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Effect of kefir consumption on intestinal microbiota and some blood parameters in Angora cats

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Abstract: Probiotics are one of the best alternatives to improve gut health. Kefir, which was discovered in the North Caucasus centuries ago, is still consumed frequently today due to its health benefits. Its impacts on the gastrointestinal system have begun to be investigated in animals. In this study, we focused to examine the effect of kefir on intestinal microbiota, some hematological parameters, and fecal quality in Angora cats to provide preliminary data regarding the hypothesis of its use as an alternative probiotic food supplement. Commercial kefir was given orally (30 mL/kg) to seven healthy Angora cats for 14 days. On day 0 and day 14, fresh feces and blood of the cats were collected. The results showed that two-week kefir consumption significantly increased the number of total mesophilic aerobic bacteria, lactococci, lactobacilli, and yeast in the gut microbiota ($p < 0.05$). Also, a significant decrease was recorded in the number of enterococci ($p < 0.05$). Measured hematological parameters (WBC, RBC, HGB, PCV, MCV, MCH, MCHC, PLT) were not affected during the experiment ($p > 0.05$). Among the biochemical parameters (ALT, AST, TP, TG, TC, HDL, LDL, LDH, K, Ca, Na) only a decrement in the activity of LDH, and an increment in K were observed after two-week of kefir consumption ($p < 0.05$). Additionally, no significant changes were recorded in the body weights, body condition scores, fecal scores, and fecal water contents ($p > 0.05$). Daily kefir consumption positively altered the intestinal microbiota of Angora cats by increasing the total mesophilic aerobic bacteria, lactococci, lactobacilli, and yeast. Moreover, no detrimental effect was observed in the blood parameters, body condition scores, and fecal quality. Therefore, it could be suggested that including kefir in Angora cats' daily diets can improve their health conditions.

Key words: Angora cats, kefir, feline, microbiota, hematological parameters, feces

1. Introduction

Intestinal microbes play a crucial role in the health status of living beings. The intestinal microbiota harbors a complex collection of microorganisms, with estimated 10^{14} microbes which are almost 10 times higher than the number of host cells [1]. Any deterioration of the balance between the host and the intestinal microbiota may cause disorders and diseases such as obesity, allergies, stress symptoms, or diarrhea [2]. In this context, probiotics are one of the best alternatives to improve gut health. They have been increasingly used for the treatment of intestinal diseases by displaying their effects through several mechanisms, such as displacing intestinal pathogens, producing antimicrobial agents, or strengthening the immune system [3].

Kefir, which was discovered in the North Caucasus centuries ago, is still consumed frequently today due to its health benefits. The unique taste, aroma, and smell of kefir occur as a result of the fermentation of the milk by the bacteria and yeasts [4]. Although the type and number of microorganisms differ according to the kefir grain, generally homo-fermentative and hetero-fermentative lactic acid bacteria (LAB) (*Lactobacillus, Lactococcus, Leuconostoc*, and *Streptococcus* species), acetic acid bacteria (*Acetobacter* species) and yeasts (*Kluyveromyces, Saccharomyces, Candida*, and *Torulopsis* species) are found in this beverage [5]. Anticarcinogenic, antioxidant, antimicrobial, and antifungal effects of kefir had been demonstrated on human health [4]. In particular, its impacts on the gastrointestinal system have also begun to be investigated in animals [6–8].

Angora cats are one of the significant cat breeds of Turkey, originating from Ankara province and the surrounding areas. They have white fluffy hairs and their eyes can be blue, golden yellow, or blue in one eye and yellow in the other [9]. Since they are in danger of extinction, collecting data on their nutrition-related health status gains importance. Therefore, it was focused

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on the physiological values of Angora cats in terms of many aspects in several previous studies [10–12]. To date, probiotics and intestinal microbiota relationship have been evaluated in a variety of animals, including cats [6,7,13–16]. However, there is no study examining the effect of kefir on intestinal microbiota in cats. In this study, we focused to examine the effect of kefir on intestinal microbiota, some hematological parameters, and fecal quality in Angora cats to provide preliminary data regarding the hypothesis of its use as an alternative probiotic food supplement. Best of our knowledge, this is the first study in cats to investigate the effect of kefir on gut microbiota and blood parameters.

2. Material and methods

2.1. Animals and kefir

The experiment was planned to start with ten Angora cats (5 male and 5 female), which were housed in the Kırıkkale University, Faculty of Veterinary Medicine. However, two female cats had to be excluded because of their high white blood cell (WBC) counts in the first hematological examination. Additionally, at the end of the 14-day of kefir administration, it was observed that one of the female cats did not drink kefir throughout the experiment. Therefore, seven healthy Angora cats (male: 5, female: 2, age: 3.3 ± 2.5 years old) were included in the study.

Before the experiment began, the cats underwent a one-week acclimation period in individual metal cages in a room with a temperature between 20–25 °C. Commercially dry cat food containing 32% crude protein, 11% crude fat, 7.5% crude ash, 2.5% crude fiber, and 3591 kcal/kg metabolizable energy was fed during the acclimation and trial periods. The adaptation to this feed was four weeks before the trial. The amount of kefir to be applied to each cat was determined as 30 mL/kg [8].

A commercially available ready-to-eat kefir was given to the cats. Kefir grains are both hard to provide and have some challenges in the preparation, and moreover, each kefir grain may contain microorganisms of different types and rates. Thus, it was aimed to provide uniformness by choosing commercial kefir from a brand that everyone in Turkey could easily access. Commercial kefirs (n = 14) with the same production number and had a long expiration date were purchased wholesale and kept in the refrigerator at 4 °C. During the experiment, each day a new kefir bottle was opened and given to the cats, while the leftovers were discarded. The contents of the kefir were 2.5% fat, 2.4% carbohydrate, 2.8% protein, and 43 kcal/100 mL. Counts of total mesophilic aerobic bacteria, lactic acid bacteria, and yeasts of kefir were determined before the onset of the experiment.

2.2. Experimental design

The experiment was executed in a 14-day period [7]. Just before the onset of kefir application on day 0 and immediately after kefir application on day 14, the blood and fresh feces of the cats were collected in order to constitute control and experiment groups. At the same time, the cats were weighed, body condition scores (BCW) were determined, and fresh feces were scored. Also, during the experiment kefir (30 mL/kg), feed (100 g), and water (200 mL) were daily provided for free access for cats, and daily intakes were recorded. The amount of food and water were determined according to the maximum consumption of cats during the adaptation period, which never exceeded 100 g for feed and 200 mL for water.

2.3. Gut microbiota analyses

On day 0 and day 14, fresh fecal samples were collected in sterile tubes and immediately taken to the laboratory for further microbiological analysis. Five g of fecal samples were homogenized with 45 mL peptone water (0.1%, CAS 91079-38-8, Merck, Germany). Subsequently, ten-fold serial dilutions were prepared in peptone water, and inoculated in duplicated on specific media: Plate Count Agar (PCA, 105463, Merck) for total mesophilic aerobic bacteria, Violet Red Bile Lactose Agar (VL, 101406, Merck) for coliform bacteria, Violet Red Bile Glucose Agar (VG, 110275, Merck) for *Enterobacteriaceae*, Slanetz Bartley Agar (SB, CM0377B, Oxoid, United Kingdom) for *Enterococcus* spp., de Man Rogosa and Sharpe Agar (MRS, 110660, Merck) for *Lactobacillus* spp., M17 Agar (115108, Merck) for *Lactococcus* spp., and Sabouraud Dextrose Agar (SDA, CM0147, Oxoid) for yeast. PCA was incubated for 72 h at 30 °C, VL, VG, and SB were incubated under aerobic conditions for 24–48 h at 37 °C [17–19]. MRS and M17 were incubated at 30 °C for 48–72 h anaerobically, and finally SDA was incubated at 30 °C for 3–5 days under aerobic conditions [20, 21]. After incubations, plates were counted and the differences between day 0 and day 14 counts were analyzed statistically.

2.4. Hematological and biochemical analyses

Blood samples were collected from the *vena saphena medialis* on the first and last day into heparinized test tubes. Parameters of blood were immediately analyzed using an automatic blood analyzer (Abacus Junior Vet 5, Austria) in terms of white blood cells (WBC), red blood cells (RBC), hemoglobin (HGB), hematocrit (PCV), mean corpuscular volume (MCV), mean corpuscular hemoglobin (MC), mean corpuscular hemoglobin concentration (MCHC), and platelet (PLT) for hematological analysis. Plasma samples were then separated from blood cells by centrifugation at 1000 × *g* for 10 min at 4 °C, and frozen at –20 °C until further analysis.

For the biochemical analysis, alanine aminotransferase (ALT), aspartate aminotransferase (AST), lactate dehydrogenase (LDH) activities and total protein (TP), triglyceride (TG), total cholesterol (TC), high-density lipoprotein (HDL), low-density lipoprotein (LDL),

calcium (Ca), sodium (Na), and potassium (K) levels were measured using an automated biochemistry analyzer (Mindray BS - 2000, China).

2.5. Fecal quality analyses

Fecal samples were scored according to Bristol's fecal scoring guidelines [22]; 1 = separate hard lumps; 2 = lumpy and sausage-like; 3 = a sausage shape with cracks on the surface; 4 = like a smooth, soft sausage or snake; 5 = soft blobs with clear-cut edges; 6 = mushy consistency with ragged edges; and 7 = liquid consistency with no solid pieces. Moreover, one g of each fecal sample was collected, and fecal water content (FWC) was determined using a dry oven at 80 °C for 24 h. Equation of [(fecal weight before drying) – (fecal weight after drying)/(feces weight before drying)] × 100 was used [7].

2.6. Statistical analysis

All the data obtained from the current study were presented as mean plus standard deviation ($\bar{x} \pm SD$). Descriptive and statistical analyses of them were performed by SPSS 18.0 Windows package program (SPSS Inc., Chicago, IL). The normality of the data was tested using Shapiro-Wilk test. Then, Student t-test was used to evaluate the statistical significance of parametric data between day 0 and day 14, and Mann-Whitney U test was used for nonparametric data. Additionally, the relationship between feed, water, and kefir consumption was evaluated using Spearman correlation analysis. $p < 0.05$ was considered statistically significant.

3. Results

3.1. Change in gut microbiota

The counts of total mesophilic aerobic bacteria, lactococci, lactobacilli and yeast of the commercial kefir were determined as 8.50, 8.26, 6.30, and 5.40 log cfu/mL, respectively. Two weeks of kefir consumption significantly increased the number of total mesophilic aerobic bacteria, lactobacilli, lactococci, and yeast in the gut microbiota of Angora cats ($p < 0.05$) (Table 1). The highest increase was observed in total mesophilic aerobic bacteria with a 2.01 log cfu/g increment, followed by lactococci (1.97 log cfu/g), lactobacilli (1.51 log cfu/g), and yeast (1.14 log cfu/g). On the other hand, the highest reduction was observed in the number of enterococci with 2.59 log cfu/g ($p < 0.05$). The change in the counts of coliform and *Enterobacteriaceae* was not found statistically significant ($p > 0.05$).

3.2. Blood parameters

No effect of kefir consumption was recorded on none of the measured hematological parameters of Angora cats on day 14, which were also not statistically different from day 0 ones ($p > 0.05$) (Table 2).

Biochemical analysis results showed that two-week of kefir administration did not change the blood biochemistry of Angora cats compared to the values of ALT, AST, TP, TG, TC, HDL, LDL, Ca, and Na measured on day 0 ($p > 0.05$). However, the activity of LDH was significantly decreased ($p < 0.05$) following 14-day of kefir consumption, while K level was significantly increased ($p < 0.05$) (Table 3).

3.3. Change in BW, BCS, and fecal quality

Body weights (BW), body condition scores (BCS), fecal scores (FS) and fecal water contents (FWC) of the Angora cats before and after kefir consumption are shown in Table 4. The changes in the BW and BCS of the cats were not statistically significant at the end of the experiment period ($p > 0.05$). Likewise, FC and FWC were not statistically significant ($p > 0.05$), but decreased numerically.

3.4. Food, water, and kefir intake

Daily changes in food, water, and kefir consumption of cats are shown as percentages in the Figure. Food consumption levels were recorded the lowest with 52.14% and the highest at 70.57%, while water consumption levels were recorded as the lowest with 39.93% and the highest

Table 1. Effect of 14-day kefir consumption on gut microbiota of Angora cats (log cfu/g).

	Day 0			Day 14			P value
Parameters	$\bar{x}$	±	SD	$\bar{x}$	±	SD	
Total mesophilic aerobic bacteria	7.41	±	0.69	9.42	±	1.84	<0.05
Coliform	5.90	±	1.32	6.52	±	0.89	>005
Enterobacteriaceae	5.60	±	1.69	6.36	±	0.88	>0.05
Enterococci	6.05	±	1.50	3.46	±	2.41	<0.05
Lactobacilli	6.98	±	0.92	8.49	±	0.72	<0.05
Lactococci	7.52	±	0.76	9.49	±	2.01	<0.05
Yeast	5.86	±	0.85	7.00	±	0.59	<0.05

$\bar{x}$: Mean, SD: Standard deviation.

Table 2. Effect of 14-day kefir consumption on hematological parameters of Angora cats.

	Day 0			Day 14			P value
Parameters	x̄	±	SD	x̄	±	SD	
WBC(×10³/μL)	16.80	±	5.92	18.18	±	3.26	>0.05
RBC (×10⁶/μL)	8.10	±	1.51	8.35	±	1.17	>0.05
HGB (g/dL)	13.20	±	1.23	12.96	±	1.50	>0.05
PCV (%)	37.85	±	3.53	36.75	±	3.83	>0.05
MCV (fL)	47.71	±	8.58	44.29	±	2.98	>0.05
MCH (pg)	16.83	±	3.89	15.63	±	1.32	>0.05
MCHC (%)	35.03	±	3.68	35.33	±	3.01	>0.05
PLT (×10³/μL)	346.71	±	165.30	457.86	±	186.80	>0.05

x̄: Mean, SD: Standard deviation.

Table 3. Effect of 14-day kefir consumption on biochemical parameters of Angora cats.

	Day 0			Day 14			P-value
Parameters	x̄	±	SD	x̄	±	SD	
ALT (U/L)	96.86	±	81.64	106.29	±	127.43	>0.05
AST (U/L)	39.29	±	12.87	45.43	±	22.59	>0.05
LDH (U/L)	364.29	±	111.59	215.00	±	92.80	<0.05
Total protein (g/dL)	8.46	±	0.59	8.30	±	0.67	>0.05
Triglyceride (mg/dL)	47.43	±	17.63	48.43	±	24.08	>0.05
Total cholesterol (mg/dL)	108.57	±	15.90	100.14	±	17.86	>0.05
HDL (mg/dL)	90.29	±	10.98	81.00	±	15.20	>0.05
LDL (mg/dL)	9.09	±	6.66	9.57	±	6.20	>0.05
Ca (mg/dL)	0.36	±	0.25	0.23	±	0.76	>0.05
Na (mmol/L)	149.71	±	3.50	150.14	±	2.27	>0.05
K (mmol/L)	15.69	±	2.63	21.69	±	3.30	<0.05

x̄: Mean, SD: Standard deviation.

with 58.71%. Kefir consumption was also found high and changed from 90.15% to 97.54%.

The correlation between feed, water, and kefir consumption of Angora cats is given in Table 5. A positive correlation between kefir and water consumption (r = 0.58, $p < 0.05$) was observed. Between feed and kefir consumption a negative correlation was recorded, however not found statistically significant (r = –0.24, $p > 0.05$).

4. Discussion

Cats are obligate carnivores, which lead to a metabolic adaptation to a protein-rich diet. The dominant gut microbiota of cats is mainly consisted of four different phyla; *Firmicutes*, *Bacteroidetes*, *Proteobacteria*, and *Actinobacteria* [1]. Additionally, relatively higher number of anaerobic bacteria in cats compared to dogs was reported [23]. In our study, the most abundant genus of Angora cats was determined as lactococci and lactobacilli with 6.98 log cfu/g and 7.52 log cfu/g, respectively. Lactobacilli are quite important in forming a balanced microorganism population in gastrointestinal tract. There are several beneficial effects of lactobacilli including antagonistic action towards pathogens, reducing serum cholesterol, stabilization of gut microbiota, and treatment of diarrhea [24]. Fourteen days of kefir consumption significantly increased the number of lactococci and lactobacilli to

Table 4. Body weights (BW), body condition scores (BCS), fecal scores (FS), and fecal water contents (FWC) of the Angora cats before and after kefir consumption.

	Day 0			Day 14			P-value
Parameters	x̄	±	SD	x̄	±	SD	
BW	3.37	±	1.26	3.45	±	1.10	>0.05
BCS	2.07	±	0.98	2.43	±	0.84	>0.05
FS	4.43	±	1.81	3.71	±	2.21	>0.05
FWC (%)	74.21	±	7.01	72.39	±	7.07	>0.05

BW: Body weight, BCS: Body condition score, FS: Fecal score, FWC: Fecal water content, x̄: Mean, SD: Standard deviation.

almost 8.5 and 9.5 logs, respectively. The positive impact of kefir was also reported in mice and dogs by other researchers [6–8]. Moreover, the same result was obtained in a study in which *Lactobacillus kefiranofaciens*, a major species in kefir and kefir grains, was administered to mice for four weeks [14].

Kefir is considered the best yeast source as it contains a wide variety and a high amount of yeast microorganisms [4]. Yeast microorganisms play an important role in maintaining a healthy intestinal microbiota [6]. The total number of yeast was increased to 7.00 log cfu/g in the feces of the Angora cats at the end of the experiment ($p < 0.05$). Consequently, the increments of yeast, lactobacilli, and lactococci possibly resulted in a rise in the amount of total mesophilic aerobic bacteria with up to 9.42 log cfu/g.

Enterococci are classified as intestinal pathogens that can cause harm under certain conditions, such as genetic or environmental changes in the host [25]. Although only two members of this genus (*E. faecium* and *E. faecalis*) are used as probiotics and feed additives in humans and animals, the remaining members of the genus possess risk due to the high potential to harbor antibiotic resistance and virulence genes [26]. In our study, the highest reduction was observed in enterococci with a 2.59 log cfu/g. The decrease in enterococci and the increase in lactobacilli and lactococci can be considered indicators of a healthier intestinal microbiota. This outcome is in agreement with the study of Marshall-Jones et al. [13] in which *Lactobacillus acidophilus* was used as a probiotic in cats. On the other hand, *Enterococcus* species have been associated with folate synthesis in the intestines [27]. Folate plays role in the production of red blood cells and supports healthy cell growth and function [28]. In spite of the decrement in the total count of enterococci, no significant changes were observed in the hematological parameters during the experiment. Nevertheless, to conclude such an assumption, more specific studies should be conducted on cats.

Slight increases were observed in the number of coliform and *Enterobacteriaceae* (0.62 and 0.76 log cfu/g, respectively), however, these changes were not found significant ($p > 0.05$). These bacteria are quite common in cat intestinal microbiota and the high initial population of coliform and *Enterobacteriaceae* (5.60 and 5.90 log cfu/g, respectively) may have prevented kefir from being fully effective on these bacteria [13]. In the study of Kim et al. [6]

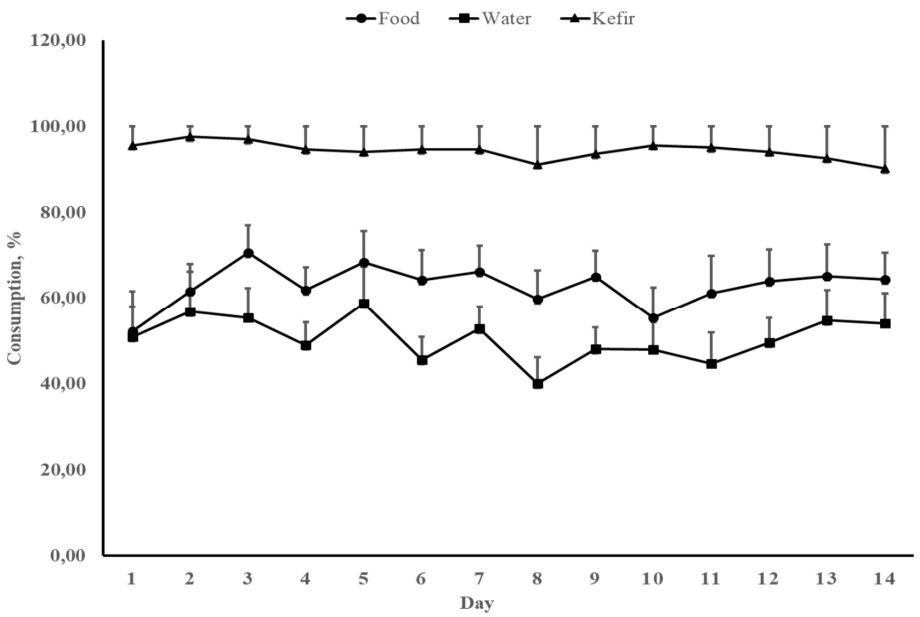

Figure. Daily food, water, and kefir consumption rates of Angora cats during the experiment.

Table 5. The correlation of feed, water, and kefir consumptions of Angora cats during the experiment.

	Feed	Water	Kefir
Feed	1.00	0.58*	–0.24
Water	0.58*	1.00	0.15
Kefir	–0.24	0.15	1.00

*Correlation is significant at the 0.05 level.

in which they investigated the effect of kefir administration on mice gut microbiota, the researchers suggested that *Lactobacillus* and *Enterobacteriaceae* had an antagonistic impact on each other. Likewise, Özsoy et al. [8] reported an increase in lactobacilli and yeast and a decrease in coliform and *Enterobacteriaceae* in kefir-administered mice. On the other hand, Marshall-Jones et al. [13] stated a reduction in coliform bacteria, while they found no significant change in the number of lactobacilli and total anaerobes in cats fed with *L. acidophilus*. These results indicate that kefir or probiotic use may differ according to animal species on the amount of fecal *Enterobacteriaceae* and coliform bacteria. Further specified studies should be performed in order to demonstrate the effect of probiotics on different animal species.

In the study, a 14-day period and kefir administration at 30 mL/kg was applied for Angora cats. The reason for choosing 30 mL/kg was because as Özsoy et al. [8] reported that between the doses 10, 20, and 30 mL/kg the most beneficial effect was observed in intestinal microflora at 30 mL/kg dose. Moreover, during the experiment, we noticed that 30 mL/kg was an ideal dose when we observed the kefir drinking habits of the cats. On the other hand, the reason for choosing a two-week period was because we did not want to stress the cats by prolonging the time considering that we keep them in the cages individually. Additionally, Kim et al. [7] also applied a two-week period for dogs and obtained satisfactory results on the effect of intestinal microbiota.

In the present study, 14-day kefir administration did not lead to changes in any hematological parameters of the Angora cats. The measured values of WBC, RBC, HGB, PCV, MCV, MCH, MCH, MCHC, and PLT on day 0 and day 14 were determined within the reference ranges suggested for domestic cats [29]. There are many studies whose blood parameters are consistent with our results. Kim et al. [7] reported that the two weeks of kefir consumption did not affect the same hematological parameters in dogs. No statistical differences were stated in WBC, RBC, HGB, PCV, MCV, MCH, MCH, MCHC, and PLT values of rats in between control and experiment groups that received 5 mL/kg milk kefir for 21 days by Ben Dhia et al. [30]. Normal (0.7 mL/animal/day) and high (3.5 mL/animal/day) doses of kefir application to rats for 4 weeks did not change the levels of hematocrit, WBC, and other leucocytes subtypes [31]. No difference was observed in the red cell counts of broilers, which consumed 2% milk kefir for 31 days [32]. RBC, WBC, PCV, and HGB were found at similar levels in both control and experiment groups after 42-day application of 2% and 4% milk kefir to broiler chickens [33]. It can be implicated from all of these findings that kefir consumption is not risky in terms of hematological disorders such as anemia, systemic inflammation, or coagulopathy.

The results of the biochemical analysis in the present study showed that both ALT and AST activities, and TP, TG, TC, HDL, LDL, Ca, and Na levels were not affected by two weeks of 30 mL/kg kefir consumption. Similarly, Toghyani et al. [32] reported that albumin, TP, TG, TC, LDL, and HDL were the same in control and kefir treated groups in broilers. In another broiler study, although 2% kefir did not affect the TG, TC, TP, albumin, globulin, LDL, HDL, and glucose levels, 4% kefir treatment significantly decreased TC and increased TP in males [33]. Moreover, Rosa [31] determined that TC, LDL, HDL, TG, creatinine, and ALT were not altered in 4-week kefir application in rats. On the other hand, Özsoy et al. [8] have demonstrated that 10–30 mL/kg kefir applications have no significant effects on albumin, TP, uric acid, and phosphorus levels and ALP activity, while 20% and 30% kefir consumption caused a decrement in TG and TC levels compared to control group. These biochemical parameters mainly reflect the liver and kidney functions, which means kefir consumption is not risky for the physiological and biochemical status of these organs of cats. We also found that 30 mL/kg kefir application for 14 days caused to decrease LDH activity and increase K level in Angora cats. Although Vahtapour and Babazadeh [34] reported that 3%–12% kefir application did not change the LDH activity of Japanese quails, Mert et al. [35] found that intra-gastric 5 mL/ kg kefir application to female rats can reduce the LDH activity increased by isoproterenol. It is thought that this is most probably related to the antioxidative effects of kefir, which is also able to reduce lipid peroxidation [36].

Studies conducted for many years have shown that the use of probiotics in animal nutrition has beneficial effects on feed efficiency, increase in body weight and strengthening of the immune system [37, 38]. BCS is the most widely used methods for cats [39]. In the present study, it was found that kefir had no effect on body weight and BCS of Ankara cats. In adult animals, health and resistance to diseases are more desirable than body weight and BCS development. In our study, this situation was supported by the absence of a negative effect on hematological parameters. Similar results were recorded in cats by Fusi et al. [40] in which *L.*

acidophilus was added to the feed, and this situation was stated as an optimum nutritional indicator.

In the study, the changes in FC and FWC were not found statistically significant, however, decreased numerically. The rapid passage of kefir through the digestive system may cause softness in the feces due to insufficient absorption of electrolytes and water in the colon [41]. On the other hand, further fermentation of poorly digested proteins or indigestible fibers in the colon can result in soft feces [42]. Marelli et al. [43] observed decreases in fecal water and fecal score as a result of a longer trial of *L. acidophilus* consumption in dogs. Parallel to our study, two weeks of kefir consumption resulted the same fecal water and fecal score in the study of Kim et al. [7]. On the other hand, some studies showed that results might vary with longer-term applications [40, 43]. Nevertheless, it should not be overlooked that the results may differ depending on the type of probiotic that is used.

All of the cats except for one, consumed all of the kefir given during the experiment. Kefir is a favorable food for cats because it contains compounds such as organic acids and flavorings that occur as fermentation products [44]. Although a negative correlation of food was observed with kefir consumption, it was not statistically significant. While Kim et al. [7] reported that there was no change in dietary habits of dogs, El-Bashiti et al. [45] observed a decrease in rabbits.

5. Conclusion

Kefir has been consumed by humans for decades for its health benefits. However, little is known about the beneficial effects of kefir in animals, especially on intestinal microbiota. This study showed that daily kefir consumption at a dose of 30 mL/kg positively changed the intestinal microbiota of Angora cats by increasing the total mesophilic aerobic bacteria, lactococci, lactobacilli, and yeast. Additionally, no detrimental effect was observed in the blood parameters, BW, BCS, FS, and FWC. According to the results of this study, it could be suggested that including kefir in Angora cats' daily diets can improve their health conditions.

Acknowledgement

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Conflict of Interest

The authors declare no conflict of interest.

Ethical approval

The study was approved by the Ethical Committee of Kırıkkale University (date: 08-July-2021, record number: 2021/07).

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