separation of large fiber particles and the absorption of water occur in the colon to produce hard feces. The results suggest that the bioactive compounds in GUMAVIT, such as tannins, work effectively to reduce intestinal hyper-motility without over-constricting the mucosal lining or disrupting the osmotic balance required for normal fecal formation. This confirms that the treatment supports recovery while maintaining the integrity of the hindgut fermentation environment of rabbits.

Fecal Color

Fecal color is an important indicator for monitoring the health and physiological responses of animals, including rabbits. Normal feces are typically blackish brown or dark green, while abnormal feces tend to be bright green (Pangasturi et al., 2020). Changes in fecal color can indicate digestive dysfunction, changes in nutritional intake, or the effects of certain environmental conditions. The graph of fecal colour is shown in Figure 3.

The results of the study on feces color and texture showed a Sig. (2-tailed) value of T0 and T1 ($P>0.05$). In more detail, the analysis of the color

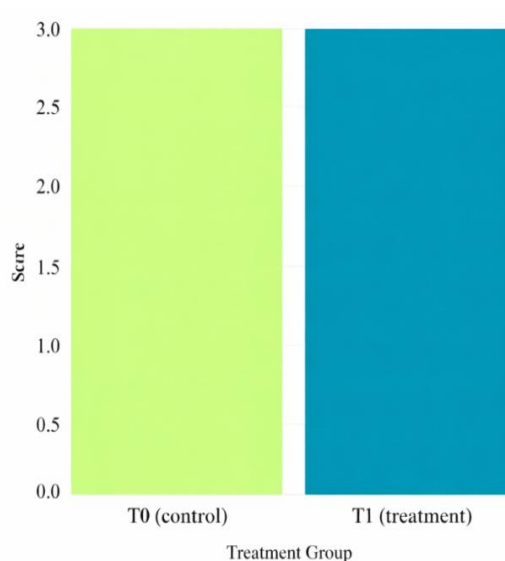


Figure 3. The Fecal Color (T0 = untreated with GUMAVIT capsules; T1 = treated with GUMAVIT capsules 600 mg/kg).

variable data showed that Equal variances were assumed, the Sig. (2-tailed) value was $0.374>0.05$, while in the Equal variances not assumed section, the Sig. (2-tailed) value was $0.423>0.05$, which indicates that there was no significant difference between the average T0 and T1. Thus, T0 and T1 do not have a significant effect on feces color. This insignificant difference is because feces color in rabbits can be influenced by the type of feed, bile concentration, feed and digesta flow rate, nutrition, health, and environmental conditions (van der Sluis et al., 2024). When T1 was given herbal capsules made from a combination of guava leaf powder, turmeric, and Javanese ginger at a dose of 600 mg/kg body weight, there was no significant change in fecal color. Rabbits feces were mostly dark green to black. This feces color was still considered normal. This may because the nutritional composition of the three herbal ingredients was not sufficient to significantly change the feces color (Iwo et al., 2021). The stable fecal color (dark green-black) in all groups indicated that the 600 mg/kg dose of GUMAVIT did not alter the rabbits feed metabolism or bile function. In rabbit digestion, drastic color changes usually indicates liver problems or excessively rapid food intake (malabsorption). Therefore, this unchanged color strongly demonstrates that GUMAVIT was safe for internal organs and does not cause metabolic stress in rabbits, even during the recovery period from diarrhea.

Research Limitations

Although the GUMAVIT capsule formulation showed significant efficacy in treating diarrhea in test rabbits, this study has several limitations that need to be considered. First, the rabbits used were between 1 and 3 months old, so the effectiveness of GUMAVIT in older rabbits cannot be confirmed to produce the same response. Second, the sample size of test animals used was relatively limited, so the generalization of the research results to a wider rabbit population needs to be done carefully. Third, clinical observations were only conducted for 7 days after treatment, so the potential for long-term side effects and the possibility of chronic toxicity from the combination of these three herbal ingredients could not be fully evaluated. In addition, this study did not examine the mechanism of action of GUMAVIT in depth at the molecular level. Therefore, further research is recommended to conduct long-term

toxicity tests with a larger sample size, as well as histopathological analysis of the intestine to understand the cellular mechanism of tissue repair before it is applied more widely to various husbandry conditions or different age groups of rabbits.

CONCLUSIONS

Based on the results, the GUMAVIT supplementation at a dose of 600 mg/kg body weight effectively reduced the frequency of defecation and improved the general health condition of rabbits. These results indicate a significant improvement compared to the control group. While no significant differences were found in fecal color and texture parameters between the two groups, the overall recovery of T1 suggests that this dosage is effective for clinical application. For practical implications, rabbit farmers can use GUMAVIT at the recommended dose of 600 mg/kg BW as a supportive treatment to manage digestive issues and accelerate the recovery of rabbits showing symptoms of diarrhea. To obtain more comprehensive results, further research is needed with more accurate dosage variations. Additionally, further studies are required to evaluate blood profiles and intestinal histopathology to ensure the long-term safety and physiological impact of this supplementation.

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