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EFFECT OF USING CHUFA TUBERS (*CYPRUS ESCULENTUS L.*) IN ZARAIBI GOATS DIETS ON THE RESULTANT MILK AND LABENH

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ABSTRACT

The purpose of the present study was to investigate the possibility of using Chufa tubers at different levels in Zaraibi goat rations and its effects on the resultant milk and labenh as well as feed utilization and economical return. Twenty four Zaraibi goats during lactation period were divided randomly into four equal groups (6 doses each). Animals in groups G_1, G_2, G_3 and G_4 received 0, 5, 10 and 15 g Chufa tubers/ head/ day, respectively in their diets. Results showed that daily feed intake tended to increase (90.95, 91.63, 92.18 and 93.69 g/kg$^{0.75}$) with increasing the levels of Chufa tubers (0, 5, 10 and 15g/h). However, the incorporation of Chufa tubers into goats' diet decreased the daily water consumption, as the highest rate of this consumption was recorded with goats fed the control ration (G_1), while the lowest consumption was found with those fed on the ration containing the high level of Chufa tubers (G_4). Daily milk yield of Zaraibi goats during most of lactation weeks was significantly ($p<0.05$) higher as a result of supplementing diet with Chufa tubers. The highest milk yield was recorded with G_4 (1.059kg) followed by G_3 (1.020 kg) then G_2 (0.989 kg) and lastly G_1 (0.892 kg) and the differences were significant. Moreover, the effect of treatment on milk fat, total solids and ash contents were significant. But, no noticeable effect for tested rations were observed on other milk contents (protein, lactose and solids non fat). Other milk qualities including flavor, acidity and pH values did not show significant differences with the use of all examined diets. Milk produced by goats fed different diets was used for the preparation of the concentrated yoghurt Mediterranean dairy product "labneh". Supplementation with Chufa tubers, at different levels, did not significantly affected the yield, moisture content, titratable acidity, fat content, salt content, total nitrogen, and soluble nitrogen of labneh after processing or during storage. Higher non-protein nitrogen content was observed in labneh of G1 (control) and G2 (5% chufa tubers). Total volatile fatty acids were increased with increasing supplementation rate of Chufa tubers from 5% (G2) to 15% (G4). The highest score in the assessment of organoleptic characteristics of Labneh was for G3 (10% Gufa) , followed by G4 (15% Chufa tubers), then G2 (5% Chufa tubers). The feed utilization efficiency (kg feed intake/kg milk production) based on DM or CP was better with increasing Chufa tubers levels (0, 5, 10 and 15 g/h/day) in goat rations as improvement in G4 reached approximately 12.6 and 14.8%, more than G1 (control), respectively. Accordingly, the economic efficiency (%) was higher due to using Chufa tubers at levels 5, 10 and 15 g/head/ day compared with the control one.

***Keywords*:** Zaraibi goats, Chufa tubers, milk production, labenh, feed utilization

INTRODUCTION

Several attempts had been undertaken in order to improve utilization of dietary nutrients by feed supplementation with various additives from different sources **(Ibrahim *et al*., 1998, Abd El-Latif *et al*., 2004 and Ahmed *et al*., 2008)**. While this trend is greatly increasing, it could pose a health threat giving the adverse effects of some chemical additives on human health. This highlights the value of using natural feed additives as to minimize or even eliminate these adverse effects. Several medicinal herbs have been used for their therapeutic and/or prophylactic traits. For example, herbs used to either help reduce high blood cholesterol concentrations, provide some protection against cancer, protect against chronic diseases or stimulate the immune system. Furthermore, medicinal herbs do not only serve medicinal roles but also contain

39.1 kg live body weight, were divided into four feeding treatments (6 does each). The experiment began two weeks after weaning (during mid-lactation) and continued until the seventh month of lactation (at mating). Each group was housed in a semi-roofed barn (4x3x5 meters). Animals were weighed at the beginning of the experiment and biweekly. Zaraibi does in groups G1, G2, G3 and G4 received a daily feed supplement of 0, 5, 10, and 15 g Chufa tubers / head, respectively. Feed additive (Chufa tubers) was mixed with approximately 10g ground concentrate and spread daily over the concentrate feed mixture. The amount of concentrate and roughage fed to goats were based on feed Allowances of **NRC (1981).** The concentrate feed mixture (CFM) and roughages (berseem hay and bean straw) were offered at 50:50 ratio. The used CFM contained: undecortecated cotton seed meal (23%), yellow corn (43%), wheat bran (22%), soybean meal (5%), molasses (3.5%), limestone (2%), common salt (1%) and minerals mixture (0.5%). Samples of feeds were analyzed according to the procedure of **A.O.A.C (1995)**. The chemical composition of feed stuffs consumed by Zaraibi does is shown in Table (1). Water was available all times. Diets were offered twice daily at 8:0 am and 3:0 pm.

aromatic substances and essential oils that used in food industries **(Craig, 1999 and Abd El-Latif *et al*., 2004).** Chufa tubers is a grass-like plant widely distributed in many areas over the world and have been used in Egypt as a source of food, medicine and perfumes **(Arafat *et al*. 2009).** Ibrahim *et al*. (2007) observed that using Chufa tubers in small ruminant rations had positive effects on digestion coefficient, feeding values and productive performance as well as some metabolic parameters. The present work was thus designed to study the effect of adding Chufa tubers to Zaraibi goats rations on feed utilization, quantity and quality of milk and labneh prepared from this milk. Labneh (concentrated yoghourt) is a popular dairy product in the Mediterranean countries due to its longer shelf life, compared to yoghurt, and organoleptic properties **(Ragab, 2000 and Ayyad, 2003).** The study also assessed the economic impact of incorporating Chufa tubers into Zaraibi goats diet.

MATERIALS AND METHODS

Feeding experiments: This study was conducted at El-Serw Experimental Research Station belongs to Animal Production Research Institute, Agricultural Research Center, Ministry of Agriculture, Egypt. Twenty four lactating Zaraibi does (post weaning), averaged

Table (1): Chemical composition of feed ingredients, and Chufa tubers consumed by dairy Zaraibi goats.

Feed	DM	Chemical comosation					
		OM	CF	CP	EE	NFE	Ash
Concentrate feed mixture, CFM	**90.5**	**93.50**	**16.00**	**14.80**	**3.30**	**59.40**	**6.50**
Berseem hay, BH	**88.6**	**87.40**	**30.50**	**11.20**	**2.20**	**43.50**	**12.60**
Bean straw, BS	**89.0**	**86.30**	**37.50**	**5.10**	**1.30**	**42.40**	**13.70**
Chufa tubers, CT	**91.3**	**98.10**	**10.0**	**7.00**	**23.90**	**57.20**	**1.90**

DM: Dry matter, OM: Organic matter, CF: Crude fiber, CP: Crude protein, EE: Ether extract and NFE: Nitrogen free extract.

described by **Baranett and Abdel-Tawab (1957**).

Preparation and analysis of labneh: Lebneh was made from standardized goat's milk using a starter culture consisting of *Lactobacillus delbrueckii* subsp. *bulgaricus*, and *Streptococcus thermophilus* as described by **El-Samaragy *et al*. (1988).** Starter culture was

Milk yield was recorded daily for each doe. Representative milk samples (about 0.5% of total milk produced) were taken biweekly for each doe at both milking. Samples were composed and analyzed for chemical composition of total solids, fat, protein and ash as well as pH and acidity according to Ling (1963), while lactose content was assessed as

Chufa tubers levels (0, 5, 10 and 15 g/h/d) in diets of Zaraibi goats (G1, G2, G3 and G4, respectively). The highest value of DM intake (1471g/h or 93.69 g/kg $w^{0.75}$) was recorded with G4 followed by G3 (1439 g/h or 92.18 g/kg $w^{0.75}$), while the lowest value (1417 g/h or 90.95 g/kg $w^{0.75}$) was recorded with G1(control). The values of feed intake in this study was approximately similar with the obtained values by **Ahmed *et al*. (2001)** during lactation period (ranged from 85.85 to 89.41 g/kg $w^{0.75}$) and **Abdelhamid *et al*. (2011)** during early lactation period (ranged from 93.1 to 95.9 g/kg $w^{0.75}$). In this respect, **Shehata *et al*. (2004)** studied the effect of some medicinal herbs such as chamomile (at the levels of 0, 5 and 10g/ 100kg BW/day) on palatability and found that daily feed intake during mid-lactation period was improved (113.6, 119.2 and 121.2 g/ g/kg $w^{0.75}$) with increasing chamomile levels in goats rations. Concerning water consumption (Table 2), the results indicated that animals fed on the control ration (G_1) had the highest value of daily water consumption (4170 ml/h or 268 ml/kg$w^{0.75}$), while the lowest value was recorded with the ration containing the high level of Chufa tubers (G_4) (3980 ml/h or 254 ml/ kg$w^{0.75}$).

obtained from Chr-Hansen's laboratories (Copenhagen, Denmark) and sub-cultured in reconstituted skim milk before use. Samples of labneh were taken to assess moisture and fat contents, titratable acidity, total nitrogen, soluble nitrogen, and non protein nitrogen as described by **Ling (1963).** pH values were measured using a digital pH meter **(model 201 Drion Res. Japan).** Salt content of labneh was determined according to the methods of **Davies (1932).** The amino acid nitrogen (AAN) of the samples was determined using 33.3% phosphotungestic acid solution as described by **Stadhouders (1959).** Total volatile Fatty acids of the samples were determined as described by **Kosikowiski (1978).** Sensory evaluation of labneh was conducted according to **Nelson and Trout (1965),** where fifty points were given for flavors, 35 point for body and texture and 15 points for appearance. Data were statistically analyzed using **SAS (2003).** The significant differences among means were assigned according to **Duncan (1955).**

RESULTS AND DISCUSSION

Daily feed intake and water consumption: Averages of daily dry matter intake by Zaraibi goats during the experimental periods (lactation period) are summarized in Table (2). The daily DM intake increased with increasing

Table (2): Average daily feed intake* and water consumption by dairy Zaraibi goats fed the experimental rations.

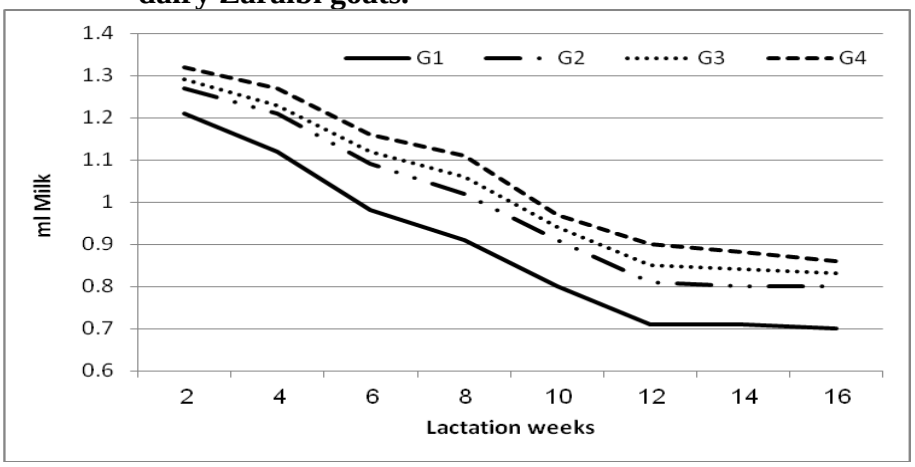
Item	Groups			
	G1	G2	G3	G4
Daily DM intake (g/h) :				
CFM	**710**	**711**	**713**	**714**
BH	**355**	**350**	**340**	**344**
BS	**352**	**373**	**386**	**413**
Total DM intake	**1417**	**1434**	**1439**	**1471**
DM intake, % of BW	**3.64**	**3.67**	**3.69**	**3.74**
DM intake, g/kg$W^{0.75}$	**90.95**	**91.63**	**92.18**	**93.69**
Roughage: Concentrate ratio, R/C	**50:50**	**50:50**	**50:50**	**51:49**
Daily Water consumption:				
Ml / h	**4170**	**4150**	**4070**	**3980**
Ml / kg$W^{0.75}$	**268**	**265**	**261**	**254**
Ml / g DM intake	**2.94**	**2.89**	**2.83**	**2.71**

*Group feeding; CFM: Concentrate feed mixture; BH: Berseem hay; BS: Bean straw; DM: Dry matter; BW: Body weight; $W^{0.75}$: Metabolic body weight.

Milk production: Milk yield as kg/h/d of lactating Zaraibi goats during lactation period (16 weeks) are presented in Fig 1. The differences in milk yield were significant ($p<0.05$) among the tested treatments during most lactation weeks. The overall mean of daily milk yield per head had the highest values with G4 (1.059 kg) followed by G3 (1.02 kg) then G2 (0.989kg) while the control (G1) was the lowest (0.892 kg).

Daily water consumption tended to decrease with increasing Chufa tubers levels (2.94, 2.89, 2.83 and 2.7 ml/g DM intake for 0, 5, 10 and 15 g/h levels, respectively). **Abdelhamid *et al*. (2011) concluded** that using some medicinal herbs in ruminant rations seems good solution under desert conditions where water resources are restricted.

Fig 1: Effect of experimental treatments on daily milk yield (kg/h) by dairy Zaraibi goats.



	G1	G2	G3	G4
Aver.	**0.892±0.01^{c}**	**0.989±0.01^{b}**	**1.020±0.02^{ab}**	**1.059±0.01^{a}**

Means with different superscripts differ significantly at ($P < 0.05$).

recorded with the control group (G1). Milk fat percentage was improved by 3.6, 7.6 and 10.2% with using Chufa tubers at levels 5, 10 and 15 g/head/day in tested diets (G2, G3 and G4, respectively) as compared with control (G1).

Milk composition in Table (3) shows that the effect of experimental treatments on milk fat percentage was significant ($p<0.05$). The highest value of milk fat % (4.63) was recorded with (G4) while the lowest value (4.20) was

Table (3): Effect of experimental treatments on Milk composition and its quality by dairy Zaraibi goats.

Item	Groups			
	G1	G2	G3	G4
Average milk yield, kg	**0.892±0.01^{c}**	**0.989±0.01^{b}**	**1.020±0.02^{ab}**	**1.059±0.01^{a}**
Fat, %	**4.20±0.04^{d}**	**4.35±0.03^{c}**	**4.52±0.03^{b}**	**4.63±0.05^{a}**
Protein, %	**3.12±0.05**	**3.10±0.04**	**3.12±0.05**	**3.13±0.03**
Lactose, %	**4.60±0.04**	**4.65±0.03**	**4.67±0.02**	**4.68±0.04**
Total solids, %	**12.63±0.06^{c}**	**12.83±0.07^{bc}**	**13.04±0.06^{ab}**	**13.19±0.12^{a}**
Solids nonfat, %	**8.43±0.06**	**8.48±0.05**	**8.52±0.04**	**8.56±0.08**
Ash, %	**0.71±0.01^{c}**	**0.73±0.01^{bc}**	**0.74±0.00^{ab}**	**0.75±0.01^{a}**
pH value	**6.68±0.02**	**6.65±0.02**	**6.66±0.02**	**6.66±0.02**
Acidity, %	**0.153±0.00**	**0.158±0.00**	**0.160±0.00**	**0.161±0.02**

Means in the some row with different superscripts differ significantly at ($P < 0.05$).

Milk color and flavor were not noticeably affected as a result of presence of Chufa tubers at levels 5, 10 and 15 g/h/day in goat rations. Moreover, the effect of experimental treatments on pH value was not significant as shown in Table (3). The highest value of acidity % (0.161) was recorded with G4 while the lowest value was detected with G1 (0.153) but differences were not significant. Generally the obtained values of milk quality such as pH value and acidity % were within the normal range given by **Ahmed *et al*. (2008)** during different experimental periods (suckling and lactation periods).

This may be attributed to the clear increase in ether extract (EE) content (23.9%) in Chufa tubers (Table 1) and the ruminal total VFA's post-feeding (**Ibrahim *et al.*,2007**) . Moreover, the present study indicated also that effect of the treatments on total solids and ash content was significant. But the effect of the tested experimental rations on other milk content (protein, lactose and solid nonfat percent) were not significant while the obtained values of milk constituents are within the normal range given by **Ahmed (1999), El-Kholany (2004), Abdelhamid *et al*. (2011)** for Zaraibi goats.

Table (4) Effect of experimental treatments on the Labneh yield percentage during storage periods at 5±1°C

Groups	Storage period (weeks)				
	0	1	2	3	4
G1	29.30	29.00	28.72	28.50	28.46
G2	29.60	29.32	29.00	28.80	28.78
G3	30.40	30.10	29.78	29.56	29.51
G4	31.20	30.90	30.53	30.31	30.27

This means that the highest acidity was obtained after four weeks storing. The obtained results are similar to those reported by **Omar (1995), Abd El-Moaty (1996), Ragab (2000) and Mehana *et al.* (2004).**

Fat content: There was no significant changes in the fat content based on dry matter of labneh during the storage period at 5 to 1°C for four weeks (Table 5). These observations are similar to those reported by **Hefnawy *et al.*(1992),Omar (1995), Ragab (2000)and Mehana *et al*. (2004).**

Salt content: Salt content of labneh on dry matter basis was nearly the same and don't show significant changes among different treatments (Table 5).

Nitrogen fractions of labneh: Total nitrogen (TN) gradually increased with increasing the storage period up to 4 weeks (Table 6). This is attributed to the changes in moisture content during labneh storing.

Yield of labneh: Table (4) show a slight decrease in the yield of labneh after one week storage. Also, negligible decrease of labneh yield was observed during the storage period up to 4 weeks in all treatments. The change in labneh yield during the storage period were found to be nearly of similar values in all feeding treatments. Similar observations were reported by **Omar (1995), Ragab (2000) and Mehana *et al.* (2004).**

Moisture content: Slight, but insignificant, decrease was observed on moisture content of labneh in all treatments through the storage periods (0 to 4 weeks) (Table 5). Similar results were reported by **Omar (1995), Ragab (2000) and Mehana *et al*. (2004).**

Acidity and pH values: An important quality criterion that determines the acceptability and shelf life of labneh is titratable acidity. The present data (Table 5) clearly indicate that (TA) values were significantly increased in all treatments with increasing the storage period.

Table (5) The chemical composition of labneh made from goats milk as affected by feeding rations during storage at 5±1°C

Groups	Storage period (weeks)				
	0	1	2	3	4
			Moisture %		
G1	72.20	71.28	70.62	70.39	70.19
G2	71.90	71.28	70.70	70.46	70.28
G3	71.20	70.48	69.88	69.66	69.47
G4	70.85	70.15	69.53	69.28	69.10
			Acidity %		
G1	1.862	1.993	2.010	2.101	2.210
G2	1.850	1.900	2.039	2.145	2.208
G3	1.677	1.753	1.862	1.959	2.105
G4	1.620	1.651	1.763	1.807	2.075
			pH		
G1	3.60	3.55	3.55	3.48	3.45
G2	3.64	3.55	3.53	3.48	3.40
G3	3.82	3.72	3.65	3.52	3.48
G4	3.82	3.76	3.63	3.50	3.50
			Fat / dry matter %		
G1	38.49	37.95	37.78	37.82	37.571
G2	39.146	38.997	38.908	38.693	38.660
G3	39.583	38.618	38.513	38.497	38.487
G4	41.509	40.536	40.532	40.527	40.485
			Salt / dry matter %		
G1	1.982	2.019	2.046	2.067	2.087
G2	2.060	2.120	2.215	2.217	2.217
G3	2.083	2.100	2.118	2.125	2.136
G4	2.069	2.154	2.209	2.214	2.233

Average of each group of 3 replicates

Table (6): Effect of storing duration, at 5±1°C, on some chemical properties of labneh.

Groups	Storage period (weeks)				
	0	1	2	3	4
			SN / TN %		
G1	10.034	10.697	11.197	11.710	12.650
G2	10.095	10.752	11.152	11.602	12.867
G3	10.112	11.005	11.150	11.893	12.893
G4	10.50	10781	11.275	11.463	12.477
			NPN / TN %		
G1	5.381	6.375	6.780	8.313	9.497
G2	5.624	6.744	7.564	8.464	9.661
G3	5.307	6.243	7.000	8.135	8.973
G4	5.222	6.302	6.863	8.108	9.153
			TVFA 0.1 NaOH / 100g labneh		
G1	7.1	8.0	8.8	9.5	10.4
G2	8.4	9.2	10.2	10.9	11.7
G3	8.8	9.6	10.6	11.4	12.4
G4	8.9	9.8	10.9	11.7	12.8

agreement with that reported by **Abou Dawood (1996).**

Organoleptic properties: An important parameter to determine the quality and shelf life of labneh is sensoric properties (Table, 7). The better organoleptic properties was noticed on lebnah of G_3 (10% Chufa tubers) which gained higher score for appearance (A); body texture (BT); flavour (F) and total score (T) at different stages of storing. Followed by G_4 (15% Chufa tubers), G_2 (5% Chufa tubers) then control. These results are in agreement with those reported by **Abd-El-Moaty (1996), El-Samragy (1997), Ragab (2000) and Mehana *et al.* (2004).**

Feed efficiency: Data of feed efficiency (feed/ yield) are summarized in Table (8). Feed efficiency based on DM intake was better with increasing Chufa tubers level ((1.45, 1.41 and 1.39 for levels 5, 10 and 15 g/h/day, respectively). Similarly, the feed conversion value as kg CP /kg milk was better with

Regarding soluble nitrogenous compounds (SN %) in labneh, a gradual increase was observed during the storage periods up to 4 weeks. The increase of SN/TN may be due to the hydrolysis of protein as a result of acidity developed by lactic acid bacteria.

Concerning non protein nitrogen content (NPN/ TN%) (Table 6), there was a slight increase observed among different treatments during storing up to four weeks. Also, NPN/ TN % of labneh (of G_1 and G_2) were higher than those of other treatments. These results are in agreement with those reported by **Mahfouz *et al.* (1992), Omar (1995), Abd- El-Moaty (1996), Ragab (2000) and Mehana *et al.* (2004).**

Total volatile fatty acids (TVFA's): The result indicates that the highest value of TVFA was recorded with G_4 (15% Chufa tubers) while the lowest value was recorded with G_2 (5% Chufa tubers) at the end of storing.

In general, TVFA's values were gradually increased in variable rates. This result is in

Table (7): Organoleptic properties of labneh stored at 5±1^{0}C

Items			Groups			
			G1	G2	G3	G4
Fresh	A	15	14	14	14	14
	BT	35	31	32	34	33
	F	50	43	44	47	46
	T	100	88	90	95	93
1 Weeks storage	A	15	14	14	14	14
	BT	35	30	30	34	32
	F	50	43	43	46	45
	T	100	87	87	94	91
2 Weeks storage	A	15	13	14	14	14
	BT	35	30	30	34	32
	F	50	41	42	46	44
	T	100	84	86	94	88
3 Weeks storage	A	15	11	12	13	13
	BT	35	29	29	33	31
	F	50	40	41	45	44
	T	100	80	82	91	88
4 Weeks storage	A	15	11	11	13	13
	BT	35	28	29	32	31
	F	50	36	39	45	46
	T	100	75	79	90	83

A : Appearance & color BT: Body & texture
F : Flavour T : Total score point

Table (10). The cost of consumed feed to produce one kg milk was decreased with control ration (1.03) compared with tested treatments (ranged from 1.05 to 1.10). Thus, the animals fed on the control ration had the highest feed cost /kg milk (1.16 LE), while the lowest value was recorded with ration containing the high level of Chufa tubers (G4). Meanwhile, G4 showed the highest economic return (4.09) compared with control (3.68).

increasing Chufa tubers in goat rations (0.165, 0.160 and 0.156 for G2, G3 and G4, respectively). Thus, the improvement in feed efficiency, calculated as kg/dry matter intake and kg/crude protein intake /kg milk yield, for G4 (15g Chufa tubers /h/d) accomplished 12.6 and 14.8% improvement than control.

Economic return: The cost of consumed feed and economical efficiency are presented in

Table (8): Feed utilization efficiency by Zaraibi does as affected by the experimental treatments.

Items	Groups			
	G1	G2	G3	G4
No. of does	**6**	**6**	**6**	**6**
Average body weight, kg	**38.9**	**39.1**	**39.0**	**39.3**
Metabolic body size, $W^{0.75}$	**15.58**	**15.64**	**15.61**	**15.70**
Average feed intake during the experimental period as DM				
CFM, g/h/d	**710**	**711**	**713**	**714**
BH, g/h/d	**355**	**350**	**340**	**344**
BS, g/h/d	**352**	**373**	**386**	**413**
Total DM intake, g/h/d	**1417**	**1434**	**1439**	**1471**
CP intake, g/h/d	**162.8**	**163.5**	**163.3**	**165.3**
Average milk yield, g/h/d	**892**	**989**	**1020**	**1059**
Feed utilization efficiency:				
kg DM/kg milk	**1.59**	**1.45**	**1.41**	**1.39**
kg CP/kg milk	**0.183**	**0.165**	**0.160**	**0.156**

CFM: Concentrate feed mixture; BH: Berseem hay; BS: Bean straw; DM: Dry matter; BW: Body weight; $w^{0.75}$: Metabolic body size.

Table (10): Economic efficiency of Zaraibi does fed different experimental diets.

Items	Groups			
	G1	G2	G3	G4
Daily milk yield (g/h)	**892**	**989**	**1020**	**1059**
Daily feed intake (g/h) as fed:				
CFM, g	**785**	**786**	**788**	**789**
BH, g	**401**	**395**	**384**	**388**
BS, g	**396**	**419**	**434**	**464**
From Chufa tubers, g	**0**	**5**	**10**	**15**
Cost of consumed feed, L.E/h*	**1.03**	**1.05**	**1.07**	**1.10**
Price of milk, L.E/h	**3.79**	**4.20**	**4.34**	**4.50**
Feed cost/kg milk, L.E	**1.16**	**1.06**	**1.05**	**1.04**
Economic efficiency, %	**3.70**	**4.00**	**4.04**	**4.08**

*The prevailing prices, per ton, at time of the study are, 1000 LE- CFM, 500 LE- BH and 100 LE - BS, while selling prices of 1kg Chufa tubers was 5 LE and 1kg goat's milk was 4.25 LE..
Economic efficiency % = money output/ money input

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CONCLUSION

It could be concluded that supplementing goat ration with Chufa tubers improve the quality of milk and labenh prepared from goat's milk, and the feed utilization efficiency, which could be reflected on better economic return.

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تأثير استخدام حب العزيز فى علائق الماعز الزرايبى على انتاج اللبن واللبنة و كفاءة التحويل الغذائي .

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الهدف من هذا البحث هو امكانية استخدام مستويات مختلفة من حب العزيز فى علائق الماعز وتأثيره على إنتاج اللبن والجبن وكذلك كفاءة التحويل الغذائي واقتصاديات الإنتاج ، تم استخدام 24 عنزة زرايبى أثناء فترة الحليب ، وقسمت لأربعة مجموعات متساوية ، وغذيت طبقا لمقررات NRC لعام 1981 مع استخدام 4 مستويات من حب العزيز هى صفر ، 5، 10، 15 جم لكل رأس يوميا للمجموعات الأربعة على التوالي. وقد أظهرت النتائج زيادة فى المأكول اليومي بمقدار(90.95، 91.93، 92.18، 93.69 جم/ كجم حيز جسم تمثيلى) مع زيادة نسبة الإضافة (صفر ، 5، 10، 15 جم /رأس /يوميا) فى المجموعات الأربعة (مج1، مج2، مج3، مج4 على التوالي) ، وفى المقابل سجلت اكبر قيمة للماء المستهلك فى مجموعة الكنترول (مج1) فى حين سجلت أقل قيمة مع مج4. بالنسبة لإنتاج اللبن فقد لوحظ أن هناك زيادة معنوية فى محصول اللبن أثناء معظم فترات الحليب نتيجة لاستخدام المعاملة بحب العزيز فى علائق الماعز الزرايبى الحلاب، وقد سجلت أعظم قيمة لمتوسط إنتاج اللبن (أثناء فترة التجربة) فى مج4 (1.059 كجم) تلتها مج3 (1.020كجم) ثم مج2 (0.989 كجم) وأخيرا مج1 (0.892 كجم) وكانت الاختلافات معنوية. فيما يتعلق بتركيب اللبن فقد حدث تأثير معنوي للمعاملة على دهن اللبن والمكونات الصلبة والرماد، فى حين لم تتأثر مكونات اللبن الأخرى (البروتين واللاكتوز والمواد الصلبة اللادهنية) وبالمثل لم تتأثر قياسات جودة اللبن مثل الحموضة وقيمة pH والنكهة واللون مع استخدام العلائق التجريبية. تم إستخدام اللبن الناتج من الماعز الزرايبي الذي تم تغذيته علي علائق تحتوي علي مستويات مختلفة من حب العزيز في صناعة "اللبنة" أو "اليوجورت المركز" وهو منتج لبني شائع الانتشار في منطقة حوض البحر الأبيض المتوسط. وقد وُجد أن استخدام حب العزيز لم يؤثر بشكل معنوي علي التصافي، نسبة الرطوبة، نسبة الحموضة، نسبة الدهن، نسبة الملح أو النتيروجين الكلي و الذائب للبنة سواء بعد التصنيع أو أثناء التخزين. ولكن نسبة النتروجين الغير بروتيني كانت أعلي في اللبنة الناتجة من لبن تم انتاجة بإستخدام عليقة المقارنة (مج1)، أو بإستخدام العليقة المحتوية علي أقل نسبة من حب العزيز وهي 5% (مج2). كذلك فقد لوحظ حدوث زيادة في نسبة الأحماض الدهنية الطيارة في اللبنة مع زيادة نسبة حب العزيز في العليقة من 5% إلي 15%. أظهرت نتائج التقييم الحسي أن اللبنة المصنعة من لبن ناتج من حيوانات تم تغذيتها علي عليقة تحتوي علي 10% حب العزيز (مج3) كانت الأفضل من حيث خصائصها الحسية، يليها اللبنة الناتجة من مج 4 (15% حب العزيز) ثم مج2 (5% حب العزيز). كفاءة تحويل الغذاء إلى لبن كانت أفضل سواء كانت على أساس المادة الجافة أو البروتين المأكول مع زيادة مستوى حب العزيز فى علائق الماعز ، وقد حقق التحسين فى المجموعة الرابعة افضل نسبة (12.6، 14.8 % على التوالي) مقارنة بالكنترول. وهذا يوضح أن المعاملة بحب العزيز (15جم / رأس / يوميا) توفر ما يقرب من 14.8% من البروتين المأكول مما يعتبر تأثيرا جيدا للمعاملة، وهذا ينعكس على تحسين الكفاءة الاقتصادية للمعاملات (مج2، مج3، مج4) مقارنة بالكنترول (مج1). من هذه الدراسة نستخلص أن استخدام حب العزيز فى علائق الماعز الزرايبى أثناء فترة الحليب له تأثير ايجابي جيد على اللبن المنتج واللبنة وكفاءة تحويل الغذاء إلى لبن مما يحقق منفعة اقتصادية فى قطعان الماعز الزرايبى.

EFFECT OF USING CHUFA TUBERS (*CYPRUS ESCULENTUS L.*) IN ZARAIBI GOATS DIETS ON THE RESULTANT MILK AND LABENH