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EFFECT OF CORN STEEP LIQUER ON PERFORMANCE OF DAIRY ZARAIBI GOATS

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ABSTRACT

The objective of the present study was to study the influence of replacing concentrate feed mixture (CFM) with different levels of corn steep liquor (CSL) at the rates of 10, 20, and 30% on the basis of crude protein supply in diets. Twenty four Zaraibi does, at the beginning of pollination season (flushing period), weighing 37.5 kg and aged < 30 months, were selected from El Serw farm and divided into four similar groups (n=6/group). The groups were assigned at random to receive the four experimental rations. All goats offered treatment diets 30 days before the breeding season as flushing period then through pregnancy and lactation periods. Dietary effects on average birth and weaning weights, total body gain and daily body gain of kids, kilogram kids born, kg kids weaned/does, mortality rate of kids, and economic efficiency were studied. Total and daily milk yield (34weeks), total solids, fat, total protein, lactose, ash and pH value were measured for milk. Average daily feed intake from CSL, CFM, roughage, total DM intake, DM intake (g/kg $w^{0.75}$) and feed utilization efficiency were studied. The results revealed that productive and reproductive performance of dairy Zaraibi goats were affected by using CSL. It seems that cases of twins and litter size was more . The greatest value of litter size was recorded with Tr1 (control) (2.5) and the lowest value (2.17) was recorded with Tr2 (10% CSL) and Tr4 (30% CSL). But, Tr3 (20% CSL) recorded medium value (2.33). Meanwhile, birth and weaning weights were higher in Tr2 (1.77 and 12.46 kg) than Tr1 (control) (1.57 and 9.58kg, respectively). The same trend was observed also with kilograms produced per doe which was greatly better with CSL in Tr2 and Tr3 (20.6 and 20.67, respectively) compared with the other groups. However, the percentage of mortality recorded the highest value in Tr4 (22.22%) then Tr1 (13.89%) followed by Tr3 (8.33%), while mortality rate was zero in Tr2. Data of daily milk yield, was significantly reduced with Tr1(1.00 kg/h) compared with Tr2 (1.30 kg/h),Tr3 (1.210 kg/h) and Tr4 (1.380 kg/h). Also, total milk yield was reduced with control group (238kg) by 13.0, 21.0 and 37.8% compared with Tr2 (269kg), Tr3 (288kg) and Tr4 (328kg) and the differences were significant. Total solids (TS) milk, fat, protein and lactose were significantly influenced by the tested treatments. The lowest values ($P \leq 0.05$) of TS, protein and lactose were recorded with control ration (11.83, 3.02, 2.86 and 4.63%, respectively). The data of milk quality indicated that PH value was higher (6.77) with control group compared with the other three levels of CSL (6.61, 6.67 and 6.67 for Tr2, Tr3 and Tr4, respectively). Based on results of the present study, it could be safely concluded that replacing CFM with CSL in Zaraibi does rations resulted the better productive and reproductive performance and feedlot performance.

k*eywords:* *Dairy Zaraibi goats, reproductive efficiency, productive performance , corn steep liquor*

INTRODUCTION

In developing countries, shortage in feedstuffs is mostly seasonal. The efficient feeding system has to utilize the local crop-residues, agro-industrial by products and wastes in supplying ready-made low-cost balanced diets for ruminants. On the other hand, feed is the most important cost item for livestock

production which represent about 50-75% of production costs (Safari et al., 2012). Since proteins is the principal constituent of the animal body and has to continuously present in feeds for repair and synthesis process, therefore, it is vital for animal life, reproduction and milk production (Harmeyer and Martetens, 1980). CSL is a major by-product of cornstarch processing. It is a rich source of nitrogen, vitamins, amino acids, peptides and soluble nutrients (Nise et al., 2004). It contains about 40% crude protein on dry matter basis, out of which more than 90% in the form of amino acid and peptides (Gill, 1997 and Trenkle, 2002). CSL is a good source of protein, energy and minerals for animals (Filipovic et al., 2002). It has been fed to beef and dairy cattle as a liquid source of protein (Gill, 1997). Therefore, the present study was planned to examine the influence of replacing CFM with CSL at three rates; 10, 20 and 30%, based on crude protein content of the diet on productive and reproductive performance of Zaraibi does.

MATERIALS AND METHODS

1- Animals and experimental design

This study was conducted in El-Serw Experimental Research Farm belonging to Animal Production Research Institute (APRI), Agricultural Research Center, Ministry of Agriculture, Egypt. Twenty four Zaraibi does at the beginning of pollination season (Flushing period), averagely weighed 37.5± kg and aged < 30 months were selected. The animals were divided into four equal groups, six does each, according to their body weight (BW) and pervious milk yield records. The does received four feeding treatments (Tr) in group feeding. Animals were weighed at the beginning then at 20, 40 and 50-weeks.The experiment started one month before flushing period and continued during milking period until the next breeding season.

2 - Feeding and management

Corn steep liquor is a free of fiber liquid contains protein and energy supplement and produced from processing of corn for human consumption. It obtained from Starch and Glucose Factory, Cairo, Mostorod. It is a dark yellow flowing liquid with molasses. It contains high levels of soluble protein, glucose and minerals that make it useful to compensate the poor value of low quality forages by increasing the energy and protein levels without more fiber intake.

All groups were fed on restricted amounts of concentrate feed mixture (CFM) to cover 90, 80 and 70% of total crude protein. Goats fed according to allowances recommended by NRC (2007) for dairy goats. Samples of feeds (CFM) and rice straw (RS) were analyzed according to A.O.A.C (2007). Chemical composition of CSL, CFM and RS are shown in Table (1).

Concentrate feed mixture (CFM) contained un-decorticated cotton seed meal (23%), yellow corn (43%), wheat bran (22%), soybean meal (5%), molasses (3.5%), limestone (2%) and common salt (1%). Water was available all times. Diets were offered twice daily at 8:0 am and 3:0 pm. Daily milk yield (DMY) was recorded individually.

Experimental parameters measured

Changes in live body weight (BW) were recorded biweekly for individual Zaraibi does and kids. Litter size (kids No/doe) and mortality rate were determined.

Representative milk samples (about 0.5% of total milk produced) were collected during lactation season for analysis from each doe from both milking. Milk samples were analyzed for total solids (TS), fat, protein, and ash as well as pH and acidity (Ling, 1963) while lactose content was determined by method of Nickerson et al., (1976). pH value was measured using digital pH meter.

Table 1: Formulation of the experimental total mixed rations (%).

Ingredient	Experimental total mixed ration			
	Tr1	Tr2	Tr3	Tr4
Concentrate	67	59.9	53.1	45.9
CSL	0	2.5	5	7.5
Rice Straw	30	34.6	38.9	43.6
Agrivate*	0.5	0.5	0.5	0.5
Sodium chloride	1	1	1	1
Limestone	1.5	1.5	1.5	1.5
Total	100	100	100	100

*Agrivate contains per 3kg Vit.A1000000 IU; Vit. D3 200000 IU; Vit.E,10000 mg; Vit B1,1000 mg; Vit. B2 5000 mg; B6, 1500 mg; Vit. B12, 10 mg; Biotin,50 mg; Colin chloride, 250000 mg; Pentothenic, 10000 mg; Niacin,30000 mg; Folic acid, 1000 mg; Manganese, 60000 mg; Zink,50000 mg; Iron,3000 mg; Copper, 4000 mg; Iodine, 300 mg; Selenium, 100 mg and, Cobalt, 100 mg.

Table 2: Chemical composition of different experimental treatments.

Item	DM%	Chemical composition of DM (%)						G.E* MJ/ Kg DM
		OM	CP	EE	CF	NFE	Ash	
Tr1	87.31	80.09	12.31	3.40	11.08	53.30	19.91	1.573
Tr2	87.36	80.41	12.85	3.01	12.64	51.91	19.59	1.574
Tr3	86.17	80.55	13.25	2.30	14.25	50.75	19.45	1.565
Tr4	87.02	84.88	13.70	2.90	14.98	53.30	15.12	1.659

* Gross energy (GE) calculated according to MAFF (1975) using the following equation: GE, MJ/Kg DM=0.0226 CP + 0.0407 EE+ 0.0192 CF + 0.0177 NFE.

Economic Efficiency rate

Economic efficiency was calculated (as output to total input ratio according to the current local prices, where CFM cost 2800 L.E /ton, CSL 600 L.E/ ton, RS 250 L.E/ton while selling price of 1 Kg goat's milk was 3.0 L.E. and 1 Kg live body weight of kids was 35 L.E).Data were statistically analyzed using SAS (2009). The significant differences among means were assigned according to Duncan (1955).

RESULTS AND DISCUSSION

1-Chemical composition of feed ingredients

The chemical composition of feed ingredients are presented in Tables (3). The obtained results showed that CSL contained 43.0 % DM, 33.5% CP, and 17.40 % starch. Similar results were observed by Khalifa et al., (2013) on CSL. In another study of Mirza and Mushtaq (2006), the proximate analysis of CSL reported higher crud protein (40%), ash and minerals and virtually free from crude fiber. CSL is practically free from fat, fiber and silica (Wagner et al., 1983 and Gupta et al., 1990). It contains about 40% crude protein on dry matter basis, out of which more than 90% is in form of amino acids and peptide (Trenkle, 2002)

Productive performance

Date of the productive and reproductive performance of Zaraibi does fed the tested experimental rations are summarized in Table (4). The results indicated that replacing with CSL to goat ration had no adverse effect on does performance during late pregnancy period. Abortion cases concentrated during the late months of pregnancy. Data in Table (4) show

that the parturition of twins was high by Zaraibi does, hence the kidding rate or litter size was high too. The highest litter size was recorded with Tr1 (2.5) and the lowest (2.17) with Tr2 and Tr4, but, Tr3 recorded medium value (2.33). Similar estimates for litter size were obtained by (Shehata et al. 2007a), while Abdelhamed et al., (1999) found that litter size ranged from 2.25 to 2.42 when fed clays supplemented rations.

In another study on Baladi does, Gihad et al. (1987) found that kidding rate ranged from 114 to 175% for Baladi does, fed concentrate feed mixture, while it was 247% in Zaraibi doe in the study of Shehata et al. (2007b). The present study indicate that does given CSL during pregnancy born kids heavier in weights at birth and weaning than those non-supplemented (control, 1.57 and 9.58) and that the highest values were recorded with Tr2 (1.77 and 12.46), respectively, but the differences were significant among weaning weights only.

The highest value of DBG was recorded with Tr2 (119g) followed by Tr4 (106g), while Tr3 recorded the lowest (88 g). Similar results were observed by Mirza and Mushtag (2006), Shahzsd et al., (2010) and Khalifa et al., (2013). Accordingly, output measured as kilograms produced per doe was greatly better with using CSL in Tr2 and Tr3 (20.6 and 20.67, respectively) compared with the other groups as shown in Table (2). The positive effect of CSL on performance of does and their born kids was early reported by Gill (1997), Trenkle (2002), Chay-Canul et al., (2011) and Khalifa et al., (2013). Mortality cases among Zaraibi kids, recorded the highest value in Tr4 (22.2%) then Tr1 (13.9%) followed by Tr3 (8.3%), while mortality rate was zero in Tr2. In this respect, Mirza and Mushtag (2006) observed that supplementation with 5% CSL (low level) is useful for growth parameters.

Changes in live body weight :

Body weights of Zaraibi goats during pregnancy, suckling and lactation periods are shown in Fig. (1). The initial live body weights (LBW's) were approximately equal among the four treatments. Devendra (1979) recorded a decline in body weight of high milk yielding goats during the first month of lactation (post-partum). In this respect, Ahmed, (1999) observed that goats fed 100% NRC had decreased LBW, from 13 to 22%, at 60 days post- partum. Generally, LBW decreased during early lactation and reached a minimum value at the 4thmonth then tended to increase with advance of lactation (Haider, 1994). Concerning the effect of experimental treatments, the obtained results indicated that LBW tended to increase especially during the last days of pregnancy with Tr3 and Tr4. These differences accompanied the supplement with CSL in Tr3 and Tr4 during the last weeks of pregnancy. The same trend was reported previously by Khalifa et al. (2013).

Table 3: Chemical composition of corn steep liquor (CSL), concentrate and rice straw.

Items	DM	CP	Fat	Starch	NFE	Sugar	ME (MJ/kg/DM)
CSL	43.00	33.50	1.00	17.40	>1.00	3.30	15.40
	Chemical composition as DM (%)						
	DM	**OM**	**CP**	**EE**	**CF**	**NFE**	**Ash**
CFM	87.85	89.25	14.42	3.45	12.16	59.22	10.75
RS	92.83	80.23	3.08	1.49	36.88	38.78	19.77

*source: **Feed Guide Energy Products**, (2011) Castle gate James Australia Pty Ltd*

Table 4 : Effect of tested rations on productive and reproductive performance of Zaraibi does.

Items	Tr1	Tr2	Tr3	Tr4
No. of does	6	6	6	6
Single kidding cases	1	1	0	1
Twins kidding cases	1	3	4	3
Triple kidding cases	4	2	2	2
Born kids	15	13	14	13
Alive kids at 0 day	15	13	14	13
Alive kids at 15 days	15	13	14	13
Alive kids at 30 days	15	13	14	13
Alive kids at 45 days	14	13	14	11
Alive kids at 60 days	14	13	13	9
Alive kids at 90 days	12	13	13	9
Litter size	2.50±0.30	2.17±0.30	2.33±0.30	2.17±0.30
Birth weight	1.57 ± 0.09^{A}	1.77 ± 0.10^{A}	1.64 ± 0.09^{A}	1.69 ± 0.10^{A}
Weaning weight, (kg)	9.58 ± 0.74^{B}	12.46 ± 0.71^{A}	9.54 ± 0.71^{B}	11.83 ± 85^{B}
Total body gain by kids, (kg)	8.04 ± 0.86^{B}	10.69 ± 0.65^{A}	7.92 ± 0.65^{B}	9.54 ± 0.79^{AB}
Daily gain by kids, (g)	89 ± 7^{B}	119 ± 7^{A}	88 ± 7^{B}	106 ± 9^{AB}
Kilogram kids born/does	3.92	3.84	3.83	3.49
Kilogram kids weaned /does	19.16	26.99	20.67	17.07
Mortality of kids, No.	3	0	1	4
Mortality of kids,%	13.89±10.28	0.00	8.33±10.28	22.22±10.28
Economic efficiency	2.39	3.20	3.11	3.82

A, B, AB means within the same row with different superscripts are significantly different at (P<0.05) .
T1 (control), T2 (10% CSL), T3 (20%CSL) and T4 (30%CSL).

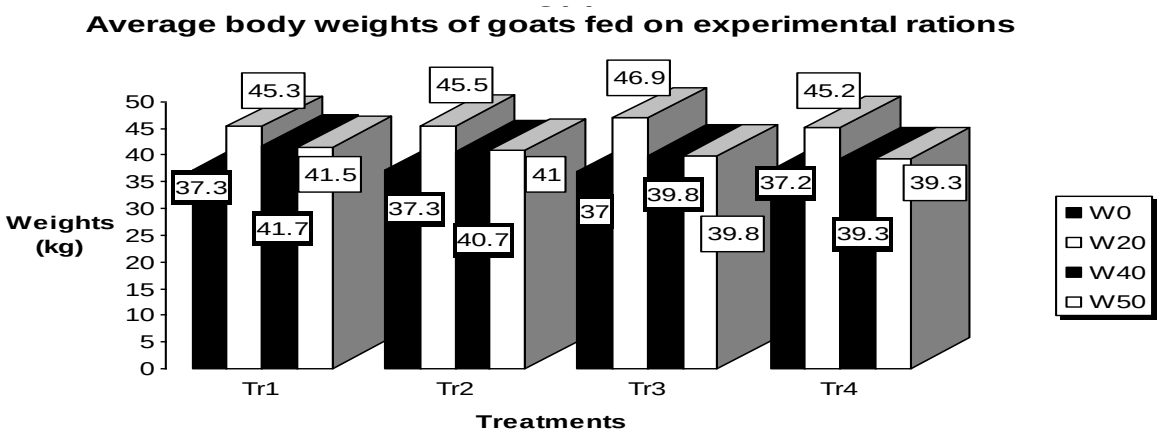

Fig. 1: Average body weights of goats fed on experimental rations

Milk yield

Data presented in Table (5) show the average daily milk yield (DMY) as affected by the tested rations. The DMY was significantly less with Tr1 (1.00 kg) compared with the three treated groups. The DMY had the highest

values with Tr4 (1.380kg) followed by Tr3 (1.210kg) then Tr2 (1.130kg). The same trend was observed on the total milk yield (34week), being the less with control group (238kg) compared with Tr2 (269kg), Tr3 (288kg) and Tr4 (328kg) where all differences were significant. The positive effect of CSL on milk yield was observed also by Khalifa et al. (2013) who found that use of CSL at level 5% in lactating Zaraibi goats ration improved milk yield by 22.88%

Milk composition

The effect of experimental treatments on milk composition is presented in Table (6). The percentage of total solids (TS), milk fat, protein and lactose were significantly influenced by CSL. The lowest values ($P \leq 0.05$) of TS, fat, protein and lactose were recorded with control ration (11.83, 3.02, 2.86 and 4.63%, respectively) while the highest were obtained with 30% CSL level (Tr4). But, the differences in ash among all treatments were not significant as shown in Table (6). In this respect, Khalifa et al. (2013) reported that most measured components especially total solids, milk fat and protein were significantly higher with using 5% of CSL in Zaraibi goats rations. Generally, milk chemical composition showed nearly similar values by Abdelhamed, et al., (2011), Ahmed, et al., (2011) and El-Emam, et al ., (2014). Regarding quality of milk, the data indicated that pH value was significantly higher with control group (6.77) compared with the three levels of CSL (6.61, 6.67 and 6.67 for Tr2 , Tr3 and Tr4, respectively) -Table (6).

The daily dry matter intake (DMI) of dairy goats is presented in Table (7). The total DM intake was gradually increased (1176.7, 1206, 1253 and 1331.2 g/h/d) with increasing levels of CSL (0, 10, 20 and 30%, respectively). Similarly, the daily feed intake as relative value to metabolic BW ($g/kgW^{0.75}$) was increased by 2.42, 8.28 and 17.17 % due to the three treatments (Tr2, Tr3 and Tr4, respectively) compared with control (70.13 g). The same trend was observed also with feed intake as % of body weight as values were 2.75, 2.80, 2.98 and 3.25 for Tr1, Tr2, Tr3 and Tr4, respectively. Similar results were observed by Shahzad et al., (2010). Generally, the increased DMI with increasing level of CSL give positive evidence that CSL is palatable material.

Daily feed intake

Feed conversion ratio

The efficiency of feed conversion (FCR) based on DM and crude protein (CP) intake by female Zaraibi goats are summarized in Table (7). The data indicated that the daily feed intake (DFI) of CP was gradually increased (137, 138, 143 and 150 g/h) with increasing levels of CSL (Tr1, Tr2, Tr3 and Tr4, respectively). The FCR calculated as DM was greatly better with the three treatments (1.07, 1.04 and 0.97 for Tr2, Tr3 and Tr4, respectively) compared with Tr1 (1.18), as shown in Table (7). In the same time FCR as CP intake/milk was better by 11, 14 and 20%, respectively compared with control (0.137). The positive effect of CSL on performance and feed conversion ratio may be attributed to improving rumen function and digestion as reported by (Nasir et al., 2012). Generally, CSL is a rich source for nitrogen, vitamins, amino acids, peptides and soluble nutrients (Nias et al., 2004).

Table 5: Milk production of lactating Zaraibi goats fed the experimental rations (during pregnancy and lactation)

Items	Tr1	Tr2	Tr3	Tr4
Total milk yield(kg/h) (34week)	238^{C}±7.54	269^{B}±6.62	288^{B}±6016	328^{A}±5.51
Daily milk yield , (g/h/d)	1.00^{C}±0.02	1.13^{B}±0.0.02	1.21^{B}±0.02	1.38^{A}±0.02

A,B,C means within the same row with different superscripts are significantly different at (P<0.05).
T1 (control), T1 (10% CSL), T3 (20%CSL) and T4 (30%CSL).

Table 6: Milk composition (%) of lactating Zaraibi goats fed the experimental rations (during pregnancy and lactation).

Items	Tr1	Tr2	Tr3	Tr4	±S.E
Total solids	11.83^{A}	12.31^{A}	12.59^{A}	12.61^{A}	0.020
Fat	3.02^{B}	3.90^{A}	3.97^{A}	3.97^{A}	0.146
Total protein	2.68^{C}	2.99^{B}	3.10^{A}	3.12^{A}	0.149
Lactose	4.63^{C}	4.68^{B}	4.75^{A}	4.75^{A}	0.120
Ash	0.72^{A}	0.74^{A}	0.77^{A}	0.77^{A}	0.019
PH value	6.77^{A}	6.61^{B}	6.67^{B}	6.67^{B}	0.0±21

A,B,C means within the same row with different superscripts are significantly different at (P<0.05).
T 1 (control), T1 (10% CSL), T3 (20%CSL) and T4 (30%CSL).

Table 7: Treatment effect on feed utilization efficiency by lactating Zaraibi does.

Items	T1	Tr12	Tr3	Tr4
No. of. does	6	6	6	6
Body weight, (kg)	42.5	43	42	41
Metabolic body size, $w^{0.75}$	16.65	16.79	16.50	16.20
Daily feed intake, during pregnancy and lactation, of different components				
CFM , g/h	889.2	800.2	711.4	662.4
CSL , g/h	-	34.4	77.4	111.8
Roughage , g/h	278.5	371.3	464.2	557.0
Total DM intake , g/h	1176.7	1206	1253	1331.2
DM intake, g/kg $w^{0.75}$	70.13	71.83	75.94	82.17
DM intake , %BW	2.75	2.80	2.98	3.25
R/C ratio*	24:76	31:69	37:63	42:58
CP intake, g/h	137	138	143	150
Milk yield ,(g/h/d)	1.00^{C}	1.13^{B}	1.21^{B}	1.38^{A}
Feed utilization efficiency:				
Kg DM/kg milk	1.177	1.067	1.036	0.965
Kg CP/kg milk	0.137	0.122	0.118	0.109

A,B,C means within the same row with different superscripts are significantly different at (P<0.05).
* R/C : Roughage to Concentrate ratio.

CONCLUSION

It could be concluded that replacing CFM with CSL at the rates 10, 20, and 30% on the basis of crude protein supply in diets could improve feed utilization efficiency, increase body weight of goats and born kids which reflected on better productive performance of dairy Zaraibi goats.

REFERENCES

Abdelamid, A.M.; E.I. Shehata; M.A. Ahmed (1999). Physio-nutritional studies on pregnant and lactating goats fed on rations differing in roughage/concentrate ratio at different feeding levels and/or; not supplemented with bentonite 3-Effects on productivity; reproductivity and digestive disturbances. J. Agric. Sci.; Mansoura Univ.24: 4637.

Abdelhamed, A.M. ; E.I. Shehata and G.A. Maged (2011). Effect of some medical herbs on production of lactating Zaraibi goats. J. Anim. and Poult. Prod., Mansoura, Univ., 2 (11): 493 – 513.

Ahmed, M.E. (1999). Improving feed conversion efficiency during reproduction-stress phases. Ph.D. Thesis Fac. Agric.; Mansoura Univ. Egypt.

Ahmed, M.E.; O. A. EL- Zelaky, K.M. Aiad and E.I. Shehata (2011). Response of small ruminants to diets containing red forage either as fresh, silage or hay versus berseem hay. Egypt, J. of Sheep and Goat Sciences; 6 (1).

A.O.A.C (2007). Association of Official Analytical Chemists. Official Methods of Analysis.19th Edition. Washington DC, USA.

Chay-Canul, A. J., Ayala-Burgos, A. J., Kú-Vera, J. C., Magaña Monforte, J. G. and Tedeschi, L.O. (2011). The effects of metabolizable energy intake on body fat depots of adult Pelibuey ewes fed roughage diets under tropical conditions. Trop. Anim. Health Prod. 43: 929-936.

Devendra, C. (1979). Goat production in Asian region; current status available; genetic resources and potential prospects. Indian Dairy MAN.; XXX:513.

Duncan, D. B. (1955). Multiple Ranges and Multiple F- Test. Biometrics, 11: 1-42.

EL-Emam G.I.; M.E. EL-Kholany, Hoda M. EL-Hosseiny and S.B. Mehany (2014). Milk production, some rumen parameters and feed utilization efficiency of lactating goats fed rations containing berseem silage and their mixture with barely or millet x Napier grass hybrid. Anim. Poul. Prod. , Mansoura, Univ., 5(1):15 -26.

Filipovic, S. S., M. D. Ristic and M. B. Sakac (2002). Technology of corn steep application in animal mashes and their quality. Roum. Biotechnol. Lett., 7: 705-710.

Gihad, E.A.; T.T. EL- Gallad; S.S. Allem and T. M. EL-Bedawy (1987). Effect of pre and post partum nutrition on birth weight and early milk yield goats. Proc. Iv. Int. Goat conf. Brazil;8 – 13 M March (89) ;pp.1401.

Gill, C. (1997). More value from imported maize. Feed International, August, 23-26.

Gupta, R. S., M. C. Desai, P. M. Talpada, and P. C. Shukala, (1990). Effect of corn steep liquor feeding on growth of crossbred calves. Indian J. Anim. Nutr. 7: 279-282

Haider, A. I. (1994). The yield and composition of milk and pre weaning growth rate of Baric desert goats in Egypt. Alex. J. Agric.Res.; 39:155.

Harmeyer, J. and H. Martens (1980). Aspects of urea metabolism in ruminants with reference to the goat. J. Dairy Sci., 63:1707

Khalifa, E. I., H. R. Behery, Y. H. Hafez, A. A. Mahrous, , Amal Fayed, A. and Hanan Hassanien, , A. M. (2013). Supplementing non-conventional energy sources to rations for improving production and reproduction performance of dairy Zaraibi nanny Goats. Egyptian J. Sheep &Goat Sciences, Vol.8 (2), P:69-83

Ling, E.R. (1963) . Atext book of Dairy Chemistry, Vol. 2 Practical 3rd ed Chapman &Hall, Lttd., London.

MAFF (1975). Ministry of Agriculture, Fisheries and Food. Energy allowance and feeding system for ruminants. Technical bulletin 33, Ministry of Agriculture, Fisheries and Food, HMSO, London, pp: 63-67.

MIRZA M. A.; AND T. MUSHTAQ (2006). Effect of supplementing different levels of corn steep liquor on the post-weaning growth performance of pak-Karalul lambs. Pakistan Vet. J., 26 (3): 135-137.

Nasir, T. A., M. Sarwar, and M. A. Khan. (2012). Influence of urea treated wheat straw with or without corn steep liquor on feed consumption, digestibility and milk yield and its composition in lactating Nili-Ravi buffaloes. Asian-Aust. J. Anim. Sci. 6: 825.

Nickerson, T. A ; I. F. Vujicie and A. R. lin (1976). Colorimetric estimation of lactose and its hydrolytic products .J. Dairy Sci., 59:386-390

Nisa, M., M. Sarwar, and M.A. Khan, (2004). Influence of ad libitum feeding of urea treated wheat straw with or without corn steep liquor on intake, in situ digestion kinetics, nitrogen metabolism, and nutrient digestion in Nili-Ravi buffalo bulls. Austr. J. Agric. Res., 55: 235-239.

NRC (2007). Nutrient Requirements of Small Ruminants: sheep, goats, cervids, and New World camelids. National Research Council of the National Academies, National Academies Press, Washington, D.C., U.S.A.

Safari, J., G.C. Kifaro, D.E., Mushi, L.A. Mtenga, T. Adnøy, and L.O. Eik, (2012). Influence of flushing and season of kidding on reproductive characteristics of Small East African goats (does) and growth performance of their kids in a semi arid area of Tanzania. African. Agric. Res. 7(35): 4948-4955.

SAS (2009). SAS/STAT® 9.2 User's Guide, 2nd ed. SAS Institute Inc, Cary, NC, USA.

Shehata, E.I.; Ferial. H. AbdeI-Rasoul; Faten F. AbouAmmou, M.A. Ahmed and A. M. Abdel-Gawad. (2007a) Effect of feeding the medical herb, Chamomile flower, on some productive performance of Egyptian Zaraibi does and their new born kids. Egyptian j. Sheep Goat sci. 2007 2 (2):111 – 120

Shehata, E.I.; M.A. Ahmed; Faten F. AbouAmmou ; M.A. EL-Ashry; A. A. M. Soliman and S. A. Tawfik (2007b). Performance and metabolic profile of Zaraibi goats under different feeding regimes. Egyptian J. Nut. Feeds, 10 (2) Special Issue:185-200.

Shahzad , M.I ; S. Muhammad; Mahr-un-Nisa and M. Sharif (2010). Corn steep liquor, a potential substitute of urea on growing lambs. 3rd International Scientific Conference on Small Ruminant Development, Hurghada, Egypt, 12-15 April,. J. of Sh. & G. Sci., 5 (1), P: 177-190

Trenkle, A., (2002). Beef Research Report, Iowa State University, Iowa, USA.

Wagner, J.J., K.S. Lusby and G.W. Horn, (1983). Condensed molasses, soluble corn steep liquor, fermented ammoniated condensed whey as protein sources for beef cattle grazing dormant native range. J. Anim. Sci., 57: 542-552.

الملخص العربي

تقييم مركز مياه نقع الاذرة من خلال الأداء الانتاجى والتناسلي للماعز الزرايبى.

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أجرى هذا العمل لدراسة تأثير استبدال مركز مياه نقع الاذرة الناتج عند صناعة النشا (CSL)محل مخلوط العلف المركز بنسبة 10 ,20 , 30 % من جملة البروتين على الأداء الإنتاجي والتناسلي للماعز الزرايبى أثناء فترتي الحمل والحليب . ولتحقيق هذا الهدف تم استخدام 24 عنزة زرايبى (6 بكل مجموعة)(متوسط وزن الجسم 37.5 كجم والعمر اكبر من2.5 سنة).

وقدمت العلائق قبل 30 يوما من بداية موسم التلقيح حتى نهاية موسم إنتاج اللبن (34اسبوع) و وقد تم تقدير الوزن للأمهات والجداء ، إنتاج وتركيب اللبن , معدل التحويل الغذائي و الأداء الإنتاجي و التناسلي للماعزويمكن تلخيص النتائج المتحصل عليها على النحو التالي :حدث تحسن في وزن الجسم للأمهات أثناء الأسابيع الأخيرة من الحمل مع استخدام CSL خاصة في المعاملة الثالثة والرابعة , وكذلك زاد إنتاج اللبن مع استخدام CSL ووصل لأعلى إنتاج يومي من اللبن (1.138كجم) مع المعاملة الرابعة ثم (1.210كجم) مع المعاملة الثالثة ثم (1.130 كجم) مع المعاملة الثانية مقارنة بالكنترول الذي سجل اقل محصول لبن يومي (1.00كجم) وكانت الاختلافات معنوية بين المعاملات, كذلك كان هناك تأثيرا ايجابيا وملحوظ منCSLعلى معظم مكونات اللبن خصوصا الدهن والمكونات الصلبة والبروتين وبالنسبة لكفاءة التحويل الغذائي والمحسوبة على أساس المادة الجافة كانت أفضل في المعاملات الثلاثة (0.965, 1.07,1.04 للمعاملات الثانية والثالثة والرابعة) مقارنة بالكنترول (1.18) وأيضا حينما تم حسابها على أساس البروتين الخام المأكول كانت أفضل بنسبة 11 , 14 ,20% مع زيادة مستوى CSL (10 ,20 , 30 % للمعاملات الثانية والثالثة والرابعة على التوالي). وفيما يتعلق بالأداء الانتاجى والتناسلي فالأمهات التي أعطيت CSLإثناء الحمل أعطت أوزان أفضل عند الميلاد وعند الفطام وكانت المعاملة الأفضل هي المعاملة الثانية (CSL%20) حيث سجلت 1.77 ,12.46 كجم لوزن الميلاد والفطام على التوالي , وبناء على ذلك كان عدد الكيلو جرامات وزن حي لكل أم أفضل بدرجة ملحوظة مع المعاملة الثانية والثالثة (20.6, 20.67) مقارنة بالمعاملات الأخرى .أما عن النسبة المئوية لنفوق الجداء المولودة فكانت 22.22فى المعاملة الرابعة ثم الكنترول كانت النسبة فيه 13.89% بينما انخفضت الى8.33%في المعاملة الثالثة وقد صلت إلى صفر في المعاملة الثانية(CSL(%20 .

من هذه الدراسة يوصى باستخدام سائل مركز مياه نقع الاذرة في علائق المعز الزرايبى الحلاب أثناء الحمل وإنتاج اللبن حيث كان له تأثير ايجابي ليس فقط على تحسين إنتاج اللبن بل أيضا على تحسين كفاءة التحويل الغذائي والكفاءة الاقتصادية بدون اى تأثيرات عكسية على أداء الأمهات وجدائها المولودة.