Tikrit Journal for Agricultural Sciences (2019) 19 (3):1-5
https://doi.org/10.25130/tjas.19.3.1

IRAQI Academic Scientific Journals
العراقية المجلات الأكاديمية العلمية

ISSN:1813-1646 (Print); 2664-0597 (Online)
Tikrit Journal for Agricultural Sciences
Journal Homepage: http://tujas.tu.edu.iq

TJAS
Tikrit Journal for Agricultural Sciences

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Effect of Using Ginger Roots (*Zingiber officinale)* on Milk Yield and Some of Its Components, Body Weight of Ewes and Lambs, in Awassi Sheep

KEY WORDS:

ginger , milk components , suckling , fat , protein , lactose .

ARTICLE HISTORY:

Received: 03/06/2016

Accepted: 06/05/2019

Available online: 10/10/2019

ABSTRACT

The practical part of the study conducted in Animal Production Department / College of Agriculture and Forestry / Mosul University from 15 / 11 / 2013 to 1/ 4 / 2014 , to study the effect of adding the ginger roots in milk yield, some milk components and weights of ewes and their lambs in Awassi sheep, 32 Awassi ewes were divided into four homologou groups of age and weight, each group contains eight ewes. Ewes were fed on the same ration contain the same % protein and % Kcal energy (N.R.C. , 2007), but were differ in containing ginger roots only (0 , 10 , 20 and 30 gm ginger / head / day. The result revealed a significant increasing ($P \leq 0.05$) in weekly and monthly milk yield for the treatment 20 and 30 gm/head/day, but the result of milk components during suckling period (Fat , Protein , Lactose and S.N.F) revealed no significant differences between the treatments , There are a significant increasing in milk yield during suckling period. For the treatment 20 and 30 gm ginger / head / day, this is a normal result for reflection in milk increasing during this period.

Tikrit Journal for Agricultural Sciences (TJAS) Tikrit Journal for Agricultural Sc.)

INTRODUCTION

Since ancient times, medicinal plants have been used in the treatment of some disease and then their use was later expanded to animal diets due to their effect in improving production performance of animals, the use was expanded as additives to animal diets especially ruminants after the perceived risk of using chemicals such as growth catalysts, antibiotics and hormones (Ojeu, 2003). This added value to medicinal plants used in animal diets in general and ruminants in particular especially after they showed encouraging results in improving production

performance and reproductive characteristics of animals (Al-Rawi, 2008 and Hadi 2010). Ginger was selected in this study for its therapeutic and pharmacological properties and its effect in improving digestion and increasing appetite (Vutyavanich et al., 2001). Ginger also reduces constipation and gastric gases by increasing the intestinal muscle efficiency and stimulating lipase, sucrase and maltase enzymes (Erust and Pitler, 2000). Al-jubouri (2012) pointed that the adding of ginger to cows' diets leads to a significant increase in milk production and its constituents. The present study aims to expound the effect of adding dried ginger roots on the production characteristics

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including (milk production and its constituents and the weights of ewes and lambs from birth to weaning).

MATERIALS AND METHODS

This study was conducted in the sheep farms of the Livestock Department / College of Agriculture and Forestry/University of Mosul from 15 / 11 / 2013 to 1/ 4 / 2014 , to test the effect of adding four levels of ginger root (0, 10, 20 and 30) g/head/day for their effect on milk production and its constituents and body weight of ewes and their lambs from birth to weaning. The study was conducted on 40 Awassi ewes divided into four groups based on body weight and each group was allocated aseperate barn to test four levels of ginger root additions (0,10,20 and 30)g . All ewes received their nutritional requirements of protein and energy based on (N.R.C 2007) by giving them a uniform diet throughout the study period with constituents as shown in Table (1). Milk samples were taken to test their constituents (fat, protein, lactose, and non-fat milk solids) every two weeks. The samples were analyzed in the laboratories of the General Company for Dairy Products in Mosul using the (Lacto star) milk analyzer supplied by the (Funke Gerber) Company/Germany. The age and mating season were close for the ewes in each group. Ewes and lambs were weighted every (4,8 and12) weeks using a sheep scale with sensitivity of (100 g) to measure their growth and health conditions. Data analysis was carried out based on the complete random design (CRD) as indicated by AL-Rawi, and Khalafallah (1980) and using the mathematical

model:

$Yij = \mu + Ti + eij$

Where:

Yij = The observed value of the studied characteristics.

μ = The general mean value.

Ti = The effect of the treatment representing the effect of ginger.

eij = Random experimental error value.

Duncan's Multiple Range Test (Duncan, 1955) was used to determine the mean differences between the means. Statistical analysis and comparison of the averages were carried out using the computer statistical program SAS (2003).

Table (1): The chemical and laboratory analysis of diet constituents.

Diets / **nutrient composition**	**Barley 60 %**	**Bran 23 %**	**Soybean 15 %**	**Straw ad libitum**
DM* %	91.33	90.30	90.20	94.44
OM* %	95.40	96.11	93.81	91.06
C.P * %	11.08	16.96	44.81	3.50
C.E** %	7.00	11.80	6.34	37.37
E.E* %	2.41	3.87	1.96	1.18
Ash* %	4.6	3.89	6.19	8.94
Metabolic energy D.M / Kg/ Kcal	2900	2550	2960	1375

*Calculated from the actual analysis of raw materials in the laboratory based on dry matter.

** Calculated from the tables of chemical analysis of Iraqi feed materials (Al-Khawaja et al., 1987) based on dry matter.

RESULTS AND DISCUSSION

The results in Table (2) show a significant increase ($P \leq 0.05$) in milk production from the third week after birth and in favor of the two treatments 20, 30 g ginger/head/day. The results agreed with the results of Al -Jubouri (2012) who found a significant increase in milk production in the Holstein cows. Table (3) showed a significant increase ($P \leq 0.05$) in the monthly of milk yield for the treatments of 20 and 30 g/ginger/head /day while the milk constituents did not significantly differ due to increase in milk production except for the level of protein in the 30 g treatment which increased significantly as indicated in Table (4). The result of this study also conforms with Al-Jubouri (2012) on absence of significant differences in milk constituents when adding ginger in the diet of Holstein cows. The reason for the significant increases in the monthly milk yield is may be due to ginger in improving of milk production (Kanjanapothi, 1987) because it contains active substances that have positive effects in improving the diet and digestion (Andrew, 2003).

Table (5) showed that there were non-significant differences (($P \leq 0.05$) in the initial weight of ewes until the fourth week of the study, but showed significant increase ($P \leq 0.05$) in the weights of ewes in the eighth week of the study in the treatment of 10 g ginger/head/day and this is expected or normal because the ewes in the group of 10 g Ginger treatment were significantly low in milk production. As ewes began this treatment the milk production dried up and the diet of this groups covers the needs of sustenance and the surplus affects the weight of the body inevitably because of the low amount of milk produced. These results agree with Al- Jubouri (2012) where he found no significant differences in body weight when he added different percentages of Ginger roots to dairy cow's diet. As for the weight of the lambs from birth to weaning, the same table showed that the weight of the lambs that had ginger introduced to their diet began slight gradual differences, especially the treatment of 30 g ginger/ head/day, but these increases did not reach the significant limit until the age eight weeks ($P \leq 0.05$). However, a significant decrease in weight was found in week 12 (weaning age) for the treatment of 10 g ginger/head/day.

Table (2): The effect of ginger in weekly milk yield before Weaning.

treatment	Weeks											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Con.treat 0 gm ginger Head/day	529a ±93.76	711.5a ±133.57	623b ±107.18	795a ±141.73	973a ±88.31	703ab ±112.67	530ab ±95.80	516bc ±91.16	488.5bc ±116.83	501bc ±117.72	503b ±96.64	497b ±137.10
10 gm ginger Head/day	525a ±86.74	458a ±84.45	378b ±74.29	351b ±66.64	505b ±78.36	402.5b ±55.84	400b ±106.71	314c ±86.63	311.5c ±91.80	327c ±107.72	163c ±76.60	163c ±73.12
20 gm ginger Head/day	683a ±63.38	746.5a ±95.29	511.5b ±119.89	801.5a ±106.61	855.4a ±133.47	895a ±191.47	649ab ±78.36	632b ±77.08	704ab ±102.74	711ab ±131.38	575b ±80.03	619ab ±81.00
30 gm ginger Head/day	700a ±87.20	714.5a ±45.43	956a ±142.72	777a ±91.09	839a ±89.85	966a ±87.73	743a ±66.08	879a ±70.14	851a ±73.38	841a ±89.06	849a ±100.60	883.8a ±130.20

* The vertically different English letters indicate significant differences at the probability level ($P \leq 0.05$).

This is a natural result of the dry udders of most ewes of this treatment and the reduction of milk production, which negatively affects the weaning weight of their lambs.

Table (3): The effect of ginger on monthly milk yield during Suckling (kgm).

Months				Total
Treatment	1	2	3	
Con.treat 0 gm ginger Head/day	74.2 a ± 0.36	75.04 a ± 0.33	55.44 b ± 0.41	204.68 b ± 0.57
10 gm ginger Head/day	48.88 b ± 0.25	45.92 b ± 0.27	26.6 c ± 319.88	120.4 b ± 0.76
20 gm ginger Head/day	76.72 a ± 0.26	84.84 a ± 0.38	72.8 ab ± 0.33	234.36 a ± 0.92
30 gm ginger Head/day	87.92 a ± 0.20	95.48 a ± 0.21	95.76 a ± 0.27	279.16 a ± 0.61

* The vertically different English letters indicate significant differences at the probability level (P≤ 0.05).

Table (4) : The effect of ginger in milk constituents .

Milk compounds				
Treatment	Fat %	Protein %	Lactose %	S.n.f %
Con.treat 0 gm ginger Head/day	4.59a ± 0.500	4.29ab ± 0.095	6.26a ± 0.161	11.48a ± 0.294
10 gm ginger Head/day	5.19a ± 0.375	4.05b ± 0.439	6.05a ± 0.768	12.34a ± 0.274
20 gm ginger Head/day	5.05a ± 0.196	4.37ab ± 0.106	6.86a ± 0.288	12.04a ± 0.561
30 gm ginger Head/day	5.44a ± 0.265	4.68a ± 0.159	7.07a ± 0.213	11.95a ± 0.299

* The vertically different English letters indicate significant differences at the probability level (P≤ 0.05).

Table (5): The effect of ginger on ewes and lambs weight (kgm).

treatment	**ewes weight**				**lambs weight**			
	initial weight	**Weeks**			**Birth**	**weeks**		
		4	**8**	**12**		**4**	**8**	**12 Weaning weight**
Con. treat 0 gm ginger Head/day	58.200a ± 2.46	46.400a ±2.22	48.200ab 2.62±	51.600a ± 2.56	4.300a ±0.08	13.28a ±0.74	16.70a ±2.29	18.02ab ±3.10
10 gm ginger Head/day	57.700a ±1.64	50.200a ±1.13	51.400a ±1.60	55.100a ±1.31	4.22a ±0.07	10.73a ±1.14	14.72a ±2.67	14.00b ±3.33
20 gm ginger Head/day	56.200a ±2.10	46.00a ±2.33	47.500ab ±1.94	51.200a ±3.03	3.88a ±0.44	10.89a ±1.32	17.70a ±2.12	19.45ab ±2.36
30 gm ginger Head/day	55.700a 2.74 ±	44.500a ±2.55	43.600b ±2.52	47.600a ±2.56	4.26a ±0.07	11.76a ± 0.95	19.53a ±1.31	22.60a ±1.54

* The vertically different English letters indicate significant differences at the probability level (P≤ 0.05).

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تأثير استخدام جذور الزنجبيل (*Zingiber officinale*) في إنتاج الحليب وبعض مكوناته ووزن الجسم للنعاج والحملان العواسية

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المستخلص

أجري الجزء العملي من هذه الدراسة في الحقل الحيواني / قسم الثروة الحيوانية / كلية الزراعة والغابات / جامعة الموصل للمدة من 15 /11 / 2013 ولغاية 1 / 4 /2014 لدراسة تأثير إضافة جذور الزنجبيل في إنتاج الحليب وبعض مكوناته ووزن الجسم للنعاج والحملان و خواص الدم في الأغنام العواسية , واستخدمت في هذه الدراسة 32 نعجة عواسية مقسمة إلى أربعة مجاميع متجانسة من حيث العمر والوزن وكل مجموعة تحتوي على 8 نعاج كما واستخدم التصميم العشوائي الكامل (C. R . D) في تحليل بيانات الدراسة. حيث غذيت النعاج على عليقة موحدة من حيث نسبة الطاقة والبروتين وحسب ما ورد في (N.R.C, 2007) لكنها تختلف بإضافات من جذور الزنجبيل المطحونة وهي (صفر , 10 , 20 , 30 غم زنجبيل / رأس / يوم) . دلت نتائج الدراسة وجود فروقات معنوية ($P \leq 0.05$) في إنتاج الحليب الأسبوعي والشهري والتجاري لصالح معاملتي 20 و 30 غم زنجبيل / رأس / يوم، كذلك بالنسبة لنسب مكونات الحليب خلال فترة الرضاعة وهي الدهن و البروتين و اللاكتوز والمواد الصلبة اللادهنية حيث أظهرت النتائج عدم وجود فروقات معنوية فيها وهذا يعني إن زيادة إنتاج الحليب لم تخفض نسب مكوناته. دلت النتائج على وجود زيادة معنوية ($P \leq 0.05$) في أوزان الحملان للمعاملتين 20 , 30 غم زنجبيل / رأس / يوم على بقية المعاملات وهذا نتيجة طبيعية لزيادة إنتاج حليب الرضاعة في تلك المعاملتين.

الكلمات المفتاحية: زنجبيل، مكونات الحليب، الرضاعة، دهن، بروتين، لاكتوز.