Effect of Coriander sativum on Live Weight Gain, Lipids, Hematological and some Blood Parameters of Awassi Female and Male Lambs

Sundus Farooq Mohammed, Omar Sadeq Hameed Al-Ghuri, Enas Rasheed Abbas

1Department of Animal Production, College of Agriculture, University of Baghdad, Baghdad, Iraq.
2Department of Animal Production, College of Agriculture, University of Baghdad, Baghdad, Iraq.
3Department of Animal Production, College of Agriculture, University of Baghdad, Baghdad, Iraq.

ABSTRACT

Objective: An experiment was carried out in the college of agriculture, university of Baghdad to investigate the effect of Coriander sativum seeds powder added to the Awassi sheep diet on body weight gain, rumen fermentation, and some blood traits. Materials and Methods: Twelve sheep with body weight ranged from 18–20 kg were selected, half were male and all fed on ration constitute 70% concentrate and 30% Roughage diet. Six grams of Coriander seeds powder were added to ration for head per day. Results: The results showed no significant differences in the weight gain and rumen fermentation between ewes and lambs which fed on coriander powder, while the results showed an increased level of glucose and white blood cells [WBC] account significantly [p < 0.05] for ewes compared to lambs and no significant differences appeared in total protein, albumin, globulin, urea, triglycerides, cholesterol, LDL, HDL, VLDL, packed cell volume PCV%, HB, red blood cells RBC, GOT and GPT. Conclusions: It can be concluded that Coriander seeds powder improve the immunity and energy of ewes rather than lambs in Awassi.

KEYWORDS: Sheep ewe and lamp, Coriander, Hematological, Blood parameters Acknowledgement to the College of Agriculture / University of Baghdad.

INTRODUCTION

Recent research attitude directed towards improving nutrition performance through using herbaceous and medicinal plants as ration substitutes for hormones and medicine [1]. Coriander Coriandrum sativum is an annual herbaceous plant with strong odorous, 50 cm in height with pinnate leaves white small flowers and round small yellow fruits. plants had high percent of fibers [2] [3]. Coriander plants found in south west of Asia and North of Africa [4], and widely used for improve digestion, flatulence, diarrhea abdominal cramps, and upset stomach [5]. Twenty types of essential oils found in Coriander plants and the dominate oil in seeds is linalool with 50–60% of total essential oils [6]. Number of minerals [phosphorus, calcium, sodium and potassium] and some amino acids [glutamine, asparagine and arginine] were also found [7]. Flavonoids and fatty acids of phenolic compounds are a consistent of Coriander plants like caffeic acid, and protocatechic and glycitin [3] and as anti-oxidant [8], antibioic and antipyretic cholesterol [9]. In addition it have the ability to regulate insulin secretion [10], and reduce triglycerides by bile acids [11]. Some research work shown that this plants and seeds had positive effects on the digestion of food and live weight and feed conversion efficiency [12].Moreover [13] found that feeding sharabi caws with fenugreek resulted in increased serum glucose throw the mechanism of
greater amount of starch passing throw small intestine and hydrolyze to glucose which absorbed and go to the blood, while [6] showed that some medicinal plants had positive role in food metabolism, and could play an important effect on blood diseases [14] and biochemistry [15][16] of sheep blood parameters. Coriander plants improved animal health and some blood characteristics and some wool production [17][18], [19] found that the supplementation of thyme or peppermint had Positive effect on lambs blood characteristics such as serum glucose level. According to above characteristic of coriander plants on animal health, and few research studies on the effect of coriander seeds on local Awassi sheep this experiment is set up to verify the effect of coriander seeds applied to female and male lambs ration on some blood characteristics, blood proteins, and liver enzymes, fats and their impact on weight gain and rumen fermentation.

MATeRIALS AND METHODS

This study was conducted in the animal far, Department of animal production, College of Agriculture, University of Baghdad, in this experiment twelve Awassi sheep lambs has been used 6 female and 6 male their age ranged between 3–4 months and their weights 18–20 kg, distributed randomly into two groups has same weights in total. Animals fed on a same concentrate diet to roughage 70:30 its components 0.38 kg corn, 0.15 kg barley, 0.10 kg soybeans 0.35 kg bran wheat, 2 kg lime and salts. The chemical analysis for concentrate, alfalfa hay and coriander seed powder shown in Table 1. The ration has been taken that covers the animals food requirements according to 3% of body weight, the metabolic energy was 11.77 MJ/Kg DM and crude protein level 12.8%. The feeding during the experimental fattening period experiment which was 56 day by one meal a day Catering at eight o’clock am, as concentrate diet supplemented with 6 g/head of coriander and then provided roughage feed alfalfa hay. Female and male has been weight weekly to determine weight gain by the difference between the final weight and primary weight divided by the number of days of the experiment. Before the conclusion of the experiment, rumen fluid has been taken from three female and three male by stomach tube, rubber stomach tube manually flush manner as described by [20]. 10 ml of blood taken from all experimental animals jugular veins at the same time then serum blood was centrifuge 3000 RPM for 15 minutes to measure the serum glucose [SG] according to, [21], urea nitrogen, [22], serum urea nitrogen[SUN], and enzymes of the serum [glutamic oxaloacetic transaminase [SGOT] and Serum glutamic pyruvic transaminase [SGPT ] [23], determination also included concentrations of the blood protein and total protein [24], albumin [25] and globulin [26], as well as triglycerides [27] and cholesterol [28], high density Lipoprotein [HDL], low density Lipoprotein [LDL] and very low density Lipoprotein [VLDL] according to[29]. The numbers of red blood cells, white blood cells and [PCV] were measured by using the method of Sahli approved by [30]. The Duncan Multiple Range Test [DMRt] was used to show the significant differences between the means of the experimental groups.

Table 1: Chemical composition of concentrated diet, roughages and Coriandrum sativum [on DM% basis].

<table>
<thead>
<tr>
<th>Ingredients</th>
<th>Concentrate</th>
<th>Alfalfa hay</th>
<th>coriander sativum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dry matter [%]</td>
<td>96.30</td>
<td>89.50</td>
<td>92.07</td>
</tr>
<tr>
<td>Organic matter</td>
<td>90.18</td>
<td>79.00</td>
<td>91.09</td>
</tr>
<tr>
<td>Crude protein [%]</td>
<td>12.50</td>
<td>13.50</td>
<td>16.09</td>
</tr>
<tr>
<td>Ether Extract [%]</td>
<td>2.970</td>
<td>0.980</td>
<td>1.140</td>
</tr>
<tr>
<td>Crude fiber [%]</td>
<td>11.00</td>
<td>26.50</td>
<td>21.39</td>
</tr>
<tr>
<td>NFE [%]</td>
<td>63.58</td>
<td>38.02</td>
<td>52.47</td>
</tr>
<tr>
<td>ME*(MJ/Kg DM)</td>
<td>12.15</td>
<td>10.19</td>
<td>10.96</td>
</tr>
</tbody>
</table>

* Metabolizable energy [ME] values are estimated according to following equation [MAFF, 1975]:

\[
ME = 0.012 \times [C.P] + 0.005 \times [C.F] + 0.031 \times [E.E] + 0.014 \times [NFE]
\]

RESULTS AND DISCUSSION

Table 2 shows no significant differences in weight gain between female and male fed a diet concentrate:roughage 70:30 supplemented with a 6 g/head/day of coriander powder. However weight gain of female and male was 2.50 and 4.00 kg respectively.

Table 2: Effect of supplemented Coriandrum sativum on live weight gain between females and males Awiss.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Concentrate/Roughage [70:30]</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Females</td>
<td>Males</td>
</tr>
<tr>
<td>Initial live weight [Kg]</td>
<td>17.66 ± 2.02</td>
<td>18.33 ± 2.40</td>
</tr>
<tr>
<td>Final live weight [Kg]</td>
<td>20.16 ± 2.31</td>
<td>22.33 ± 1.33</td>
</tr>
<tr>
<td>Total live weight gain [Kg]</td>
<td>2.50 ± 0.28</td>
<td>4.00 ± 1.15</td>
</tr>
</tbody>
</table>

* Means in the same row with different the superscripts are significantly different [p < 0.05].

ns. Non significant.
Table 3 demonstrates that there is no significant differences in the rumen fermentation such as ammonia nitrogen [NH3-N], total volatile fatty acid [TVFA] and [pH] for each of the Awassi female and male fed a diet concentrate:roughage 70:30 supplemented with 6 g/head/day of coriander seed powder and this may be due to the used dose of coriander powder which is insufficient to show the differences between groups.

**Table 3:** Effect of supplemented coriander on rumen fermentation of Awassi female and male lambs.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Concentrate:Roughage [70:30]</th>
<th>Significant</th>
</tr>
</thead>
<tbody>
<tr>
<td>NH3-N</td>
<td>Females: 26.66 ± 0.89</td>
<td>Males: 32.07 ± 2.40</td>
</tr>
<tr>
<td>TVFA</td>
<td>Females: 121 ± 0.75</td>
<td>Males: 123.57 ± 8.72</td>
</tr>
<tr>
<td>pH</td>
<td>Females: 6.5 ± 0.37</td>
<td>Males: 6.5 ± 0.37</td>
</tr>
</tbody>
</table>

* Means in the same row with different the superscripts are significantly different \( p < 0.05 \).

ns No significant.

Table 4 shows significant differences \( p < 0.05 \) in the level of serum glucose mg/dl in females compared to the males fed on a diet concentrate:roughage 70:30 supplemented with a 6 g/head/day of coriander.

**Table 4:** Effect of supplemented Coriandrum sativum on blood proteins of Awassi females and males lambs.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Concentrate:Roughage [70:30]</th>
<th>Significant</th>
</tr>
</thead>
<tbody>
<tr>
<td>SG mg/dl</td>
<td>Females: 75.66 ± 2.39 a</td>
<td>Males: 67.34 ± 1.70 b</td>
</tr>
<tr>
<td>Total protein g/dl</td>
<td>Females: 52.17 ± 2.18</td>
<td>Males: 55.51 ± 0.24</td>
</tr>
<tr>
<td>Albumin g/dl</td>
<td>Females: 31.96 ± 0.93</td>
<td>Males: 35.06 ± 0.83</td>
</tr>
<tr>
<td>Globulin g/dl</td>
<td>Females: 20.33 ± 1.33</td>
<td>Males: 22.00 ± 0.57</td>
</tr>
<tr>
<td>Urea mg/dl</td>
<td>Females: 45.56 ± 2.30</td>
<td>Males: 42.86 ± 2.12</td>
</tr>
</tbody>
</table>

* Means in the same row with different the superscripts are significantly different \( p < 0.05 \).

ns No significant.

in Table shows that 5 Coriander supplementation had no significant different effect on serum total cholesterol, S. total triglyceride, high density lipoprotein [HDL], low density lipoprotein [LDL], and very low density lipoprotein [VLDL] of the blood of female and male lambs fed on ratio proportion concentrate:roughage 70:30 supplemented with 6 g/head/day of coriander powder.

**Table 5:** Effect of supplemented Coriandrum sativum on blood lipids of Awassi female and male lambs.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Concentrate:Roughage [70:30]</th>
<th>Significant</th>
</tr>
</thead>
<tbody>
<tr>
<td>S. Total cholesterol mg/dl</td>
<td>Females: 43.04 ± 4.88</td>
<td>Males: 54.12 ± 3.53</td>
</tr>
<tr>
<td>S. Total triglyceride mg/dl</td>
<td>Females: 20.63 ± 5.79</td>
<td>Males: 15.60 ± 2.89</td>
</tr>
<tr>
<td>High density lipoprotein [HDL] mg/dl</td>
<td>Females: 38.16 ± 2.74</td>
<td>Males: 45.02 ± 3.37</td>
</tr>
<tr>
<td>Low density lipoprotein [LDL] mg/dl</td>
<td>Females: 3.33 ± 1.33</td>
<td>Males: 6.33 ± 0.66</td>
</tr>
<tr>
<td>Very low density lipoprotein [VLDL] mg/dl</td>
<td>Females: 4.00 ± 1.00</td>
<td>Males: 4.00 ± 0.73</td>
</tr>
</tbody>
</table>

* Means in the same row with different the superscripts are significantly different \( p < 0.05 \).

ns No significant.

...data in table 6 shows that wbc count was significantly high in female lambs compared to male lambs while pcv %, RBC count, and Hb were not significantly affect between male and female lambs

**Table 6:** Effect of supplemented Coriandrum sativum on health and immunity of Awassi female and male lambs.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Concentrate:Roughage [70:30]</th>
<th>Significant</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCV%</td>
<td>Females: 27.66 ± 0.88</td>
<td>Males: 31.66 ± 1.20</td>
</tr>
<tr>
<td>U/L RBC</td>
<td>Females: 40.11 ± 0.40</td>
<td>Males: 12.00 ± 0.57</td>
</tr>
<tr>
<td>U/L WBC</td>
<td>Females: 13100.00 ± 1201 a</td>
<td>Males: 9133.33 ± 705.5 b</td>
</tr>
<tr>
<td>U/L HB</td>
<td>Females: 7.26 ± 0.56</td>
<td>Males: 7.08 ± 0.63</td>
</tr>
</tbody>
</table>

** Means in the same row with different the superscripts are significantly different \( p < 0.01 \).

ns No significant.

Table 7 showed no significant differences of liver enzymes GPT and GOT of female and male lambs fed diet proportion concentrate:roughage 70:30 supplemented with 6 g/head/day of coriander powder
Significant differences in the number of white blood cells can be observed, which may due to the sterol and tocopherol compounds that coriander seeds contain. Furthermore, these compounds affect the immune response as they represent anti-oxidant materials and have the ability to suppress the free radicals[32]. Coriander seeds also contain volatile fatty acids that can potentially support the immune system [33], which has impact on the blood criteria. These observations are consistent with what [18] has observed from investigating the use of three levels of coriander feed [i.e. 0, 2.5 and 5%] on Awassi sheep and found that coriander has the impact to increase the number of white blood cells. This is also consistent to what has been found by [34] when the effect of some medical plants on stimulating the immune system has been studied.

Increased serum glucose in ewes blood may be similar to that occur to the glucose increase in blood of cows duo to feed animals with fenugreek [13]. The anti-oxidant compounds of the coriander seeds eliminate the free radicals and reduce MDA [Malondialdehyde] that can potentially destruct the β cells by transferring the electron need by the active oxygen atom via attacking the membrane of these cells, which will lead to damage those cells. Due to this damage, the effectiveness of those cells will be reduced; hence, the insulin level will be raised [35]. It is worth noting that the membrane of a β cell is made up of unsaturated fatty acids.

No significant differences have been observed in the weight gain, fermentations of rumen’s ammonia nitrogen [NH3-N], total volatile fatty acids [TVFA], potential of hydrogen [pH], as well as the triglyceride such as cholesterol, LDL, HDL and VLDL. HB% PCV unit/litre and RBC unit/litre. Moreover, no significant differences have been observed in urea, albumin, total protein, globulin, GPT and GOT.

Result of this experiment contributed to the acknowledge of mechanism Medicinal plants on the immunity and energy and the differences between ewes and lambs in awassi sheep.

REFERENCES

[14] Al-Janabi, A., S. Ali, 2011. The vital effect of different levels of fenugreek seeds [Trigonella foenum-
graceum] on some hematological parameter in Damascus crossbred doeses. In: Proceedings of the 5th
Veterinary world, 3(7): 315-317.
[16]Ibrahim, M., 2013. Effect using of fenugreek seeds on some physiological and biochemical characters of
[17]Al-Zwein, D., 2010. Effect of coriander seeds [Coriandrum sativum] on wool growth and it's traits and
or peppermint [Mentha piperita] on performance, digestibility and blood metabolites of fattening Sanjabi
lamb. BIHAREAN BIOLOGIST 10(2): 118-122.
[saccharomyces cerevisiae] on Turkish Awassi lamb’s performance. Ph.D. thesis, College of Agriculture,
University of Baghdad, Baghdad, Iraq.
[23]Richmond, W., 1973. Preparation and properties of a cholesterol oxidase from nocardia sp. and its
application to the enzymatic assay of total cholesterol in serum. Clinical Chemistry, 19(12): 1350-1356.
measurement of highdensity lipoprotein cholesterol: executive summary. the national cholesterol education
program working group on lipoprotein measurement. Clinical chemistry, 41(10): 1427-1433.
a food ingredient. Food and Chemical Toxicology, 47(1): 22-34.
[34]Mansour, Reem S., Adnan K. Nasser, Y. Nader, 2013. Abo The Effect of different Nigella sativa L. seed
[cake] concentrations on leukoocytes counts and some serum immunological parameters in calves. Tikrit