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INFLUENCE OF USING RADICEL ON PERFORMANCE OF LACTATING GOATS

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ABSTRACT

This study was carried out to study the effects of replacement of barley radicel (B.R) by 15 and 30 % from concentrate feed mixture (CFM) on digestibility of various nutrients using Rahmany rams and its effect on milk yield of fifteen lactating Demascus goats.

Three digestibility trials were carried out using three adult Rahmany rams about three years old and averaging 60 kg to evaluate the flowing rations:

Control ration (C): 70 % concentrate feed mixture (CFM) + 30 % rice straw (RS).

1st tested ration (T_1): [55 % CFM + 30%RS + 15 % barely radicel (BR)].

2nd tested ration (T_2): [40 % CFM + 30%RS + 30 % barely radicel (BR)].

Also the effect of the three experimental rations on milk yield through 16 weeks were studied by lactating goats.

The obtained results of the digestibility trials showed that, the CP and CF digestibility of ration T_2 were significantly ($P<0.05$) higher than that of C and T_1 rations . While no significantly differences of DM, OM, EE and NFE among the three rations (C, T_1 and T_2).

In the feeding trials, data indicated that, the total or daily DM intake decreased with increasing radicel replacement (0, 15 and 30 %), yet the weekly milk yield was higher for rations T_1 and T_2 than for control one.

Milk constituents (T.S., SNF, fat, protein, lactose and ash) of lactating Demascus goats fed C, T_1 and T_2 rations were not significant.

Economical efficiency and return were the best for goats fed the rations contained radicel (T_1 and T_2).

Keywords*:* barley radicel , Demascus goats, Milk constituents , digestibility.

INTRODUCTION

The shortage of feed stuffs and the high price of concentrate feed mixture are considered the important problems for development of livestock in Egypt.

Therefore, it is believed that inclusion of some agriculture by-products to replace a part of the concentrate diet for animals becomes an obligation. One of these by-products is the barley radicel remaining usually from the processing of beer.

In Egypt, about 6550 tons of dried barley radicel are yearly produced (Al-Ahram for Manufacturing and Filling Co.) this by product remains from the squeeze of fermented barley. It is rich in protein and energy. Ibrahim et al. (1999), El-Gendy *et a*l. (1999) and Abd El-Malak et al. (2001) concluded that, using barley radicel for growing rabbits and poultry with different levels had a beneficial effects on rabbits and poultry performance. Zaki *et al.* (1999) concluded that, barley radicels could be used successfully and economically in rations for lactating cows as a cheaper ingredient to improve the

performance of animals the aim of this study was conducted to study the replacement of barley radicel by concentrate feed mixture.

MATERIALS AND METHODS

This experiment was carried out at El-Gemmiza Experimental Station, Animal Production Research Institute, Agriculture Research Center, Egypt. The experiments were digestibility trails using nine Rahmany rams and the dairy feeding trials on barely radicel (BR) using fifteen Demascus goats. An anple amount of barley radicel was provided by Al-Ahram for Manufacturing and filling Co.

Digestibility trials:

The digestibility trials were carried out using three adult Rahmany rams of about three years old weighing about 60 kg in average to evaluate the following experimental rations:

Control ration (C): 70 % concentrate feed mixture (CFM) + 30 % rice straw (RS).

1st tested ration (T_1): [55 % CFM + 30%RS + 15 % barely radicel (BR)].

2nd tested ration (T_2): [40 % CFM + 30%RS + 30 % barely radicel (BR)].

Each digestibility trial lasted for 21 days, the first 14 days were used as a preliminary period along with seven days as collection period. The rams were put individually in metabolic cages during the experiments. The rams were fed twice daily at 8 a.m. and 4 p.m. and water was offered after feeding as desire, after feeding concentrate.

Chemical composition of feedstuffs and the three rations which were used in the experiment are presented in Table 1.

Dairy feeding trials :

Fifteen lactating Demascus dose in the 4th season of lactating, aging five years and average weighing 41.67 kg were divided randomly into three similar groups (five dose each). The experiment started after suckling and continued for 16 weeks. Maintenance and production requirements of lactating goats were calculated according to NRC (1981). Recomandation animals were fed individually on the experimental rations using the randomized complete block design. Animals were fed three experimental rations as the rations of the digestibility trials.

The animals were weighted biweekly for two successive days. Drinking water was available all time. The daily milk yield was recorded for each goat. Representation milk samples about 0.5 % of total milk produced were taken once biweekly from each goat, from the morning and evening milking of the same day, and then stored in deep freezer till chemical analysis.

The official method of A.O.A.C. (1990) were used for running the proximate analysis of feedstuffs, tested rations and feces.

Analysis of variance was carried out using F. test according to Snedecor and Cochran (1982) and differences among treatments means were tested using Duncan's multiple rang test (Duncan, 1955).

RESULTS AND DISCUSSION

The ingredients and the chemical composition of the experimental rations were shown in Table (1). The results showed that, barley radicel contained about 21 % CP and about 1.35 times of CFM content. Chemical analysis of tested rations indicted that were nearly similar for most constituent.

The results showed that, there were no significant differences among the three rations in daily dry matter intake as g / h / d or kg $w^{0.75}$ of sheep (Table 2) and the values were nearly similar. Similar results of total DM intake g/kg $w^{0.75}$ were obtained by Zaki et al. (1999), who fed sheep on rations contained 20 and 40 % barley radicel and El-Gendy et al. (1999) in rabbits fed radicel diets.

The digestion coefficients of T_2 were slightly higher than that of the other treatments (IC and T_1).

The digestibility coefficients of CP and CF for rams fed ration T_2 were significantly ($P<0.05$) higher than that of ration IC and T_1, while no significant differences among the rations IC and T_1 for the same items while no significant differences among the three rations of DM, OM, EE and NFE digestibility.

The values of various nutrients were higher than that reported by Abou EL-Nasr (1985) using sheep fed 25 % barley radicel + 75 % rice straw. The CP digestibility of sheep fed ration T_2 was slightly higher than that of sheep fed rations IC and T_1, this is most probably due to the complementary effect of the sources protein.

Table (1): Chemical composition (%) of feedstuffs and experimental rations on DM basis.

Items	DM	OM	CP	CF	EE	NFE	Ash
Concentrate feed mixture (CFM)*	92.0	89.70	15.8	14.7	2.2	57.0	10.3
Rice straw (RS)	91.5	83.65	3.7	34.80	3.45	41.7	16.35
Barley radicel (BR)	89.67	88.43	21.38	15.59	2.61	48.85	10.57
Experimental rations:							
C (CFM + RS)	91.85	87.93	12.27	20.57	2.57	52.52	12.07
T_1 (CFM + RS + 15 % BR)	91.52	88.73	12.99	20.79	2.63	52.32	11.27
T_2 (CFM + RS + 30 % BR)	91.19	89.77	13.84	20.82	2.68	52.43	10.23

*** CFM contained of 35 % wheat bran, 15 % cotton seed meal, 30 % yellow corn , 15 % sunflower meal, 3 % molasses, 1.5 % limestone and 1 % salt.**

The nutritive values as TDN of rations T_2 was significantly ($P<0.05$) higher than that of the rations IC and T_1. Also DCP of sheep fed ration T_2 was significantly higher ($P<0.05$) than that of sheep fed rations IC and T_1 due to high digestibility coefficient of CP and CP content of ration T2. In this connection, Zaki *et al.* (1999) reported that, the addition of radicels increased CP content.

Table (2): Feed intake, digestibility and nutritive value of experimental rations containing barley radicel by rams.

Items	C	T_1	T_2
Animal weight (kg)	62.60 ± 3.34	61.5 ± 4.20	61.40 ± 4.40
Daily DM intake :			
CFM g/h/d	776.94	616.77	460.00
RS g/h/d	320.50	324.83	315.91
BR g/h/d	-	152.89	305.49
Total DM intake g/h/d	1097.45	1094.49	1081.40
T. DM intake g/kg/$w^{0.75}$	49.30	49.84	49.31
Digestion coefficient (%)			
DM	77.22 ± 1.04	77.62 ± 2.02	78.08 ± 1.65
OM	76.11 ± 0.13	76.24 ± 2.15	77.12 ± 1.59
CP	77.99^{b} ± 0.96	79.73^{b} ± 2.40	81.48^{a} ± 2.15
CF	59.77^{b} ± 3.06	60.88^{b} ± 4.75	64.29^{a} ± 2.09
EE	82.13 ± 1.02	82.59 ± 1.29	82.82 ± 1.05
NFE	83.31^{a} ± 1.16	82.38^{b} ± 1.40	82.70^{b} ± 1.28
Nutritive value (%)			
DCP	9.57^{b} ± 0.05	10.36^{b} ± 0.04	11.28^{a} ± 0.44
TDN	68.36^{b} ± 0.12	71.01^{b} ± 1.96	73.02^{a} ± 1.68

$^{a, b, c}$ means in the same raw with different superscripts differ significantly (P<0.05).

From the data of Table (3), it was observed that, no significant differences of the daily DM intake as g / h / d or per g / kg $w^{0.75}$ among the three experimental rations (C , $T_1$and T_2) were fed to lactating goats. It was noticed that, the total or daily DM intake as g / h / d or g / kg $w^{0.75}$ decreased with increasing radicel replacement (15 and 30 %) although a good palatability of barley radicel may be due to the different bulk between concentrate feed mixture and barley radicel. Also the rumen size of goats.

The feed units intake as TDN and DCP h/day or g / kg $w^{0.75}$ of goats increased with increasing barley radicel in the rations due to high nutritive values of TDN and DCP.

Table (3): Feed intake of experimental rations containing barley radicel by lactating goats.

Items	IC	T_1	T_2
Body weight (kg)	42.00	41.80	41.20
Daily DM intake:			
CFM g/h/d	1375.0 ± 0.25	1170.0 ± 0.18	965.0 ± 0.12
RS g/h/d	350.10 ± 0.08	300.23 ± 0.06	310.38 ± 0.07
BR g/h/d	-	152.50 ± 0.02	320.20 ± 0.05
Total DM intake g/h/d	1680.10 ± 10.4	1622.73 ± 9.29	1595.58 ± 8.17
T. DM intake g/kg$w^{0.75}$	101.82 ± 5.08	98.71 ± 6.07	98.13 ± 4.05
Daily DM intake kg/100 kg BW	4.00 ± 0.19	3.92 ± 0.21	3.87 ± 0.17
Daily TDN intake g/h/d	1148.52^{c} ± 20.2	1152.3^{b} ± 18.5	1165.09^{a} ± 17.6
Daily TDN intake g/kg$w^{.75}$	69.61^{c} ± 7.21	70.09^{b} ± 7.59	71.65^{a} ± 6.11
Daily DCP intake g/h/d	160.79^{b} ± 9.52	168.11^{ab} ± 8.48	179.98^{a} ± 10.28
Daily DCP intake g/kg$w^{.75}$	9.74^{c} ± 1.13	10.23^{b} ± 1.29	11.07^{a} ± 1.38

a,b and c means in the same raw with different superscripts differ significantly (P<0.05).

Milk yield :

Many factors may affect milk yield such as breed of dose, number of suckled kids, feeding level and parity of ewes (Abdel-Karim, 1981 and Latif *et al*., 1988).

The average milk yield of lactation period (week 1 to week 16) after sulking are show in table (4) and figure (1). Milk yield of dose of all treatments studied reached peak from six to eight weeks in T_2, from six to seven weeks in T_1 and at the six week in T_1 after suckling and then gradually declined till the end of the lactation period figure.

The milk yield of dose fed ration T_2 was significantly ($P<0.05$) higher than those fed rations IC and T_1 during most weeks of lactation period and in average of the entire period which may be due to higher CP intake and digestibility (Table 2 and 3).

The milk yield of Demascus goats fed ration T_2 was significantly ($P<0.05$) higher than those ration T_1 and IC during lactating period (6 to 16 weeks). This resulted may be due to higher DM intake then higher CP intake and digestibility (Table 2 and 3) and agreement with those reported by Moawed (2003) .

In this connection, Porten and Conrad (1975) reported that, using dried brewer's grains in the ration of lactating cows at 20 % of the total dry matter improves the milk production of cows. Also, Zaki et al. (1999) found that, milk production of Friesian crossbred lactating cows improved with increasing barley radicel replacement (0, 20 and 40 % from concentrate feed mixture).

Table (4): Average weekly milk yield (kg) for dose fed experimental rations during lactation period.

Week	C	T_1	T_2
1	4.45 ± 0.07	6.77 ± 1.01	7.14 ± 2.34
2	5.17 ± 0.80	6.23 ± 0.80	7.81 ± 2.56
3	4.31 ± 0.95	6.40 ± 0.92	7.68 ± 0.10
4	5.31 ± 1.48	6.66 ± 1.21	9.36 ± 2.58
5	8.98^{b} ± 0.70	10.60^{b} ± 1.12	12.44^{a} ± 0.88
6	10.11 ± 0.50	11.23 ± 1.25	13.32 ± 1.30
7	9.23^{b} ± 0.59	10.80^{b} ± 0.50	13.32^{a} ± 1.41
8	8.07^{b} ± 0.84	9.24^{b} ± 1.30	11.64^{a} ± 1.27
9	7.35 ± 1.20	8.26 ± 1.03	10.70 ± 1.83
10	6.66 ± 0.47	7.15 ± 0.87	10.66 ± 1.50
11	6.03 ± 0.99	7.61 ± 1.15	9.83 ± 2.12
12	6.35^{b} ± 0.67	6.35^{ab} ± 1.00	9.92^{a} ± 2.62
13	4.23^{b} ± 0.84	5.83^{ab} ± 1.12	8.83^{a} ± 1.97
14	3.53^{b} ± 0.70	5.93^{ab} ± 0.94	9.05^{a} ± 2.32
15	1.91^{b} ± 0.23	4.31^{ab} ± 0.80	7.68^{a} ± 2.12
16	1.33^{b} ± 0.25	3.32^{ab} ± 0.63	6.05^{a} ± 2.07

a,b and c means in the same raw with different superscripts differ significantly (P<0.05).

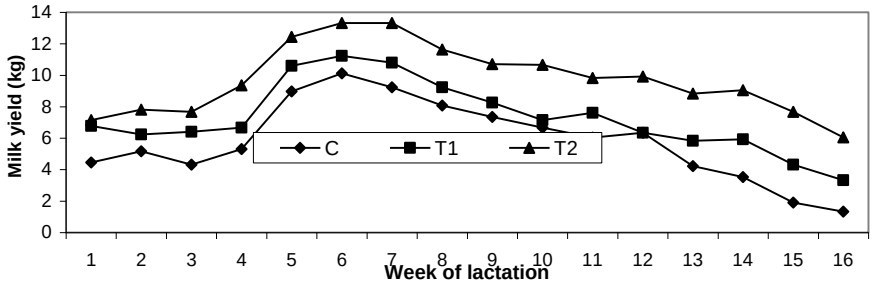

Fig. (1): Average of daily milk yield (kg) for does fed experimental ration during lactation period

Table (5): Milk chemical constituents (%) of lactating Demascus goats fed experimental rations.

Items	C	T_1	T_2
Moisture	89.22 ± 1.13	89.68 ± 1.85	89.54 ± 1.61
TS	10.78 ± 0.33	10.32 ± 0.21	10.46 ± 0.16
SNF	7.38 ± 0.37	7.42 ± 0.13	7.48 ± 0.10
Fat	3.06 ± 0.16	2.88 ± 0.11	2.99 ± 0.02
Protein	2.37 ± 0.16	2.43 ± 0.10	2.56 ± 0.02
Lactose	4.25 ± 0.02	4.26 ± 0.02	4.16 ± 0.02
Ash	0.77 ± 0.02	0.69 ± 0.03	0.70 ± 0.03

TS = total solid SNF = Solid non fat
No significant differences among all treatments.

The milk constituents as percentage (Table 5) such as total solid (TS), solid non fat (S.N.F.), fat, protein, lactose and ash of lactating Demascus goats fed the three experimental rations were not significant differences. This findings are in accordance with those obtained by Mohamed *et al*.(2003) and Kholif *et al.* (2005).

Table (6). Economic efficiency of lactating Demascus goats fed rations containing barley radicel meal.

Items	C	T_1	T_2
Cost of feed daily intake(pt.):			
CFM	0.93	0.68	0.51
RS	0.03	0.03	0.03
BR	-	0.07	0.14
Total input (LE)	0.96	0.78	0.68
Average daily production milky	0.83	1.04	1.39
(kg)	2.49	3.12	4.17
Total output (LE)	1.53	2.35	3.51
Return	2.59	3.01	5.16
Economic efficiency			

The price of feedstuffs and products: concentrate feed mixture / ton = 1100 (LE), rice straw / ton = 90 (LE), barley radicel / ton = 400 (LE) and milk / kg = 3 (LE).

The cost of feed intake (total input) were 0.96, 0.78 and 0.68 (pt.) for lactating goats fed ration C, T_1 and T_2 , respectively. The values of economical efficiency were 2.59, 3.01 and 5.16 for C, T_1 and T_2 rations , respectively. The corresponding values as return / kg were1.53, 2.35 and 3.51 pt., respectively. This showed that, better economical efficiency of milk production were obtained from goats fed rations containing radicel (T_1 and T_2) than those fed concentrate feed mixture (CFM) and rice straw (RS) due to increasing milk yield and decreasing feed cost.

Abou El-Nasr (1985) reported that, the utilization of by-product containing diets could substantially reduce the cost of meat and milk production as compared to the conventional diets.

In conclusion, radicels could be used successfully and economically in formulating rations of lactating Demascus goats as a cheaper ingredient to improve feed intake, digestibility of various nutrients of the rations and improved performance of lactating goats.

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تأثير استخدام الراديسيل الجاف على أداء الماعز الحلابة

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تهدف هذه الدراسة تأثير استخدام الراديسيل الجاف في علائق الماعز الحلابة على إنتاج اللبن والمأكول ومعاملات الهضم والقيمة الغذائية والمردود الاقتصادي – استخدم عدد ١٥ عنزة دمشقي حلابة قسمت إلى ٣ مجاميع (٥ لكل مجموعة) وكانت العلائق التجريبية كالآتي:

1) ٧٠% مخلوط العلف المركز من الاحتياجات الغذائية +٣٠ % قش أرز (عليقة كنترول).
2) (٨٥% مخلوط العلف المركز + قش أرز) + ١٥% راديسل (T1)
3) (٧٠% مخلوط العلف المركز + قش أرز)+ ٣٠% راديسل (T2)

وكانت أهم النتائج:

1) فيما يتعلق بمعاملات هضم المركبات الغذائية كان معامل هضم البروتين الخام والألياف الخام أعلى معنويا (٥%) في العليقة الثانية عن عليقة الكنترول وعليقة T1 بينما لاتوجد فروق معنوية في المادة الجافة والمادة العضوية ومستخلص الإثير ومستخلص الخالي من الأزوت بين العلائق الثلاثة.
2) فيما يتعلق بتجارب التغذية أظهرت النتائج أن المادة الجافة المأكولة يوميا تقل مع زيادة إحلال الراديسل ومع ذلك نجد أن الإنتاج الأسبوعي للبن كان عاليا في كل من العليقة T1 ، T2 عن عليقة الكنترول.
3) مكونات اللبن لكل من الجوامد الكلية والجوامد اللادهنية والدهن والبروتين واللاكتوز والرماد كانت غير معنوية.
4) الكفاءة الاقتصادية والعائد الاقتصادي كانت أفضل في الماعز المغذاة على العليقة T1، T2

مما سبق يتضح أنه يمكن استخدام الراديسل الجاف في علائق الماعز الحلابة بنسبة ١٥% أو ٣٠% من الاحتياجات الغذائية بنجاح وبشكل اقتصادى فى تحسين المأكول والمهضوم والقيم الغذائية فى العلائق وتحسين معدل الأداء للماعز الحلابة .

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