Feeding effects of fenugreek seeds on intake, milk yield, chemical composition of milk and some biochemical parameters in Hamdani ewes

D. A. O. Al-Sherwany
Animal Resource Department/ College of Agriculture/ University of Salahhadin/ Erbil

Abstract

This study was conducted to evaluate the effect of feeding fenugreek seeds on dry matter intake, milk yield, chemical composition of milk and some biochemical parameters: total protein (T.P), glucose (G), cholesterol (Ch), triglyceride (T.G), protein albumin, globulin, urea, and liver enzymes AST, ALT in the blood serum in hamdani ewes. Twelve lactating ewes were selected randomly from private sheep flock (similar in the body weight and ages), and were divided into three equal groups in Grdarasha in Erbil, from 15 Jun to 1 September 2014. The crushed fenugreek seed was used as feed additives and added to basal ration at level 0.6 and 1.2g/kg live body weight for treatment one (T1) and treatment two (T2) respectively, while the control group (C) was left on basal ration only. Ewes were fed in groups on basal ration as 3% of live weight and according to developing of body weight during the study. (Results): showed that daily feed intake, daily milk yield, milk protein percentage and solid non-fat increased significantly ($p<0.05$), while percentage of milk fat and milk lactose were significantly decreased as fenugreek seed was added to basal ration at level 0.6 and 1.2g/kg live body weight as compared to control group, but the results of blood analysis showed that the treatment did not have any significant effect on blood parameters. The experiment showed that feeding of fenugreek increased feed intake and milk yield compared to non-feeding fenugreek seeds in Hamdani ewes.

Keywords: fenugreek seeds, milk yield, chemical composition of milk and some biochemical parameters, Hamdani ewes.

تأثير تغذية بذور الحلبة على المتناول، إنتاج الحليب، مكونات الكيميائية للحليب وبعض الصفات البيوكيميائية في النعاج الحمدانية

دلير علي عثمان الشيرواني
قسم الثروة الحيوانية– كلية الزراعة/ جامعة صلاح الدين/ أربيل

الخلاصة

أجريت هذه الدراسة لتقيم تأثير تغذية بذور الحلبة على مادة جافة المتناولة، إنتاج الحليب، مكونات الكيميائية للحليب وبعض الصفات البايوكيميائية للدم: بروتين كلي (T.P)، كلوكوز (G)، كولسترول (Ch)، كليسريدات الثلاثية (T.G)، بروتين البومين، كلوبيولين، يوريا وكذلك أنزيمات الكبد AST، ALT في بلازما الدم للنعاج الحمدانية. تم اختيار 12 نعاج الحلوبة عشوائياً في احدى الحقول الأهلية (متشابه في الوزن والعمر)، ثم وزعت إلى ثلاثة الأقسام متساوية في العدد في منطقة كردرشة في أربيل، ولفترة 15 حزيران إلى 1 أيلول 2014. استخدمت بذور الحلبة المجروشة كإضافات غذائية إذ تم إضافتها إلى العليقة المركزة بمستوى 0.6 و1.2غرام/ كغم وزن الجسم الحي لمعاملة الأولى (T1) ومعاملة الثانية (T2) على التوالي، ومعاملة المقارنة (C) تتغذى فقط على العليقة المركزة. غذيت الحيوانات على العليقة المركزة وبواقع 3% من وزن الجسم الحي وحسب زيادة الوزنية للحيوانات طيلة مدة التجربة. أظهرت النتائج ان المتناول اليومي من العلف، إنتاج الحليب، نسبة البروتين في الحليب ومواد الصلبة غير الدهنية زادت معنوياً (أ<0.05)، في حين انخفضت نسبة الدهن واللاكتوز في الحليب

معنوياً بإضافة 0.6 و1.2 غرام/كغم وزن الجسم الحي بذور الحلبة إلى العليقة المركزة مقارنة بمعاملة المقارنة، ولكن النتائج أظهرت ان المعاملات ليس لها أية تأثيرات معنوية على صفات الدم المدروسة. أظهرت النتائج بان تغذية النعاج الحمدانية على بذور الحلبة أدت إلى زيادة كمية المتناول وإنتاج الحليب مقارنة بعدم تغذيتها على بذور الحلبة.

الكلمات المفتاحية: بذور الحلبة، إنتاج الحليب، مكونات الكيميائية للحليب وبعض الصفات البايوكيميائية، النعاج الحمدانية

Introduction

Fenugreek (*Tringonella Foenum- Graceum*) is a member of a legume family that is widely cultivated in different places of the world especially in India, middle east, north Africa and south Europ (1). The fenugreek in the most important plants commonly used in medicine, and high nutritional value because it contains 45% carbohydrates and 20-30% protein (2). Also, the fenugreek containing 0.6-1.7% saponins, fixed oils and phytoestrogens, which is plant chemicals similar to the female sex hormone estrogen and activate milk secretion by activating prolactin secretion, in addition it contain diosgenin which is one of the sources of natural steroid that's due to stimulate the secretion of female sex hormones (3). Also, some studies indicate that fenugreek seeds improved production (milk or meat) and will not cause bloat (4). The daily feed intake and milk yield increased significantly with concomitant decrease in milk fat content (5), also increase protein percentage in the milk significantly by increased levels of fenugreek seed supplement in the ration (6). The percentages of cholesterol decreased significantly as fenugreek seed powder was added to basal ration at level 50 or 100 g/cow/day as compared with control (7), also blood glucose decreased by increased levels of fenugreek seed (8). The aim of this study to evaluate the effect of fenugreek seed on feed intake, milk yield, milk composition and some biochemical traits in hamdani ewes.

Materials and Methods

This study was conducted by using 12 hamdani ewes, were selected randomly from sheep flock in Grdarasha in Erbil-Iraq, at same age (38-42 Months) and weights 58.88 ± 1.13 kg. The ewes were divided into three equal groups, each groups consist of four animals. The crushed fenugreek seed was used as feed additives and added to basal ration at level 0.6 and 1.2g/kg live body weight for treatment one (T1) and treatment two (T2) respectively, while the control group (C) was left on basal ration only. Ewes were fed in groups on basal ration as 3% of live weight (9) and according to developing of body weight during 75 days after parturition, also animals went for grazing for seven hours daily. Milk samples were collected once weekly for chemical analysis, the milk sample taken from each animal and tested in Grdarasha field laboratory Milkoscaner apparatus {Lactostar FUNKE GERBER Labortechnik (12/05) Berlin 2003} to determine fat, protein, solid non-fat and lactose. At the end of the experiment 10ml of blood was collected from jugular vein, and separated by centrifuge (3000 rpm for 15min) and the serum was immediately collected and stored at -20°C until analysis: total protein (T.P), glucose (G), cholesterol (Ch), triglyceride (T.G), protein albumin, globulin, urea, and liver enzymes (ALT and AST). Where the measurement of (cholesterol, triglyceride, total protein, and blood urea) through the use of several Kits equipped by the German company (Centronic Gmbh) with ready-made solutions and the examination was conducted on the basis of the steps cited by the company processed in the manual that came with the kit for the examination. Blood glucose was estimated by using commercial glucose kit from PLASMATIC LABORATORY PRODUCT® (UK) after performing the kits procedure results read and recorded by spectrophotometer at 500nm. Serum Albumin was measured calorimetrically by a kit supplied from BioMed-

Albumin, Germany, after performing the kits procedure, results read and recorded by spectrophotometer apparatus at 623nm. To calculate the amount of Globulin in blood serum were applied according to the following equation brought by (10):

Globulin amount (g/dl) = amount of total protein (g/dl) - amount of albumin (g/dl)

Liver enzyme (ALT and AST) was measured calorimetrically by a kit supplied from Teco Diagnostics after performing the kits procedure. The weights of the animals were taken once a week until the end of the experiment, the feed materials were chemical analyzed in the nutrition lab-Animal Resource Department- College of Agriculture - Erbil, which included dry matter (DM), organic matter (OM), crude fiber (C.F), ether extract (E.E), crude protein (C.P) and (NFE) nitrogen free extract according to (11) as shown in Table (1 and 2).

Table (1) Rations used in the experiment

Ration composition		**Chemical analysis of basal ration, fenugreek seed %**		
	%	**Feed composition**	**Basal ration**	***Fenugreek seed**
Barely	50	**DM**	90.9255	92.92
Wheat bran	35	**OM**	86.5463	89.78
Wheat floor	8	**EE**	2.1296	3.21
Soybean meal	6	**C.P**	14.5405	25.67
Salt	0.5	**C.F**	7.5379	8.2
Date ston	0.5	**NFE**	62.3383	52.7
		**** ME(Kcal)**	2662	2791

***Not fenugreek seeds account as part of the ration (supplement). And be analyzed in a laboratory feeding/ Animal resource department/ college of Agriculture/ University of Salahhadin.**

****ME (Kcal/kg)= 32.95(%CP+%EE×2.25+%NFE)-29.20. (25)**

Table (2) %Chemical analysis of basal ration composition

	%Basal ration composition			
	Barely	**Wheat bran**	**Wheat floor**	**Soybean meal**
DM	93.01	90.89	89.91	90.27
OM	88.99	85.59	87.84	84.46
EE	1.13	3.88	1.54	1.39
C.P	10.62	15.71	12.6	45.4
C.F	6.29	11.09	2.32	5.43
NFE	70.95	54.91	71.38	32.24
*** ME(Kcal/kg)**	2742	2585	2852	2632

***ME (Kcal/kg)= 32.95(%CP+%EE×2.25+%NFE)-29.20. (25)**

The statistical analysis system (12) was used for analyzing the data to study the effect of transactions on both the amount of dry matter intake, milk production daily, the components of milk, feed conversion efficiency rate and some biochemical traits in blood mathematical model according to the following:

$Yij = \mu + Ti + eij$

Where:

Yij: The value of viewing.

μ = Grand mean of treatment population.

Ti = Effect of treatment (First group = 0.6g Fenugreek seed/kg body weight; Second group =1.2g Fenugreek seed/kg body weight; Third group = Control).

eij = Experimental error.

It also has a comparison of averages using Duncan test (13).

Results and Discussion

The results of this study showed that the amount of dry matter intake amounted to (1649.02, 1729.57, 1633.25 g/day/ animal) in T1, T2 and C respectively. The amount of dry matter intake in T2 difference significantly ($P<0.05$) compared with T1 and control (Table 3). Also, showed significant differences ($P<0.05$) in feed conversion efficiency

by adding fenugreek seeds in the ration compared with control, as well as the total amount of daily milk yield (748.13, 1079.06, 513.44 g/animal) for T1, T2 and C respectively, where significant differences ($P<0.05$) in T1 and T2 that adding fenugreek seeds in the ration compared with control. Table (3) indicates that the addition of fenugreek seeds in the ration from the zero (C) to 1.2g/kg live body weight/day (T2) led to a significant increase ($P<0.05$) in daily milk yield by 565.62 g/animal, as the addition of fenugreek seeds from zero (C) to 0.6g fenugreek seeds/kg live body weight/day (T1) significantly increased ($P<0.05$) a daily milk yield by 234.69 g/animal. It has been proposed that the galactopoietic effect of fenugreek might be mediated through an increase in feed intake (14). The reasons for increasing feed intake belong to saponins in the fenugreek seeds (15). In addition (16) stated that the increases in feed intake as result of feeding fenugreek may be attributed to its effect on hypothalamus to stimulate hunger centres in the brain and increase the desire for eating. Also, (17) suggested that the stimulation of endogenous hormone secretion could be hypothesized through a mechanism by which fenugreek exerts its action on milk yield, in buffaloes fenugreek feeding leading to increased plasma levels of prolactin hormone which is responsible for milk secretion and composition. The present results were agreement with the findings of many researchers, they reported that fenugreek feeding increased milk yield in buffaloes (18) goats (5), and ewes (19). Also as similar as obtained by (20) who found that when goats feeding on a 60g/ animal/ day fenugreek seeds increased daily and total milk yield, and agrees with (6) during added 6% and 12% fenugreek seeds in Awasi ewes ration. Furthermore, (21) noticed significant effect ($P<0.05$) in the amount of dry matter intake when goats feeding on the 5, 10 and 15% fenugreek seeds added to the ration compared with control. The result as the present study disagrees with (22) showed that the average daily milk yield had not been affected by feeding 5 and 10% of fenugreek seed in the ration. The results showed that low fat and high protein content in the milk of T1 and T2 was significant ($P<0.05$) compared with control (Table 3). The reason that the type of fatty acids in the food have an impact on the quality and quantity of fat in milk, and fenugreek seeds contain a substance saponins that increase propionic acid, which in turn reduces the concentration of beta butyric hydroxide acid which is the source of the fatty acids in milk and reduce the acetic acid, leading to a decline in the percentage of milk fat (23). The present result agrees with (5) who showed a lower fat percentage in the milk when adding 5, 10 and 15% fenugreek seeds in the ration compared with control, and agree with (6) during added 6 and 12% of fenugreek seeds in the ration. Table (3) indicates there were negative correlation between lactose, total solid material and solid non-fat in the milk during added fenugreek seed in the ration of hamdani ewes. The present result agrees with (24) who found that the lactose in the milk decreased significantly ($P<0.05$) when goats feeding on a 10% fenugreek seeds in the ration, But disagrees with (6) who found that no significant effects of the lactose, solid non-fat and total solid material when using (6, 12%) fenugreek seeds in the ration.

Blood results analysis (Table 4) showed that the Ch, T.G, G and globulin were lower and blood urea, GOT and GPT were higher in (T1) and (T2) compared with control, but were not statistically significant. This result is as similar as obtained by (22) who noticed that the cholesterol, triglyceride, globulin, albumin, total protein and blood urea were not significant effect by adding (5, 10, 15%) fenugreek seeds in the ration.

Table (3) Effects of feeding fenugreek seeds on dry matter intake, milk yield and chemical composition of milk in hamdani ewes (Mean ± S.E.)

	DM intake g/day/Animal	Milk yield g/day/Animal	Feed conversion ratio	Milk Composition%				
				Fat	Protein	Lactose	Solid non-fat	Total solid material
T1	1649.02± 18.14 b	748.13± 29.33 b	2.32± 0.10 b	5.47± 0.09 b	4.42± 0.09 a	4.96± 0.04 b	10.84± 0.06 a	16.30± 0.09 b
T2	1729.57± 16.21 a	1079.06± 29.24 a	1.65± 0.06 c	5.35± 0.06 b	4.64± 0.09 a	4.63± 0.05 c	10.90± 0.08 a	16.25± 0.07 b
C	1633.25± 23.93 b	513.44± 24.22 c	3.42± 0.17 a	6.36± 0.08 a	3.60± 0.09 b	5.55± 0.02 a	10.48± 0.07 b	16.84± 0.10 a

Legend: **Different letters in the same line indicate significant differences among groups (P<0.05).**
Feed conversion ratio= g daily feed intake/g daily milk yield

Table (4) Effects of feeding fenugreek seeds on some biochemical parameters in hamdani ewes (Mean ± S.E.)

	Ch mg/dl	TG mg/dl	G mg/dl	T.P g/dl	Albumin g/dl	Globiolin g/dl	Urea mg/dl	Liver enzyme IU/L	
								AST	ALT
T1	84.88 ±3.43	44.03 ±3.81	60.23 ±9.51	5.17 ±0.14	2.80 ±0.10	2.68 ±0.11	31.30 ±1.54	19.26 ±0.73	11.23 ±0.78
T2	83.41 ±16.14	43.87 ±1.90	51.09 ±11.38	5.58 ±0.06	2.90 ±0.05	2.37 ±0.09	34.35 ±1.73	20.05 ±2.45	11.78 ±0.90
C	87.56 ±7.41	44.52 ±4.52	63.36 ±3.71	5.51 ±0.24	2.81 ±0.03	2.70 ±0.25	28.02 ±4.64	16.48 ±0.34	10.99 ±0.35

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