Original Research Article ISSN (Print) 2786-0272 ISSN (Online) 2786-0280

Comparative Treatment of Simple Indigestion, in Goats by Probiotic and Prebiotic

Salah A. GALBAT [1], Yasser F. Elnaker [2], Rabab R. El-Zoghby [3], and Ola A. Mahmoud [1]

[1]Department Animal Medicine, (internal medicine), Faculty of Veterinary Medicine, New Valley University, Egypt
[2]Department of Animal Medicine, (infectious diseases) Faculty of Veterinary Medicine, New Valley University, New Valley, Egypt
[3]Department of Pharmacology, Faculty of Veterinary Medicine, New Valley University, New Valley, Egypt
*Corresponding author: rabab_r@vet.nvu.edu.eg
Received at: 2023-08-29 Accepted at: 2023-09-10

ABSTRACT: *In small ruminants, gastrointestinal disorders are serious health and economic issue that cause significant financial loss. GIT dysfunction continues to be the leading cause of animal mortality, slowed weight increase, and decreased productivity in the small ruminant sector. The examination of 110 sheep and goats revealed that 71(65%) suffer from simple indigestion, the rumen is full, solid, and doughy; deep examination rarely causes pain. diarrhea, fewer fasces than usual, and increased direness no widespread response. No systemic reaction. To correct this disorder, recent alternative trends in goat rearing have led to the use of prebiotic, and probiotic treatment by oral administration. selected 10 kids from field cases of goats suffering from indigestion for were divided into 2 groups (group I – group II) and group III of 5 healthy animals as a control group. Group, I treated by AMINO GAR (mannan and B glucan 2g per Kg for 3 days as prebiotic, Group II treated by Digest punch (probiotic lactobacillus acidophilus with bacillus subtilis and bacillus licheniformi as 1ml per Kg for 3 days, taken serum samples to detect biochemical examination for examination of liver function test (AlT and AST, creatinine for rough detection of kidney function. Examination of ruminal fluid and ruminal juice. The results revealed that probiotic and prebiotic give good results for improving ruminal microflora and enhancing digestion, but prebiotic is potent than probiotic and improvement of liver and kidney function but prebiotic group improvement of liver function but non-significant effect on kidney creatinine.*

KEYWORDS: Gastrointestinal disorder, prebiotic, probiotic, diseased goats

1. Introduction

Meat, milk, and wool, small ruminants constitute a very significant ecological niche among livestock [1]. One of the most useful animals in the world, goats are frequently referred to as the poor man's cow. These creatures are among the earliest domesticated species known to have existed, dating back 10,000 years [2] They are friendly creatures that make excellent home pets. Due to their capacity to use complex polysaccharides found in plant cell walls (cellulose, hemicelluloses, and pectin) and transform them into meat and milk for human consumption, ruminant animals are significant contributors to the human food chain. According to [1], the anaerobic biodegradation of these polysaccharides into their corresponding monomers by microbes present in the fore stomach of the animals is responsible for the digestion of these polysaccharides in ruminants. According to [3], the rumen, which serves as the most significant digestive organ in ruminants, is an anaerobic habitat where microbial feed digestion takes place. According to [4] and [5], the primary cause of animal mortality, weight gain retardation, and productivity loss in small ruminant farming has been gastrointestinal illnesses. Different conventional medications' efficacies against GIT disease have been reported. However, at the same time, the negative consequences of excessive and inappropriate use of these substances, the rise in resistance, and the development of alternative medicines are required for the management and treatment of GIT disorders in small ruminants because of high treatment costs [6]. Prebiotic and probiotic are two of the alternative therapy options that have been shown to boost daily weight increases in lambs by enhancing nutrition utilization in the rumen [7]. Ruminant disease diagnosis, treatment, and scientific research all benefit from the collection of ruminal fluid [8]. [9, 10] noted that it has a mixed population of microorganisms that includes bacteria (1010–1011 cells/ml), ciliate protozoa (104-106 /ml), and anaerobic fungus (103-105 zoospores/ml). A complex mixed population of these various bacteria interacts with one another.

While prebiotic is non-digestible food components that are digested by mammalian enzymes to reach the intact colon and help to encourage beneficial bacteria in the digestive tract, probiotic are living microorganisms that have great importance in rumen ecology by improving the intestinal microbial balance and helping colonization of cellulitic bacteria result in enhancement of digestion. Different polysaccharides that have been extracted from algae, mushrooms, yeast, and higher plants have recently drawn significant interest in the fields of nutrition and medicine. They have a wide range of therapeutic effects, minimal toxicity, infrequent adverse side effects, and a relatively moderate cost. Mannan and glucan are the two most and most thoroughly researched polysaccharides. The main aim of the current work is to compare the prebiotic and probiotic effects for management of simple indigestion in goat in new Valley governorate

2. Material and methods

2.1. Animals

2.1.1. A. Animals for Study:

Five hundred sheep and goats of varying localities, ages, and sexes (male and female) underwent clinical examination to identify signs of indigestion. Among these, 110 animals (34 goats and 37 sheep) displayed symptoms of indigestion.

2.1.2. Experimental Animals:

Fifteen goats were selected from the examined animals to participate in the experimental trial. The experimental design involved dividing the 15 goats into three groups, each containing five goats:

- Group I: Five goats treated with Amino agar (prebiotic)
- Group II: Five goats treated with Digest punch (probiotic)
- Group III: Control group consisting of five healthy goats in optimal condition.

2.2. Samples:

2.2.1. Blood Samples:

Blood samples were drawn from infected sheep and goats through the jugular vein. These samples were distributed into two vacutainer tubes, one with anticoagulant and one without. For biochemical analysis, 15 serum samples were preserved in vacutainer tubes and stored at -20°C in Eppendorf tubes.

2.2.2. Ruminal Juice:

Fifteen fresh samples of ruminal juice were collected using a stomach tube and evaluated at an animal medicine laboratory in a veterinary college. This process involved clinical examination of 34 goats. Clinical outcomes, contextual information, and owner complaints related to goat dyspepsia, as described by [11],were considered.

2.2.3. Clinical Examination:

Clinical cases presenting symptoms such as loss of appetite, anorexia, weight loss, abnormal abdominal distension, semi-solid to pasty feces, and diarrhea were examined. Ten kids from diseased animals were selected for the trial experiment, alongside five healthy kids as controls.

2.2.4. Examining Rumen Fluid:

Samples were obtained using a stomach tube, with 15 samples collected from each group. Five milliliters of ruminal fluid were randomly collected from each group using a 20-cc syringe. These samples were then subjected to physical and microscopic analysis. A drop of rumen fluid was placed on a slightly warmed glass slide, covered with a cover slip, and studied using a magnification of x40 to determine protozoa activity and population density.

2.2.5. Physical Examination of Rumen Fluid:

As outlined by [12], the color, odor, and consistency of ruminal fluid were assessed. Visual inspection and olfactory assessment were employed to evaluate color and odor. Rumen fluid from lactic acidosis cases typically exhibits a milky-gray color and a distinct rancid/acidic smell. Protein putrefaction results in a darker, greener hue.

2.2.6. Microscopical Analysis Technique:

For protozoa motility assessment, a drop of fresh rumen fluid was placed on a clean slide and examined under a low-power microscope (x40). Motility was classified as follows:

- +++: Extremely crowded and highly motile.
- +: Slow motility and low quantity.
- ++: Motile and densely populated.
- 0: No or infrequent live protozoa.

2.3. Biochemical Examination:

Blood samples were collected from the jugular veins of each animal, following the procedure established by [4]. These samples were preserved in vacutainer tubes to isolate serum for subsequent biochemical analysis. The samples were centrifuged at 3000 rpm for 15 minutes, and the obtained serum was stored in Eppendorf tubes at -20°C until analysis. Biochemical parameters, including AST and ALT tests for liver function and creatinine tests for kidney function, were determined using diagnostic kits and an autoanalyzer (Micro lab 2100, spectrophotometer).

2.4. Statistical Analysis:

All acquired experimental data were subjected to one-way analysis of variance (ANOVA) using Graph Pad Prism software, version 6.01. Significantly different means among treatments were identified using Tukey's honestly significant difference (HSD) option within the same software, at a significance level of 5%

3. Results

3.1. Clinical assessment

In the current study, 34 goats of various ages and sexes from various parts of the New Valley governorate were clinically investigated for signs of dyspepsia. The results of the examination of the goats revealed that the rumen is typically full, firm, and doughy with no pain on deep probing. decrease in feces amount, drier than usual, and diarrhea, No overall reaction.

3.2. Liver function test (ALT & AST):

prebiotic exposed group (group I) and probiotic group (group II) showed a significant decrease in aspartate transaminase (AST) and alanine transaminase (ALT) after treatment in comparison to before treatment group (non-treated) and begin to return within normal.

3.3. Kidney function test (Creatinine):

prebiotic exposed group (group I) showed a non-significant increase in creatinine after treatment in comparison to before treatment group (non-treated) and probiotic group (group II) showed a significant increase in creatinine after treatment in comparison to before treatment group (non-treated) (Table 1).

3.4. Examination of Rumen Fluid

Prebiotic exposed group showed highly mobile and high protozoal number after treatment (Table 2) in comparison to non-treated group which showed protozoal motility is low with low number, while probiotic exposed group showed highly motile with high protozoal number in comparison to non-treated group which showed protozoal motility is moderate with moderate number.

4. Discussion

The most typical rumen malfunction is indigestion. Several issues called indigestion can result in aberrant foregut motility or abnormal fermentative activity. Indigestion types include basic indigestion, ruminal acidosis, vagal indigestion, bloat, and abomasal displacement are determined by differences in motility and fermentation. Simple indigestion brought on by a sudden shift in ruminal pH, such as a drop in rumen pH brought on by the quick fermentation of consumed carbohydrates or a rise in rumen pH brought on by the hypomotility of the forestomach and putrefaction of consumed feed. The usual symptoms of mild dyspepsia and anorexia are examined in this study. The rumen is typically large, solid, and doughy; deep examination rarely causes pain. reduce feces production and become drier than normal and diarrhea, No systemic reaction. This result agrees with the study finding of [11] who

Table 1: Biochemical examination Liver and Kidney function test ((ALT & AST and Creatinine)

Groups	Group I			Group II		
Parameter	AST (U/ l)	ALT (U/ l)	Creatinine (mg/ dl)	AST (U/ l)	ALT (U/ l)	Creatinine (mg/ dl)
Controls	38.26±0.27^{b}	31.06±0.06^{b}	0.8±0.06^{a}	38.27±0.07^{b}	31.00±0.057^{b}	0.8±0.06b^{c}
Before treatment	52.0±2.81^{a}	46.87±3.0^{a}	0.6±0.16^{a}	50.2±5.29^{a}	50.14±3.08^{a}	0.6±0.13^{c}
After treatment	34.4±2.94^{b}	17.82±3.26^{c}	1.06±0.22^{a}	37.14±1.51^{b}	25.36±6.29^{b}	0.96±0.05^{a}

Selected 10 goat suffering from simple indigestion for trial experiment with different ages in the same place and same condition 10 goat divided in to 2groups.

Table 2: Examination of Rumen Fluid

Groups	Group I		Group II	
	Protozoal motility	Protozoal number	Protozoal motility	Protozoal number
Controls	+++	High	+++	High
Before treatment	+	Low	++	moderate
After treatment	+++	High	+++	high

The rumen fluid samples from 34 animals of goat suffer from simple indigestion. (++) moderate Motility, number and crowded. (+) Sluggish motility, low number and low crowded.

also reported similar findings in the sheep. in the present study, ruminal acidosis in goats is well known managemental disorder which occurs due to unintended consumption of large quantities of grain, overnight stored cooked rice, ripped fruits, and baker dough [13]. The weight loss can be attributed to a drastic reduction in feed and water intake leading to a reduction of fermentable ingesta in the rumen and disturbances in microbial fermentation and a decrease in fatty acid production and absorption [14]. The concentration and motility of ruminal protozoa were sluggish in both acidosis and alkalosis due to a lack of nutrients and optimal pH. Further, excessive acid generated in case of acidosis and toxic amines generated in case of alkalosis, due to putrefaction are responsible for decreased motility and death of protozoa [15]. In the current investigation, goats with uncomplicated indigestion were found to have a high prevalence of 55%. Anorexia, weight loss, and diarrhea were the most noticeable clinical symptoms. For goats with minor dyspepsia receiving experimental therapy in a trial experiment, a Prebiotic was given orally to Group I once daily for 3 days at a dose of 2g/Kg body weight. Whereas group II received probiotic in a single oral dose of 1 g/kg body weight every day for 3 days. When the motility and protozoal number increased (+++) in comparison to before treatment and control groups (+++), analysis of ruminal fluid samples from goats in groups I and II revealed a beneficial effect on the rumen ecology. Creatinine, ALT, and AST levels in the experimental animals revealed that they suffered from simple dyspepsia and decreased in groups I and II after the experiment compared to before treatment. They then started to rise to normal levels in the control groups. It is commonly recognized that probiotic are healthy, non-pathogenic bacteria [**?**]. probiotic have an immunomodulatory effect in the gut, which enhances the release of immune modulators such as cytokines and IgA in the intestinal mucosa, [16]. Ruminants are administered probiotic to target the rumen, which is where primary feed digestion takes place. According to [17], they have an impact on rumen fermentation in this case, specifically feed digestibility and degradability and rumen microbiota. According to [18], probiotic have a positive effect on cellulolysis and the production of microbial protein during digestion via regulating rumen pH and lactate levels. According to [19], probiotic can help increase nutritional absorption. The benefits of direct-fed probiotic have been established. probiotic can help with ruminal acidosis, according to studies by [20]. probiotic have been proposed as a useful dietary supplement for goat production [21].

Several commercial probiotic products including single strains or blends of strains, including Lactobacillus reuteri DDL19, Lactobacillus alimentarius DDL 48, Enterococcus faecium DDE 39, and Bifidobacterium bifidum DDBA, have been evaluated on goats [22]. Probiotic therapy significantly increased body weight in goats by increasing the number of lactic acid bacteria and Bifidobacteria in their microflora. Furthermore, probiotic treatment reduced fecal mutagenicity by 60%, illuminating the protective benefits of probiotic in goats [22]. Performance, feed digestibility, carcass traits, or fecal microbial populations in meat goats did not change, according to [23] study. According to research findings [24], probiotic can be used to help goats' rumens retain more microorganisms. The use of probiotic by goats is defended to increase microbial retention in the rumen. moderate dyspepsia in goats can be treated with prescribed drugs. Biochemical markers, ruminal fluid, clinical symptoms, and an improvement in general health. According to [25] original definition of the term, prebiotic are "a non-digestible food element that beneficially affects the host by selectively boosting the proliferation and/or activity of one or a limited number of bacteria in the colon and so improves health. Contrary to probiotic, which introduce allochthonous microorganisms into the gut and push them to compete with already-established colonic populations, prebiotic has the advantage that the target bacteria are already widespread in the large intestine. Thus, prebiotic may be a more practical and efficient way to affect the flora of the stomach than probiotic. [26]. In vitro, experiments have revealed that some of the eukaryotic cell surface receptors that pathogenic bacteria cling to during the pathogenicity phase are mimicked by mannan oligosaccharide prebiotic. For instance, it has been shown that GOS is even more effective than antibiotics at preventing EPEC (enteropathogenic Escherichia coli) from adhering to HEp-2 and Caco-2 cells [27]. In some animal studies, the use of GOS as a treatment for immunological regulation in IBD was investigated [28]. Supplementing the diet of broilers with mannan-oligosaccharide and beta-glucan boosted the immunological response of the broilers and reduced pathological lesions brought on by E. coli infection [29] the effectiveness of the medications used to treat goats' mild dyspepsia. After three days of treatment, both probiotic and prebiotic groups showed improvement in clinical signs, ruminal fluid, biochemical markers, their reversal to normal, and total clinical recovery, but take care with prebiotic use may affect creatinine level, more investigation must be done.

References

[1] W. Ripple, *Nature climate change*, 2014, **4**, 2–5.

[2] R. Sinn, *Raising goats for milk and meat*, 1985.

[3] T. Nagaraja and E. Titgemeyer, *Journal of dairy science*, 2007, **90**, 17– 38.

[4] L. Kaplan, A. Pesce and S. Kazmierczak, *Clinical chemistry : theory, analysis, correlation*, Mosby St. Louis, Louis, 4th edn., 2003.

[5] M. Zeineldin, *Alexandria Journal for Veterinary Sciences*, 2018, **56**, year.

[6] G. Rahmann and H. Seip, *Landbauforschung Völkenrode*, **2007**, 75–88.

[7] A. Abd El-Ghani, *Small ruminant research*, 2004, **52**, 223–229.

[8] J. Shen, *Journal of dairy science*, 2012, **95**, 5978–5984.

[9] H. Bouraoui, *African Journal of Biotechnology*, 2011, **10**, 17640–17644.

[10] N. Kenters, *Journal of microbiological methods*, 2011, **84**, 52–60.

[11] F. Lessire, *Vlaams Diergeneeskundig Tijdschrift*, 2017, **86**, year.

[12] O. Radostitis, *A text book of disease s of cattle, horses, sheep, pigs and goats.(10*, 2007.

[13] G. Cao, *Australian Veterinary Journal*, 1987, **64**, 367–370.

[14] D. Randall, *Eckert animal physiology : mechanisms and adaptations*, W.H. Freeman and Co, New York, 5th edn., 2002.

[15] S. Hoflund, *Vet. Bull*, 1967, **37**, 701–717.

[16] Y. Ohashi and K. Ushida, *Animal Science Journal*, 2009, **80**, 361–371.

[17] P. Williams and C. Newbold, *Recent developments in ruminant nutrition*, 1996, **3**, 351–367.

[18] I. Yoon and M. Stern, *Asian-Australasian Journal of Animal Sciences*, 1995, **8**, 533–555.

[19] K. Mountzouris, *Poultry science*, 2007, **86**, 309–317.

[20] J. Wahrmund, *Journal of animal science*, 2012, **90**, 2794–2801.

[21] A. Apás, *Journal of bioscience and bioengineering*, 2010, **110**, 537–540.

[22] N. Whitley, *Journal of animal science*, 2009, **87**, 723–728.

[23] K. Gyenai, *American Journal of Animal and Veterinary Sciences*, 2016, **11**, 91–99.

[24] G. Gibson and M. Roberfroid, *The Journal of nutrition*, 1995, **125**, 1401–1412.

[25] S. Macfarlane, *Bioactive Foods in Promoting Health*, 2010, 145–156.

[26] K. Shoaf, *Infection and immunity*, 2006, **74**, 6920–6928.

[27] R. Holma, *Scandinavian journal of gastroenterology*, 2002, **37**, 1042–1047.

[28] A. Khalil and Ultrasonographic, *Benha Veterinary Medical Journal*, 2020, **39**, 59–67.

[29] C. Cole, R. Fuller and S. Carter, *Microbial Ecology in Health and Disease*, 1989, **2**, 223–225.