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Effect of adding the crushed date kernel treated with probiotic bacteria to the ration on some blood parameters of Awassi lamb

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Abstract

This study was conducted in the fields of Al-Dabouni research station in Al-Dabouni district, Wasit Governorate, the General Authority for Agricultural Research / Ministry of Agriculture, during the period from 8/2 to 7/6/2022, to investigate the effect of adding the crushed date kernel treated with probiotic bacteria to the ration on some blood parameters of Awassi lamb. A total of 24 male Awassi lambs, aged between 4-5 months, with average weight ($24,583 \pm 0.25$) kg, were randomly distributed into six equal groups (4 lambs per group) and fed on daily diets for a period of 18 weeks, as follows: T1 (the negative control); T2 (Positive control); T3: the lambs were fed a diet containing 10% crushed date seeds, loaded with *Bacillus subtilis* as a probiotic; T4: the lambs were fed a diet containing 10% crushed date seeds, loaded with *Lactobacillus acidophilus* as a probiotic; T5: the lambs were fed a diet containing 10% crushed date seeds, loaded with *Bifidobacterium bifidum* as a probiotic; T6: the lambs were fed a diet containing 10% crushed date seeds, loaded with *Streptococcus thermophiles* as a probiotic. The results indicate that there were no significant differences between all experimental treatments on the red blood cells (RBC), white blood cells (WBC), Packed Cell Volume (PCV) and the hemoglobin concentration (HGB) before and after the treatment.

Keywords: date kernel, probiotic bacteria, Awassi lamb, blood cellular.

Introduction

Many researchers have intensified the study of the chemical components of date stones, they referred to the distinctive nutritional properties of the date kernel in terms of its fat content (10-12%), minerals and protein by 5-6%.

Akasha *et al.* (2016) reported the prevalence of storage proteins related to glycinin and β -conglycinin, and the presence of at least 300 different proteins in date seed extract, all of which are necessary to provide energy and metabolism for the embryo inside the seed, there were also carbohydrates in addition to a high percentage of polyphenols such as hesperidin, quercetin, kaempferol, phenolic acid allergic, epicatechin, catechol, chlorogenic, and carotenoids. Total dietary fiber accounts for 75–80% such as pectin, β -glucan and Arabinoxylan (Alem *et al.* 2017; Dardjito *et al.* 2019; Maqsood *et al.* 2020).

in the studies were focused to using dietary fiber extracted from date stones as cheap sources in many fields, because of its content of dietary fiber 39.89%, with a high content of some elements as parts per million such as iron 186.84, potassium 185.88, magnesium 505.64, sodium 506.72, and zinc 13.28, it also showed technological properties such as 0.81 g/g

oil binding capacity, the water holding capacity is 4.06ml/g, and the swelling capacity is 8.88ml/g, antioxidant activity and proven prebiotic activity, as it was observed to stimulate the multiplication of *L. acidophilus* (Afrazeh *et al.* 2021).

Antibiotics have been widely used in improving the production of farm animals, which resulted in an increase in the emergence of strains of microorganisms resistant to antibiotics, including *Salmonella*, this prompted the World Health Organization to prohibit the use of some types of antibiotics, for fear of the transmission of antibiotic resistance to the consumer and what it leads to allergy problems in individuals and the emergence of pathogenic bacterial species with multiple antibiotic resistance (Reuter, 2001; WHO, 1997).

Preferred to return to the use of intestinal flora in the treatment of diseases caused by *Salmonella* bacteria in America in the eighties of the last century. The US Food and Drug Administration united required laboratories and companies producing probiotics to use the term direct microbial exposure instead of probiotics, and this agency defined it as a source of beneficial microorganisms for the host (Bootwalla and Miles 1991). After fearing the use of raw or unclassified intestinal flora, which

may contain some types of pathogenic microorganisms (Bootwalla & Miles 1991), Some organizations worked to determine the type of microorganisms used in microbial balance events of the intestinal flora through the launch of the GRAS list (General Recognize As-Safe) (Burdock and Carabin, 2004), which includes dozens of species and genera of beneficial microorganisms that the World Health Organization has allowed to be added to food.

This study aimed to the effect of adding crushed date kernel treated with probiotic bacteria to Awassi lamb diets on blood cellular traits.

Material and methods

This study was conducted in the fields of Al-Dabouni research station in Al-Dabouni district, Wasit Governorate, the General Authority for Agricultural Research / Ministry of Agriculture, during the period from 8/2 to 7/6/2022, to investigate the effect of adding the crushed date kernel treated with probiotic bacteria to the ration on some blood parameters of Awassi lamb. A total of 24 male Awassi lambs, aged between 4-5 months, with average weight ($24,583 \pm 0.25$) kg

The animals were placed in a large, semi-closed barn to house the animals, divided into adjacent partitions made of cement, with dimensions of 5 x 5 m and an area of 25 m² for each barn, consisting of six barns (three adjacent barns corresponding to three other adjacent barns) in the middle of which is a theater with a wide area, and each barn contains a mobile feeder to place the concentrated feed and underneath the feed. Coarse (shredded barley straw) with a height of 40-45 cm and fixed drinkers for clean water with a height of 30 cm, equipped with pipes and a tank for drinking water.

After the plastic numbers were attached to the left ear of each lamb, then the lambs were weighed after cutting off the feed from them overnight with a digital scale for small animals, and the initial weight was considered. In order to reduce the differences in animal weights between the six groups, the experiment continued for a period of 120 days, including a preparatory period of 20 days for the purpose of acclimatization to the new place for it and to accustom the lambs to the diets allocated for the experiment and the feeding method. The group feeding system was followed for each treatment of the lambs. The lambs were fed a unified diet at 3% of the live

body weight. Concentrated feed was provided twice a day during the experiment period at eight in the morning and five in the afternoon to ensure that the animals consumed the allocated amount of crushed date seeds loaded with bacteria. The quantities provided were adjusted on the basis of the new weight of the treatment every two weeks, and the concentrated feed. For each of the types used in the experiment, it was prepared by taking a certain weight of each type sufficient for 50 kg of concentrated feed, according to the concentration used in each treatment in the nutrition laboratory of the General Authority for Agricultural Research / Ministry of Agriculture (in the Abu Ghraib area), and the fodder materials that enter each of the treatments were crushed and kept in special containers until use, and the preparation process is repeated again when the quantity runs out, and the lambs were entire amount of feed provided was consumed without any residue, while water and hay were provided freely throughout the study period.

Twenty-four Awassi male lambs were distributed into six equal groups (4 lambs for each group) and fed on daily diets for a period of 18 weeks, as follows:

T1 (negative control): It was considered a control group that was given a standard diet free of crushed date seeds and probiotic.

T2 (positive control): She was given a diet containing 10% crushed date seeds without adding the probiotic.

T3: the lambs were fed a diet containing 10% crushed date seeds, loaded with *Bacillus subtilis* as a probiotic.

T4: the lambs were fed a diet containing 10% crushed date seeds, loaded with *Lactobacillus acidophilus* as a probiotic.

T5: the lambs were fed a diet containing 10% crushed date seeds, loaded with *Bifidobacterium bifidum* as a probiotic.

T6: the lambs were fed a diet containing 10% crushed date seeds, loaded with *Streptococcus thermophiles* as a probiotic

Blood Sampling

Pre-treatment and post-treatment blood samples for all lambs were drawn from the jugular vein, using a sterile 5 ml syringe and 18 gauge needle, where 2 ml Some of them are in special marked tubes that contain an anticoagulant (EDTA) for the purpose of studying blood parameters, including counting red blood cells (RBC) and white blood cells (WBC), as

well as measuring hemoglobin (HGB) and the volume of Packed Cell Volume (PCV),

Statistical Analysis

The Statistical Analysis System SPSS (2012) was used to analyze the data to study the effect of different coefficients on the studied traits according to a complete random design (CRD). Significant differences between the means were compared with the Duncan (1955) multiple range test.

Results and Discussion

Red Blood Cells (RBC)

The normal range of RBC concentration in Awassi lambs is (8.9 - 9.3) $\times 10^6$ cells/ cm^3 , which is considered a value that does not affect the health of the animal.

Table (1) shows the superiority of the T2 treatment over the rest of the treatments before addition in the average number of red blood cells, as it recorded 8.37 ± 0.26 , 19.8 ± 0.24 , 8.18 ± 0.30 , 8.01 ± 0.26 , 7.87 ± 0.33 , 6.05 ± 0.75 for T6, T4, T5, T3 and T1, but after the addition, the T4 treatment excelled and scored 8.63 ± 0.34 compare with the other treatments (8.59 ± 0.23 , 8.39 ± 0.12 , 8.31 ± 0.20 , 7.82 ± 0.82 , 7.77 ± 0.35) T6, T5, T1, T2, T2 and

T3, for the purpose of indicating the significance of the differences, a covariance analysis was conducted and it was found that there were significant differences between the results before the addition, while there were no significant differences after the addition and for the purpose of explaining the reason for the significant differences, the smallest significant difference LSD test was conducted, and through it it was found that there is a significant difference between all treatments with treatment T2, while after the addition, there are no significant differences between all treatments.

In order to ensure the validity of the results, the Duncan test was carried out, and it was found before the addition that the T6 treatment differed from the rest of the treatments, but it was not significant in the Duncan test, as for after addition, there are no differences between the transactions, all of which are at one level, and this indicates that there are no significant differences between the results.

From this it was found that giving the probiotic to ruminants lead to an increase in the availability of nutrients in light of their production of protein materials, vitamins and minerals (Moloney

and Drennan, 1994) and that this improves the transport of nutrients to all parts of the body and an increase in the number of red blood cells.

And that these results came in agreement with Hama Salim and Abdulla, 2011), for the addition of the probiotic, and did not agree with what was reached by (Al-Ghalbi, 2010) for the addition of the probiotic and (Baeuchemin *et al.*, 2003) for the addition of the probiotic and yeast.

White Blood Cells (WBC)

The normal limits for the concentration of white blood cells in Awassi lambs ranged from $(4.3 - 7.4) \times 10^3$ cells/cm³, which is considered a value that does not affect the health of the animal.

Table (1) shows that treatment T1 has achieved the highest test results before addition, it recorded an average ability of 52.4 ± 0.12 , then it was followed by the treatments T4, T4, T3, T6, T2 (4.42 ± 0.11 , 4.40 ± 0.09 , 4.37 ± 0.10 , 4.37 ± 0.09 , 4.37 ± 0.09), after addition, treatment T1 also recorded the highest mean of 4.47 ± 0.10 , then it was followed by treatments T5, T4, T6, T3, T2 (4.27 ± 0.10 , 4.22 ± 0.11 , 4.17 ± 0.06 , 4.15 ± 0.06 , 4.15 ± 0.06), in order to show the significance of the difference, the LSD covariance test was performed, and it was found that there were no significant

differences between the results of the test before and after the addition.

It was noted that the record of treatments decreased after the addition compared to before the addition. These results agreed with what was indicated by Baeuchemin *et al.*, 2003, when adding the probiotic, and (Al-Ghalbi, 2010) and (Hama Salim & Abdulla, 2011) when adding the probiotic.

Table 1. The effect of adding probiotic bacteria loaded on crushed date seeds on Red Blood Cells (RBC) and White Blood Cells (WBC) of the blood of Awassi sheep before and after the treatment.

Treatment s	Red Blood Cells (RBC)		White Blood Cells (WBC)	
	Before	After	before	After
T1	± 8.19 0.24	± 8.31 0.20	± 4.52 0.12	± 4.47 0.10
T2	± 8.37 0.26	± 8.39 0.12	± 4.42 0.11	± 4.27 0.10
T3	± 8.18 0.30	± 8.59 0.23	± 4.37 0.10	± 4.22 0.11
T4	± 7.87 0.33	± 8.63 0.34	± 4.37 0.09	± 4.15 0.06
T5	± 8.01 0.26	± 7.82 0.82	± 4.37 0.04	± 4.15 0.06
T6	± 6.05 0.75	± 7.77 0.35	± 4.40 0.09	± 4.17 0.06
Sig.	N.S	N.S	N.S	N.S

Hemoglobin concentration (HGB)

The normal range of hemoglobin concentration in Awassi lambs is (7.1-9.1) g/dl, which is considered a value that does not affect the health of the animal.

Table (2) shows that the highest average was achieved in treatment number T4, which was 7.30 ± 0.10 before

addition, while the treatments T1, T3, T2, T5, and T6 were recorded with averages of (7.25 ± 0.06 , 7.07 ± 0.16 , 7.07 ± 0.08 , 7.05 ± 0.02). , 6.95 ± 0.16), as for after the addition, the treatment T3 with an amount of 9.02 ± 0.53 recorded the highest average of the treatments T6, T2, T4, T5, T1 with averages (9.00 ± 0.75 , 8.30 ± 0.88 , 8.60 ± 0.27 , 8.55 ± 1.10 , 8.30 ± 0.88), for the purpose of showing the significance of the difference, the LSD covariate test was performed, and it was found that there were no significant differences between the results, so there is no need to perform the Duncan test, the increase in hemoglobin in the treatments that were given probiotics was attributed to the production of microbial proteins, that lead to an increase in protein concentrations in the blood, because they contain globulin, which, by increasing the latter, will raise the synthesis of hemoglobin, which is composed of globulin (Jawad et al., 2016), and that these results were consistent with what was indicated by (Baeuchemin *et al.*, 2003) to add the probiotic and also came in agreement with (Chen et al., 2020; Milewski and Sobiech, 2009; Al-Faris, 2012) when adding the probiotic.

Packed Cell Volume (PVC)

The normal range of hematocrit concentration in Awassi lambs is (28-31%), which is considered a value that does not affect the health of the animal.

Table (2) shows that the highest average was achieved in the T3 treatment before addition, with an average of 31.50 ± 0.64 , it was mathematically higher than the rest of the averages of the other treatments (31.00 ± 0.40 , 31.00 ± 0.40 , 31.00 ± 0.40 , 30.75 ± 0.75 , 30.25 ± 1.25) T2, T1, T4, T5, T6, while it was found after the addition that the T4 treatment achieved the highest mean, and for the purpose of showing the significance of the difference, the covariance test (LSD) was performed.

It was found through it that there are no significant differences between the results before and after the addition, so there is no need to conduct the Duncan test, it turns out that the reason for the increase in the size of the blood cells that are packed as a result of its direct correlation with the numbers of red blood cells, any increase in the number of red blood cells increases the size of the packed blood cells, these results were consistent with (Al-Ghalabi, 2010; Hama Salim and Abdulla, 2011) when adding the probiotic and not in agreement with what

was indicated by (Beauchemin *et al.*, 2003) for adding the probiotic.

Table 2. The effect of adding probiotic bacteria loaded on crushed date seeds on Hemoglobin concentration (HGB) and Packed Cell Volume (PVC) of the blood of Awassi sheep before and after the treatment.

Treatment s	Hemoglobin concentration (HGB)		Packed Cell Volume (PVC)	
	Before	After	before	After
T1	±30.75 0.75	±32.75 0.25	±6.95 0.16	±9.00 0.75
T2	±30.25 1.25	±32.00 0.70	±7.07 0.08	±8.55 1.10
T3	±31.50 0.64	±33.00 0.40	±7.05 0.02	±9.02 0.53
T4	±31.00 0.40	±33.25 0.25	±7.30 0.10	±8.60 0.27
T5	±31.00 0.91	±32.75 0.47	±7.07 0.16	±8.82 0.34
T6	±31.00 0.40	±32.50 0.28	±7.25 0.06	±8.30 0.88
Sig.	N.S	N.S	N.S	N.S

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