EFFECT OF NATURAL PROTECTED PROTEIN ON MILK YIELD AND ITS COMPOSITION OF SHEEP

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SUMMARY

An experiment was conducted on 20 finnish ewes which concentrate: roughage ratio of the ration were 70%: 30% in R1 and R3 and 30%: 70% in R2 and R4. One thirds of protein in the concentrate portion of R3 and R4 were replaced by corn gluten meal which is known as natural protected protein (Maiga and Schingoethe, 1997; and Overton *et al*., 1998). The effect of protein source in the ration of finnish ewes on milk yield and composition was studied.

Results indicated that significant increase ($P<0.05$) in milk yield in R3 compared to other treatments was detected while R2 gave the lowest milk yield. Also similar effects were observed in milk composition such as fat, total proteins, lactose, total solids, solids not fat and ash.

It is concluded that adding natural protected protein in the form of corn gluten meal improves milk production and composition. Also, study was carried out on the suckling lambs, which were left suckling their dams up 12 weeks then weaned. Their initial body weight and their average daily gain were recorded. As affected by their mother's nutrition, such performance was investigated.

Keywords: *natural protected protein, corn gluten, sheep, milk yield, milk composition*

INTRODUCTION

When the microbial protein is inadequate in pregnant ewes specially multi twin ewes at the last two months of pregnancy when the size of rumen becomes less related to increasing embryos sizes, one of the valid ways to cover the inadequate part of ewes needs to protein is adding protected protein which gives ewes true amino acids and improves digestibility since protein is digested better in the lower gut (Limin Kung and Rode, 1996). Most proteins have the ability to bypass the rumen partially (Klopfenstein, 1985) but some protein sources are featured as protected protein than the others such as corn gluten.

This study was planned to investigate the effect of source of protein on highly production ewes such as finnish sheep and their suckling lambs weights and performance from birth to weaning.

MATERIAL AND METHODS

This study was carried out in animal production station in Karada, Kafr el Sheikh governorate which belongs to the animal production research institute, Dokki, Giza, Egypt. The present work was conducted to study the effect of using natural-protected protein on productive performance of highly performance sheep (Finnish landrace breed). The experimental animals (20 ewes) were assigned equally on four rations before mating season: The first ration (R1) was composed of 70 % complete feed mixtures (CFM1)+ 30 % (Alfalfa) hay, while the second ration (R2) was composed of 30% of the same mixture (CFM1) + 70 % (Alfalfa) hay. The third ration (R3) was 70% complete feed which one third of its protein content was replaced by corn gluten protein (CFM2) + 30 % (Alfalfa) hay and The fourth ewe group (R4) was fed on 30% of the same mixture (CFM2) + 70 % (Alfalfa) hay. The experment was conducted up to the end of lactation season.

The formulation of CFM1 and CFM2 and chemical composition of their ingredients is shown in Table (1) and Table (2).

Sampling of milk:

Samples of milk were taken after two weeks from lambing and continued biweekly up to 12 weeks of lactation. The lambs were stayed 8 hours daily apart from their dams, then weighted before suckling and after suckling, then the sample of milk were taken for chemical analysis and calculating milk yield and milk contents.

Ash and total solids were determined according to Ling (1963) while the fat percentage was determined by using Gerber method according to Ling (1963).

Solids-not-fat content was calculated by the difference between total solids and fat content according to Ling (1963).

Total nitrogen was determined by the semi-micro-Kjeldahl distillation method according to Ling (1963).

Lactose was determined colorimetrically according to method of Barnett and Abd El-Tawab (1957).

RESULT AND DISCUSSION

Data of table (3) clearly indicated that animals received corn gluten meal had higher ($P<0.05$) daily milk yield (908 g) than those received linseed cake (735 g).

Similar results were obtained by Constantin *et al.*, (1994), who found that the increased milk production might be due to the presence of protected protein in complete feed mixture. It is also likely that rumen retention time was less for the protected protein than the concentrate feed mixture protein as reported by Pailan and Kaur (1996), by which the source of protected protein was more available in the small intestine (Mishra and Rai, 1996).

Similar results were also obtained by Grummer and Clark (1982) who found that the increased milk production may have been from the low soluble N content of the diets because of an improved pattern of amino acids flowing into the small intestine.

Also the same trend was reported by Broderick (1973) and Larry (1986). They reported that the amino acids content of the undegraded dietary protein, in particular lysine and methionine are likely to be limiting for milk production. Moreover, histidine, leucine and valine were the first three limiting amino acid (AA's) for microbial protein (Erasmus and Botha 1994).

However, corn gluten is a relatively rich source of these amino acids, therefore, pattern of amino acids was improved in the small intestine when supplemental protein was corn gluten (Maiga and Schingoethe, 1997; and Overton *et al.*, 1998)

The tabulated data were also in agreement with those of Overton *et al.*, (1998) who determined the effect of protein supplement as corn gluten meal, blood meal plus corn gluten meal and sunflower meal on milk yield and

Table (1): The ingredients of the complete feed mixture (%):

The ingredients	CFM1 (%)	CFM2 (%)
Corn grain	33	35
Barely grain	10	20
Linseed cake	19	---
Corn gluten	---	7
Alfalf hay	25	25
Wheat straw	5	5
Molasses	5	5
Limestone	1.5	1.5
Mineral and vitamins.	1.5	1.5
TDN	65.15	67.13
CP	13.55	13.45

Table (2): The formulation of the experimental rations and their chemical composition (%).

Item	Treatments			
	T1	T2	T3	T4
DM	92.71	90.86	91.92	90.46
OM	89.02	90.10	89.43	91.64
CP	15.78	15.90	15.57	16.15
CF	24.55	16.52	23.56	16.21
EE	3.80	4.07	3.50	3.94
NFE	44.89	54.01	46.80	55.34
Ash	10.98	9.50	10.57	8.36
TDN	55.19	65.57	57.40	67.40

T_1 (70% Alfalfa hay + 30% complete feed mixture1)
T_2 (30% Alfalfa hay + 70% complete feed mixture1)
T_3 (70% Alfalfa hay + 30% complete feed mixture2)
T_4 (30% Alfalfa hay + 70% complete feed mixture2)

composition of lactating cows. Production and composition of milk showed significant dietary effect.

Results also showed (Table 3) that animal groups offered 70C: 30R recorded higher ($P<0.05$) daily milk yield (940 g) than those fed 30C: 70R (700 g). These results are in good agreement with those reported by El Serafy *et al* (1980) and El Badawi (1994).

Comparison among the four treatments, Table (3) indicated that T4 had the highest milk yield (1015 gm/h/d) whereas T1 recorded the lowest one (574 gm/h/d). Differences among treatments were statistically significant.

In other words, T4 recorded higher milk yield than those of T1, T2 and T3 by 43.14, 15.69 and 21.57%, respectively. The relative improvement in milk production of T4 could be illustrated on the base of that the ration of this group had a high ratio of protected protein (corn gluten) and starch compared to the other three treatments.

With respect to the effect of protein sources, ewes received corn gluten ration Table (4) had insignificant ($P>0.05$) higher fat yield (43.44 gm/h/d) than those received linseed cake (38.77 gm/h/d). These results are in line with those of Constantin *et al.*, (1994), Sevi *et al.*, (1998b) and Roeder *et al.*, (2000). They found that averages of milk fat content were increased ($P<0.05$) as the level of protected protein increased in a ration based on concentrate source (Table 4).

With regard to the effect of concentrate to roughage ratio (Table 4), it is obvious from the results that ewes afford rations of higher concentrate protein recorded significant higher ($P<0.05$) milk fat yield (47.07 gm/h/d) than those fed the lower concentrate ratio (35.28 gm/h/d).

El Serafy *et al.*, (1980) and El Badawi (1994) observed that increasing ratio of concentrate in the ration led to an increase in milk fat yield.

The present results of milk fat content could be explained by the fact that milk fat is mainly affected by the molar proportions of the VFA's produced in the rumen.

It is now well recognized that when cows are fed diets that contain a low proportion of roughage and a high proportion of concentrates, fat content of milk decreased (Rook, 1961; Olson Hinners and Bernett 1966).

Such effect of diet on milk fat content is mediated via an influence on the end products of rumen fermentations, namely the reduction in molar proportion of acetic and the increase in the molar proportion of propionic acid.

Comparisons among the four experimental treatments indicated that T4 recorded the highest ($P<0.05$) milk fat yield (48.01gm/h/d) while T1 recorded the lowest one (29.57 gm/h/d). In other words T4, T2, T3 produced 38.4%, 35.9% and 25.8% more ($P<0.05$) milk fat yield than that of T1 (Table 4).

Such results agreed well with the remarks made by Antongiovanni *et al.*, (1999), who found that when level of protected protein with starch in the ration increased, yield of milk fat increased being 34.71, 46.12 and 45.01g/h/d for 0%, 2.1% and 4.9% protected protein respectively.

Ewes fed corn gluten rations Table (5) produced more ($P<0.05$) milk total proteins (34.03 gm/h/d) than those fed linseed cake (27.25 gm/h/d). That indicates more AA's were available in the small intestine in the case of corn gluten compared to linseed cake (Table 5). The present results are in good agreement with those reported by Wilkinson *et al.*, (2000).

With regard to the effect of C: R ratio, data in Table (5) clearly showed significant ($P<0.05$) higher total milk

Table (3): Average daily milk yield (g) of lactating ewes fed the tested rations:

Sampling time	Groups				Protein sources		R / C ratio	
	T_1	T_2	T_3	T_4	S_1	S_2	R_1	R_2
Week 2	577^c ±11	720^b ± 10	706^b ±10	926^a ±10	657^b	816^a	649^b	823^a
Week 4	683^c ±16	1022^b ±15	1012^b ±15	1088^a ±15	871^b	1050^a	866^b	1055^a
Week 6	688^c ±21	1028^b ±18	976^b ±18	1092^a ±18	877^b	1034^a	848^b	1060^a
Week 8	680^d ±16	1004^c ±14	892^b ±14	1070^a ±14	860^b	981^a	798^b	1037^a
Week 10	475^d ± 11	900^c ± 10	740^b ±10	1004^a ±10	711^b	872^a	622^b	952^a
Week 12	343^d ± 10	508^c ± 9	476^b ±9	912^a ±9	434^b	694^a	417^b	710^a
Overall mean	574^{cd}	864^{bc}	800^b	1015^a	735^b	908^a	700^b	940^a

a,b,c and d : Means in the same column or raw with different superscripts are significant ($P<0.05$).
T_1 (70% Alfalfa hay + 30% complete feed mixture1) -- T_2 (30% Alfalfa hay + 70% complete feed mixture1)
T_3 (70% Alfalfa hay + 30% complete feed mixture2) -- T_4 (30% Alfalfa hay + 70% complete feed mixture2)
S_1 (Linseed cake as a protein source in CFM1) -- S_2 (corn gluten as a protein source in CFM2)
R1 (30:70 concentrate: roughage ratio) -- R2 (70:30 concentrate: roughage ratio)

Table (4): Average daily milk fat yield (g) of lactating ewes fed the tested rations:

Sampling time	Groups				Protein sources		R / C ratio	
	T_1	T_2	T_3	T_4	S_1	S_2	R_1	R_2
Week 2	29.5^c ±2.9	39.1^{bc} ±2.7	37.3^{ab} ±2.7	45.2^a ±2.7	34.8^b	41.3^a	33.8^b	42.2^a
Week 4	38.3^b ±3.7	58.1^a ±3.3	52.1^a ±3.3	48.7^a ±3.3	49.3^a	50.4^a	46.0^b	53.4^a
Week 6	34.4^b ±2.8	53.4^a ±2.5	47.2^a ±2.5	48.6^a ±2.5	45.0^a	45.0^a	41.5^b	51.0^a
Week 8	32.9^c ±2.4	52.0^b ±2.2	41.2^a ±2.2	50.2^a ±2.2	43.5^a	45.7^a	37.5^b	51.1^a
Week 10	24.2^c ±2.3	47.0^b ±2.1	35.9^a ±2.1	51.7^a ±2.1	36.9^b	43.8^a	30.7^b	49.4^a
Week 12	18.1^c ±1.7	27.1^b ±1.5	25.5^b ±1.5	43.5^a ±1.5	23.1^b	34.5^a	22.2^b	35.3^a
Overall mean	29.6^c	46.1^a	39.9^b	48.0^a	38.8^a	43.4^a	35.2^b	47.1^a

a,b,c and d : Means in the same column or raw with different superscripts are significant ($P<0.05$).

protein (35.11 gm/h/d) for the 70C: 30R group, than of 30C: 70R group (26.04 gm/h/d). There results are in line with those obtained by El Serafy *et al.*, (1980) and El Badawi (1994).

The overall means of milk total protein yield for T1, T2, T3 and T4 were 21.32, 31.98, 29.82 and 38.24 gm/h/d respectively (Table 5). Differences among treatments were statistically significant (P<0.05). The present results are in good agreement with those of Constantin *et al.*, (1994) and Sevi *et al.*, (1998a).

Results of Table (6) indicated higher (P<0.05) milk lactose yield (49.16 gm/h/d) for ewes received corn gluten than those received linseed cake (38.87 gm/h/d), that agree with the finding of Wilkinson *et al.*, (2000).

Moreover, ewes offered rations of 70C: 30R had higher (P<0.05) production of milk lactose (50.95 gm/h/d) than those offered the 30C: 70R rations (36.88 gm/h/d) as shown in Table (6). El Serafy *et al.*, (1980) obtained the same effect.

Comparisons between the four experimental treatments (Table 6) showed that T4 recorded the highest (P<0.05) yield of milk lactose (56.12 gm/h/d) while T1 recorded the lowest one (30.45 gm/h/d). There results are in line with those reported by Sevi *et al.*, (1998b).

The present data (Table 7) clearly showed significant (P<0.05) higher milk total solids yield (132.74 gm/h/d) for ewes fed corn gluten ration than those fed linseed cake ration (109.07 gm/h/d). This finding is in good agreement with that obtained by Wilkinson *et al.*, (2000).

In addition, ewes received rations of 70C: 30R (Table 7) recorded significant (P<0.05) higher yield of milk total solids (138.56 gm/h/d) than those recorded in rations 30C: 70R (102.59 gm/h/d). El Serafy *et al.*, (1980) and El Badawi (1994) obtained the same conclusion.

Results of Table (7) showed also that T4 had the highest (P<0.05) value of milk total solids yield (148.60 gm/h/d), meanwhile T1 recorded the lowest value (84.76 gm/h/d). Differences between the four experimental groups were statistically significant (P<0.05). Constantine *et al.*, (1994) reported that as the level of protected protein increased in the ration, milk total solids yield significantly increased.

As shown in Table (8), ewes received corn gluten ration produced more (P<0.05) milk solids not fat (88.66 gm/h/d) than those received linseed cake ration (70.47 gm/h/d). Wilkinson *et al.*, (2000) obtained the same conclusion.

It is also shown (Table 8) that as the level of concentrates in the ration increased the yield of milk solids not fat yield significantly increased (91.64 as 67.15 gm/h/d). These results are in agreement with those recorded by El Serafy *et al.*, (1980) and El Badawi (1994). It is of interest to note (Table 8) that ewes received the T4 ration (corn gluten with 70C: 30R) recorded the two folds of the milk solids not fat yield obtained by ewes received the T1 ration (linseed cake with 30C: 70R) (100.59 as 50.02 gm/h/d).

The present results are in line with these of Constantin *et al.*, (1994) and Sevi *et al.*, (1998a) who found that protected protein in the ration affected positively (P<0.05) the solids not fat of milk during lactation period.

As shown in table (9) ewes fed on corn gluten ration recorded significant (P<0.05) higher value of milk ash yield (5.45 gm/h/d) than those fed linseed cake (4.40 gm/h/d). These results are in line with that obtained by Wilkinson *et al.*, (2000).

Data of table (9) show also that the high concentrate ration recorded

Table (5): Average daily milk protein yield (g) of lactating ewes fed the tested rations:

Sampling time	Groups				Protein sources		R / C ratio	
	T_1	T_2	T_3	T_4	S_1	S_2	R_1	R_2
Week 2	21.37^c ±0.68	26.78^b ±0.60	26.46^b ±0.60	35.00^a ±0.60	24.38^b	30.73^a	24.20^b	30.89^a
Week 4	24.95^c ±0.76	37.58^b ±0.68	37.18^b ±0.68	40.18^a ±0.68	31.97^b	38.68^a	31.74^b	38.88^a
Week 6	25.55^c ±0.92	38.36^b ±0.83	37.00^{ab} ±0.83	40.54^a ±0.83	32.67^b	38.77^a	31.91^b	39.45^a
Week 8	25.27^d ±0.68	36.76^c ±0.61	33.06^b ±0.61	40.78^a ±0.61	31.66^b	36.92^a	29.60^b	38.77^a
Week 10	17.83^d ±0.49	33.36^c ±0.44	27.56^b ±0.44	39.20^a ±0.44	26.46^b	33.38^a	23.23^b	36.28^a
Week 12	12.95^c ±0.80	19.04^b ±0.72	17.68^b ±0.72	33.72^a ±0.72	16.33^b	25.70^a	15.58^b	26.38^a
Overall mean	21.32^c	31.98^b	29.82^b	38.24^a	27.25^b	34.03^a	26.04^b	35.11^a

a,b,c and d : Means in the same column or raw with different superscripts are significant (P<0.05).

Table (6): Average daily milk lactose yield (g) of lactating ewes fed the tested rations:

Sampling time	Groups				Protein sources		R / C ratio	
	T_1	T_2	T_3	T_4	S_1	S_2	R_1	R_2
Week 2	29.13^b ±3.84	37.44^b ±3.43	34.82^b ±3.43	49.04^a ±3.43	33.74^b	41.93^a	32.29^b	43.24^a
Week 4	34.68^c ±2.19	54.86^b ±1.96	54.48^b ±1.96	62.94^a ±1.96	45.89^b	58.71^a	45.68^b	58.90^a
Week 6	36.73^c ±4.66	56.22^{bc} ±4.17	47.84^{ab} ±4.17	64.42^a ±4.17	47.56^b	56.13^b	42.90^b	60.32^a
Week 8	37.58^c ±2.82	53.18^b ±2.52	49.02^b ±2.52	61.34^a ±2.52	46.24^b	55.18^a	43.93^b	57.26^a
Week 10	26.13^d ±1.86	46.26^c ±1.66	40.44^b ±1.66	54.94^a ±1.66	37.31^b	47.69^a	34.08^b	50.60^a
Week 12	18.43^b ±2.99	25.74^b ±2.68	25.54^b ±2.68	45.02^a ±2.68	22.49^b	35.29^a	22.38^b	35.38^a
Overall mean	30.45^c	45.62^b	42.02^b	56.12^a	38.87^b	49.16^a	36.88^b	50.95^a

a,b,c and d : Means in the same column or raw with different superscripts are significant (P<0.05).

Table (7): Average daily milk total solids yield (g) of lactating ewes fed the tested rations:

Sampling time	Groups				Protein sources		R / C ratio	
	T_1	T_2	T_3	T_4	S_1	S_2	R_1	R_2
Week 2	83.45[c] ± 5.46	105.42[b] ± 4.88	105.04[b] ± 4.88	134.78[a] ± 4.88	95.66[b]	119.91[a]	95.44[b]	120.10[a]
Week 4	102.03[b] ± 4.61	156.66[a] ± 4.12	149.78[a] ± 4.12	158.38[a] ± 4.12	132.38[b]	154.08[a]	128.56[b]	157.52[a]
Week 6	100.80[c] ± 5.11	154.10[b] ± 4.57	137.86[a] ± 4.57	160.20[a] ± 4.57	130.41[b]	149.03[a]	121.39[b]	157.15[a]
Week 8	99.75[d] ± 2.77	147.90[c] ± 2.47	128.64[b] ± 2.47	158.70[a] ± 2.47	126.50[b]	143.67[a]	115.80[b]	153.30[a]
Week 10	71.00[d] ± 2.44	132.04[c] ± 2.18	108.36[b] ± 2.18	151.90[a] ± 2.18	104.91[b]	130.13[a]	91.76[b]	141.97[a]
Week 12	51.53[c] ± 4.19	74.96[b] ± 3.76	71.54[b] ± 3.76	127.66[a] ± 3.76	64.54[b]	99.60[a]	62.64[b]	101.31[a]
Overall mean	84.76[cd]	128.51[bc]	116.93[bc]	148.60[a]	109.07[b]	132.74[a]	102.59[b]	138.56[a]

a,b,c and d : Means in the same column or raw with different superscripts are significant (P<0.05).

Table (8): Average daily milk solids not fat yield (g) of lactating ewes fed the tested rations:

Sampling time	Groups				Protein sources		R / C ratio	
	T_1	T_2	T_3	T_4	S_1	S_2	R_1	R_2
Week 2	53.95[c] ±3.77	68.14[b] ±3.37	65.94[b] ±3.37	89.56[a] ±3.37	61.83[b]	77.75[a]	60.61[b]	78.85[a]
Week 4	63.68[c] ±2.55	98.54[b] ±2.28	97.70[b] ±2.28	109.60[a] ±2.28	83.04[b]	103.65[a]	82.58[b]	104.07[a]
Week 6	66.38[c] ±4.74	100.70[b] ±4.24	90.68[ab] ±4.24	111.50[a] ±4.24	85.44[b]	101.09[a]	79.88[b]	106.10[a]
Week 8	66.90[c] ±3.25	95.96[b] ±2.91	87.46[b] ±2.91	108.54[a] ±2.91	83.04[b]	98.00[a]	78.32[b]	102.25[a]
Week 10	46.80[d] ±1.96	85.00[c] ±1.75	72.46[b] ±1.75	100.16[a] ±1.75	68.02[b]	86.31[a]	61.06[b]	92.58[a]
Week 12	33.40[c] ±3.67	47.84[b] ±3.29	46.08[b] ±3.29	84.18[a] ±3.29	41.42[b]	65.13[a]	40.44[b]	66.01[a]
Overall mean	50.02[c]	82.69[bc]	76.72[b]	100.59[a]	70.47[b]	88.66[a]	67.15[b]	91.64[a]

a,b,c and d : Means in the same column or raw with different superscripts are significant (P<0.05).

Table (9): Average daily milk ash yield (g) of lactating ewes fed the tested rations:

Sampling time	Groups				Protein sources		R / C ratio	
	T_1	T_2	T_3	T_4	S_1	S_2	R_1	R_2
Week 2	3.45^{c} ±0.07	4.30^{b} ±0.06	4.24^{b} ±0.06	5.52^{a} ±0.06	3.92^{b}	4.88^{a}	3.89^{b}	4.91^{a}
Week 4	4.08^{c} ±0.10	6.12^{b} ±0.09	6.08^{b} ±0.09	6.52^{a} ±0.09	5.21^{b}	6.30^{a}	5.19^{b}	6.32^{a}
Week 6	4.13^{c} ±0.11	6.10^{b} ±0.10	5.82^{b} ±0.10	6.62^{a} ±0.10	5.22^{b}	6.22^{a}	5.07^{b}	6.26^{a}
Week 8	4.08^{d} ±0.09	6.02^{c} ±0.09	5.36^{b} ±0.09	6.38^{a} ±0.09	5.16^{b}	5.87^{a}	4.79^{b}	6.20^{a}
Week 10	2.88^{d} ±0.07	5.40^{c} ±0.07	4.50^{b} ±0.07	6.04^{a} ±0.07	4.28^{b}	5.27^{a}	3.78^{b}	5.72^{a}
Week 12	2.05^{d} ±0.06	3.06^{c} ±0.06	2.84^{b} ±0.06	5.48^{a} ±0.06	2.61^{b}	4.16^{a}	2.49^{b}	4.27^{a}
Overall mean	3.45^{d}	5.17^{c}	4.81^{b}	6.09^{a}	4.40^{b}	5.45^{a}	5.20^{b}	5.61^{a}

a,b,c and d : Means in the same column or raw with different superscripts are significant ($P<0.05$).

Table (10): Changing in body weight of lambs (birth to weaning weight) kg:

Weeks	Groups				Protein source		R / C ratio	
	T_1	T_2	T_3	T_4	S_1	S_2	R_1	R_2
Weight 1	2.72^{a} ±0.35	3.85^{a} ±0.35	3.91^{a} ±0.35	4.07^{a} ±0.35	3.39^{a}	3.87^{a}	3.36^{a}	3.99^{a}
Weight 2	3.82^{ab} ±0.58	5.17^{bc} ±0.58	5.25^{ac} ±0.58	5.64^{a} ±0.58	4.73^{a}	5.20^{a}	4.59^{a}	5.44^{a}
Weight 3	4.76^{a} ±0.74	6.19^{a} ±0.74	6.28^{a} ±0.74	6.68^{a} ±0.74	5.73^{a}	6.23^{a}	5.58^{a}	6.48^{a}
Weight 4	5.74^{a} ±0.87	7.32^{a} ±0.87	7.32^{a} ±0.87	7.95^{a} ±0.87	6.84^{a}	7.32^{a}	6.64^{a}	7.64^{a}
Weight 5	6.67^{c} ±1.09	8.20^{c} ±1.09	8.37^{b} ±1.09	9.44^{a} ±1.09	8.05^{a}	8.36^{a}	7.54^{b}	9.00^{a}
Weight 6	8.14^{c} ±1.24	9.38^{c} ±1.24	9.81^{b} ±1.24	10.72^{a} ±1.24	9.43^{b}	9.56^{a}	8.85^{b}	10.26^{a}
Weight 7	9.27^{c} ±1.41	10.50^{c} ±1.41	11.50^{b} ±1.41	11.94^{a} ±1.41	10.60^{b}	10.93^{a}	9.97^{b}	11.72^{a}
Weight 8	10.17^{c} ±1.56	11.53^{c} ±1.56	13.48^{b} ±1.56	13.88^{a} ±1.56	12.03^{b}	12.36^{a}	10.94^{b}	13.68^{a}
Weight 9	11.40^{d} ±0.23	12.31^{c} ±0.23	13.21^{b} ±0.23	15.45^{a} ±0.23	11.85^{b}	14.17^{a}	12.43^{b}	13.87^{a}
Weight 10	12.38^{d} ±0.23	13.42^{c} ±0.23	15.86^{b} ±0.23	17.10^{a} ±0.23	12.89^{b}	16.39^{a}	14.37^{b}	15.26^{a}
Weight 11	13.69^{d} ±0.23	14.54^{c} ±0.23	16.76^{b} ±0.23	18.70^{a} ±0.23	14.11^{b}	17.60^{a}	15.45^{b}	16.62^{a}
Overall mean	8.07^{d}	9.31^{c}	1016^{b}	11.05^{a}	9.06^{b}	10.18^{a}	9.07^{b}	10.36^{a}

significant (P<0.05) higher value of milk ash yield (5.61 gm/h/d) than that of the low concentrate (5.20 gm/h/d). Similar conclusions were obtained by El Serafy *et al.*, (1980) and El Badawi (1994).

It is also shown that the T4 recorded the highest (P<0.05) value of milk ash yield (6.09 gm/h/d) whereas T1 recorded the lowest one (3.45 gm/h/d). Differences between the four experimental treatments were statistically significant. These results are in agreement with those reported by Constantin *et al.*, (1994) and Sevi *et al.*, (1998a).

Mean values of lambs' birth weight and during suckling till weaning are shown in Table (10). It seems from the data in table to that plan of nutrition for dams had affected the birth weight of their lambs. Moreover, suckling and weaning weight of lambs from dams received corn gluten were higher (P<0.05) than those received linseed cake (Table 10). These results are in good agreement with those obtained by Mastika *et al.*, (1994), Mekic *et al.*, (1997), Dean *et al.*, (1999) and Hegarty *et al.*, (1999).

Also there are significant differences (P<0.05) among weights gain along with the suckling period till weaning and that might be due to the differences in milk components and its quantity.

With regard to the effect of C: R ratio on birth weights of lambs, high concentrate rations gave higher birth weights of lambs than low concentrate rations. It seems that the concentrate ratio affected milk components and both quantity and quality, which led to high effect on birth weights of lambs till weaning. These results are in good agreement with those obtained by Aly *et al.*, (1982), El Serafy *et al.*, (1982) and Reddy and Raghavan (1988).

Comparison between the four experimental treatments, T4 recorded the highest (P<0.05) birth weight and weaning weight followed by T3, T2 and then T1, which recorded the lowest (P<0.05) values.

It could be concluded that the increased of live body weight was parallel with the increase in protected protein intake and the concentrate portions in the experimental rations. Lynch *et al.*, (1991), Mercik *et al.*, (1992), Shaker *et al.*, (1998) and Chiafala *et al.*, (1999) obtained similar results.

CONCLUSION

Corn gluten as a natural protected protein sources could be used successfully as a partial replacement from the protein in the ration of lactating ewes to improve nutrients digestibility and nutritive value of rations containing different C: R ratios without any adverse effects on animal performance or health.

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تأثير البروتين المحمى طبيعيا على كمية اللبن ومكوناته فى الأغنام.

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تم إجراء تجربة على نعاج الفنلندي من قبل موسم التلقيح وحتى فطام حملانها وقد تم استخدام أربع علائق تجريبية مختلفة في نسبة المركز إلى الخشن مع كسب كتان او جلوتين ذرة كمصادر للبروتين في العليقة وتم التغذية على الأربعة علائق عشوائيا وكان نظام العلائق ، الاولى ٣٠% من مخلوط علف مركز يحتوى على كسب كتان كمصدر للبروتين و٧٠% مادة خشنة (دريس) والثانية ٧٠% من مخلوط علف مركز يحتوى على كسب كتان كمصدر للبروتين و٣٠% مادة خشنة (دريس) والثالثة ٣٠% من مخلوط علف مركز يحتوى على جلوتين أذرة كمصدر للبروتين و٧٠% مادة خشنة (دريس) والرابعة ٧٠% من مخلوط علف مركز يحتوى على جلوتين أذرة كمصدر للبروتين و٣٠% مادة خشنة (دريس).

وقد تم استخدم ٢٠ نعجة فنلندي ناضجة ، وقد قسمت فيها الأمهات إلى ٤ مجاميع عشوائية في كل مجموعة ٥ نعاج و تم قياس محصول اللبن للمجاميع وكذلك تم اخذ عينات لتحديد مكونات اللبن المختلفة ، كما تم قياس معدلات الزيادة الوزنية للحملان من الميلاد وحتى الفطام.

ودلت النتائج على ان الفروق بين المجموعات الأربعة معنوية ولكن التغذية على ٧٠% مركز مع استبدال جزء من بروتين العليقة ببروتين جلوتين ذرة مع ٣٠% دريس (المجموعة الرابعة) أعطت أعلى معدل لانتاج اللبن طول موسم الحليب واقلهم في الإنتاج المجموعة الأولى غير المحتوية على جلوتين أذرة وترتفع فيها نسبة المادة الخشنة.

كما وجد أن مكونات اللبن للمجموعة الرابعة أعطت أعلى معدل وكانت تزيد معنويا عن باقي المجاميع واقلهم كانت المجموعة الأولى وذلك بالنسبة لمحصول جميع المكونات (البروتين ، اللاكتوز ، المواد الصلبة الكلية ، المواد الصلبة الغير دهنية ، الرماد) ما عدا الدهن حيث انه في أول موسم الحليب كان إنتاج الدهن يأخذ اتجاه عكسي مع كمية إنتاج اللبن وفى نهاية الموسم يأخذ نفس اتجاه إنتاج اللبن والمكونات الأخرى.

ووجد أن وزن الميلاد لحملان المجموعة الرابعة سجل أعلى معدل للزيادة الوزنية عن باقى المجاميع ، حتى وزن الفطام للحملان وكانت تزيد معنويا عن باقي المجاميع وكانت اقلهم المجموعة الأولى.

من النتائج السابقة يمكن استخلاص إمكانية استخدام مصدر للبروتين المحمى طبيعيا مثل جلوتين الذرة لرفع القيمة الغذائية للعليقة مع اختلاف نسبة العليقة المركزة إلى الخشنة وكذلك توفير احتياجات الحيوانات أثناء فترات معينة من حياته الإنتاجية بدون حدوث تأثير غير مرغوب على صحة الحيوان وانتاجه.