Impact of partially and completely replacing of dried tea ground with soybean meal on few carcass features and biochemical blood traits of the fattening of Awassi lambs

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Abstract :

A study focused on the utilization of some plant protein by-products in excess of the daily individuals consumption which is namely dried tea grounds. They were partially and completely replaced at rates (0, 4, 8, 12%) with the level of soybean meal in the basal feed for the growth and fattening trial of Awassi offspring. 24 Awassi lambs were grown on a field specifically designed for sheep breeding under the supervision of the department of Animal Production at the College of Agriculture and Forestry. The experimental lambs were randomly assigned into four treatments of equal number. Four identical diets with crude protein levels (15.93, 15.17, 15.00, 15.08%) and metabolizable energy levels (2440, 2432, 2425, 2415 kcal) for 3 months period. The groups of lambs were feeding on four rations were differing in rates of dried tea grounds. The results of this experiment indicate a highly significant statistical effect of the alternative protein source on final weight, weight of empty body, and daily weight gain between level of dried tea grounds substitution (4, 8, 12%) compared to the first treatment without dried tea grounds. As for carcass characteristics the rates of substitution of partial and total tea grounds was significantly outperformed ($P \leq 0.05$) than control treatment in the mean of hot carcass weights, dressing percentages, and area of eye muscle. Regarding of the fat layer thickness deposited of body tissues it was noted that it decreased significantly ($P \leq 0.05$) with increasing rates of partial and total substitution of tea grounds by soybean meal. In another context, the results of blood biochemical characteristics confirmed a significant improvement ($P \leq 0.05$) on blood protein measurements (total blood protein and albumin), accompanied by a highly significant decrease ($P \leq 0.01$) in the concentrations of cholesterol, triglycerides and liver enzymes (AST and ALT) for the experimental groups compared than for control lamb group. We conclude from this study results it is possibility of benefiting from some plant protein by-products that daily accumulate in large quantities, posing a great danger and pollution to the local environment which requires recycling them and making some physical changes such as cleaning, drying, remixing them with the components of the concentrated feed and reusing them as a nutritional protein source as an in feeding and fattening of sheep without negative effects on the productive performance and health of animals.

Key words: tea grounds, carcass features, weight gains, biochemical blood, liver enzymes.

Introduction

The scarcity of fodder resources provided to animals and their poor quality during certain seasons of the year have led to a decline in the development and sustainability of sheep production in dry areas. This is exacerbated by the problem of high feed costs, which is approximately about of constitute of 70% of total cost for project breeding of sheep

(1).Therefore, Most of authors in parts of the world are seeking to develop balanced fattening rations that meet the nutritional needs of fattening animals (2,3). Most local breeders are relying on barley grains primarily to feed their animals, soybean meal, wheat straw in preparation and processing of fattening rations (3). One of the obstacles that facing for most investors is an increased demand for soybean meal as a basic protein source for growth and fattening of sheep due to its constant unavailability locally in the country which causes confusion in its high prices and only option is to resort importing it from countries neighboring Iraq.This has prompted a section of producers and breeders to resort partial or complete replacement of this meal with alternative protein sources that are locally available and less options cost for example urea, spoiled yeast , sugar beets, vetch seeds, and black seed meal (4,5,6).The tea is widely popular separated around the world because its stimulant properties. Also, it is using to treat tumors, abscesses, bladder diseases, and physical inactivity. Large quantities of this waste was reaching 100,000 tons per year are produced annually due to its daily consumes from the companies, hotels, cafes, and restaurants. Most of this waste is burned and buried in a landfill designated for waste incineration. However, this waste can be recycled and made into fodder suitable for animal consumption and was using as a nutritional source of protein in feeding of farm animal at percentage in it reaches to 22-35% of crude protein (7,8,9). It must be a caution taken if it is stored at a high humidity level (10) because it encourages to fungi grow that may secrete some mycotoxins and effect on health of animals.In addition, Some studied indicates (11,12) leaves of tea that contained nitrogenous compounds, vitamins and polyunsaturated fatty acids. Polyphenols (catechin, epicatechin, epigallocatechin and epigallocatechin gallate). In addition, their content of tannin (1.5-5%) did not have any negative effect on the rate of protein degradation in the rumen of ruminants (13,14). In this direction, several studies have shown that tea waste can partially replace imported commercial as nitrogen sources for ration of milking cow diets (15,16). Some scientific sources reported that tea waste contains a little amounts of crude fat and pigments (17). It is worth noting that some sources indicated that polyphenols consumed as components of tea which led to a significant decrease in level of total cholesterol for blood plasma of ruminants which caused a suppression in absorption of blood lipids by digestive tract of the animal's (18,19,20).Some results of other subsequent studies reached the same conclusion, namely a significant decrease in levels of total cholesterol for the blood plasma when tea waste was added as a protein source to ruminant animal feeds and its effect was more pronounced compared to feeding monogastric animals (21). This finding aligns with (22) which demonstrated that using of 3 gm/d of tea saponins significantly improved on weight gains and feed conversion of goats.

As considered about high prices of basic feed materials especially traditional protein sources and their scarcity during certain seasonal conditions. We explored the potential of dried tea dregs as a non-protein nitrogen source for fattening local lambs. With a remarkable protein content of 22-35% (8,9) and a combustible energy content of approximately 2.454 kilocalories (23), dried tea dregs present a promising option.Our study focuses on assessing the effects of partial and complete substitution of dried tea residues on the growth of Awassi sheep offspring, along with

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evaluating carcass characteristics and blood biochemical profiles. On the one hand, to encourage breeders and investors to utilize and exploit protein feed alternatives in fattening of lambs with the aim of increasing breeder incomes which will ultimately lead to a reduction in red meat prices to support local consumers and to meet their nutrient requirements of protein.

Materials and Methods :

1. Experimental Animals

This trial was carried out on 24 Awassi lambs at the field position of the Animal Production Department, College of Agriculture and Forestry, University of Mosul. All lambs in the study were uniform in age and initial weight, ensuring consistency for accurate results. The lambs were underwent for monitoring of veterinary health for 14 days to ensure they were free of disease. They were numbered with metal numbers on their earlobes. These lambs were fed roughage and gradually increased amounts of concentrated feed (Table 1) during introductory period (10 days). Also, they were allowed to daily grazing until were completed of the experimental procedures.

2.Experiment Plan:

The initial phases of this experiment included measuring the weights of all animals at the beginning of the study by using of box balance designed for sheep with a sensitivity of 0.5 kg. The ranging of initial weights of the lambs were homogeneous from 23.667 to 24.160 kg and they were close in age (4.5-5 months). Statistical analysis of the initial weight of the lambs was using (24). To ensure the accuracy of our findings, we confirmed that there were no significant differences in initial weights (25).We measured the weights of all animals bi-weekly throughout the experiment, allowing for precise tracking until the end of experiment.Through. the preliminary period the lambs were randomly divided into four nutritional treatments that contained partial and total replacement ratios of dried tea grounds at (0, 4, 8, 12%) instead of soybean meal in the control treatment. The four treatments were identical in protein level (15.93, 15.27, 15.06, 15.20%) and metabolizable energy level (2679, 2671, 2664, 2658 Kcal) in the fattening experiment of four groups of Awassi lambs (Table 1).

3.Lambs feeding: Dried tea grounds were using as a non-protein nitrogen source in the ad libitum feeding system for Awassi lambs. Dried tea grounds were obtained from various sources, including the student club inside campus and some popular coffee shops.The process of preparing and processing of dried tea grounds as a non-protein nitrogen source in the four fattening rations was carried out as follows: First, they were collected daily in nylon bags or small plastic containers from their source, and then transported to the forage store inside campus.Afterward, the materials were physically processed and spread in thin layers on concrete floors, allowing them to be exposed to direct sunlight.They were stirred to dry and mixed with the other components of the concentrated feed according to the specified ratios. They were ground by grinding machines with the remaining feed ingredients according to the specified ratios in the feed mill.The four rations were then ready for feeding (Table 1). Dried tea grounds were introduced at rates of (0, 4, 8, and 12%) as a non-protein nitrogen source instead of soybean meal (Table 1) in the growth and fattening rations of four groups of Awassi lambs.The sheep's remarkable ability to convert this into a protein source is attributed to the action of

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microorganisms in the rumen.We implemented a daily feeding schedule consisting of two meals: the first at 8:00 a.m. and the second at 4:00 p.m. to ensure that all lambs consumed the prescribed amount of concentrated feed. The rations covered of the lambs' nutritional requirements accordance with the (26) regulations. To tracking of total feed provided for all animals and monitoring remaining feed is crucial for effective resource management and ensuring optimal animal health.

Table1.Components of concentrated feed and its chemical composition in fattening experiment of Awassi lambs.

Components of rations (%)	First ration	Second ration	Third ration	Fourth ration
Black barley .	56	56	56	56
Wheat bran .	25	24.95	24.75	24.40
Soybean meal.	12	08	04	00
Black tea pomace.	00	04	08	12
Urea (46.5% N_2).	00	0.05	0.25	0.60
Wheat straw .	05	05	05	05
Limestone.	01	01	01	01
Salts.	01	01	01	01
Sum	100%	100%	100%	100%
Chemical composition (%)				
The dry matter .	96.84	96.94	96.84	96.89
The crude fat	15.93	15.27	15.06	15.20
Ether extract.	02.23	02.32	02.40	02.48
Crude fiber.	09.41	09.69	09.90	09.51
Ash.	05.02	05.18	05.35	05.51
Nitrogen Free Extract.	64.25	64.48	64.13	64.19
MetabolizeEnergy* (Kcal/kg feed).	2679	2671	2664	2658

* Metabolize energy of dried tea pomace was to determine according to MAFF (26).

4.Biochemical blood traits:

At the end of the experiment, 10 ml of blood samples were drawn from the jugular vein of the lambs. The clot formed was removed by using a centrifuge system at 3000 rpm to 15 minutes to get blood serum. The serum samples were placed inside sealed tubes and stored on -20 C° for biochemical tests. Laboratory tests were performed on the blood serum samples, which included measurements of albumin (27),cholesterol (28),total blood protein (29) and triglycerides (30).The globulin concentration was determined from difference among concentrations of total protein and albumin (31).

5.The carcass features:

All lambs underwent on 12-hour fasting period prior to slaughter at the end of the experimental phase.The lambs were weighed at the following day prior to the lamb slaughter. During the slaughtering process, carcass weights were recorded after skinning

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and cleaning and this was called the "hot carcass weight." In our recent study, we assessed the dressing percentage was determined by using two distinct methods: the first was calculated based on live Weight Method prior to slaughter.The second was calculate according on the empty Body Weight Method Following the approaches outlined by (32,33).Additionally, we enhanced our rib eye muscle area by focusing on the twelfth rib, as detailed by (34,45).This involved creating a diagram of the muscle area on transparent graph paper, allowing us to calculate the rib eye muscle area through a straightforward method of counting squares.The fat thickness under skin was measured on the twelfth rib by using a conventional transparent ruler (36).

6. Statistical analyses :

Th statistical analysis of the data was it is designed according to a completely random design (CRD) (24) to study effects of replacing as a partial or completely of tea grounds in growth rations for fattening Awassi lambs on the studied traits. Statistically, the data were analyzed by using (37) software. The Duncan Multiple Range test (23) was used at a probability level of 0.05 or 0.01 to determine significant differences and compare the means of the studied characteristics.

Results and Discussion :

1.Productive Performance:

This results showed (table 2) indicates that the rates of initial weight for all lambs was close in completely homogeneous in terms of live weight, size and age. For this reason the statistical analysis did not showed any significant effect in the rates of this trait among four treatments. The rates of initial weight of lambs were 24.000, 24.166, 23.667 and 24.167 kg respectively. In the same direction.The results reveal highly significant differences that warrant further exploration in the average of final weights and empty body weight of the lambs between two treatments (first and second) compared to fourth treatment (12% dried tea grounds). At the same time.The results indicate that there are no highly significant differences between the first and second treatments, nor between the third and fourth treatments, concerning the average of the two traits analyzed. However, the statistical analysis of daily and total weight gains revealed significant differences ($P \leq 0.05$) between the first and second treatments compared to the third treatment for both traits..The rates of the final weight for lambs were 37.333, 39.667, 44.167, 44.667 kg and empty body weight was 34.698, 37.270, 40.812, 44.202 kg and rates of daily weight gain were 148, 172, 228, 262 gm/lamb/day and total weight gain was 13.330, 15.500, 20.500, 24.167 kg for four groups respectively.This results showed a significant increase on final weight, empty body weight, daily and total weight gain of lambs by increasing the level of partial and total replacement of dried tea grounds at the expense of soybean meal.This may be due to the role of dried tea grounds in the feed which to reduce percentage of protozoa in the rumen of lambs was feeding on feed containing tea grounds (6). The introduction of tea grounds in the rumen can significantly reduce methane production. This shift enhances bacterial activity while decreasing protozoa levels, leading to an increase in bacterial protein synthesis. As microorganisms to utilize the protein from tea grounds, more microbial protein reaches the stomach, ultimately boosting the net energy value for maintenance and growth. This process contributes to improved growth across of the animal's body (38,39).This results are consistent with the

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results of (40) who found a significant improvement in rates of daily weight gain, total and final weight of Hanwoo beef calves were feeding a concentrated diet containing 2% green tea grounds compared to the control calf group which fed a diet containing antibiotics for 105 days (fattening period).As far as the results were consistent with the findings of (22) who confirmed a significant increase on rates of weight gain for goats when they used tea saponins at a level of 3 gm/day per head compared to the control group without tea saponins. The findings of our study resonate with the research conducted by (12) which revealed notable differences on daily, total, and final weight gain among crossbred pigs (Landrace × Large White) when comparing green tea treatments to a control group. Through, incorporating green tea residues at varying rates (0%, 0.5%, 1%, and 2%) as a substitute for beer spoilage in feed, we highlight the promising potential of integrating green tea into livestock nutrition.This innovative approach could pave the way for enhanced animal health and productivity. This results was not supported and inconsistent with reported by (41) in fattening Bangladeshi calves, (42) in feeding of crossbred dairy cows (Jersey × Assam Local) and (43).As for fattening of goats, it was found had no significant effect on daily, total weight gain and final weight.When incorporating tea waste in varying proportions as a nitrogen source in ruminant diets, our findings revealed a notable enhancement in daily feed consumption and feed conversion efficiency.The experimental lamb groups that received different ratios of dried tea grounds showed significant improvements compared to the control group. (Table 2).The rates of daily feed intake were 1.389, 1.487, 1.563, 1.596 kg feed intake/day, and the feed conversion efficiency was 9.47, 8.65, 7.00, 6.06 kg feed intake/kg weight gain for four treatments. In sequence.It is noted from this results that rates of daily amount of feed consumption and feed conversion efficiency improved significantly at the experimental treatments when you compare to the first treatment.This due to attributed to that inclusion of tea grounds in components of the concentrated feed which leads to an increase in the efficiency of the metabolic activity of bacteria to benefit from and exploit protein of tea grounds for their growth and bacterial protein production. During this occurs increase the number of bacteria and their percentage and another expense of the protozoa percentage inside the rumen. Consequently, this leads to a significant improvement and increase rates of daily feed consumption , which leads to increase net energy value for focused on maintenance and growth strategies to drive success.

This increases to readiness of the feed for nutritional compounds and this is subsequently reflected on the improvement of growth for the experimental treatments (38,39). The results of this study were supported by (40) who reported significant differences in rates of dry matter intake and feed conversion efficiency for groups of Hanwoo beef calves which were feeding a diet containing 2% green tea residue compared to control diet containing an antibiotic (110 ppm neomycin).The results of this study were consistent with the findings of (12) who examining the impact of green tea residue as an alternative protein source in the diets of hybrid pigs (Landrace × Large White) during the fattening period (6 weeks).Which revealed significant differences in dry matter intake and feed conversion efficiency across various experimental treatments (0.5%,1%, and 2%

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green tea residue) compared to the control group without green tea residue.This research highlights the potential of utilizing green tea residue to replace beer spoilage in animal diets which its promoting sustainable feeding practices. On the other hand, the results of this study differed from some studies (41) on the fattening of Bangladeshi beef calves (42) on the feeding of dairy cows, and (44,45) on the fattening of goats, These study's found no significant impact of tea waste as a nitrogen source on dry matter intake and feed conversion efficiency.

Table 2. Effect of partial and completely substitution of dried tea pomace with soybean meal on body weight gains parameters of Awassi lambs.

Productive traits	First treatment (0% tea pomace)	Second treatment (4%tea Pomace)	Third treatment (8%tea Pomace)	Fourth treatment (12%tea Pomace)
No. of lambs.	6	6	6	6
Initial weight (kg).^{NS}	24.000 ± 0.29 A	24.166 ± 0.44 A	23.667 ± 0.33 A	24.167 ± 0.88 A
Final weight (kg).**	37.333 ± 1.5 C	39.667 ± 2.12 BC	44.167 ±0.33 AB	44.667 ± 1.4 A
Empty body weight** (kg).	34.698 ± 0.81 C	37.270 ± 0.52 BC	40.812 ± 1.8 AB	44.202 ± 1.4 A
Daily weight gains* (gm).	148 ± 0.06 C	172 ± 0.01 BC	228 ± 0.04 AB	268 ± 0.01 A
Total gains (kg)*.	13.330 ± 1.64 C	15.500 ± 0.50 BC	20.500 ± 1.80 AB	24.167 ± 2.40 A
Feed intake (kg)**.	1.389 ± 0.06 B	1.487 ± 0.01 AB	1.563 ± 0.04 A	1.596 ± 0.01 A
Feed conversion. (kg feed/kg gains)**.	9.47 ± 0.91 A	8.65 ± 0.25 AB	7.00 ± 0.80 BC	6.06 ± 0.85 C

NS : Non significant . * Significant differences at 0.05. ** High significant at 0.01

2. Carcass features :

The results showed that weight trait of hot carcass was highly significantly affected (P≤0.01) by increasing level of partial and completely replacement of dried tea grounds in the diets of Awassi lambs (table 3). This results revealed highly significant differences (P≤0.01) among treatments of the third (8% dried tea grounds) and fourth (12% dried tea grounds) When comparing the first (control) and second treatments (4% dried tea grounds). The average of hot carcass weights reached 19.083, 20.400, 23.717, and 24.700 kg for the four treatments, in order. From reviewing we find that there is a highly significant increase in the average of hot carcass weights with increasing levels of dried tea grounds, in favor of the experimental treatments which containing dried tea grounds than to the lamb group that ate of control feed. This leads to significant increase in the final live weight of lambs that consumed diets which contained dried tea grounds were added in different proportions compared than to control group of lambs without dried tea grounds (46,47). On the other hand, The positive correlation between the live weight of lambs at slaughter and their hot carcass weight is a key factor to consider in optimizing meat production. Understanding this relationship can enhance efficiency and profitability in the industry (48. Additionally, we observed similar trends to (46) who reported notable increases in hot carcass weights when black tea residues were used as a protein source, replacing coconut meal at rates of 15% and 7.5%, compared to a

control group without black tea grounds.Furthermore, our results indicate a significant improvement (P≤0.05) in the rib-eye muscle area with higher levels of dried tea ground substitution for soybean meal, showcasing the advantages of our experimental treatment for lambs.The findings underscore the potential of utilizing tea residues in livestock diets to enhance growth performance. The average ribeye muscle area measured 10.38, 12.86, 15.17, and 17.00 cm^2 across four treatments as shown in Table 3, there is a significant difference (P≤0.05) in the average eye muscle area with the last three experimental treatments outperforming the first treatment.This is attributed to the presence of a positive correlation between the area of the eye muscle and the carcass weight (48).

On the other hand, we find that the increase in the area of the eye muscle is due to the increased deposition of protein muscle tissue in all tissues of the animal's body as a result of the efficiency of the metabolic activity processes which consequently leads to an increase in the area of the eye muscle. Moreover, the reason for this may be due to the increased amount of tea grounds consumed during the fattening period. This results of this study are in agreement with the findings of (46) who observed significant differences in the rates of rib eye muscle area of Awassi lambs carcasses. The results were in favor of the 15% tea waste than for the control group free of dried black tea grounds.Also, this results of the current study are inconsistent with the findings of (49) who did not find any significant difference on rates of rib eye muscle area between levels of green tea leaf powder when he using tea leaf powder in feeding of hybrid lambs (Suffolak × Texel × Mult).Through reviewing of the current study presented (Table 3), we find that adding of dried tea grounds to the control feed did not significantly effect on the rates of fat subcutaneous thickness and dressing percentage which its calculated by two methods, the first based on the final body weight and the second based on the empty body weight. The rates of subcutaneous fat layer thickness were 7.33, 7.07, 6.33, 6.16 mm and the net weight calculated by the first method was 51.12, 51.42, 53.77, 54.73% and net weight calculated by the second method was 55.09, 53.91, 58.19, 55.94% for the treatments 0, 4, 8, 12% dried tea grounds respectively.This results are consistent with the findings of (49) who confirmed that there were not significant differences among three nutritional treatments in the thickness of the fat subcutaneous layer when he was using leaves of green tea powder at different levels of (0, 10, 20%) in fattening diets of hybrid lambs (Suffolk × Texel × Mult) for a fattening period of 70 days.On the other hand, this results did not support by findings of (50) who found significant differences on the fat thickness subcutaneous layer when there was feeding different levels of black seed meal as a protein source in fattening diets of Awassi lambs for a fattening period of 90 days. Additionally, the current study did not support by the findings of (46) who observed significant differences in thickness fat subcutaneous layer between lambs groups were feeding on varying levels of tea residues of lambs compared to a control group fed a tea-free diet.

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Table 3.Effect of partial and completely substitution of dried tea pomace with soybean meal on carcass characteristics of Awassi lambs.

Carcass traits .	First treatment (0% tea pomace).	Second treatment (4% tea pomace).	Third treatment (8% tea pomace).	Fourth treatment (12% tea pomace).
Hot incorpse weight** (kg).	19.083 ± 0.98 B	20.400 ± 0.48 B	23.717 ± 0.83 A	24.700 ± 0.56 A
Rib eye muscle area* (cm^2).	10.38 ± 0.39 C	12.86 ± 0.39 B	15.17 ± 0.84 A	17.00 ± 0.58 A
Subcutanious fat * (mm)	7.33 ± 0.44 A	7.07 ± 0.52 A	6.33 ± 0.33 A	6.16 ± 0.60 A
Dressing percentage(1) (%).	51.12 ± 0.73 A	51.42 ± 1.01 A	53.77 ± 0.81 A	54.73 ± 1.98 A
Dressing percentage(2) (%).	55.09 ± 3.41 A	53.91 ± 2.61 A	58.19 ± 1.36 A	55.94 ± 1.29 A

NS : Non significant . * Significant differences at 0.05. ** High significant at 0.01.
(1) Estimated based on final live weight of lambs .
(2) Estimated based on empty body weight of lambs .

3.Biochemical blood parameters:

By reviewing results of the blood protein shown in Table (4) were found significant differences ($P \leq 0.05$) on the rates of total blood protein concentration between the first three treatments (0, 4, 8%) dried tea grounds and the last treatment (12%) dried tea grounds. Also, there were significant increase ($P \leq 0.05$) on concentration of albumin at the last treatment (12%) when it compare to the first treatment (0% tea pomace) .The results of total blood protein concentration were 5.45, 5.60, 5.50 and 6.27 gm/L.The rates of albumin concentration for the four treatments were measured at 3.20, 3.27, 3.40, and 3.90 gm/L, respectively.The above results showed that total blood protein and albumin concentrations was significantly increased with increasing levels of substitution of dried tea grounds for soybean meal in the basal diet of fattening rations for Awassi lamb. This is attributed to the increase in the amount of microbial protein digested from the rumen and reaching to the small intestine (51) or it may be due to the fact that there is a positive correlation between dietary protein intake and total protein concentration in blood plasma. This relationship highlights the importance of adequate protein consumption for maintaining optimal health and supporting bodily functions (52).As for globulin concentration, the results showed no significant effect of the level of substitution of dried tea grounds for soybean meal on the average concentrations of this trait."The average globulin concentrations were 2.25, 2.33,2.10 and 2.37 gm/L for 0, 4, 8, and 12% tea grounds levels respectively (Table 4).It is believed that reason for the absence of significant differences in rates of globulin concentration among the four treatments was shown in table (4) is due to the absence of significant differences in rates of

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the white blood cells count among the four treatments in the current study (table 4).The results are consistent with the findings of (53) who observed a significant effect of tea residues on the average of total blood protein and albumin for blood plasma of Holstein calves when they was using two diets, the first which was a control diet and the second of which contained tea residues from the variety of Yerba Mate in feeding of Holstein beef calves.As for the results mentioned of the cholesterol and triglyceride characteristics in table (4) the results showed a highly significant decrease ($P \leq 0.01$) in rates of cholesterol and triglyceride concentrations between the first treatment (control) and the last three treatments (4, 8, 12%) dried tea grounds. This is attributed to the fact that the concentration of fats in the blood is always changing due to the animal metabolizing the fatty tissue stored in its body to meet its energy needs (54).In addition, the results showed a significant decrease in the average cholesterol concentrations with increasing levels of tea pomace replacement for the second, third, and fourth treatments compared to the control treatment. This may be attributed to the significant decrease in triglyceride concentration, which causes a significant decrease in cholesterol concentration in the blood serum of Awassi lambs (Table 4).This results are consistent with reported by (55) who found highly significant differences in the average triglyceride concentrations among five treatments (0, 5, 10, 15, 20%) of dried chromium waste in fattening of Bakhtiari lambs over a fattening period of 100 days. The results are consistent with reported by (46) who had found a significant effect of different proportions of black tea residues on the levels of cholesterol and triglyceride for lambs groups that had consumed different levels of tea grounds (0, 7.5, 15%) during a fattening period (90 days). Additionally, the recent study, our findings diverged from results of (9) who reported no significant impact on cholesterol levels when comparing the control ration to the second and third rations containing 2.5% and 5% tea residues as a partial substitute for soybean meal in diets of Holstein beef calf. Aso,this aligns with the conclusions of (56) which indicates did not significantly affect on cholesterol concentrations that substituting barley grains with legume alfalfa.

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Table 4.Effect of partial and completely substitution of dried tea pomace with soybean meal on concentrations of biochemical blood characteristics of Awassi lambs.

Blood parameters.	First treatment (0% tea pomace).	Second treatment (4% tea pomace) .	Third treatment (8% tea pomace).	Fourth treatment (12% tea pomace) .
No.of lambs.	6	6	6	6
Total blood protein* (gm).	5.45 ± 0.10 B	5.60± 0.05 B	5.50 ± 0.26 B	6.27 ± 0.27 A
Albumin* (gm).	3.20 ± 0.11 B	3.27 ± 0.14 AB	3.40 ± 0.25 AB	3.90 ± 0.20 A
Globulin^{NS} (gm)**	2.25 ± 0.05 A	2.33 ± 0.18 A	2.10 ± 0.15 A	2.37 ± 0.06 A
Cholesterol** (mg).	62.67 ± 6.22 A	54.00 ± 0.58 AB	48.33 ± 1.20 BC	38.00 ± 1.00 C
Triglycerides** (mg).	39.00 ± 2.30 A	30.33 ± 1.20 B	24.33 ± 0.33 C	20.00 ± 1.15 C
AST enzyme** (unit/L).	178.47 ± 1.94 A	141.00 ± 13.43 B	100.27 ± 5.54 C	83.23 ± 2.93 C
ALT enzyme** (unit/L).	36.33 ± 2.56 A	27.50 ± 1.53 B	21.00 ± 2.08 BC	16.80 ± 1.65 C

NS : Non significant . * Significant differences at 0.05. ** High significant at 0.01.

Based on the results of our experiment, we found that substituting dried tea pomace for both partially and completely as an alternative nitrogen source for traditional protein sources in the diet of Awassi lambs led to a remarkable improvement in key performance traits. This includes significant enhancements in daily and total weight gain, as well as feed conversion efficiency prior to slaughter.This significant improvement in lamb performance parameters led to notable superiority in carcass characteristics and eye muscle area. On the other hand, we observed in this recent study that incorporating varying proportions of tea grounds into lambs' diets led to promising results. Notably, there was a significant reduction in levels of triglyceride and cholesterol in the blood serum of lambs that fed on tea grounds compared to those on control diet.This highlights the potential of tea grounds as a beneficial dietary supplement for improving lamb health. This study recommends the possibility of utilizing and recycling non-protein nitrogenous wastes, including dried tea dregs, as an alternative nitrogen source to imported cakes in local lamb growth and fattening feeds. Furthermore, recycling nitrogenous wastes leads to the removal of accumulated environmental pollution round cities and provision of a healthy, pollution-free environment suitable for human and animal health.

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Conflict of interest :

Conflict of Interest: The authors affirm that there are no conflicts of interest and take full responsibility for the accuracy and integrity of the information presented in this research.and bear responsibility for the details contained in this scientific research.

References :

1.Abdullah,Nour-Alddin Mahmoud, Adnan Khader Nasser,Abdel-Nasser Thenoun Mahmoud.1993.. Feeding two levels of concentrated feed with different sources of coarse feed on growth and fattening of Awassi lambs. Iraqi J.Vet.Sci.;6 (2):57-63.Mosul,Iraq .

2.Shams Al-Din, Qusay Z, Issam AWJ, Mohamed Hussein AS,Yunis IH ,.2012 Effect of nutrition on the sesame industry on some blood and chemical traits of Awassi lambs. Mesopotamia Journal of Agriculture . 40 (2): 24-33. Mosul,Iraq .

3.Arafat, Ibrahim Abdullah ,.2005. Effect of protein level and energy on some of the productive characteristics of the Awassi lambs. J. Mesopot. 33 (1) : 62-66. Mosul/ Iraq .

4.El-Gohary ESHI ,.1997.Performance of lambs fed on diets containing nigella sativa meal. M.Sci. Thesis, Faculty of Agriculture, Mansoura University,Egypt .

5.El-Ayek, MY AA Gabir, AZ Mehrez ,.1999.Influence of substituting concentrate feed mixture by nigella sativa meal on: 2-Animal performance and carcass traits of growing lambs. Egyptian J. Nutr. Feed. (special issue) : 265-277 .

6.Almahdawi,Mozhir K.K.,.2013. Effect of using tea residues in fattening rations of Awassi lambs on the productive performance and digestibility coefficients. J. Kufa Agric. Sci. 5(3):195-216 .Kufa ,Iraq.

7.El-Gendy, KMAA Zaki, Faten F. Abou Ammo, MFA El- Gamal ,.2001.Nigella sativa meal as a protein supplement in ruminant rations. Egyptian J. Nutr. Feed. (special issue):23-26.

8.Yang,C.J.,Y.Yang,D.H.Oh,I.H.Bae,S.G.Cho,I .G.Kong,D.Unganbayer,I.S.Nou and K.S. Cho(2003 .Effect of green tea by-product on performance and body composition in broiler chicks. Asian-Aust.J. Anim.Sci; 16 : 867-872.

9.Kondo M, M Nassashi, A Kaneko. H Agata, K Kita, H Yokata ,.2004. Ensiled Green Tea Waste as partial replacement for soybean meal and alfalfa hay in lactating cows. Asian.Aust. J. Anim. Sci. 17(7) : 960-966. https://doi.org/10.5713/ajas.2004.960

10.Ismail, Salah Hamid ,.2004.Non-traditional forages in Feeding of Animal and Poultry. Arab Publishing and Distribution,32, Abbas El Akkad St., Nasr City, 2nd edition, Egypt.

11.Yamamoto T, Juneja LR, Chu DC, Kim M ,.1998.Chemistry And application of green tea, T.C.R Press.Florida, U.S.A.

12.Hassain Md. Elias, Seok Young Ko, Chul Ju Yung ,.2012.Dietary supplementation of green tea by-product on growthperformance, meat quality, blood parameters and immunity in finishing pigs. J. Med. Plants Res. 6(12) : 2458-2467.

13.Salawue MB, Acamovic T, Stewart CS , Velplund T H, Weisberg MR,. 1999. The use of tannins as silage additives effects on silage composition and mobile bag disappearance of dry matter And protein. Anim.Feed Sci.;Technol.82:243-259. https://doi.org/10.1016/S0377-8401(99)00105-4

14.Santos GT, Oliveira RL, Petit HV, Cecato U, Zeoula LN, Rigolon LP, Damasceno JC, Branco AF, Bett V ,.2000. Effect of tannic acid on composition and ruminal digrability of Bermuda grass and alfalfa silage. J. Dairy Sci. 83: 2016-2020.https://doi.org/10.3168/jds.S0022-0302(00)75080-6.

15.Chiou PWS, CR Chen, KJ Chen, B Yu ,.1998.Wet brewers grains or bean curd pomance as partial replacement of soybean meal for lactating cows. Anim. Feed Sci.

Technol. 74:123-134.https://doi.org/10.1016/S0377-8401(98)00170-

16.Huang HJ, PWG Chiou, CR Chen, JK Chiang, B Yu.1999.Effect of dried rice distillers and grain supplementation on the performance of lactating cows. Anim. Feed Sci. Technol.77:303-15.

17.Chernet DJR,.2000.Characterization of forage by chemical analysis. In Forage Evaluation in ruminant nutrition (Givens, E.Owen, R.F.E.Oxford and H.M.Omed).CABI.International Oxon, pp:281-300. UK.

18.Vinson JA,Dabbagh YA,.1998. Effect of green and black tea Supplementation on lipids, lipid oxidation and fibrinogen in the hamster mechanisms for the epidemiology benefits of the drinking. FEMS letters. 433 : 44-46.

19.Teddy TC, Yang MWL Koo ,.1999.Chinese green tea lower Cholesterol level through an increase in fecal lipid excretion.Life Sci. 66 : 411-423. https://doi.org/10.1016/S0024-3205(99)00607-4

20.Raederstorff DG, FM Schlachter, E Volker, P Weber ,.2003.Effect of EGCG on lipid absorbtion and plasma lipid levels in rats. J. Nutr. Biochem. 14 : 326-332 . https://doi.org/10.1016/S0955-2863(03)00054-8

21.Gabir AA, El-Asyouty SA, Zaki AA, Abou Ammo FF, El-Gohary ESI,.1998.Productive performance of lambs fed diet containing nigella sativa meal. Egyptian J.Nutr.Feed. (2) :97-107.

22.Wang JK,JA Ye, JX Lu ,.2012.Effect of tea saponins on rumen microbiota,rumen fermentation, methan production and growth performance--a review. Trop. Anim. Health Prod;44(4): 697-706.

23.Duncan CB ,.1955. Multiple rang and Multiple " F " test.Biometric 11 : 1-12. USA . https://doi.org/10.2307/3001478

24.Al-Zubaidy KMD, MAH Al-Falahy ,.2018.Principles and procrdures of statistics designs and experimental designs.Ministry of Higher Education, And Scientific Research,University of Duhok , College of Agriculture. Pp (183-187).Kurdistan Region / Iraq.

25.NRC,.(National Research Council).2007.Nutrient Requirements of Small Ruminants: Sheep, Goats, Cervids, and New World Camelids. National Academy Press, Washington, DC,.USA. https://doi.org/10.17226/11654 .

26.MAFF Ministry of Agriculture, Fisheries and Food, .1975.Department of Agriculture and Fisheries for Scottland .Energy allowance and feeding system for ruminants.Technical Bulletin, No.33 , 484-497.

27.Bush BM ,.1998.Plasma albumin interpretation of laboratory results for small clinicians. 2nd edn. Blackwell science ltd.Oxford oel., pp.250-254 .

28.Allain CC, LS Poon, CSG Chon, W Richmond, PC Fu ,.1974.Enzymatic determination of total serum cholesterol. Clin.Chem. 20 : 470-475.

29.Green SA, Clark PA.,.1982. A comparison of chemical electrophoretic methods of serum protein determination in clinically normal domestic animals of various ages.Cornell Vet.;73:412-415.

30.Tietz NW, CA Burtis, ER Ashwood, WB Saunders ,.1999.Text Book of Clinical chemistry, 3rd ed. P. 95-809-857. France.• Tokura M, I Chagan, K Ushida, Y Kojima (1999). Phylogenetic study of methanogens associated with rumen ciliates,Curr, Microbiol. 39 : 123-128. https://doi.org/10.1007/s002849900432

ISSN 2072-3857

31.Otto F, P Baggasse, E Bogin, M Harun, F Vilela ,.2000.Biochemical blood profile of Angoni cattle in Mozambique.Israel J. Vet. Med. 55(3) : 1-9 .

32.Everitz GC, KB Turry ,.1966. Effect of sex and gonadectomy on the growth and development of south down Romney cross lamb. Effect of live weight, growth and component of live weight J. Agric. Sci. Camp. 66: 1-14. https://doi.org/10.1017/S0021859600060238

33.AL-Jalili, Zuhair Fakhri, Atallah Saeed, Salwa Lilo Aziz ,.1985.Production and preservation of meat. Ministry of Higher Education and Scientific Research. Establishments of Technical Institutes / Baghdad - Iraq.

34.Rouse GH, DG Topel, RE Vettor, TW Wickorsham,.1970.Carcass composition of lambs at different stage of development. J. Anim. Sci. 31(5) : 846-855. https://doi.org/10.2527/jas1970.315846x

35.Yaqoub, Salem Fadel, Maher Fathouhi, Ossama Kashmoula,.1986.Effect of live weight prior to slaughter on carcass properties in goat-like Angora. Iraqi J. Agric. Sci.;4:(3).

36.Abdullah AY, Awawdeh FT,.2004.The effect of protein source and formaldehyde treatment on growth and carcass composition of Awassi lambs. Asian. Aust. J. Anim. Sci.17(8) :1080-1087. https://doi.org/10.5713/ajas.2004.1080.

37.SAS ,.2018.Users guide, Statistics, Cary, NC.; Statistical Analysis System Inc. Release 9.12 Tsozo, North Carolina state University of Cary, NC,U.S.A.

38.Zinder SH ,.1993. Physiological ecology of methanogens.In: Methanogenesis, Ecology, Physiology, methanogens.In: Methanogenesis, Ecology, Physiology, ministry and Genetics (JG.Ferry,Ed.). Chapman & Hall New York,London,128-206 .

39. Tokura, M., Chagan, I., Ushida, K., & Kojima, Y. (1999). Phylogenetic study of methanogens associated with rumen ciliates. Current microbiology, 39, 123-128.

40.Sarker MSK, SY Ko, SM Lee, GM Kim, JK Choi, CJ Yang,. 2010.Effect of different feed additives on growth performance and blood profiles of korean hanwoo calves.Asian-Aust.J.Anim.Sci.;23(1):52-60.

41.Begum J, A Reza, MR Islam, MM Rahman, MS Zaman ,.1996.Effect of supplementation of different levels of tea waste on the performance of growing calves. Asian Australasian.Anim.Sci. 9(2) :175-179.

42.Baruah KK ,.1997. Effect of supplementation of decaffeinated tea waste on the yield and composition of milk in lactating crossbred cows. Indian Vet. J. 74, June : 480-482.

43.Kondo Makoto, Miho Hidaka, Kazumi Kita, Hiro-Omi Yokota,.2007. Feeding value of supplemented diet with back tea by-product silage : Effect of polyethylene glycol addition to the diet on digestibility of protein fractions in goats.Grassland Sci. 53(3): 131-137. https://doi.org/10.1111/j.1744-697X.2007.00083.x

44.Muller M.,.1993. The hydrogenosome. J. Gen. Microbiol. 139:2879-2889.

45.Singer MD, Robinson HP, Salem AZM, DePeters EJ,.2008.Impacts of rumen fluid modified by feeding Yucca schidigerato lactatin dairy cows on in vitro gas production of 11 common dairy feedstuffs, as well as animal performance.Anim. Feed Sci. Technol. 146: 242-258. https://doi.org/10.1016/j.anifeedsci.2007.12.010

46.Almahdawi,Mozhir K.K.,.2018. Using Tea Waste as A Source of Protein in the Ration and its Impact on Productive Performance, Growth and Some Blood Parameters of

Awassi Lambs. Advances in Animal and Veterinary Sciences; 6 (2):499-508.Mosul,Iraq.
DO I | http://dx.doi.org/10.17582/journal.aavs/2018/6.11.499.508
47. Kokja, Ghazi Khazal Khattab Abdullah, 2001.Effect of using of biggia hay in sheep feeding in Dry Areas.Ph.D. Thesis Department of Animal Science, Faculty of Agriculture and Forestry, University of Mosul, Iraq.
48.Khah A Nik, Meghaddam R.A.,1975.Effect of high and lowcost rations on feedlot performance and carcass traits of fattening chall lambs.World Rev. Anim. Prod.XI :74.
49.Gabir AA, El-Asyouty SA, Zaki AA, Abou Ammo FF, El-Gohary ESI,.1998.Productive performance of lambs fed diet containing nigella sativa meal. Egyptian J. Nutr. Feed. (2) :97-107.
50.Abdullah, Nour-Addin Mahmoud, Emad El-ddin Mohammed Sulaiman Dahl, Osama Abdul Ghani Abdul Aziz ,.2012.Effect of addition of the black nigella sativa meal to the diets of the developing lambs on their productive qualities and carcass recipes. J. Mesopot. 40 (2): 1-7. Mosul/ Iraq .
51.Thomas VM, CK Clark, CM Schuldt ,.1994.Effect of substituting feather for soybean meal on ruminal fiber fermentation lamb wool growth . J. Anim. Sci. 72: 504-514. https://doi.org/10.2527/1994.722509x.
52.Boulos L ,.1983. Medicinal plants of north african .Reference publications Inc., Algonac, Michigan, USA.
53.Pietro Celi, Adam Robinson ,.2010. Effect of yerba mate (llex paraguariensis) supplemntation on the performance of diary calves.Anim.;Prod.;Sci.;50(6):376-381. https://doi.org/10.1071/AN09170
54.Saleh HH ,.1988. Effect of Limited Nutrition on the Qualitative Characteristics of the carcasses of Awassi Lambs. Master Thesis, College of Agriculture, University of Baghdad, Iraq.
55.Bahrami, Yadollah, Saeid Chekani-Azar ,.2010. Some blood biochemical parameters and yield of lambs fed ration contained dried grape pomace. Global Vet. 4(6): 571- 575.
56.Al-Hilou, Murtada Faraj Abdul-Hussain, Emad Falah Al-Jassem, Waleed Yousef Qasim ,.2007. Effect of feeding different levels of barley and alfalfa on the growth of the carcass characteristics and blood traits of the Arabian lambs.J. Basrah Agric. Sci. 20 (2) : 53-63. Basrah University, Iraq.