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EFFECT OF RAW COW MILK KEFIR ON SOME PRODUCTIVE TRAITS IN IRAQI RAM LAMBS

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Abstract

The aim of this study is to conduct the effect of raw cow milk Kefir on some productive, reproductive and physiological traits in Iraqi ram lambs. A twenty-four Iraqi rams of an approximate age (6-7 months) and weighted (31-32) kg been selected and purchased from local market. The animals divided equally and randomly according to their body weight into 3 group (8 each). The experiment was been done from 24/1/2019 until 24/4/2019 and conducted at Animal Farm, College of Veterinary Medicine / University of Baghdad. All animals were feed concentrate diet and graze for 3-4 hours /day on the college fields. The diet offered to animals as two ratios, at morning and evening. The first group (G1) fed 2.5% of the body weight concentrated diet and the animal's drainage 50 ml raw cow milk and consider as control group. While the animals of G2 group were fed, the same diet of the control group and drainage 50 ml of raw cow milk with 10% kefir\ day\ animal. Whereas G3 group animals were drainage with 50 ml of raw cow milk and 20 % kefir\ day\ animal and the animals fed the same of the other groups, Alfalfa and hay were offered for all groups.

Kefir microbiota were been counted by viable cell count method in kefir grain to detect *Lactobacillus Spp*. and *Saccharomyces cerevisiae.* In addition, the bacteria confirmed by PCR technique, the identified species were recorded in NCBI-Genbank database.

The animal's body weights taken biweekly after they were been acclimatized to environment until the end of experiment. Daily feed consumption, feed conversion efficiency and feed conversion ratio determined at the last month of experiment**.** The results of biweekly body weight showed that all treated groups were increased significantly ($P \leq 0.05$) with age and time progress. G2 group were significantly increased ($P \leq 0.05$) compared with G1 and G3 groups from 4th week to the end of experiment. Feed intake results were take the same trend of the body weight that increase significantly ($P \leq 0.05$) in all groups and G2 showed significant ($P \leq 0.05$) increased compared with other groups at the end of the study. The results of biweekly live weight gain means revealed that G2 group was a higher significantly ($P < 0.05$) than other two groups in all treatment periods. FCR results revealed that the ratio were significant increased ($P \leq 0.05$) in all groups with time progress, while the G3 were increased significantly ($P \leq 0.05$) than other groups from the first period until the end of study. While the FCE showed significant, ($P \leq 0.05$) increase in the G2 compared with other groups along studied periods.

Key words: Kefir, Probiotic, Productive traits, Iraqi ram lambs.

Introduction

Kefir is been defined as an acidic-alcoholic fermented milk product, which characterized by a slight creamy uniformity and acidic taste that exhibited in Europe, Caucasus (Serafini *et al*., 2014). Kefir beverage is prepared by fermenting milk with kefir grains. The mentioned method supports a variety of microorganism dependent mixture of lactic acid bacteria (LAB) including *Lactobacillus*, *Lactococcus*, *Leuconostoc* and *Streptococcus* and yeasts *e.g*., *Kluyveromyces* and *Saccharomyces* (Magalhães *et al.*, 2010). There are many names for kefir *e.g*., kefer, kiaphur, knapson, kepyr, kephir, kepi and kiipi (Rattray and O'Connell, 2011). The researchers (Ramzi, 2010; Al-Saady, 2010) established that feed additive in the diet cause an improving in carcass traits and weights. Feed efficiency and animal health is been in relation with lactic acid utilization and production in rumen (Seo *et al*., 2010) in addition, *Saccharomyces* yeasts and fungal probiotics have recorded better results in adult ruminants. Growth indices (average daily gain, final weight, intake and feed to gain ratio) were been already notified to enhance by persistent live yeast

feeding (Chaucheyras and Durand, 2010; Twegh *et al*., 2020). Bacteriocin extracted from *Lactobacillus acidophilus* was used as a tool to control the growth of undesirable *B. cereus* growth as spoilage and pathogenic bacteria as well as to keep the food more acceptable and safe to consumer (Abd and Ali, 2015). Saleem *et al*., (2017) established that supplying of probiotic resulted in enhance the performances of growing lambs by increasing BW gain, total weight gain and reducing FCR in post-weaning period that accompanied with elevation of DM intake. Arab *et al*., (2014) informed when young lambs fed 0.5 and 1 g probiotic/kg have significantly ($p<0.05$) increased body weight when compared with control group. Likewise, the modification in feed intake capability of growing lambs could influence growth performance especially in post-weaning stage (Ataşoglu *et al*., 2010).

Material and Methods

Kefir grains obtained from Azad University/Republic of Iran. The method of making Kefir is occurred by directly adding Kefir grains to the glass container that contain raw cow milk generally 10 gm /500 ml of milk and 20 gm /500 ml of milk and taped with a piece of gauze. After a period of fermentation, 18-24 hours at room temperature, the grains separated from the milk by filtering with a sieve for using in the next inoculation (Otles and Cagindi, 2003). Then the sieved milk used for drainage of animals.

A twenty-four Iraqi rams of an approximate age (6-7 months) been selected and purchased from local market. The experiment was been done from 24/1/2019 until 24/4/2019. The study was been conducted at Animal Field, College of Veterinary Medicine, University of Baghdad. Experimental animals been contained in hygienic conditions, ventilated perfectly and semi closed pens, which supplied with manger and fountains and fed on ration 2.5% of body weight. The diet offered to animals as two ratios, at morning and evening and continuously supplied with mineral blocks for all lambs to prevent the mineral deficiency. The lambs allowed accommodating within interval of 10 days before experimental feeding application. All animals were vaccinated and drainage against liver parasites with Al-Bendazole 10 cm^3 for each animal and injected S/C with Ivermectin as a remedy for external and internal parasites and enterotoxaemia vaccine to each animal prior to the start of study in addition to, they inspected by the officials veterinarian of the Animal field. All the lambs were been maintained at ambient temperature with natural day light. The experimental animals were been distributed randomly according to their body weight in different treatment groups and by randomized design into three treatment groups of eight animals for each group that subjected to one control (G1) and two treatment groups (G2 and G3) where, Control group (G1) included eight lambs that drainage with 50 ml of raw cow milk only for each animal and fed 2.5% of the body weight of concentrate diet. First treatment group (G2) were include 8 lambs which drainage with 50 ml of raw cow milk fermented with 10% of kefir grains for each animal and fed 2.5% of the body weight concentrate diet. Second treatment group (G3) were include 8 lambs and drainage 50 ml of raw cow milk fermented with 20% of kefir grains for each animal and fed 2.5% of the body weight concentrate diet.

The quantity of experimental feed supplement was been measured and introduced to all animals in all treatment groups for the whole period of the study. Ingredient composition of empirical diet given for animals was as shown in table 1 and ingredient composition of basal diet that is concentrated feed, having 14% percent crude protein and 2000 kcal/kg metabolic energy as 2.5% of body weight.

Samples of ingredients that been used in the formulation of concentrate diets, during feeding and digestibility trials were dried in electric hot air oven at 100°C until the point when proportionate weight, while feces were desiccated at 60°C (Yuangklang *et al.,* 2010). Desiccated samples were then ground by using electric grindery and preserved in well closed clean plastic containers for further chemical analysis which the dry matter, crude protein, organic matter, crude fiber, ether extract and were estimated according to AOAC, (1990). The chemical composition of the concentrated ration viewed at table 2.

Table 1: Composition of experimental feed supplement.

Composition	Percent %
Barley	53.5 %
Wheat bran	40 %
Soybeans	5 %
Calcium carbonate	1 %
Premix	1 %
Sodium Chloride	0.5 %

Table 2: Chemical composition of experimental feed supplement.

Chemical composition	Percent %
Dry matter	93.22
Crude fiber	8.21
Crude protein	14.23
Ether extract	6.26
Ash	1.39
Energy	2298

Table 3: Effect of raw cow milk Kefir in BW (Kg) of Iraqi ram lambs M±SE.

Group / Periods (biweekly)	G1 (C) (N = 8)	G2 (K 10%) (N = 8)	G3 (K 20%) (N = 8)	LSD
(Initial)	A31.18 ± 0.31i	A31.25 ± 0.46i	A31.25 ± 0.50i	1.2868
W2	A33.03 ± 0.33h	A33.80 ± 0.46h	A32.86 ± 0.52h	
W4	B34.98 ± 0.31g	A36.29 ± 0.38g	B34.47 ± 0.52g	
W6	B36.87 ± 0.34f	A38.98 ± 0.36f	B35.94 ± 0.52f	
W8	B38.68 ± 0.37e	A41.55 ± 0.42e	B37.57 ± 0.55e	
W10	B40.56 ± 0.35d	A44.15 ± 0.45d	C39.05 ± 0.55d	
W12	B42.45 ± 0.38c	A46.82 ± 0.47c	C40.59 ± 0.53c	
W14	B44.36 ± 0.41b	A49.41 ± 0.50b	C42.14 ± 0.54b	
W16	B46.32 ± 0.44a	A52.05 ± 0.56a	C43.79 ± 0.59a	

The means with a different small letter in the same column significantly different (P<0.05); The means with a different capital letter in the same row significantly different (P<0.05); C (Control), K 10% (Kefir 10%), K 20% (Kefir 20%), W2 (2nd week), W4 (4th week), W6 (6th week), W8 (8th week), W10 (10thweek), W12 (12thweek), W14 (14thweek), W16 (16thweek).

All experimental animal groups (G1, G2 and G3) of eight animals in each group were been allowed to grazing for 6 hours during morning and evening along with basal diet (concentrate mixture) and are permitted to drink water before and after grazing hours. In G1 group animals were been kept on grazing with basal diet + 50 ml raw milk while in G2 group animals were fed 50 ml + 10% kefir milk per day per animal. In addition, they fed along with grazing and basal diet, whereas in G3 group animals were supplied with 50 ml + 20% kefir milk per day per animal that been fed along with grazing and basal diet, Alfalfa and hay were offered for all groups. The concentrated diets was been offered as a same amount for each animal twice daily and green clover was been offered ad libitum, without any refusals of the concentrated diet to be gathered. The amount of concentrated diets offered for every lambs were biweekly adjusted according the body weight gain in order to ensure that the intake would be around 2.5% of the recorded live body weight (LBW), though, the offered concentrated diets was balanced by the intake of the earlier day. Lambs were weighed bi-weekly using animal balance. Feed intake was been day by day recorded and feed conversion efficiency (FCE) and feed conversion efficiency (FCR) were estimated accordingly. Normal animal balance used to measure the body weight of all experimental animals at biweekly interval. On the first day of the procurement of experiment, the body weight of experimental animals were been measured individually and subsequently on biweekly periods regularly until 4 months of experimental period. Biweekly live weight gain were been obtained by the variation in body weight gained at the finale and at the beginning of the period.

Feed conversion efficiency of the animal feed conducted with the whole study period with respect to live weight gain to entire feed consumption obtained by following formula.

$$\text{Feed conversion efficiency} = \frac{\text{Total feed consumed}}{\text{Weight gain}}$$

(AOAC, 1990).

While Feed Conversion ratio been calculated with following formula.

$$\text{Feed conversion ratio} = \frac{\text{Weight gain}}{\text{Total feed consumed}}$$

(AOAC, 1990).

Table 4: Effect of raw cow milk Kefir in BFI of Iraqi ram lambs M±SE.

Group / Periods (biweekly)	G1 (C) (N = 8)	G2 (K 10%) (N = 8)	G3 (K 20%) (N = 8)	LSD
(Initial)	A10.71 ± 0.10e	A10.43 ± 0.16e	A10.78 ± 0.17e	0.4235
W2	A11.36 ± 0.11d	A11.32 ± 0.16d	A11.34 ± 0.18d	
W4	A12.04 ± 0.11c	A12.20 ± 0.13c	A11.91 ± 0.18c	
W6	B12.70 ± 0.11b	A13.13 ± 0.12b	B12.42 ± 0.18b	
W8	C10.56 ± 0.10e	A14.04 ± 0.14a	B12.99 ± 0.19a	
W10	A11.21 ± 0.11d	A11.42 ± 0.16d	A11.39 ± 0.18d	
W12	A11.89 ± 0.11c	A12.30 ± 0.13c	A11.96 ± 0.18c	
W14	B12.55 ± 0.11b	A13.23 ± 0.12b	B12.47 ± 0.18b	
W16	B13.18 ± 0.13a	A14.14 ± 0.14a	B13.04 ± 0.19a	

The means with a different small letter in the same column significantly different (P<0.05); The means with a different capital letter in the same row significantly different (P<0.05); C (Control), K 10% (Kefir 10%), K 20% (Kefir 20%), W2 (2nd week), W4 (4th week), W6 (6th week), W8 (8th week), W10 (10thweek), W12 (12thweek), W14 (14thweek), W16 (16thweek).

Statistical Analysis

Results expressed as mean, standard Error (S.E.) using SAS system parameters of regression lines and Student paired *t*-test (LSD) was been used. Non-significant differences were been defined at $p \geq 0.05$.

Results and Discussion

The results in the table 3 of biweekly body weight showed that all groups were increased significantly ($P \leq 0.05$) along study progress, also the results showed that G2 group showed significant increase ($P \leq 0.05$) compared with G1

Table 5: Effect of raw cow milk Kefir in WG (Kg) of Iraqi ram lambs M±SE.

Group / Periods (biweekly)	G1 (C) (N = 8)	G2 (K 10%) (N = 8)	G3 (K 20%) (N = 8)	LSD
W2	B1.85 ± 0.08a	A2.55 ± 0.10a	B1.61 ± 0.09a	0.2481
W4	B1.94 ± 0.07a	A2.49 ± 0.11a	C1.61 ± 0.10a	
W6	B1.89 ± 0.07a	A2.68 ± 0.11a	C1.47 ± 0.06a	
W8	B1.80 ± 0.08a	A2.57 ± 0.08a	B1.62 ± 0.07a	
W10	B1.88 ± 0.04a	A2.60 ± 0.06a	C1.47 ± 0.07a	
W12	B1.88 ± 0.04a	A2.66 ± 0.06a	C1.54 ± 0.08a	
W14	B1.91 ± 0.09a	A2.58 ± 0.13a	C1.55 ± 0.10a	
W16	B1.95 ± 0.04a	A2.63 ± 0.12a	C1.64 ± 0.08a	

The means with a different small letter in the same column significantly different (P<0.05); The means with a different capital letter in the same row significantly different (P<0.05); C (Control), K 10% (Kefir 10%), K 20% (Kefir 20%), W2 (2nd week), W4 (4th week), W6 (6th week), W8 (8th week), W10 (10thweek), W12 (12thweek), W14 (14thweek), W16 (16thweek).

and G3 groups from 4th week to the end of experiment. In addition, G1 group were significantly (P≤0.05) higher than G3 group from the 10th week to the end of the study. This could be attributed to, the patronized effect of the two doses of kefir, that improve the rumen activity and digestibility of most nutrients with kefir supplementation in accordance with those reported by (Ahmed and Salah, 2002), (Komonna, 2007), who found that adding yeast culture for diets of ewes during nursing period resulted in improving its feed utilization and resulted in satisfactory ewe live body weight and lamb growth rate. This is also in agreed with (Salem *et al.,* 2000; (Fayed, 2001), (Nagah, 2002) and (El-Ashry *et al.,* 2003) that referred to the probiotic supplementation improved the growth performance of growing lambs. Or, it could be attributed to an improvement in rumen development parameters, such as papillae length and width and rumen thickness that confirmed by (Lesmeister *et al.,* 2004), or it may be attributed to early establishment and stabilization of rumen microbial communities which recorded by Chaucheyras-Durand and Fonty, (2001, 2002), or it could be as a result of reduced number of days of diarrhea that documented by Galvao *et al.,* (2005). In addition, El-Ashry *et al.,* (2003); Ali *et al.,* (2005) and Helal and Abdel-Rahman, (2010) came to the same conclusion for probiotic or dry yeast supplementation for sheep. On contrast, El-Shaer, (2003) reported that, yeast culture supplementation had no significant effect on final body weight and body gain when sheep fed diet containing (2:1 or 1:2) concentrate:, berseem hay ratio with or without 0.25 g yeast culture / 10 kg LBW. This no significant effect of yeast supplementation may be attributed to the ration composition and plane of nutrition, variations in feeding systems, animal species, age of animals, frequency of feeding, dose of probiotic and strains employed physiological state of the experimental animals, environmental conditions that referred by Mousa *et al.,* (2012).

Results of biweekly feed intake (BFI) during experiment progress table 4 revealed that there are a high significant differences (P<0.05) in G2 group than other two groups in W6 (13.13 ± 0.12), W8 (14.04 ± 0.14), W14 (13.23 ± 0.12) and W16 (14.14 ± 0.14) experiment periods. Nevertheless, the differences within periods were significantly (P<0.05) increased with time progress, that G1 group showed significant increase (P<0.05) at the end of the study (13.18 ± 0.13) compared with other periods. In addition, G2 group also showed significant (P<0.05) increase along studied period except between the 16th, 8th, 6th, 14th, 12th, 4th while 10th and 2nd weeks showed no differences. Furthermore G3 take the same trend of the G2 group that the third group showed significant (P<0.05) increase compared with other periods except between 16th, 8th, 14th, 6th, 12th and 4th and between 10th and 2nd week.

The significant (P<0.05) and mathematical increasing of feed intake values in group that be supplemented by kefir 10% (G2) than other groups

Table 6: Effect of raw cow milk Kefir in FCR (Kg. DMI/Kg. gain) of Iraqi ram lambs M±SE.

Group / Periods (biweekly)	G1 (C) (N = 8)	G2 (K 10%) (N = 8)	G3 (K 20%) (N = 8)	LSD
W2	B5.87± 0.25b	C4.48± 0.19b	A7.18± 0.38c	0.93
W4	B5.89± 0.26b	B4.99± 0.32ab	A7.60± 0.49bc	
W6	B6.42± 0.24ab	C4.95± 0.23ab	A8.59± 0.44a	
W8	B7.11± 0.28a	C5.48± 0.15a	A8.08± 0.36abc	
W10	B5.62± 0.16b	C4.40± 0.07b	A7.87± 0.45abc	
W12	B5.94± 0.12b	C4.63± 0.12ab	A7.97± 0.51abc	
W14	B6.33± 0.32ab	C5.22± 0.33ab	A8.32± 0.63ab	
W16	B6.42± 0.13ab	C5.44± 0.25a	A8.08± 0.43abc	

The means with a different small letter in the same column significantly different (P<0.05); The means with a different capital letter in the same row significantly different (P<0.05); C (Control), K 10% (Kefir 10%), K 20% (Kefir 20%), W2 (2nd week), W4 (4th week), W6 (6th week), W8 (8th week), W10 (10thweek), W12 (12thweek), W14 (14thweek), W16 (16thweek).

Table 7: Effect of raw cow milk Kefir in FCE (Kg. gain /Kg. DMI) of Iraqi ram lambs M±SE.

Group / Periods (biweekly)	G1 (C) (N = 8)	G2 (K 10%) (N = 8)	G3 (K 20%) (N = 8)	LSD
W2	B0.16± 0.008a	A0.22± 0.009a	C0.13± 0.009a	0.0207
W4	B0.16± 0.007a	A0.20±0.010abc	C0.13± 0.008a	
W6	B0.15± 0.006ab	A0.20±0.008abc	C0.11± 0.006a	
W8	B0.13± 0.006b	A0.17± 0.006d	B0.11± 0.005a	
W10	B0.17± 0.005a	A0.22± 0.003a	C0.12± 0.007a	
W12	B0.16± 0.003a	A0.21± 0.006ab	C0.12± 0.007a	
W14	B0.15± 0.007a	A0.19± 0.009bcd	C0.11± 0.008a	
W16	B0.15± 0.003a	A0.18± 0.008c	C0.12± 0.006a	

The means with a different small letter in the same column significantly different (P<0.05); The means with a different capital letter in the same row significantly different (P<0.05); C (Control), K 10% (Kefir 10%), K 20% (Kefir 20%), W2 (2nd week), W4 (4th week), W6 (6th week), W8 (8th week), W10 (10thweek), W12 (12thweek), W14 (14thweek), W16 (16thweek).

during the experiment periods (Table 4) it could be attributed to, the bacterial probiotic prevent the acidosis of the rumen through facilitating the rumen microbes which could survive in the presence of lactic acid in the rumen that confirmed by Nocek *et al*., (2002) and this bacterium mainly decreases the concentration of lactic acid and keeps the pH at normal level. One such example is *Megasphaera elsdenii* bacteria, which utilize the lactic acid in the rumen (Yang *et al*., 2004). Furthermore, Propionic bacteria is present in the rumen in high number in animals fed with medium concentrate diet which modify the rumen conditions through conversion of lactate into propionate resulting in the higher production of hepatic glucose (Stein *et al*., 2006). Also probiotic splits certain carbohydrates into simpler substances like glucose, which provides energy and leading to improved animal performance which confirmed by Khalid *et al.,* (2011) and consistent with (Abd El-Ghani, 2004; Antunovic *et al.,* 2005; Desnoyers *et al.,* 2009) who indicated that probiotic supplementation can increase feed intake. Current finding of this study in contrast with other researchers observed that probiotic may contribute to increased growth and improvement of FCR, but it has no effect on feed intake (Haddad and Goussous, 2005).

In concerning with means of biweekly feed conversion ratio (BFCR) table 5 during experiment showed that G3 group significantly higher (P<0.05) than other two groups along all periods. In addition, G1 group was the higher significantly (P<0.05) when compared with G2 treatment group in all period except in W4. Regarding, the differences within groups among periods that G1 group viewed a significant differences (P<0.05) at W8 (7.11 ± 0.32) than other periods except for W6 (6.42± 0.24), W14 (6.33± 0.32) and W16 (6.42± 0.13) periods of the same group. While G2 group recorded a high significant differences (P<0.05) at W8 (5.48± 0.15) and W16 (5.44± 0.25) periods than W2 (4.48± 0.19) and W10 (4.40± 0.07) periods of the same group. Finally G3 group recorded a remarkable significant differences (P<0.05) at W6 (8.59± 0.44) and W14 (8.32± 0.63) than W2 (7.18± 0.38) period of the same group.

Concerning to the results of biweekly feed conversion efficiency (BFCE) table 6 in Iraqi ram lambs which supplemented with raw cow milk Kefir viewed that G2 group illustrated an obvious significant increasing (P<0.05) than other two groups in all intervals. While G1 group recorded significant increasing (P<0.05) than G3 group in all intervals except for W8 (0.13± 0.006), (0.11± 0.005) respectively. On the other hand, the differences within group along the different periods showed the FCE were higher significantly (P<0.05) in the 2nd, 4th, 10th and 12th week compared with 8th week of the experiment. While G2 group showed that FCE were significantly higher in 2nd and 10th weeks compared with 8th, 14th and 6th weeks. While. No significant differences within G3 group along the studies periods.

The improvement of FCR that more evident in G2 (Kefir 20%) than other group as a result of Kefir supplementation (Table 5), may be attributed to the collaborated effect of two type of probiotics in kefir (yeast and bacterial probiotic combination) that give increasing in the nutrients digestibility leading to the higher body weight gain which in a negative manner with FCR and cause improvement in FCR which recorded by (Antunovic *et al.,* 2006) and it agreed with Whitley *et al.,* (2009) who found the significant increase in bodyweight gain and improvement of FCR were observed in the dry yeast and lactic acid producing bacteria that supplemented in diet of kids. Also current finding of this study agreed with Robinson, (2002) who

Table 8: Effect of raw cow milk Kefir in **PW** (**Kg**) of Iraqi ram lambs M±SE.

Group / Para-meter	G1 (C) (N = 8)	G2 (K 10%) (N = 8)	G3 (K 20%) (N = 8)	LSD
PW	B46.32 ± 0.44	A52.05 ± 0.56	C43.79 ± 0.59	1.5808

The means with a different capital letter in the same row significantly different (P<0.05); C (Control), K 10% (Kefir 10%), K 20% (Kefir 20%).

referred to the feed additives like probiotics improve FCR in ruminants. Or it could be attributed to improvement of feed efficiency that confirmed by Abdelrahman and Hunaiti, (2008). Or might be as a result of improving microbial ecology leading to enhancing of TDN and DCP which cause increasing in the body weight gain and consequently improvement in FCR that in negative manner with body weight gain this referred by Musa *et al.,* (2009) that agreed with Haddad and Goussous, (2005) who found that the supplementation of yeast culture (YC; Diamond V® YC) in Awassi lambs resulted in better FCR. It also agreed with Jang *et al.,* (2009) who noticed that the probiotics supplementation to the basal diet tended to improve FCR and El-Katcha *et al*., (2016) reported that growing lambs receiving *Pediococcus* spp (Bacteria probiotic) supplementation in drinking water had a higher final BW and weight gain and better feed conversion efficiency compared to control group. Whereas disagreed with Titi *et al.,* (2008) who reported that yeast supplementation had no effect feed conversion rate.

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