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EFFECT OF RAW COW MILK KEFIR ON SOME SEMEN 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 has 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.* And the bacteria confirmed by PCR technique, the identified species were recorded in NCBI-Genbank database. Semen samples were collected after animal reach puberty by using artificial vagina, ram semen parameters were examined to find out the Semen volume, Sperms concentration, Sperms individual, mass motilities, Dead sperm percentage, Sperms tail and head abnormalities percentage at the end of experiment. Samples for digestibility measurements were been taken weekly at the last month of experiment.

The results of semen parameters showed that G2 and G3 treatment groups were a higher significantly ($P<0.05$) than G1 group at the most tests. While G2 and G3 treatment groups recorded a low significant differences ($P<0.05$) than G1 in concerning with Dead Sperm and Sperm Abnormality parameters.

Keyword: Kefir, Probiotic, semen 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.*, 2012). There are many names for kefir e.g., kefer, kiaphur, knapson, kepyr, kephir, kepi and kiipi (Rattray and O'Connell, 2011). Akhter, (2019) viewed that all treated group viewed a significant testicular weight better than control animals. Furthermore, Probiotic groups were been higher weight than antibiotic T2 group. It insures better quality semen in sheep. The improvement in quality of semen is an important aspect for maximum utilization of genetically superior sub-fertile sires (Eidan *et al*., 2017). Sehgal and Kumar, (2016) stated that adding of fermented yeast culture improves the growth and diminishes the puberty age in male Murrah buffalo calves and stated that the serum testosterone values elevated significantly ($P < 0.05$) in the administrated group for 20–23 months. The average scrotal circumference recorded during 24 months of age was also higher in the probiotic fed group. The supplemented group achieved puberty at 25 months of age earlier, whilst only 4 through 6 animals of the control treatment group achieved puberty by 27 months of age. It was been indicated that probiotic bacteria exhibit an antioxidant impact on spermatogenesis to save against the detrimental free radicals as action of TPGS (Yang *et al*., 2012; Twegh *et al*., 2020).

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 (3.1) 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.

Table 3.1 : Composition of experimental feed supplement.

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

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 ºC until the point when proportionate weight, while feces were desiccated at 60C^{o} (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 (3.2).

Table 3.2 : 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

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 supernatant of sperm fluid was been diluted as 1:100 with a solution compromising a 5 g of sodium bicarbonate, 25 mg eosin per 100 ml ultra-pure water and 1 ml formalin (35%) for examination of sperm number, motility and viability. The sperm number of diluted sperm suspension were been calculated with a hemocytometer (Hawksley and Sons Ltd, England, UK). An aliquot part of 10 ml of dilution were been poured to counting chamber. The sperm number were been counted using the 400X magnification of a light microscope after holding for 5 min (Olympus Optical Co. Ltd., Tokyo, Japan).

The total sperm counts (3106/ml) in addition were been calculated. The calculation of sperm motility and viability of diluted sperm suspension was been achieved. In a slide, an aliquot of 20 ml of diluted sperm suspension jumbled with a similar volume of nigrosine and 0.05% eosin-Y. The blend were been incubated at room temperature for 2 min and investigated under a light microscope with 400X magnification. The live sperms were white (unstained) and dead sperms were been stained. A 100 sperms per lamb were been calculated and viability percentages (%) were counted. Sperm motility and rapid progressive motile sperm percentage (grade A, percentage of the sperms that move forward rapidly) labeled and evaluated according to the (WHO, 2010).

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

Table (4.37) showed the results of semen volume that G3 group (0.66±0.017) was a higher significantly (P<0.05) than G1 group (0.59±0.03) at T1 test. While G2 (0.80±0.01) and G3 (0.84±0.02) treatment groups recorded a high significant differences (P<0.05) than G1 group (0.66±0.02) at T2 test. The differences within groups among periods demonstrated that all treatment groups at the T2 were significantly (P<0.05) higher than the T1 test of the same each group.

Table 4.37 : Effect of raw cow milk Kefir in semen volume (ml) of Iraqi ram lambs M±SE.

Group / Test	G1 (C) (N=8)	G2 (K 10%) (N=8)	G3 (K 20%) (N=8)	LSD
T1	B0.59±0.03b	AB0.63±0.02b	A0.66±0.017b	0.0638
T2	B0.66±0.02a	A0.80±0.01a	A0.84±0.02a	

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%), T1 (first test), T2 (second test).

Results of **Semen Concentration** of the rams table (4.38) explained that were a significant differences (P<0.05) between G1 and G2 groups for T2 test. In addition to, the differences within groups among periods demonstrated that no treatment groups appeared any significant differences at the T1 and T2 tests within the same each group.

Table 4.38 : Effect of raw cow milk Kefir in Semen Concentration (10^9 Sperm/ml) of Iraqi ram lambs M±SE.

Group / Test	G1 (C) (N=8)	G2 (K 10%) (N=8)	G3 (K 20%) (N=8)	LSD
T1	A2.80±0.11a	A2.82±0.08a	A2.76±0.07a	0.2706
T2	B2.63±0.12a	A3.06±0.09a	AB2.82±0.02a	

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%), T1 (first test), T2 (second test).

The **Individual Motility** of Iraqi ram lambs that supplemented with raw cow milk Kefir table (4.39) demonstrated that G3 group (82.52±1.81) viewed a remarkable significant differences (P<0.05) in comparison with G1 (74.12±1.59) and G2 (73.55±2.43) groups at the T1 test. While G2 (88.93±1.68) and G3 (86.60±2.11) treatment groups mentioned a higher significant (P<0.05) than G1 group (67.63±1.53) at the T2 test. However, the differences within groups among periods explained that G1 (74.12±1.59) treatment group at the T1 test was significantly (P<0.05) higher than the T2 test (67.63±1.53) of the same group. While G2 group at T2 test (88.93±1.68) was significantly (P<0.05) higher than the T1 test (73.55±2.43) of the same group. In addition to, G3 group did not appear any significant variation (P<0.05) between the results of the same treated group.

Table 4.39 : Effect of raw cow milk Kefir in **Individual Motility (%)** of Iraqi ram lambs M±SE.

Group / Test	G1 (C) (N=8)	G2 (K 10%) (N=8)	G3 (K 20%) (N=8)	LSD
T1	B74.12±1.59a	B73.55±2.43b	A82.52±1.81a	5.3893
T2	B67.63±1.53b	A88.93±1.68a	A86.60±2.11a	

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%), T1 (first test), T2 (second test).

Results of **Total Motility** of different groups table (4.40) demonstrated no any significant differences among all groups for the T1 test (82.46±1.46), (83.24±1.19) and (86.14±0.73) respectively. Nevertheless, G2 group (91.39±1.16) was higher significantly (P<0.05) than G1 (70.44±1.09) and G3 (84.88±2.34) treatment groups for the T2 test. In addition to, G3 group (84.88±2.34) was significantly (P<0.05) higher than G1 group (70.44±1.09). In concerning with the differences within groups among periods it was explained that G1 treatment group at the T1 test (82.46±1.46) were significantly (P<0.05) higher than the T2 test (70.44±1.09) of the same group. While, G2 group at T2 test (91.39±1.16) was higher significant differences (P<0.05) than the T1 test (83.24±1.19) of the same group. In addition to, G3 group did not appear any significant variation (P<0.05) between the results of the same group.

Table 4.40 : Effect of raw cow milk Kefir in Total Motility (%) of Iraqi ram lambs M±SE.

Group / Test	G1 (C) (N=8)	G2 (K 10%) (N=8)	G3 (K 20%) (N=8)	LSD
T1	A82.46±1.46a	A83.24±1.19b	A86.14±0.73a	4.0634
T2	C70.44±1.09b	A91.39±1.16a	B84.88±2.34a	

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%), T1 (first test), T2 (second test).

The percentages of **Dead Sperm** of reproductive parameters table (4.41) demonstrated that G1 group at the T1 test (16.78±0.81) recorded the higher significant differences (P<0.05) when compared with G2 (11.46±0.92) and G3 (8.93±0.34) treatment groups. While, G2 group (11.46±0.92) was higher significantly (P<0.05) than G3 treatment group (8.93±0.34). In addition to, G1 group at the T2 test (16.37±0.62) recorded a high significant differences (P<0.05) when compared with G2 (9.24±0.30) and G3 (8.35±0.24) treatment groups. Concerning the differences within groups among periods it was explained that G1 and G3 groups did not demonstrated any significant differences (P<0.05) between the T1 and T2 tests of the same each group. While, G2 group at T1 test (11.46±0.92) was higher significant differences (P<0.05) than the T2 test (9.24±0.30) of the same group.

Table 4.41 : Effect of raw cow milk Kefir in **Dead Sperm (%)** of Iraqi ram lambs M±SE.

Group / Test	G1 (C) (N=8)	G2 (K 10%) (N=8)	G3 (K 20%) (N=8)	LSD
T1	A16.78±0.81a	B11.46±0.92a	C8.93±0.34a	1.723
T2	A16.37±0.62a	B9.24±0.30b	B8.35±0.24a	

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%), T1 (first test), T2 (second test).

Results of Progressive Motility table (4.42) demonstrated that G2 (79.17±1.33) and G3 (79.76±1.01) groups at the T1 test recorded a higher significantly (P<0.05) in comparison to G1 treatment group (65.72±1.44). While, G3 group at the T2 test (92.87±0.61) was higher significant differences (P<0.05) than G2 (85.97±1.93) and G1 (69.65±0.94) treatment groups. In addition to, G2 group at the T2 test (85.97±1.93) recorded a high significant differences (P<0.05) when compared with G1 (69.65±0.94) treatment group. Furthermore, the differences within groups among periods it was explained that all treatment groups were higher significant differences (P<0.05) at the T2 test (69.65±0.94), (85.97±1.93) and (92.87±0.61) respectively in comparison with the T1 test (69.65±0.94), (85.97±1.93) and (92.87±0.61) respectively of the same each group.

Table 4.42 : Effect of raw cow milk Kefir in Progressive Motility (%) of Iraqi ram lambs M±SE.

Group / Test	G1 (C) (N=8)	G2 (K 10%) (N=8)	G3 (K 20%) (N=8)	LSD
T1	B65.72±1.44b	A79.17±1.33b	A79.76±1.01b	3.6697
T2	C69.65±0.94a	B85.97±1.93a	A92.87±0.61a	

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%), T1 (first test), T2 (second test).

Statistical analyses for result means of Sperm Abnormality table (4.43) demonstrated that G1 group at the T1 (4.17±0.11) and T2 (3.83±0.18) tests recorded a high significant differences (P<0.05) in contrast to G2 and G3 treatment groups. The differences within groups among periods explained that all treatment groups did not illustrated any significant differences (P<0.05) between the T1 and T2 tests of the same each group.

Table 4.43 : Effect of raw cow milk Kefir in Sperm Abnormality (%) of Iraqi ram lambs M±SE.

Group / Test	G1 (C) (N=8)	G2 (K 10%) (N=8)	G3 (K 20%) (N=8)	LSD
T1	A4.17±0.11a	B2.71±0.17a	B3.08±0.13a	0.4526
T2	A3.83±0.18a	B2.61±0.17a	B2.86±0.16a	

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%), T1 (first test), T2 (second test).

Semen pH results in Iraqi ram lambs where supplemented with raw cow milk kefir table (4.44) explained that G2 group at the T1 (6.77±0.01) and T2 (6.81±0.01) tests were significantly (P<0.05) high when compared with G1 and G3 treatment groups. Nevertheless, G3 group (6.70±0.06) was the higher significantly (P<0.05) when compared with G1 group at the T2 test (6.35±0.02). In concerning with, the differences within groups among periods it was explained that G1 group at the T1 test (6.60±0.02) viewed a high significant differences (P<0.05) than the T2 test (6.35±0.02) of the same group. While, G2 and G3 treatment groups did not appear any significant differences between the T1 and T2 tests of the same each group.

Table 4.44 : Effect of raw cow milk Kefir in Semen pH of Iraqi ram lambs M±SE.

Group / Test	G1 (C) (N=8)	G2 (K 10%) (N=8)	G3 (K 20%) (N=8)	LSD
T1	B6.60±0.02a	A6.77±0.01a	B6.62±0.04a	0.1064
T2	C6.35±0.02b	A6.81±0.01a	B6.70±0.06a	

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%), T1 (first test), T2 (second test).

Results of Semen Score (0-4) of semen parameters table (4.45) demonstrated that G2 group at the T1 test (3.81±0.14) illustrated a higher significant differences (P<0.05) when compared with G1 (3.06±0.20) treatment group. While, no any significant differences between all treatment groups at the T2 test. Furthermore, among the differences within groups among periods it was explained that G1 and G2 groups did not demonstrated any significant differences between the T1 and T2 tests of the same each group. While, G3 treatment group at the T2 test (3.93±0.19) viewed a high significant differences (P<0.05) than the T1 (3.46±0.15) of the same group.

Table 4.45 : Effect of raw cow milk kefir in Semen Score (%) of Iraqi ram lambs M±SE.

Group / Test	G1 (C) (N=8)	G2 (K 10%) (N=8)	G3 (K 20%) (N=8)	LSD
T1	B3.06±0.20a	A3.81±0.14a	AB3.46±0.15b	0.4585
T2	B3.43±0.06a	AB3.84±0.15a	A3.93±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%), T1 (first test), T2 (second test).

The Sperm Viability (%) of semen parameters of different treatment groups results table (4.46) demonstrated that G2 and G3 treatment groups recorded a higher significantly (P<0.05) in comparison to G1 treatment group at the T1 and T2 tests. As well as, the differences within groups among periods explained that G1 and G3 groups did not revealed any significant differences between the T1 and T2 tests of the same each group. While, G2 treatment group at the T2 test (86.94±1.61) illustrated a higher significant differences (P<0.05) than the T1 (77.98±3.35) of the same group.

Table 4.46 : Effect of raw cow milk Kefir in Sperm Viability (%) of Iraqi ram lambs M±SE.

Group / Test	G1 (C) (N=8)	G2 (K 10%) (N=8)	G3 (K 20%) (N=8)	LSD
T1	B69.20±1.03a	A77.98±3.35b	A79.50±1.41a	5.1162
T2	B68.82±0.97a	A86.94±1.61a	A84.16±1.18a	

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%), T1 (first test), T2 (second test).

Administration of the probiotic mixture revealed a highest sperm concentration, testosterone concentration and advanced motility were been obtained when probiotic was administered. In addition, Sperm concentration was highest in rams given fermented milk probiotic (3.65×10^9 sperm/ml) than control and other treatments. Probiotic significantly ($P < 0.001$) increased sperm motility than control and other treatments (63.0% and 50.3% for probiotic and symbiotic rams, respectively). The increase that been gained by drinking the fermented milk on sperm motility reached 16% above the control rams. Rams given probiotic gave ejaculates with the lowest percent of dead sperm (14.7%) (Zeitoun *et al.*, 2014).

It is evident from the result on semen characteristics obtained in the present study that semen from lambs fed kefir had superior motility, higher sperm concentration, higher percentage of sperm livability and lower number of abnormal spermatozoa. This improvement in semen characteristics may be attributed to the antioxidant property of SC as a probiotic-based feed additive (Uskova & Kravchenko, 2009; Spyropoulos *et al*., 2011).

The significant improvement in semen characteristics parameters was been found in this study with those lambs supplemented with the kefir. May be related to, this beneficial effect that resulted from an indirect consequence of the hypolipidemic and antioxidant bioactivities of probiotic (Ibrahim *et al*., 2012). It was been reported that oral administration of probiotics could improve animal antioxidative status, which is important in that it can protect sperm cells from the damage by harmful free radicals induced by lipid peroxidation (Wang *et al*., 2009).

Our study is been supported by Al-Sobayil *et al*. (2008) who stated that the high dose of the mixture enhanced (p<0.01) the libido in both breeds. Testosterone levels were significantly (p<0.01) higher in Aradhi than Damascus Goat's Bucks. Administration of the probiotic mixture resulted in an increased (p<0.01) ejaculate volume, gross and individual motility, sperm concentration, total motile sperm in the ejaculate than in control. Additionally, lower dead and abnormal sperm numbers were been obtained with bucks given the probiotic mixture. Administration of the synbiotic mixture caused significant (p<0.01) stimulation for buck' sex drive, this was shown in the reduction of the duration (seconds) between buck release from its pen until a complete erection was achieved.

The ingredients of probiotics are mainly lactic acid bacteria (*Lactobacillus acidophilus* and *Bifidobacterium bifidum*) which proved to enhance the functions of the lower gut (Rafter, 2003). Additionally, there might have a synergistic effect between these bacteria and rumen microorganisms to enhance their functions in rumen absorption. In addition, some lactic acid bacteria been shown to increase colonic NADPH-cytochrome P-450 reductase activity and glutathione S-transferase levels. Obviously, these enzymes, which are involved in several metabolic processes including spermatogenesis and steroidogenesis, might enhanced such physiological functions in the treated lambs (Pool-Zobel, 2005).

Sperm motility in Oilpro and Fryoilpro group were significantly higher than both control and oil groups (P<0.01). The results taken from Fryoilpro group demonstrated the highest motility rate in comparison to the other groups. Probiotic use had a positive effect on the sperm motility. The negative effects of sunflower oil and fried sunflower oil on seminiferous tubules was been demonstrated. These negative effects were been ameliorated with probiotics to the level of the control group. Additionally, sperm motility and seminiferous tubule scores increased in the probiotic high fat diet group (Sayiner *et al*., 2019). Dardmeh *et al*. (2017) showed that *Lactobacillus rhamnosus* PB01 has a positive effect on both weight loss and reproductive hormones, significantly improving sperm motility and kinematic parameters. Bucks on T_B (*Saccharomyces cerevisiae*-based diet) had improved (p<0.05) sperm concentration, motility and live sperm, tubule diameter, epididymal volume, volume fraction of duct, and total duct volume, but decreased testicular volume. Incidence of head and tail sperm abnormality was significantly (p<0.05) reduced in bucks fed SC-based diets, and highest for control (Treatment A) fed bucks. Bucks fed diets supplemented with a combination of *Saccharomyces cerevisiae* and zinc oxide (Treatment D) had significantly (p<0.05) higher sperm pH compared with other treatments. Cheng *et al*. (2002) pointed out that semen quality assessment is an important marker in selection of breeding males, and for effective monitoring of the male's reproductive capacity. Usually, sperm traits such as sperm motility, percentage of live or dead sperm, morphological features among others often determines the inseminating capacity of particular semen (Okoro *et al*., 2016).

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