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Effect of Adding *thymus vulgaris* and/ or *Rhus coriaria* Grind Seeds in Diet of Domestic Male Rabbits on Some Productive and Physiological Features

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Abstract

The current study designed to determine the effects, of *Thymus Vulgaris* and /or *Rhus Coriaria* grind seeds as feed additives in the diet of male rabbits on some physiological and productive parameters.16 male domestic rabbits were divided into 4 groups four animals for each, the first group was the control fed with a basal diet free from any feed additives while the second and third groups were fed with 3% sumac and 3%Thyme , while the fourth group fed with a same basal diet supplemented with both 3% sumac + 3% Thyme, the experiment lasted for 45 days, feed consumption was calculated daily while blood sample and body weight recorded every week, the results appeared that body weight , total blood protein including. Albumin and Globulin of all treated groups especially mixed feed additives were recorded 3.53 , 3.88, 4.82 and 3.31, 2.79, 2.47 in comparison to the control group which recorded 3.22 and 3.49 respectively at last sampling period .In contrast, the feed consumption and cortisol hormone levels reported 428.75, 372.75,363.25 and 3.33, 3.30,2.40 compare to the control group that revealed significantly high ranges 514.25 and 3.67 respectively at the last sampling period . In conclusion, the data of the study demonstrated a positive role and improvement effect when they use such feed additives separately or together, especially when fed as a mixed compound on some productive and physiological traits.

Keywords: *Rhus ;Coriaria*; *Thymus Vulgaris*; cortisol; hormone; medical; plant

Introduction

Many medicinal plants are used as biological stimulators for their effects on different body organs because they are natural and good sources of some active materials like minerals and vitamins. Many medical plants originating from the Mediterranean regions are frequently used for cosmetic, enrichment food, and medicinal resolves (1). Thymes were thought to be antimicrobial antiseptic astringent medication carminative medicinal drugs anthelmintic disinfectants and tonics (2) thyme herbs commonly originated from *Thymus Zygis L or Thymus Vulgaris* L .there were most famous herbal compounds in the industrial pharmacy that were used as an active drug against intestinal cocci bacteria. its regarded as one of the most anti-inflammatory drugs in general for intestinal bacterial infections and is used in anthelminthic infestations like Ascarids, hookworms, and some types of bacteria yeasts and fungi. The Thyme active constituent is highly active against Enterobacteriaceae and especially cocci bacteria. also might elevate the stimulation of an appetite and improve and increase the activity of liver function (2). It may be used in

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cartilaginous tube-treated inflammation of bronchi, laryngitis, and urinary tract inflammation due to general bacterial infections (3). Thymes are also used for general skin inflammation and secondary complications like dermatitis, oily skin acne bug bites, and other skin inflammatory conditions Also, numerous varieties of Thymes are employed in aromatherapy, including the oil of red thyme of the linalool type owing to gentle achievement and Thuyanol used as an antiviral ingredient (4). In the similar vein, sumac (Rhus Coriaria), which has been revered as a medicinal plant since ancient times due to its abundance of ascorbic acid (vitamin C), which is regarded as a highly anti-oxidant compound and organic acids like citric tartaric and malice acids, have shown health-improving attributes including anti-inflammatory, antiviral antioxidant, antidiarrheal, antibacterial, antispasmodic astringent antiulcer fungicide, hepatoprotective lipoxygenase inhibitors, and cyclooxygenase-inhibitor because of their active ingredients of phenolic acids flavones, as myricetin gallic acid quercetin tannin and isoquercitrin (5). So, the current research aimed to evaluate, the effects of 3% (*Rhus Coriaria*)Sumac seed powder and 3% thymus vulgaris supplementation separately or both in the feed of domestic male rabbits on some physiologic and Productive traits .

Material and Methods

Experimental design :

Current work was conducted in the animal house, College of Veterinary Medicine - the University of Baghdad, Iraq for a period of 45 days ,including 7 days as an adaptation period. 16 domestic male rabbits used obtained from different local markets, with an average of initial weight 1000 gm weight ,2-3 months of ages ,animals were divided into 4 groups, 4 rabbits in each cage. A basal diet as pellet had been used and animals were fed as follows, the first group was fed with standard basal feed free from any feed additives and regarded as the control group, and the second and third groups were fed the basal diet supplemented with 3% grind sumac and 3% Thymus grind seeds respectively, while the fourth group was fed with both 3% grind seeds sumac plus (+)3% Thymus grind seeds water and feed were provide to all groups ad-libtum (27) .All Rabbits were injected with internal and external anti-parasite drugs (Ivermetin- from Byer company Germany) subcutaneously pre-started the experiment, animals were put in cages 90×60×40 cm in measurements prepared with two plastic dish feeders and spontaneous nipple drinkers with plastic plates also used. 20 ºC was a middling temperature in the area. Feed consumption was daily recorded and the amount offered was daily weighed and the remaining amount per each cage and each rabbit had been weekly weighed any mortality or Digestive disturbance did not occur throughout all periods of the study.

Blood sampling :

(5 cc) Blood samples were collected using disposable syringes from the ear vein of each animal and put in labeled tubes including (EDTA)anticoagulant substance –for hematological tests and analysis other test tubes were still free from anticoagulant used for serum biochemical determination. All biochemical testing had been carrying out according -to the method (6).

Nutrition formula:

Table 1 : Formula of basal diet (7).

Ingredients%	Content
Corn	16.5
Soybean (52%)	17.5
Wheat bran	13.5
Barley	12.0
Dicalcium phosphate	0.80

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Salts	0.60
Vit. Mineral Premix	0.60
Limestone	1.50
Alpha Alpha hay	37.0
Total	100

Dry matter (%)	91.00
OM%	84.50
Crude protein%	16.50
Ether extract %	2.500
Ca %	1.22
P %	0.54
Vit	0.56
Ash %	8.80
Cross energy	2.800

provided per each kg diet; Vit E 12.0mg;; Vit. A 1600IU Biotin/ 0.25; Riboflavin 9.0mg Nicotinic acid/ 8.0 mg;Pantothenic/ acid, 12.0mg; Vit k/3/ 3.0mg; Mn, 10 mg B12 8.0 mg; B6.6 mg; Zn/ 4 mg; Co .2.5 mg; Se. 0.01 mg Fe 5.0 mg, chromium 300 µg. Calculated according to (7).

Ethical approval:

The local Committee for Animal Care and Use at the College of Veterinary Medicine, University of Baghdad, Baghdad, Iraq, reviewed and approved all procedures. involved in the current study.

Statistical analysis:

Data were collected and analyzed by using SAS program (8) the statistical analysis system- to determine the effects on the parameters of different groups the LSD least-significant, difference (ANOVA) was used to compare between means variables values in current research(9).

Results

Body weight:

Data illustrated, in Table 2. revealed that levels of body weight values of most treated groups recorded significant (P<0.05) higher ranges compare to the control group started from the second, till to the last period of the experiment, particularly in the mixed feed additives group which recorded the highest numerical and significant (P<0.05) values in comparison to both other treated groups as well as the control, group which, has been recorded the lowest weight levels .

Table (2). Effect of adding 3% grind thymus seeds and 3 % grind sumac seeds in the diet of male- rabbits on the body- weight (gm day)(Means ± SE)

Period	Zero -time	two weeks	four weeks	six weeks	Period
ControG1l G.Gr(G)1	4	C1070.50 ± 0.53	B1115.75 ± 1.25 c	A1325.50 ± 14.12c	A1346.25 ± 8.90 c
3% th(G2).	4	C1066.50 ± 7.10 a	B1240.50 ± 12.47 b	A1366.25 ± 11.59b	A1383.50 ± 6.45 b
3%su(G3).	4	C1069.50 ± 10.42 a	B1269.50 ± 12.79 b	A1393.25± 3.06 b	A1392.50 ± 2.75 b
6%t+s(G4).	4	D1067.00 ± 14.61 a	C1359.00 ± 5.78 a	B1447.00 ± 10.03a	A1476.50 ± 7.88 a
LSD	26.92				

Means in capital litters in same row and mean in small letters in same column are significant (P<0.05)

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Feed intak:

Table (3). Effect of 3% grind thymus seeds and/or 3 % grind sumac seeds adding n in feed of male- rabbit- on feed intake g/ day. (Means ± SE)

Period	Zero-time	two weeks	four weeks	six weeks	Period
Control G1	4	D354.75±11.99a	C419.75±4.19a	B487.75± 6.52a	A514.25±5.83a
3% th(G2).	4	A346.00±8.95a	B399.50±14.71ab	A432.50±10.60b	A428.75±8.37b
3%su(G3).	4	A336.50±7.57a	A372.25±10.99bc	A369.25±15.68c	A372.75±12.51c
6%t+s(G4).	4	C353.00±4.14a	A349.50±9.49c	A357.50±15.50c	A363.25±16.87c
LSD	31.30				

Means in capital litters in same row and mean in small letters in same column are significant (P<0.05)

cortisol hormone:

Table (4). Effect of 3% grind thymus seeds and/or 3 % grind sumac seeds adding n in feed of male- rabbit- on. Cortisol hormone µg/dl(Means ± SE)

Period	Zero- time	two weeks	four weeks	six weeks	Period
Control-G1	4	A3.82 ± 0.05 a	A3.92 ± 0.03a	A3.76 ± 0.04 a	A3.67 ± 0.07 a
3% th(G2).	4	A3.57 ± 0.05 a	A3.26 ± 0.10 b	A3.37 ± 0.08 b	A3.33 ± 0.03 b
3%su(G3).	4	A3.52 ± 0.08 a	A3.39 ± 0.07 b	A3.24 ± 0.10b	A3.30 ± 0.12 b
6%t+s(G4).	4	A3.80 ± 0.10 a	A3.43 ± 0.31 b	B2.51 ± 0.07 c	B2.40 ± 0.11 c
LSD	0.31				

Means in capital litters in same row and mean in small letters in same column are significant (P<0.05)

Blood proteins:

Table (5). Effect of 3% grind thymus seeds and/or 3 % grind sumac seeds adding n in feed of male- rabbit- on total serum protein gm\L levels gm\L(Means ± SE)

Period	Zero -time	two weeks	Four weeks	Six weeks	Period
Control-G1-GG11	4	A6.65± 0.09a	B6.37± 0.04c	B6.22± 0.05c	A6.71± 0.13b
3% th(G2).	4	A6.79± 0.02a	A6.70± 0.06b	A6.83± 0.16b	A6.85± 0.12b
3%su(G3).	4	B6.70± 0.07a	A6.98± 0.06b	AB6.85± 0.10b	B6.67± 0.05b
6%t+s(G4).	4	C6.77± 0.03a	B7.00± 0.14a	AB7.25± 0.09a	A7.30± 0.06a
LSD	0.26				

Means in capital litters in same row and mean in small letters in same column are significant (P<0.05)

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Table (6): Effect of 3% grind thymus seeds and/or 3 % grind sumac seeds adding n in feed of male- rabbit- on Albumin levels gm\L(Means ± SE)

Period	Zero- time	two weeks	four weeks	Six weeks weeks	Period
Control-G1	4	B3.45 ± 0.07a	AB3.60 ± 0.03c	A3.71 ± 0.05b	C3.22 ± 0.04d
3% th(G2).	4	B3.47 ± 0.03a	A3.89 ± 0.01b	C3.27 ± 0.07c	B3.53 ± 0.03c
3%su(G3).	4	B3.48 ± 0.02a	B3.49 ± 0.06c	C3.21 ± 0.05c	A3.88 ± 0.04b
6%t+s(G4).	4	C3.60 ± 0.02a	B4.47 ± 0.12ag	A4.86 ± 0.03a	A4.82 ± 0.06a
LSD	0.15				

Means in capital litters in same row and mean in small letters in same column are significant (P<0.05)

Table (7). Effect of 3% grind thymus seeds and/or 3 % grind sumac seeds adding n in feed of male- rabbit- on on Globulin levels gm\L (Means ± SE)

Period	Zero- time	two week	four weeks	Six weeks weeks	Period
Control-G1	4	C3.20± 0.08a	B2.77± 0.05b	B2.51± 0.05c	A3.49± 0.10a
3% th(G2).	4	B3.31± 0.03a	C2.80± 0.06b	A3.55± 0.10b	B3.31± 0.08c
3%su(G3).	4	B3.21± 0.08a	A3.49± 0.06a	A3.64± 0.12a	C2.79± 0.09b
6%t+s(G4).	4	A3.16±0.02a	B2.53± 0.09c	B2.39± 0.11b	B2.47± 0.06c
LSD	0.23				

Means in capital litters in same row and mean in small letters in same column are significant (P<0.05)

Discussion

Body weight:

This increasing in values of body weight in treated groups might be attributed to the role of the active ingredients compounds that contain in the both sumac and thymus grind seeds , such as antioxidant substances ,proteins, vitamins and minerals that formed a high value as an a active ingredients of the dry matter that present in both of the two feed additives as well as their contain of high percentage of non-protein nitrogenous compounds that help increase growth and Cellular tissue structure these results is closely agree with the finding obtained by some researchers (10) and (11) whom reported that there were positive effects in some productive features in animals provided

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with such feed additives which may led to improve the levels of animal health status and immunity, and enhanced general physiological health of experimental animals, in addition to the role such active compounds in elevated of the food conversion factor and their benefits by caused an obvious decreased in the feed consumption values as a result for high nutrient cultivated of such feed additives compounds to stimulate producing anabolic hormones, which can improved Optimizing and decreased the levels of diet consuming, despite achieving good weight gain (12) and (13) body weight depends on the balance between feed intake and utilization of the calories, while Weight loss happens due to decrease in energy intake, doesn't elevate expenditure . A decrease in energy intake arises from good feeding, or loss or reduction in appetite, malabsorption, or/ and malnutrition (14).

Feed intak:

On the same trend, the data recorded in the Table. 3 showed that daily feed intake of both treated groups 3% of sumac 3% thymus groups as well as 6% mixed supplemented group reported significant ($P<0.05$) decrease levels in comparison with the control group started from the beginning to end of the studying date, especially in the last test indicated that the diet contained enough levels of vitamins, protein, and fibers in both sumac and thymus grind seeds caused synergetic effects on different body organs which might be lead to activate the secretion of adrenal, caused a moderate reduction in the rates of feed daily consumption (15). On the other side , Mohammed et al (2020) revealed in their study that feed conversion factor usually regard one of the main economic indicators that are important to infer on the animal's efficiency in converting the feed into a live weight and that any decrease in this value is a solid indication of an improvement in the conversion of the feed into a live weight and a reliable economic profit.this might be lead to the improvement of the efficiency of the digestive system of animals , increased susceptibility to digesting of feed through the role of active substances found in these feed additves , which It increases the efficiency of digestion and the effectiveness of digestive enzymes, and works to increase the of some foodstuffs, and this may be due to active digestion of suma and thymus and is prepared for digestion by bacteria and microflora and to get rich benefit of nutrients resulting from digestion of bacterial (16) Especially in the second and the third groups of rabbits fed on the proportion of 6% thymus and sumac (17).On the other side some researchers reported that the decrease in feed intake in G3 compared to G1 and G2 may be attributed to increased in the biological processes due to the effect of improving in metabolic statues of animal that results from synergist effects of active ingredients present in both sumac and thymus (11) and (18).

cortisol hormone:

From data illustrated in Table 4 appeared that the animals in the control group revealed significant ($P<0.05$) higher levels in blood serum cortisol values compared to all treated groups during all tested periods, while the group receiving 6% mixed feed additives of both sumac and thymus grind seeds recorded significant($P<0.05$) lowest range during all testing periods and despite of this static elevation values of all treated groups but still within reference values except in the mixed receiving group which was revealed marked decreased, started from the beginning of experiment till to the ends such a trend may suggest the stimulation of (HPA) hypothalamic - pituitary –Adrenal and

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cortical axis (15) leads to increase plasma cortisol in rabbits(19) and (20)). Present results are likely the findings of one researcher (20)who reported a study about heat stress, that blood serum concentration of cortisol significantly increased following exposure to some stress such as heat, and other bad climate conditions. These results might be attributed to the action synergistic effects of antioxidant substances in both thyme and sumac seeds due to beneficial active ingredients contains which might reduce the blood cortisol level in the same trend, this finding highly agreement with these was recorded by several researchers who established that there were declined in cortisol in blood serum of animals supplemented with vitamin C and minerals that presents as normal active ingredients of such these feed additives, especially sumac as well as thyme (22).

Blood proteins:

In the same trend the results illustrated in table 5-6- 7 for the values of total protein ,Albumin and Globulin showed significant ($P<0.05$) higher levels in most treated groups in all tested period especially in the last test comparative with control group this increasing in protein values these findings was closely agreement with some researcher whom reported this positive changes may be due to improve in appetite due to synergist effects of the both feed additives *Thymus vulgaris* and sumac due to high enrichment nutrient compounds of vitamins ,minerals antioxidants which finally lead to development in general health status and total blood protein including , Albumin and globulin (23) and (24)) which might be reflect an improved of general immune system of all treated groups in compare to control group, the elevation in the whole protein values and its constituents Albumin ,and globulin of all, groups might be due to high levels of animals feeding with concentrated feed that contain a high percentage of protein due to appetite stimulators effects of both thym and sumac and their high contain of enrichment feed materials (25) in contrast of that, other researchers revealed that such improvement and development in experimental animals occur because they were being under growing stage which characterized by an increase in the metabolic rate with progress of age and growth (26).

Comclusion:

According to data illustrated in the current study, it might be concluded that using medical plants such as *Thymus Vulgaris* and *Rhus Coriaria* grind seeds in diets of rabbits separately or both have real beneficial effects due to their clear improvement effects on some productive traits in all treated groups, therefore, it might be recommended to conduct further more studies by using different concentrations in different animal farms.

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Conflict of Interest: The author declares that there is no conflict of interest

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